PRODUCT SELECTION GUIDES

TECHNICAL INFORMATION

WHERE TO FIND THEM IN THE 1999 EDITION OF EEM

Batteries, Product Selection Guide **D•1313**

Cabinets, Enclosures, Racks & Chassis, Product Selection Guide **C•1003**

Capacitors, Product Selection Guide **A•1003**

Coils, Chokes, Inductors, Product Selection Guide **A•1153**

Connectors & Sockets, Product Selection Guide **C•1127**

Cores, Magnets & Ferrites **A•1349**

Crystals, Oscillators, Crystal & Piezoelectric Filters, Product Selection Guide **A•1365**

Data Acquisition/Handling Systems & Accessories **D•1139**

DC-DC Converters **D•1879**

Delay Lines, Product SelectionGuide **A•1545**

Discrete Semiconductors, Product Selection Guide **A•2049**

Displays, Readouts, & CRTs, Product Selection Guide **B•1006**

Fans, Blowers, Cooling Equipment, & Heat Exchangers, Product Selection Guide **C•1470**

Fiber Optics, Product Selection Guide **B•1163**

Filters, Power, Product Selection Guide **A•1577**

Filters, Signal, Product Selection Guide **A•1615**

Instruments, Test & Measuring, Product Selection Guide **D•1178**

Keyboards, Keypads & Membrane Switches, Product Selection Guide **B•1613**

Lamps, Lights, & Indicators, Product Selection Guide **B•1089**

LAN Products **B•1002**

Microwave Components, Product Selection Guide **A•1671**

Motors, Drives, & Rotating Components, Product Selection Guide **B•1169**

Oscilloscopes, Product Selection Guide **D•1309**

Panel Hardware, Product Selection Guide **C•1446**

Panel Meters, Analog & Digital, Product Selection Guide **D•1273**

Potentiometers, Trimmers, Controls, & Rheostats, Product Selection Guide **A•2010**

Power Supplies, AC, Product Selection Guide **D•2147**

Power Supplies, DC, Product Selection Guide **D•1379**

Protective Components (Fuses, Circuit Breakers, etc.) Product Selection Guide **B•1231**

Relays, Product Selection Guide **B•1285**

Resistors, Product Selection Guide **A•1857**

Solenoids, Product Selection Guide **B•1450**

Switches, Product Selection Guide **B•1467**

Terminal Blocks **C•1383**

Test Accessories **D•1270**

Thermal Components, Product Selection Guide **B•1667**

Transducers & Encoders, Product Selection Guide **B•1736**

Transformers, Product Selection Guide **A•2079**

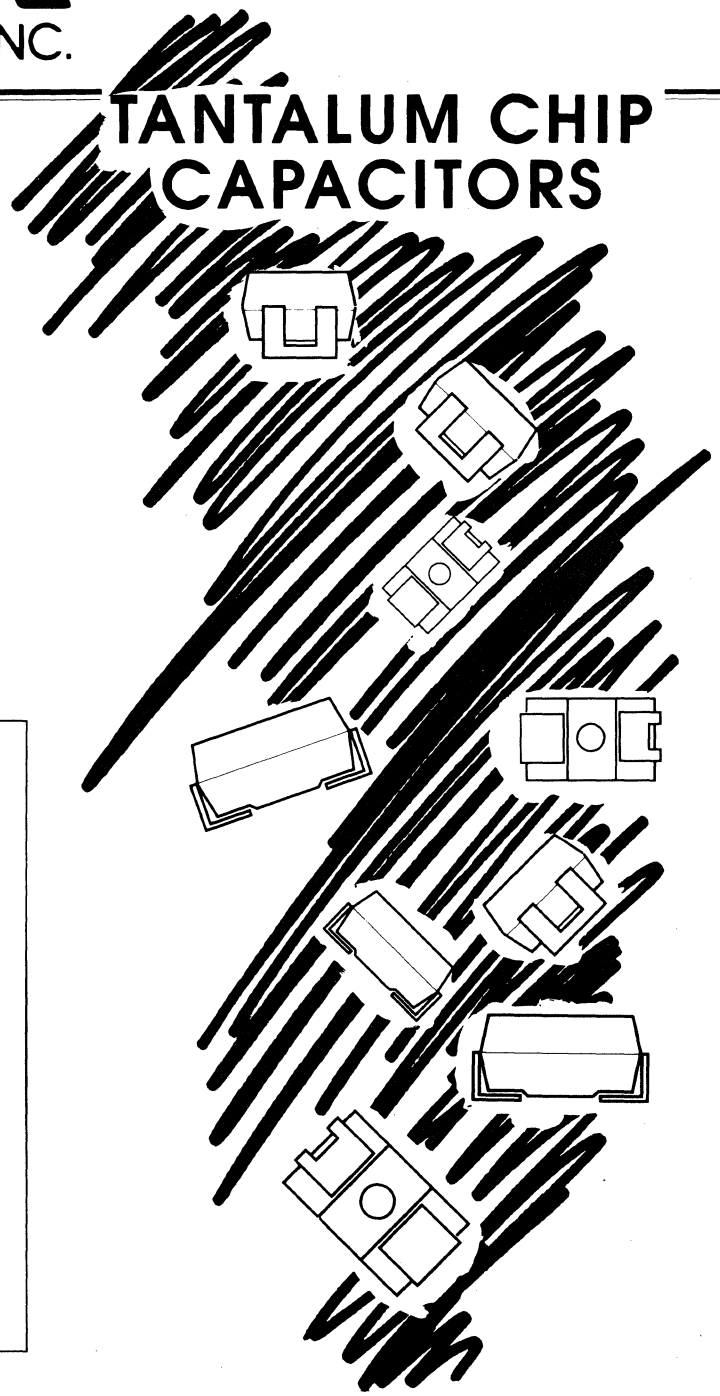
Wire & Cable, Product Selection Guide **C•1581**

KOA SPEER ELECTRONICS, INC.

"Dedicated to Quality and Service"

TANTALUM CHIP CAPACITORS

TMC Series of molded tantalum chip capacitors offers an extensive range of values in EIA—U.S. and EIA—Japan compatible sizes. By design, strict process control, and a commitment to provide the most reliable product in the industry, the TMC has passed our customers' most severe humidity/temperature/pressure induced life stress testing. For surface mount applications, the space saving, highly reliable TMC is the most ideal tantalum chip capacitor.



*For additional information or application data see us in section 1500 page **A•1074** and Section 1800 page **A•1232** or contact:*

KOA Speer Electronics Application Engineering.

Other KOA Speer Products:

See our Data Sheets in Section 4700
Pages **A**•1915 - **A**•1921

SMT - Resistors (General Purpose & Precision)
SMT - Resistor Trimmers
SMT - Resistor Networks
SMT - Melf Resistors
SMT - Inductors
Carbon Film Resistors
Metal Film Resistors
SIP R - Networks
Metal Oxide (Power Resistors)

KOA SPEER ELECTRONICS, INC.
P.O. Box 547
Bradford, PA 16701

Telephone General Office
1-800-450-0573

CAPACITORS, FIXED, ELECTROLYTIC

Manufacturer	Starting EEM Page No.	Aluminum	Tantalum
AVX Corporation	A•1014		√*
CGE-USA	A•1016	√	
Cornell Dubilier	A•1036	√	
Dearborn Electronics	A•1040		√*
Illinois Capacitor, Inc.	A•1064	√	
Kemet Electronics Corp.	A•1072		√§*
KOA Speer Electronics	A•1074		√§
Mallory-Duracap International	A•1080	√	
Matsuo Electronics	A•1081		√
NEC Electronics	A•1104		√
Paccom Electronics	A•1114	√§	√§
RFE International Inc.	A•1120	√§	√§
Samsung Electro-Mechanics	A•1123	√	√
Sanyo Video Components	A•1126	√	√
Seacor Inc.	A•1129	√	
United Chemi-Con, Inc.	A•1139	√§	√§
Vishay Dale Electronics	A•1144	√*	√*

* MIL Spec. § Surface Mount.

CAPACITORS, FIXED, ELECTROSTATIC

Manufacturer	Starting EEM Page No.	Disc/ Tubular	Monolithic	Film/ Foil	Mica	Paper	AC Motor Start	Chip	Energy Storage	Air	Feed-Thru	Glass	Lab Std.	Oil Filled	Porcelain	Vacuum
American Technical Ceramics	A•1008		√*	√				√§*			√*				√*	
AVX Corporation	A•1014	√	√*					√§*			√*	√*				
Bourns, Inc	A•1015							√§								
CGE-USA	A•1016			√			√									
Chicago Condenser Corp.	A•1103			√*		√*			√*		√*			√*		
Component Research Co., Inc.	A•1018			√*		√	√*		√*		√*		√*	√*		
Condenser Products	A•1035			√*		√*	√		√*					√*		
Cornell Dubilier	A•1036			√	√		√							√		
Dearborn Electronics	A•1040			√*		√*	√*		√*		√*			√*		
Dielectric Laboratories	A•1044	√						√§							√	
Electrocube	A•1047			√			√				√					
Electronic Concepts	A•1048			√*			√		√		√					
Electronic Film Capacitors Inc.	A•1056			√			√									
High Energy Corporation	A•1058	√					√		√		√					
Illinois Capacitor. Inc.	A•1064	√		√			√		√							
InterTechnical Group Inc. (WIMA)	A•1066			√			√	√§								
ITW Paktron	A•1068			√				√§								
Jennings Technology Corp.	A•1069											√*				√*
Johanson Dielectrics, Inc.	A•1070		√§*					√§*							√*	
Kemet Electronics Corp.	A•1072	√*	√§*					√§*								

* MIL Spec. § Surface Mount.

CAPACITORS, FIXED, ELECTROSTATIC (cont'd.)

Manufacturer	Starting EEM Page No.	Ceramic					AC Motor Start	Chip	Energy Storage	Air	Feed-Thru	Glass	Lab Std.	Oil Filled	Porcelain	Vacuum
		Disc/ Tubular	Monolithic	Film/ Foil	Mica	Paper										
LCR Electronics	A•1076			√			√									
Maida Development Corporation	A•1077	√*														
Matsuo Electronics	A•1081							√§								
Maxwell Energy Products	A•1088								√*	√						
Metuchen Capacitors Inc.	A•1092	√*	√*					√§*			√*					
MTK Electronics, Inc.	A•1099										√					
Motor Capacitors, Inc.	A•1100			√*		√*	√*		√*		√*			√*		
NEC Electronics	A•1104							√§*								
Nissei-Arcotronics	A•1106			√		√	√	√§	√		√			√		
Novacap	A•1108	√	√	√				√§	√		√					
Okaya Electric America Inc.	A•1110			√												
Oren Elliott Products, Inc.	A•1113									√						
Paccom Electronics	A•1114	√		√				√§	√							
Pilkor Electronics Ltd.	A•1118			√			√	√§	√							
Presidio Components	A•1119		√§*					√§*							√	
RFE International Inc.	A•1120	√		√				√§								
RFI Corporation	A•1122	√		√*	√	√*	√		√		√*			√*		
Samsung Electro-Mechanics	A•1123	√						√§								
SB Electronics	A•1128			√					√		√					
Seacor Inc.	A•1129			√		√	√		√		√			√		
SEI Capacitors	A•1102			√		√	√				√			√		
Sprague Goodman Electronics	A•1134							√§								
Taiyo Yuden (USA) Inc.	A•1137	√						√§								
Tusonix	A•1136	√*	√*								√*					
United Chemi-Con, Inc.	A•1139	√§	√§	√				√§	√							
Vishay Dale Electronics	A•1144	√*	√*	√*		√*	√*	√§	√		√*					
Wesco Electrical Company	A•1148			√*			√		√*		√		√			
World Products, Inc.	A•1151			√												

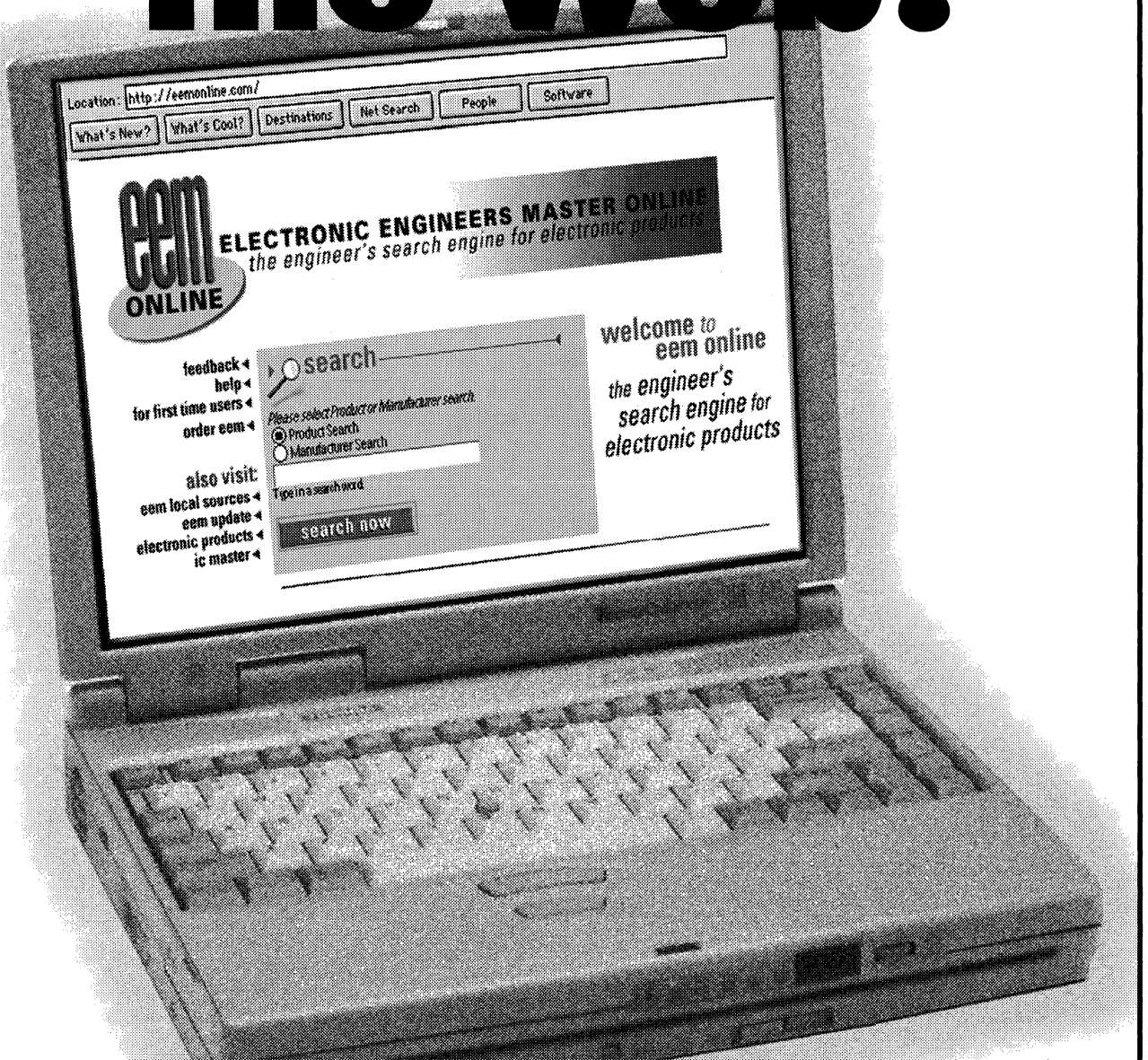
* MIL Spec. § Surface Mount.

CAPACITORS, VARIABLE

Manufacturer	Starting EEM Page No.	Air	Ceramic	Film/ Foil	Glass	Mica	Quartz	Sapphire	Vacuum	Gas Filled	HV Lab Type	Padders & Trimmers
AVX Corporation	A•1014		√									
Jennings Technology Corp.	A•1069		√*		√*				√*	√*	√*	
Johanson Dielectrics, Inc.	A•1070		√									
Johanson Mfg. Corp.	A•1071	√§*	√§*		√§*							√§*
Oren Elliott Products, Inc.	A•1113	√								√		√
RFI Corporation	A•1122										√	
Sprague Goodman Electronics	A•1134	√§	√§	√	√§*	√	√*	√§				√*
Tusonix	A•1136		√*									√*
Voltronics Corp.	A•1143	√§*	√*		√§*						√*	√*

* MIL Spec. § Surface Mount.

EEM is on the Web!



http://eemonline.com

Hearst Business Communications, Inc./UTP Division
645 Stewart Avenue, Garden City, NY 11530 • Tel: 516.227.1300 • FAX: 516.227.1901

ATC Multilayer High Performance Capacitors

100 A SERIES PORCELAIN SUPERCHIP® MLCs

QUIK-PICK

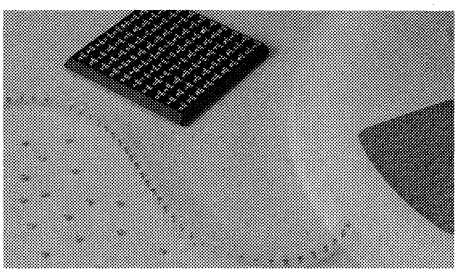
FUNCTIONAL APPLICATIONS:
Bypass, Coupling, Tuning, Feedback, Impedance Matching and D.C. Blocking

CIRCUIT APPLICATIONS:
Microwave RF/IF Amplifiers, Mixers, Oscillators, Low Noise Amplifiers, Filter Networks, Timing Circuits, Delay Lines and Medical Equipment

ELECTRICAL CHARACTERISTICS:
- Capacitance Range: 0.1 pF to 100 pF
- High Q >10,000 @ 1 MHz
- Rated Voltage: 150 WVDC
- T.C. +90 ±20 PPM/°C (-55°C to +125°C)

MECHANICAL DIMENSIONS:
- .055" x .055" (1.4 mm x 1.4 mm) Case Size

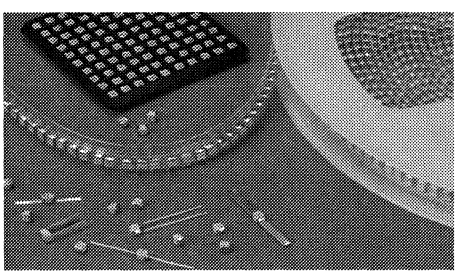
FEATURES:
- Improved low ESR/ESL Performance
- ATC's high self-resonance MLC



FOR 100 A DATA SHEET FAX-BACK, CALL (516) 622-4884 AND ENTER 901

100 B SERIES PORCELAIN SUPERCHIP® MLCs

QUIK-PICK



FOR 100 B DATA SHEET FAX-BACK, CALL (516) 622-4884 AND ENTER 902

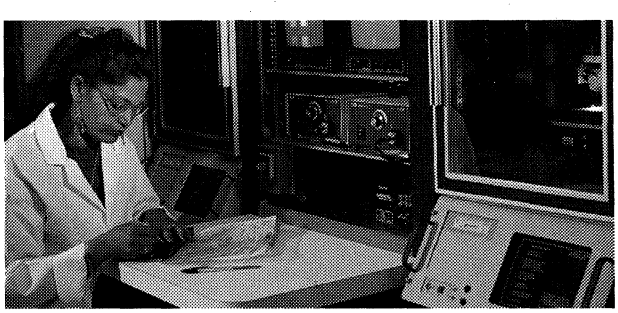
FUNCTIONAL APPLICATIONS:
Bypass, Coupling, Tuning, Feedback, Impedance Matching and D.C. Blocking

CIRCUIT APPLICATIONS:
UHF/Microwave RF Power Amplifiers, Mixers, Oscillators, Low Noise Amplifiers, Filter Networks, Timing Circuits and Delay Lines, MRI Coils and Medical Equipment

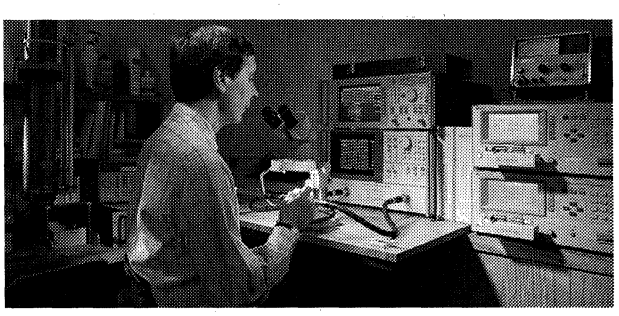
ELECTRICAL CHARACTERISTICS:
- Capacitance Range: 0.1 pF to 1000 pF
- High Q >10,000 @ 1 MHz
- Rated Voltage: up to 500 WVDC
- T.C. +90 ±20 PPM/°C (-55°C to +125°C)
  +90 ±30 PPM/°C (+125°C to +175°C)

MECHANICAL DIMENSIONS:
- .110" x .110" (2.79 mm x 2.79 mm) Case Size

FEATURES:
- Improved low ESR/ESL Performance
- Extended operating temperatures up to +175°C.



Laser Marking



RF/Microwave Test and Measurement Facility

All products with the QUIK-PICK symbol are available for shipment in 48 hours, in selected values and tolerances.

FOR ATC SALES DEPARTMENT, CALL DIRECT: 1-800-370-6858

American Technical Ceramics • One Norden Lane, Huntington Station, N.Y. 11746-2142
fax (516) 622-4748 • e-mail: sales@atceramics.com • http://www.atceramics.com

ATC Multilayer High Performance Capacitors

180 R SERIES NPO PORCELAIN ULTRA-LOW ESR MLCs

QUIK-PICK

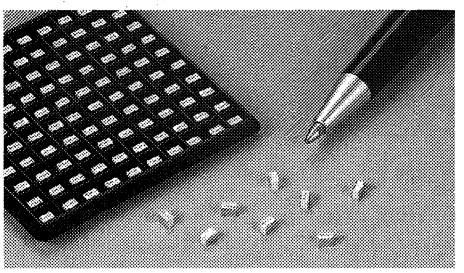
FUNCTIONAL APPLICATIONS:
Bypass, Coupling, Tuning, Feedback, Impedance Matching and D.C. Blocking

CIRCUIT APPLICATIONS:
RF Power Amplifiers, Filters, Oscillators, Timing Circuits and Delay Lines, MRI Coils and Medical Equipment

ELECTRICAL CHARACTERISTICS:
- Capacitance Range: 0.5 pF to 100 pF
- High Q >10,000 @ 1 MHz
- Rated Voltage: 500 WVDC
- T.C. 0 ±30 PPM/°C (-55°C to +125°C); 0 ±60 PPM/°C (+125°C to +175°C)

MECHANICAL DIMENSIONS:
- .070" x .105" (1.78 mm x 2.67 mm) Case Size

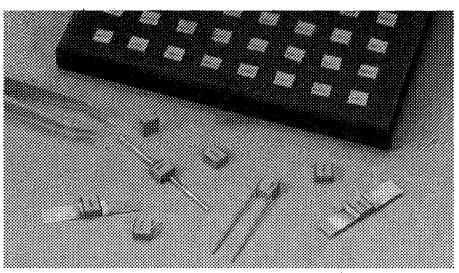
FEATURES:
- ATC's lowest ESR capacitor
- ATC's highest self-resonance MLC



FOR 180 R DATA SHEET FAX-BACK, CALL (516) 622-4884 AND ENTER 905

NEW 100 C SERIES PORCELAIN HIGH RF POWER MLCs

QUIK-PICK



FOR 100 C DATA SHEET FAX-BACK, CALL (516) 622-4884 AND ENTER 903

FUNCTIONAL APPLICATIONS:
Bypass, Coupling, Tuning, Impedance Matching and D.C. Blocking

CIRCUIT APPLICATIONS:
VHF/UHF RF Power Amplifiers, Antenna Tuning, Plasma Chambers, MRI Coils and Medical Equipment

ELECTRICAL CHARACTERISTICS:
- Capacitance Range: 1 pF to 2700 pF
- High Q >10,000 (1.0 pF to 1000 pF) @ 1 MHz; >10,000 (1100 pF to 2700 pF) @ 1 KHz
- Rated Voltage: up to 2500 WVDC
- T.C. +90 ±30 PPM/°C (-55°C to +125°C)

MECHANICAL DIMENSIONS:
- .250" x .250" (6.35 mm x 6.35 mm) Case Size

FEATURES:
- Improved low ESR/ESL Performance
- Ultra-stable under high RF current and voltage applications

100 E SERIES PORCELAIN HIGH RF POWER MLCs

QUIK-PICK

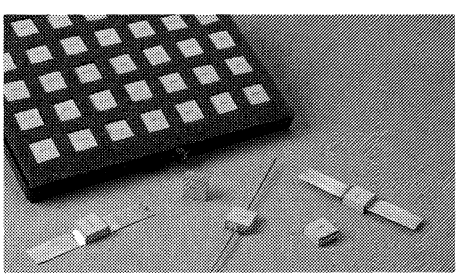
FUNCTIONAL APPLICATIONS:
Bypass, Coupling, Tuning, Impedance Matching and D.C. Blocking

CIRCUIT APPLICATIONS:
HF/RF Power Amplifiers, Transmitters, Antenna Tuning, Plasma Chambers, MRI Coils and Medical Equipment

ELECTRICAL CHARACTERISTICS:
- Capacitance Range: 1 pF to 5100 pF
- High Q >10,000 (1 pF to 1000 pF) @ 1 MHz; > 10,000 (1100 pF to 5100 pF) @ 1 KHz
- Rated Voltage: up to 7200 WVDC
- T.C. +90 ±30 PPM/°C (-55°C to +125°C)

MECHANICAL DIMENSIONS:
- .380" x .380" (9.65 mm x 9.65 mm) Case Size

FEATURES:
- Improved low ESR/ESL Performance
- High RF Current/Voltage



FOR 100 E DATA SHEET FAX-BACK, CALL (516) 622-4884 AND ENTER 904

FOR ATC SALES DEPARTMENT, CALL DIRECT: 1-800-370-6858

American Technical Ceramics • One Norden Lane, Huntington Station, N.Y. 11746-2142
fax (516) 622-4748 • e-mail: sales@atceramics.com • http://www.atceramics.com

ATC Multilayer High Performance Capacitors

700 A SERIES NPO PORCELAIN AND CERAMIC MLCs

QUIK-PICK

FUNCTIONAL APPLICATIONS:

Bypass, Coupling, Tuning and D.C. Blocking

CIRCUIT APPLICATIONS:

Filter Networks, Oscillators, Timing Circuits, Small Signal RF Amplifiers and Medical Equipment

ELECTRICAL CHARACTERISTICS:

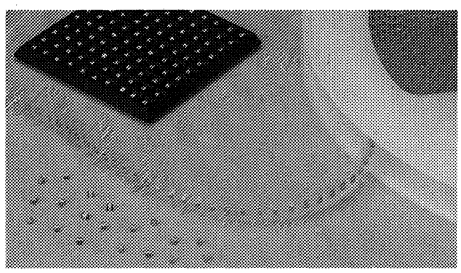
- Capacitance Range: 0.1 pF to 1000 pF
- Q >10,000 (0.1 pF to 100 pF) @ 1 MHz; >2,000 (110 pF to 1000 pF) @ 1 MHz
- Rated Voltage: up to 150 WVDC
- T.C. 0 ±30 PPM/°C (-55°C to +125°C)

MECHANICAL DIMENSIONS:

- .055" x .055" (1.4 mm x 1.4 mm) Case Size

FEATURES:

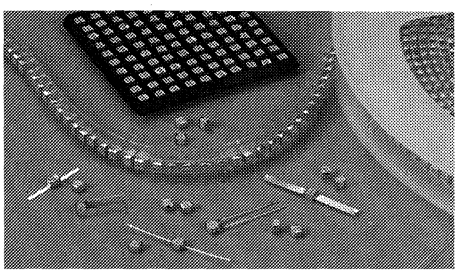
- Improved low ESR/ESL Performance
- Excellent performance over a broad range of RF and microwave applications requiring minimum drift



FOR 700 A DATA SHEET FAX-BACK, CALL (516) 622-4884 AND ENTER 908

700 B SERIES NPO PORCELAIN AND CERAMIC MLCs

QUIK-PICK



FOR 700 B DATA SHEET FAX-BACK, CALL (516) 622-4884 AND ENTER 909

FUNCTIONAL APPLICATIONS:

Bypass, Coupling, Tuning and D.C. Blocking

CIRCUIT APPLICATIONS:

Filter Networks, Oscillators, Timing Circuits, RF Power Amplifiers and Medical Equipment

ELECTRICAL CHARACTERISTICS:

- Capacitance Range: 0.1 pF to 5100 pF
- Q >10,000 (0.1 pF to 200 pF) @ 1 MHz; >2,000 (220 pF to 1000 pF) @ 1 MHz >2,000 (1100 pF to 5100 pF) @ 1 KHz.
- Rated Voltage: up to 500 WVDC
- T.C. 0 ±30 PPM/°C (-55°C to +125°C)

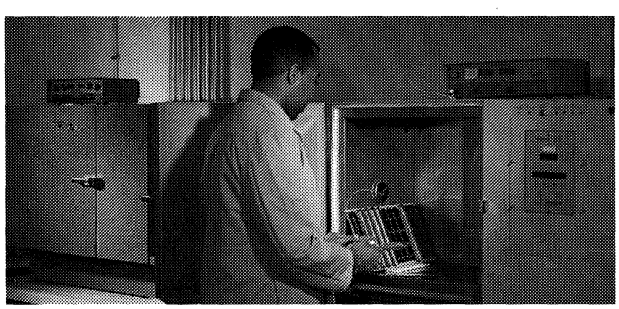
MECHANICAL DIMENSIONS:

- .110" x .110" (2.79 mm x 2.79 mm) Case Size

FEATURES:

- Improved low ESR/ESL Performance
- Excellent performance over a broad range of RF and microwave applications requiring minimum drift, including RF Power

Government approved Hi-rel Test Lab: Burn-in Chambers



Humidity Chambers

FOR ATC SALES DEPARTMENT, CALL DIRECT: 1-800-370-6858

American Technical Ceramics • One Norden Lane, Huntington Station, N.Y. 11746-2142
fax (516) 622-4748 • e-mail: sales@atceramics.com • http://www.atceramics.com

ATC Multilayer High Performance Capacitors

200 A SERIES BX CERAMIC MLCs

QUIK-PICK

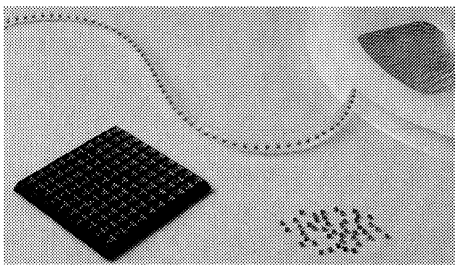
FUNCTIONAL APPLICATIONS:
Bypass, Coupling and D.C. Blocking

CIRCUIT APPLICATIONS:
Switching Power Supplies, Broadband Coupling and Small Signal Amplifiers

ELECTRICAL CHARACTERISTICS:
- Capacitance Range: 510 pF to 0.01 MFd
- Rated Voltage: 50 WVDC
- T.C. ±15% (-55°C to +125°C)

MECHANICAL DIMENSIONS:
- .055" x .055" (1.4 mm x 1.4 mm) Case Size

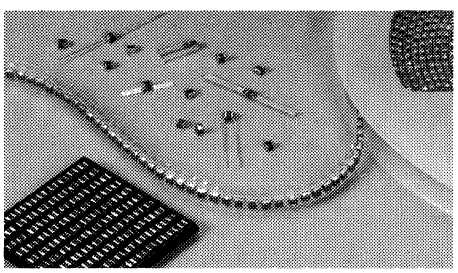
FEATURES:
- Improved low ESR/ESL Performance
- Improved current handling capability



FOR 200 A DATA SHEET FAX-BACK, CALL (516) 622-4884 AND ENTER 906

200 B SERIES BX CERAMIC MLCs

QUIK-PICK



FUNCTIONAL APPLICATIONS:
Bypass, Coupling and D.C. Blocking

CIRCUIT APPLICATIONS:
Switching Power Supplies, Broadband Coupling and Medium Power Amplifiers

ELECTRICAL CHARACTERISTICS:
- Capacitance Range: 5000 pF to 0.1 MFd
- Rated Voltage: 50 WVDC
- T.C. ±15% (-55°C to +125°C)

MECHANICAL DIMENSIONS:
- .110" x .110" (2.79 mm x 2.79 mm) Case Size

FEATURES:
- Improved low ESR/ESL Performance
- Improved current handling capability

FOR 200 B DATA SHEET FAX-BACK, CALL (516) 622-4884 AND ENTER 907

900 C SERIES X7R CERAMIC RF POWER MLCs

QUIK-PICK

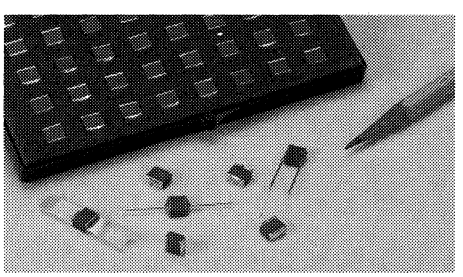
FUNCTIONAL APPLICATIONS:
Bypass, Coupling and D.C. Blocking

CIRCUIT APPLICATIONS:
HF/RF Power Amplifiers, Switching Power Supplies, High Frequency SMPS Filters and Medical Equipment

ELECTRICAL CHARACTERISTICS:
- Capacitance Range: 0.01 MFd to 1 MFd
- Rated Voltage: up to 300 WVDC
- ±15% (-55°C to +125°C)

MECHANICAL DIMENSIONS:
- .250" x .250" (6.35 mm x 6.35 mm) Case Size

FEATURES:
- Improved low ESR/ESL Performance
- Superior volumetric efficiency, providing high levels of capacitance for HF/RF power applications



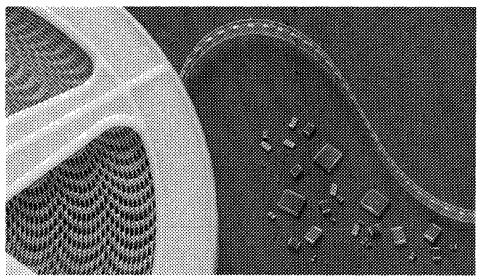
FOR 900 C DATA SHEET FAX-BACK, CALL (516) 622-4884 AND ENTER 910

FOR ATC SALES DEPARTMENT, CALL DIRECT: 1-800-370-6858

American Technical Ceramics • One Norden Lane, Huntington Station, N.Y. 11746-2142
fax (516) 622-4748 • e-mail: sales@atceramics.com • http://www.atceramics.com

ATC Commercial Line Multilayer Capacitors

Low Cost, General Purpose Capacitors for Surface Mount Applications Manufactured for ATC



EIA Size	Mechanical Dimensions - Inches (mm)		
	Length (L)	Width (W)	Thickness (T)
0603	.063 (1.60)	.031 (0.80)	.035 (0.89)
0805	.079 (2.00)	.049 (1.25)	.051 (1.30)
1206	.126 (3.20)	.063 (1.60)	.059 (1.50)
1210	.126 (3.20)	.098 (2.50)	.067 (1.70)
1812	.177 (4.50)	.126 (3.20)	.067 (1.70)
2225	.220 (5.59)	.250 (6.35)	.070 (1.78)

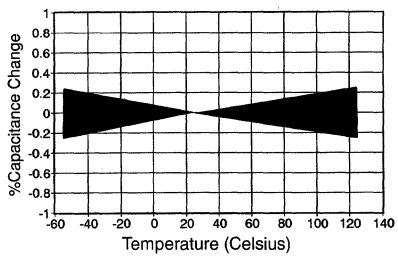
Standard EIA Sizes: 0603, 0805, 1206, 1210, 1812, 2225

NPO (COG) DIELECTRIC COMMERCIAL LINE CAPACITORS QUIK-PICK

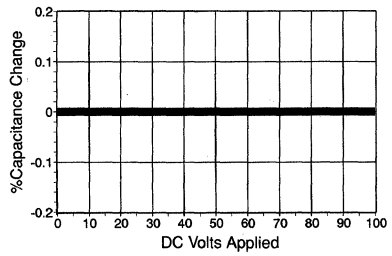
ELECTRICAL CHARACTERISTICS:

- Capacitance Range: 1.0 pF to .047 MFd
- Rated Voltage: up to 100 WVDC
- T.C. 0 ±30 PPM/°C (-55°C to +125°C)

Temperature Coefficient



Voltage Coefficient

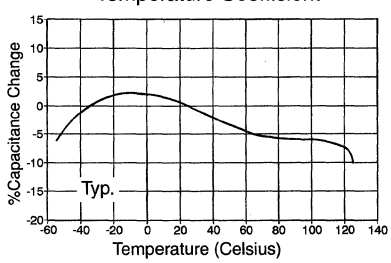


X7R DIELECTRIC COMMERCIAL LINE CAPACITORS QUIK-PICK

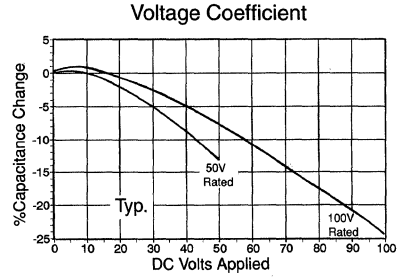
ELECTRICAL CHARACTERISTICS:

- Capacitance Range: 470 pF to 1.5 MFd
- Rated Voltage: up to 100 WVDC
- T.C. ±15% with 0 Vdc applied (-55°C to +125°C)

Temperature Coefficient



Voltage Coefficient

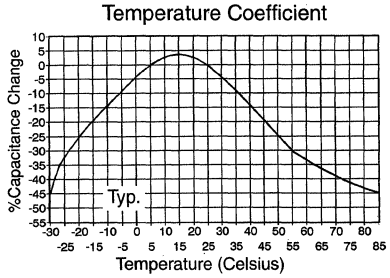


Z5U DIELECTRIC COMMERCIAL LINE CAPACITORS QUIK-PICK

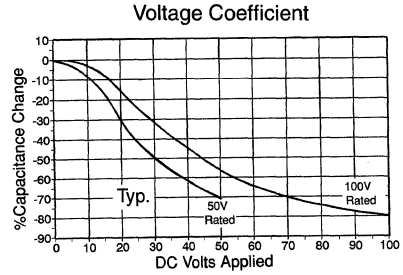
ELECTRICAL CHARACTERISTICS:

- Capacitance Range: .01 MFd to 3.9 MFd
- Rated Voltage: up to 50 WVDC
- T.C. +22% -56% (+10°C to +85°C)

Temperature Coefficient



Voltage Coefficient



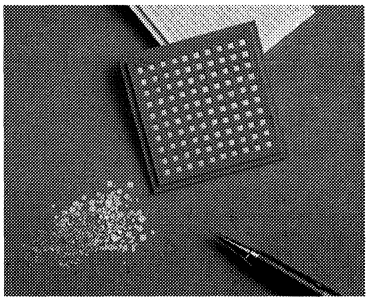
FOR ATC SALES DEPT., CALL DIRECT: 1-800-370-6858

American Technical Ceramics • One Norden Lane, Huntington Station, N.Y. 11746-2142
fax (516) 622-4748 • e-mail: sales@atceramics.com • http://www.atceramics.com

ATC Single Layer Capacitors

- .06 to 4700 pF
- DC TO 50 GHz
- 100 WVDC
- RUGGED CONSTRUCTION, LOW COST
- BROADBAND APPLICATIONS
- DIELECTRIC CONSTANTS 14 TO 9,000

QUIK-PICK



ATC provides High Q Low Loss dielectrics for microwave and millimeter-wave applications, in various termination styles. Titanium Tungsten/Nickel/Gold (TT) and Platinum Gold (AP) terminations are available to meet your requirements. ATC 111 Series Microcaps® and 116 Series SLCs are designed for high Q, broadband applications. 111 Series have a truncated pyramid shape; 116 Series are straight-sided. 112 Series Bi-Trim® SLCs, four capacitors on a single substrate, are highly stable variable (trimable) SLCs. 113 Series Twin/Caps® are two capacitors on a single substrate for microstrip applications.

STABLE K DIELECTRIC 111 & 116 SERIES: ULTRA STABLE CAPACITORS FOR FILTERING AND TUNING APPLICATIONS

Dielectric Code	T.C.(-55°C to +125°C)	Dielectric Const. (K)	Cap. Range	Quality Factor
A	+90 ±30 PPM/°C	14	0.06 to 5.6 pF	10,000 min.
AX	0 ±30 PPM/°C	23	0.1 to 10 pF	2000 min.
BA	-80 ±30 PPM/°C	36	0.2 to 15 pF	660 min.
BB	0 ±30 PPM/°C	31	0.2 to 12 pF	660 min.
CA	0 ±30 PPM/°C	62	0.3 to 27 pF	660 min.
CC	-750 ±200 PPM/°C	130	0.6 to 56 pF	660 min.

MID-K DIELECTRIC 111 & 116 SERIES: BROADBAND APPLICATIONS INCLUDING COUPLING AND DECOUPLING

Dielectric Code	T.C.(-55°C to +125°C)	Dielectric Const. (K)	Cap. Range	Quality Factor
DA	-1500 ±500 PPM/°C	165	0.7 to 68 pF	400 min.
DB	±7.5% max. change (non-linear)	200	0.9 to 82 pF	400 min.
HC	-2000 ±500 PPM/°C	350	1.5 to 150 pF	200 min.
EA	-4700 ±1500 PPM/°C	650	2.7 to 270 pF	400 min.
EC	±10% max. change (non-linear)	650	2.7 to 270 pF	65 min.

HIGH K DIELECTRIC 111 & 116 SERIES: HIGHER CAPACITANCE VALUE FOR BY-PASS AND DC BLOCKING APPLICATIONS

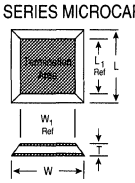
Dielectric Code	T.C.(-55°C to +125°C)	Dielectric Const. (K)	Cap. Range	Quality Factor
J	+5% to -15% max. change (non-linear)	1100	5.1 to 470 pF	40 min.
F	±10% max. change (non-linear)	2000	9.1 to 820 pF	40 min.
G	+10% to -75% max. change (non-linear)	4500	22 to 2200 pF	40 min.
K	0% to -92% max. change (non-linear)	9000	47 to 4700 pF	25 min.

Mechanical Configurations - Inches (mm)

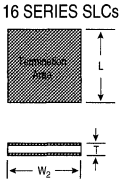
Case Size	W or L	T*	Ref. W_1 or L_1
R**	.015 (.381) ±.003 (.076)	.003 (.076) min. to .012 (.305) max.	N/A
S	.018 (.457) ±.003 (.076)		.014 (.356)
T	.025 (.635) ±.005 (.127)		.019 (.483)
U	.035 (.889) ±.005 (.127)		.030 (.762)
X	.050 (1.27) ±.010 (.254)		.045 (1.14)
Y	.070 (1.78) ±.010 (.254)		.065 (1.65)
Z	.090 (2.29) ±.010 (.254)		.085 (2.16)
Q	Customer specified non-standard dimensions		

*T depends upon capacity value. **Case size R is not available in 111 Series.

111 SERIES MICROCAPS®

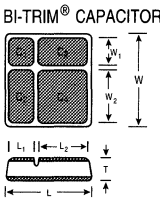


116 SERIES SLCs

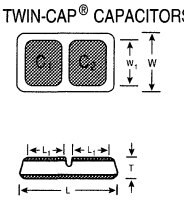


$W_2 = \frac{W + W_1}{2}$

112 BI-TRIM® CAPACITORS



113 TWIN-CAP® CAPACITORS



American Technical Ceramics • One Norden Lane, Huntington Station, N.Y. 11746-2142
fax (516) 622-4748 • e-mail: sales@atceramics.com • http://www.atceramics.com

A WORLD OF ADVANCED COMPONENTS AVX

Billions of components now have a new address

Welcome to AVX's web page! Our new web site is an on-line technical resource center for component and design engineers, bringing billions of advanced electronic components as close as your computer.

- Thin Film Capacitors
- Thin Film Inductors
- Thin Film Fuses
- Multilayer Transient Voltage Suppressors
- Integrated Passive Components
- EMI Filters
- SAW Filters
- Resonators
- Oscillators
- Piezo Devices
- Trimmer Capacitors
- MLC Capacitors
- Tantalum Capacitors
- Microwave Capacitors
- Power Supply Capacitors
- Ceramic Filters
- Chip Resistors
- Resistor Networks
- SpiCALCI specifying software
- SpiCAP circuit modeling software
- SpiTAN software
- SpiMIC software
- ELCO Interconnect Products

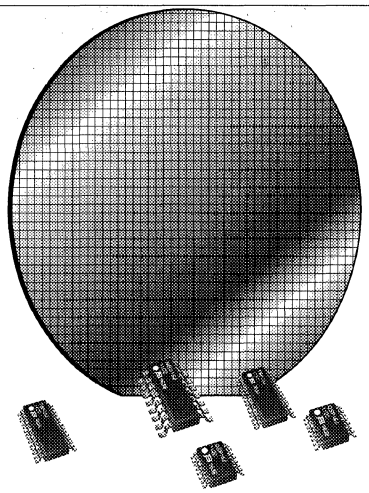
You'll find our web site hyperlink in EEM's on-line edition.
If you're not on-line yet, here's our number:

843-946-0414

Home Page	E-mail	"Faxback" Tech Literature	Fax
www.avxcorp.com	avx@avxcorp.com	(800) 879-1613	(843) 626-5186

AVX Corporation P.O. Box 867 Myrtle Beach, SC 29578

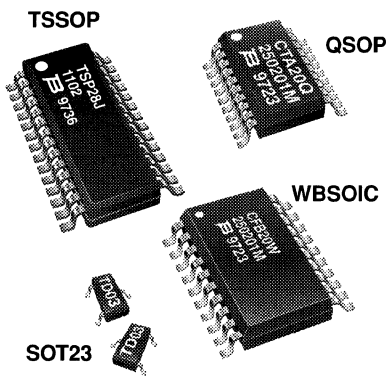
BOURNS, INC., • 2533 NORTH 1500 WEST, OGDEN, UTAH 84401
For technical assistance call (801) 786-6360.
www.bourns.com



MiniNet™

PASSIVE NETWORKS

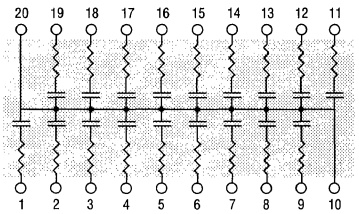
Thin-Film-On-Silicon Technology



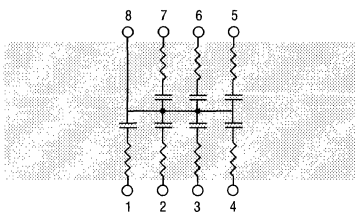
Standard Specifications

Resistance/Capacitance Values...See table
Tolerance
M Grade .....R = ±10%, C = ±20%
Power Rating (per Resistor).....100mW
Operating Temperature ...-55°C to +125°C
Packages .....QSOP, NBSOIC, WBSOIC, SOT23

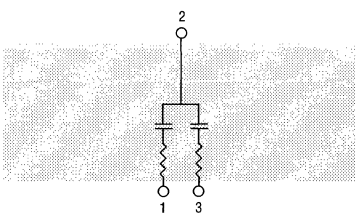
CTA
AC Terminator x 18



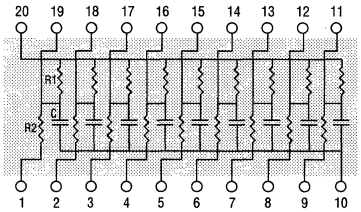
CTB
AC Terminator x7



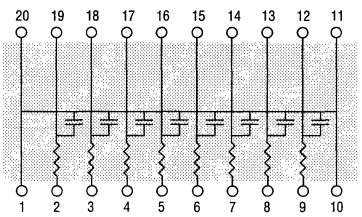
CTD
AC Terminator x2



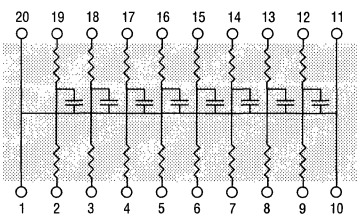
CTE
1284 Terminator



CFA
Tapped RC Filter



CFB
T-Filter



Standard Resistance/ Capacitance Values

Type	R(Ω)	C(pF)	R(Ω)	C(pF)
CFA (Tapped RC Filter)	10	15	47	47
	33	47	75	50
	33	100	100	100
	39	220	100	150
CFB (T-Filter)	25	100	39	50
	25	150	39	220
	25	200	47	33
	27	220	47	100
	33	47	100	100
	33	180		
CTA (AC Terminator x 18)	33	47	56	100
	47	33	75	22
	47	47	75	50
CTB (AC Terminator x 7)	50	100	100	100
	50	180		
CTD (AC Terminator x 2)	10	15	47	47
	10	20	50	100
	33	47	56	68
	33	100	75	50
	47	33	100	100

Type		R1	R2	C1		R1	R2	C1
CTE (1284 Terminator)	**V01**	1K	33	180	**V05**	4.7K	270	33
	V02	2.2K	33	220	**V06**	4.7K	27	33
	V03	4.7K	10	180	**V07**	10K	10	27
	V04	4.7K	33	180	**V08**	1K	33	47
					V09	2.2K	33	47

Non-standard component values, tolerances and device packages also available. Consult your Bourns representative.

How to Order

2 CTA 470 330 M Q20 R

Product Class
Thin-Film-on-Silicon

Product Function
CFA = Tapped RC Filter
CFB = T-Filter
CTA = AC Terminator x 18
CTB = AC Terminator x 7
CTD = AC Terminator x 2
CTE = 1284 Terminator

Resistance Value Code*
1st two digits are significant.
3rd digit represents number of zeros to follow to give value in ohms

Capacitance Value Code*
1st two digits are significant.
3rd digit represents number of zeros to follow to give value in picoFarads

Grade:

	Resistor	Capacitor
M =	±10%	±20%

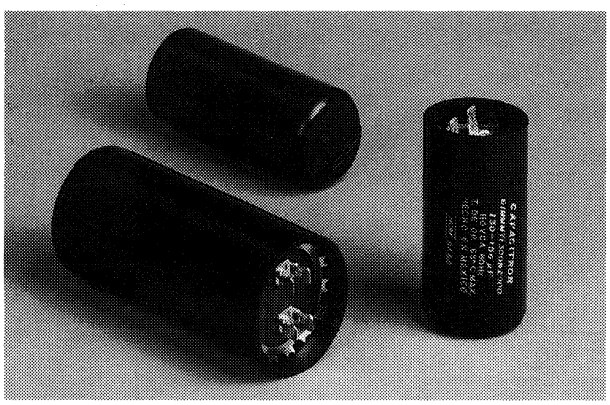
Package Style & Pin Count
Q20 = QSOP, 20 pins
N08 = NBSOIC, 8 pins
W2Q = WBSOIC, 20 pins
S03 = SOT23, 3 pins

Dispensing Method
R = Tape and Reel
T = Tube

*For the CTE device, replace the "Resistance and Capacitance Value Codes" with the value code designator from the accompanying table.
For example: **2 CTE V03 M Q20 R**

CGE

ELECTROLYTIC
A.C. MOTOR START



CGE's A.C. Motor Start Capacitors are manufactured with high purity aluminum foils, separated by layers of chemically pure paper, which are impregnated with a conducting electrolyte. Units are provided with a lid made of phenolic sheet, a positive pressure safety vent, and are furnished in phenolic cases. They are provided with 2 terminals for female connectors or for use as solder lug terminals. CGE Motor Start Capacitors have been granted UL Recognition for Construction No. E1 30758 (R).

VOLTAGE 110 / 125		VOLT. 165	VOLT. 220	VOLT. 250	VOLT. 330
CAPACITANCE VALUE (µF)	CASE SIZE	CASE SIZE	CASE SIZE	CASE SIZE	CASE SIZE
21 - 25	1 - 2	1	2 - 4	2	2
25 - 30	1 - 2	1	2 - 4	2	2
30 - 36	1 - 2	1	2 - 4	4	4
36 - 43	1 - 2	1	2 - 4	4	4
43 - 53	1 - 2	1	2 - 4	4	4
47 - 56	1 - 2	1	2 - 4	4	4
53 - 64	1 - 2	1	2 - 4	4	5 - 6
64 - 77	1 - 2	1	2 - 4	4	5 - 6
72 - 88	1 - 2	1	4	4	5 - 6
80 - 96	1 - 2	2	4	4	6 - 7
88 - 108	1 - 2	2	4	4 - 5	7
108 - 130	1 - 2	2	4	4 - 5	7
124 - 149	1 - 2	4	4 - 5	4 - 5	7
130 - 156	1 - 2	4	4 - 5	4 - 5	7
145 - 175	1 - 2	4	4 - 7	4 - 7	7
161 - 193	1 - 2	4	4 - 7	4 - 7	7
189 - 227	1 - 2	4	4 - 7	4 - 8	7
216 - 259	1 - 2	5	4 - 7	4 - 8	8
233 - 280	1 - 2 - 4	5	4 - 7	4 - 8	8
243 - 292	1 - 2 - 4	5	4 - 7	4 - 8	8
270 - 324	1 - 2 - 4	5	4 - 7	4 - 8	8
340 - 408	1 - 2 - 4	7			
378 - 440	1 - 2 - 4	7			
400 - 480	1 - 2 - 4				
430 - 516	1 - 2 - 4				
460 - 552	2 - 4				
540 - 648	2 - 4 - 5				
590 - 708	4 - 5				
710 - 850	4 - 6 - 7				
829 - 995	4 - 6 - 7				
1000 - 1200	4 - 6 - 7				

ELECTRICAL

Designed in accordance with EIA-RS463

Capacitance Range: 21 µF to 1000 µF.

Nominal Voltage: 110, 125, 165, 220, 250, and 330 VAC.

Nominal Frequency: 50 Hz ~ 60 Hz.

Operating Temperatures: -20°C ~ +65°C

Power Factor: 10% max. after applying working voltage for max. 4 sec. at 60 Hz. at 25°C.

Life Test: Per standard EIA-RS463

MECHANICAL

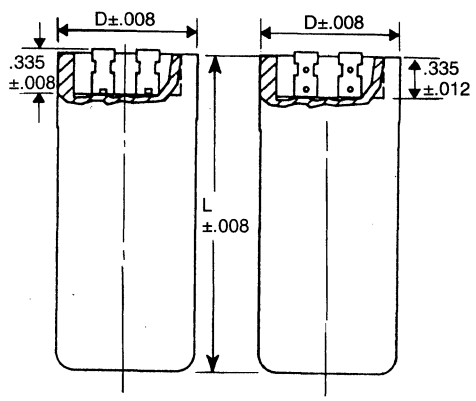
Case:

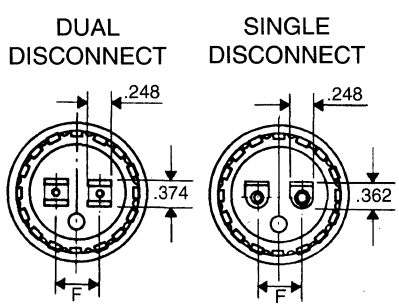
Oil and moisture resistant phenolic case with a positive pressure safety vent.

Nominal Voltage:

Designed to accept both single and double quick female connectors or solder lug terminals.

CASE SIZE	D (Ø)	F	L
1	1.437	0.500	2.750
2	1.437	0.500	3.365
4	1.812	0.625	3.365
5	1.812	0.625	4.365
6	2.062	0.875	3.365
7	2.062	0.875	4.365
8	2.562	0.875	4.365

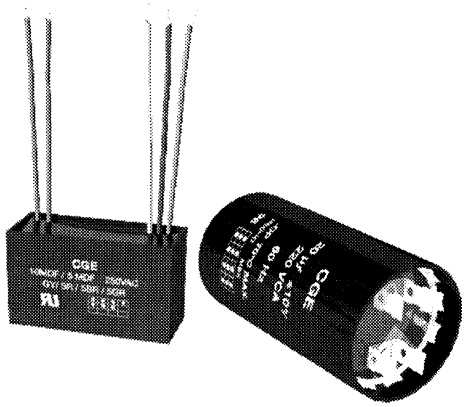




CGE
228 KENYON ROAD WEST
FORT DODGE, IA 50501
PH: 515-576-7744
FAX: 515-573-5522

CGE

METALLIZED POLYPROPYLENE DRY CAPACITORS



The CGE dry capacitors are manufactured with a dielectric material that consists of two sheets of polypropylene film, each one with a thin layer of vacuum deposited metal on one side. The entire edge of each electrode is bonded by a metallized endspray which serves as the termination point for the internal connections of the capacitor. These capacitors are self-healing. This capability is the property of the metallized film to restore itself to an operating condition when a dielectric breakdown occurs during operation. These capacitors are not filled with a dielectric fluid. They are available in polyester and phenolic case styles.

APPLICATIONS:

In ballasts for lamps of mercury vapor, LPS & HPS and metal halide; For miniature electric motors; For electric motors used in swimming pools, whirlpools, spas, refrigeration, air conditioners, laundry equipment, HPS and LPS.

ELECTRICAL:

Capacitance Range: 1.8 μF to 65 μF.
Capacitance Tolerance: -5%, +10%, ±5%, ±10% & ±15%.
Voltage Range: 220, 250, and 370 VAC.
Operating Temperatures: -40°C ~+70°C.
Dissipation Factor: 0.1% maximum at 25°C, 60 Hz.
Working Frequency: 50, 60, Hz.
Dielectric Strength:
Between terminals: Working voltage X 1.75 for 1 second.
Between terminal and case: Working voltage X 2+1000 VAC for 1 second.
Maximum Fault Current: 10000A

MECHANICAL:

Case: Plastic or phenolic
Potting: Polyurethane resin
Leads: Faston 3/16" & 1/4" quick connect tinned terminals or wire leads
Marking: Trademark "CGE", UL marking, nominal capacitance value (μF), tolerance, working voltage, frequency (Hz), SH (self-Healing), Dry, 10000 AFC part number and month/year of manufacture.

COMPLIES WITH EIA RS-456-A.

CGE capacitors meet the requirements of the following international standards:

BS 60252	Germany (VDE), United Kingdom, Austria
IMO	Italy
SEV	Switzerland
EIA RS 456A	USA
JIS	Japan
IEC 252	

Capacitance Vs. Smallest Case Dimension

V (VAC) / CAP.(μF)	UP TO 220	250	330 370
1.8	1	1	
2.0	1	1	5
2.5	1	1	5
3.0	1	1	5
3.5	1	1	7
3.8	1	1	7
4.0	1	1	7
5.0	1	5	7
6.0	5	5	7
7.0	5	6	7
8.0	5	6	7
10.0	5	7	8
12.0	6	7	
15.0	6	8	
18.0	7	8	
20.0	7	8	

Case Dimension

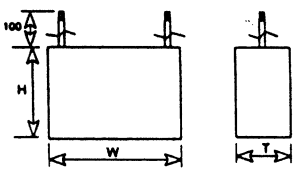
CASE	L	H	W
1	37	26	13
2	37	26	15
3	37	26	15
4	41	28	23
5	49	29	20
6	54	32	22
7	58	35	24
8	58	41	29
9	39	30	22

Capacitance Vs. Case Dimension

UP TO 250 VAC	
CAPACITANCE VALUE (μF)	CASE SIZE
5	1
7.5	1
10	1
12.5	2
15	2
17.5	4
20	4
22.5	4
25	4
30	4
35	5
40	5
45	6
45	7
50	7
55	7
60	7
65	7

Case Size

CASE	D (ø)	F	L
1	1.437	0.500	2.770
2	1.437	0.500	3.330
4	1.812	0.622	3.330
5	1.812	0.622	4.370
6	2.062	0.874	3.371
7	2.062	0.874	4.370



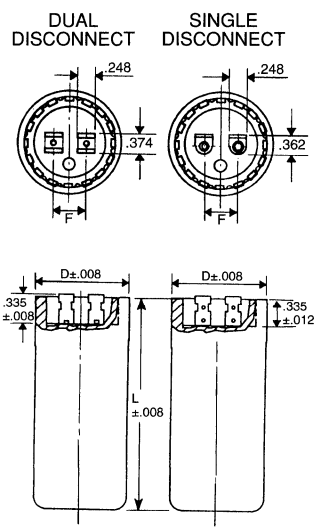
CASE "2,4,5,6"

In case 1 & 3 a special mounting tab is available. Also in case 7 & 8 with faston terminals.

General Note:
AVAILABLE 18 AND 20 AWG. CABLE AND 1/4" FASTON TERMINAL.

PHENOLIC MOTOR START CASE

The phenolic motor start case is designed specifically to be used with permanent split-phase capacitor motors in swimming pool, whirlpool and spa application where strict form and fit restriction are required.

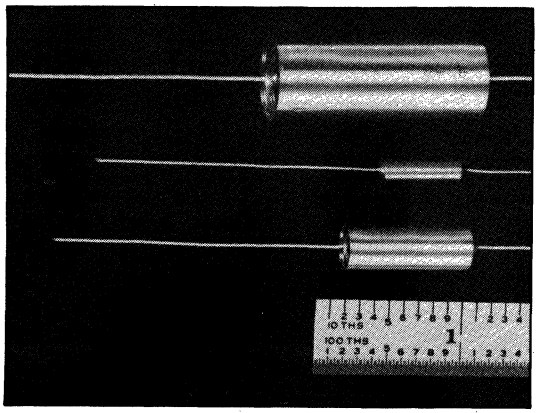


APPROVALS:

VDE: 220V 1.8 to 20 μF
File # 21609-4630-0002/3035Y tb1/bt-dn (Rectangular case)
UL/ULc: E130758 (Recognized for construction for rectangular case)
CE
CSA: E130758

CGE
228 KENYON ROAD WEST
FORT DODGE, IA 50501
PH: 515-576-7744
FAX: 515-573-5522

Component Research High Reliability Film Capacitors



Component Research Company is recognized as the leader in hermetically sealed high reliability plastic film capacitors. These capacitors see large usage in military, aerospace, space, medical and oil well logging industries.

Established in 1957, Component Research Company has gained industry wide recognition for outstanding technical expertise, unsurpassed quality and excellent service.
Since the early sixties, Component Research Company capacitors have been used in every U.S. space program. Many of the innovations developed and produced by Component Research have resulted in new military specifications such as MIL-C-83421, MIL-C-39022/9 and MIL-C-87217.

Quality is assured by the strictest adherence to all specification requirements and state-of-the-art manufacturing and testing methods. To this end, Component Research maintains a complete military approved environmental testing laboratory with capabilities for vibration, shock, acceleration, thermal shock, burn-in, moisture resistance, and resistance to solvents, hermeticity and radiographic testing.This quality system is approved to MIL-Q-9858 and MIL-STD-790. A calibration laboratory complying to MIL-STD-45662 is also maintained.

Table of Contents • (17 Page Catalog)

A12	Metallized Polycarbonate	2
G12	Reduced size Metallized Polycarbonate	4
P12	Metallized Polycarbonate with A.C. burn-in	6
C15	Metallized Polypropylene Qualified to MIL-C-8-83421/2	8
J11	Metallized Teflon	10
J93	Polystyrene	12
A52	Foil Polycarbonate	14
B52	High Voltage Foil Polycarbonate	16
B12	High Voltage Metallized Polycarbonate	16
B55	High Voltage Foil Polypropylene	17
B15	High Voltage Metallized Polypropylene	17

Custom Capacitors:

Component Research designs and manufactures thousands of custom capacitors for special applications.These custom designs include:

- Capacitor Networks
- Capacitor Standards
- Feedthrough Capacitors
- Matched Sets
- Special Temperature Coefficient Capacitors
- High Temperature Capacitors
- Special Hermetic Packages for High Vibration
- High Current Capacitors Tested at High Frequencies

Military Approvals: Component Research is qualified to the following Military specifications:

- MIL-C-83421/1
- MIL-C-83421/2
- MIL-C-39022/7
- MIL-C-39022/9
- MIL-C-39022/10
- MIL-C-87217/1

Patent Information:
Component Research capacitors are exclusively manufactured under one or more of the following patents:
3,238,428; 3,260,906; 3,920,063; 3,506,895; 3,539,886; 3,603,849; 4,587,144.
Additional patents pending.

Applications Assistance:
Our applications engineers are recognized as the most knowledgeable in the industry. Please call our applications department for any requirement that is not covered in our catalog.

WWW: http://www.crcfilm.com
E-mail:info@crcfilm.com

CRC Component Research • 1655 26th St., Santa Monica, CA 90404 • (310) 829-3615 Fax (310) 829-9584

Component Research

Metallized Polycarbonate Capacitor - A12

Specifications

Construction: Metallized polycarbonate dielectric, hermetically sealed, extended metal film electrodes, axial leads isolated from case.

Environmental: Capacitors meet all environmental requirements and are qualified to MIL-C-83421/1.

Operating Temperature: -65°C to +100°C
At full rated voltage, derate linearly to 50% of rated voltage at 125°C.

Dielectric Absorption: 0.1% maximum
At 25°C when measured per MIL-C-83421.

Dissipation Factor: 0.15% maximum
At 25°C when measured per MIL-C-83421.

AC Square Wave: 100 Hz, 60 seconds
At 25°C at a peak to peak voltage of 3 times rated DC voltage, terminal to terminal per MII-C-83421.

Dielectric Strength: 200% rated DC voltage
At 25°C from terminal to terminal to case for 60 seconds minimum.

Temperature Coefficient: (In % Capacitance) -1.0% to 1.2%; From +25°C to +125°C
-0% to -2.5%; From -55°C to 25°C

Capacitance Stability: (In % Capacitance) ±0.2.5%
When measured at any two corresponding temperature points taken in five successive temperature cycles from -65°C to +125°C.

Hermetic Seal: $1x10^{-6}$ atm/cm^3/sec.
Maximum leak rate

Insulation Resistance: See Insulation Resistance Table
Measured from terminal to terminal at rated DC voltage and 5 minutes charge time. Values greater than 1 µF, allow an additional minute / µF charge time.

Minimum Insulation Resistance At Rated DC Voltage

For values over 0.1 µf divide limit shown by µF to obtain minimum I.R.

Example: A 0.5 µF series A12 capacitor at 25°C is 300,000 ÷ 0.5 = 600,000 megohms

Range	Style	25°C	55°C	85°C	100°C	125°C
.001 to 0.1 F	A12	3,000,000 Megohms	2,000,000 Megohms	1,000,000 Megohms	3000,000 Megohms	20000 Megohms
Greater Than 0.1µ F	A12	300,000 Megohms- µF	200,00 Megohms- µF	100,00 Megohms- µF	30,000 Megohms-µF	2,000 Megohms- µF

Quality Conformance Inspection

Test No.	Test	Test Conditions	Test Meth. MIL-C-83421	Test Limit	Quality Level A12
1	Burn-In	48 Hrs. minimum at 125°C, at 140% rated DC voltage	4.7.2	No physical damage	100% Test
2	Thermal Aging	10 cycles minimum from -65°C to +125°C	4.7.3	No physical damage	100% Test
3	Seal Test (Fine Leak)	Helium bomb 45 PSi for 1 hr. minimum, check for helium leak	4.7.5	$1x10^{-6}$ atm/cm^3/sec. max.	100% Test
4	Sel Test (Gross Leak)	Per MIL-C-83421	4.7.5	No continuous bubble stream	100% Test
5	AC square wave	Apply 100 Hz at a peak to peak voltage of 3 times DC rated voltage for 60 seconds minimum'	4.7.6	No shorts	100% Test
6	DC Hi-Pot (Terminal to Terminal and Terminals to case)	Apply 200% of rated DC voltage for 60 seconds minimum. Do not exceed 800 volts peak to peak.	4.7.6	No shorts	100% Test
7	Insulation Resistance (Terminal to Terminal)	At 25°C at rated DC voltage	4.7.7	Per I.R. Table	100% Test
8	% Capacitance Tolerance	At 25°C at 1 KHz	4.7.8	Per Part Number	100% Test
9	% Dissipation Factor	At 25°C at 1 KHZ, values above 1 µF measure at 0.1 Khz	4.7.6	0.15% max.	100% Test
10	Visual and Mechanical Inspection	For marking dimensions, and workmanship	4.7.1	Per specification	1.0% AQL

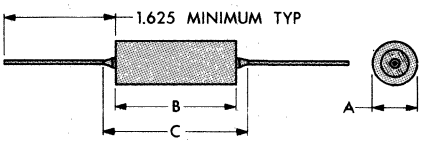
1. Capacitors are packaged and shipped with Certification of Conformance. **2.** Traceability to production and test records by permanent marking of parts with date code lot. **3.** Process and inspection date is maintained on file per NHB 5300.4 (1C), MIL-Q-9858 and MIL-STD-790.

Component Research

Metallized Polycarbonate Capacitor - A12

Case Dimensions:
"A" Diameter
"B" Case Length
"C" Bead to Bead Max. Length

Tolerance Limits (inches)
±0.10 Without Sleeving;+0.02 / -0.00 With Mylar Sleeving
±0.03 With or Without Sleeving
The lengths shown in table are maximum and include solder beads. CRC "C" dimensions for A12 and K12 capacitors is 0.1" less than MIL-C-83421/1 requires.



Case Dimensions

For special values and tolerances please contact our application department

	30VDC			50VDC			100VDC			200VDC			400VDC		
µF	Diam. A	Length B	Length C	Diam. A	Length B	Length C	Diam. A	Length B	Length C	Diam. A	Length B	Length C	Diam. A	Length B	Length C
.001	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.0012	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.0015	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.0018	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.002	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.0022	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.0027	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.235	.562	.662
.0033	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.235	.562	.662
.0039	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.170	.562	.662
.0047	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.235	.562	.662
.005	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.235	.562	.662
.0056	.170	.500	.600	.170	.500	.600	.170	.500	.600	.170	.562	.662	.235	.562	.662
.0068	.170	.500	.600	.170	.500	.600	.170	.562	.662	.170	.562	.662	.235	.687	.787
.0075	.170	.500	.600	.170	.562	.662	.170	.562	.662	.193	.562	.662	.235	.687	.787
.0082	.170	.500	.600	.170	.562	.662	.170	.562	.662	.193	.562	.662	.235	.687	.787
.01	.170	.500	.600	.170	.562	.662	.170	.687	.787	.193	.562	.662	.235	.687	.787
.012	.170	.500	.600	.170	.562	.662	.170	.687	.787	.193	.562	.662	.235	.687	.787
.015	.170	.500	.600	.170	.562	.662	.170	.687	.787	.235	.562	.662	.235	.813	.913
.018	.170	.500	.600	.193	.562	.662	.193	.687	.787	.235	.687	.787	.312	.813	.913
.02	.170	.500	.600	.193	.562	.662	.193	.687	.787	.235	.687	.787	.312	.813	.913
.022	.170	.500	.600	.193	.562	.662	.193	.687	.787	.235	.687	.787	.312	.813	.913
.027	.170	.562	.662	.193	.562	.662	.193	.687	.787	.312	.687	.787	.312	.813	.913
.033	.170	.562	.662	.193	.562	.662	.193	.687	.787	.312	.687	.787	.312	.813	.913
.039	.170	.562	.662	.170	.687	.787	.235	.687	.787	.312	.687	.787	.312	.813	.913
.047	.170	.562	.662	.170	.687	.787	.235	.687	.787	.312	.687	.787	.400	.813	.913
.05	.170	.562	.662	.170	.687	.787	.235	.687	.787	.312	.687	.787	.400	.813	.913
.056	.170	.562	.662	.193	.687	.787	.235	.687	.787	.312	.813	.913	.400	.813	.913
.068	.170	.687	.787	.193	.687	.787	.235	.813	.913	.312	.813	.913	.400	.813	.913
.075	.170	.687	.787	.193	.813	.913	.312	.687	.787	.312	.813	.913	.400	1.063	1.163
.082	.170	.687	.787	.193	.813	.913	.312	.687	.787	.312	.813	.913	.400	1.063	1.163
.1	.193	.687	.787	.193	.813	.913	.312	.687	.787	.312	.813	.913	.400	1.063	1.163
.12	.193	.687	.787	.235	.687	.787	.312	.687	.787	.312	.813	.913	.400	1.063	1.163
.15	.235	.562	.662	.235	.687	.787	.312	.813	.913	.400	1.063	1.163	.400	1.375	1.475
.18	.235	.687	.787	.235	.813	.913	.312	.813	.913	.400	1.375	1.475	.500	1.375	1.475
.2	.235	.687	.787	.235	.813	.913	.312	.813	.913	.400	1.375	1.475	.500	1.375	1.475
.22	.235	.687	.787	.235	.813	.913	.312	.813	.913	.400	1.375	1.475	.500	1.375	1.475
.27	.235	.687	.787	.312	.687	.787	.312	1.063	1.163	.500	1.375	1.475	.562	1.375	1.475
.33	.235	.687	.787	.312	.687	.787	.312	1.063	1.163	.500	1.375	1.475	.562	1.375	1.475
.39	.235	.687	.787	.312	.813	.913	.400	1.063	1.163	.500	1.375	1.475	.562	1.875	1.975
.47	.312	.687	.787	.312	.813	.913	.400	1.063	1.163	.500	1.375	1.475	.562	1.875	1.975
.5	.312	.687	.787	.312	.813	.913	.400	1.063	1.163	.500	1.375	1.475	.562	1.875	1.975
.56	.312	.687	.787	.400	.813	.913	.400	1.063	1.163	.500	1.375	1.475	.562	1.875	1.975
.68	.312	.687	.787	.400	.813	.913	.500	1.125	1.225	.562	1.376	1.475	.750	1.875	1.975
.75	.312	.813	.913	.400	1.063	1.163	.500	1.125	1.225	.562	1.875	1.975	.750	1.875	1.975
.82	.312	.813	.913	.400	1.063	1.163	.500	1.125	1.225	.561	1.875	1.975	.750	1.875	1.975
1.0	.312	.813	.913	.400	1.063	1.163	.562	1.125	1.225	.562	1.875	1.975	.750	1.875	1.975
1.2	.312	.813	.913	.400	1.063	1.163	.562	1.125	1.225	.562	1.875	1.975	1.000	1.875	1.975
1.5	.400	.813	.913	.400	1.063	1.163	.562	1.375	1.475	.670	1.875	1.975	1.000	2.375	2.475
1.8	.400	.813	.913	.400	1.063	1.163	.670	1.375	1.475	.750	1.875	1.975	1.000	2.375	2.475
2.0	.400	.813	.913	.500	1.125	1.225	.670	1.375	1.475	.750	1.875	1.975	1.000	2.375	2.475
2.2	.400	.813	.913	.500	1.125	1.225	.670	1.375	1.475	.750	1.875	1.975	1.000	2.375	2.475
2.5	.400	1.063	1.163	.500	1.375	1.475	.670	1.875	1.975	.750	1.875	1.975			
2.7	.400	1.063	1.163	.500	1.375	1.475	.670	1.875	1.975	.750	1.875	1.975			
3.0	.400	1.063	1.163	.500	1.375	1.475	.670	1.875	1.975	1.000	1.875	1.975			
3.3	.400	1.063	1.163	.500	1.375	1.475	.670	1.875	1.975	1.000	1.875	1.975			
3.9	.400	1.375	1.475	.562	1.375	1.475	.750	1.875	1.975	1.000	2.375	2.475			
4.7	.500	1.375	1.475	.670	1.375	1.475	.750	1.875	1.975	1.000	2.375	2.475			
5.0	.500	1.375	1.475	.670	1.375	1.475	.750	1.875	1.975	1.000	2.375	2.475			
5.6	.500	1.375	1.474	.670	1.375	1.475	.750	1.875	1.975	1.000	2.375	2.475			
6.8	.562	1.375	1.475	.670	1.875	1.975	1.000	2.375	2.475						
7.5	.562	1.375	1.474	.670	1.875	1.975	1.00	2.375	2.475						
8.2	.562	1.375	1.475	.670	1.875	1.975	1.000	2.375	2.475						
10.0	.562	1.375	1.475	.670	1.875	1.975	1.000	2.375	2.475						
12.0	.562	1.875	1.975	.750	1.875	1.975	1.000	2.375	2.475						
15.0	.562	1.875	1.975	.750	1.875	1.975									
18.0	.670	1.875	1.975	1.000	1.875	1.975									
20.0	.670	1.875	1.975	1.000	1.875	1.975									
22.0	.670	1.875	1.975	1.000	1.875	1.975									
25.0	.750	1.875	1.975	1.000	2.375	2.475									
27.0	.750	1.875	1.975	1.000	2.375	2.475									

A12 - A - 104 - J - S - W

Style

Voltage
A= 30VDC
B=50VDC
C=100VDC
D=200VDC
E=400VDC

Picofarad Code: First two digits represent significant figures, Last digit represents number of zeros to follow. Example: 104= 100,000 picofarads

Capacitance Tolerance
K=10% F=1% B=1/4%
J=5% D=1/2% A=.1%
G=2%

Sleeving Code
S=Mylar Sleeve
X=No Sleeve

Lead Code
W = Tinned copper clad steel: #22 (.025") for .312" case dia. & smaller; #20(.032"0 for .400" & .500" case dia.
C = Tinned oxygen-free copper:#18(.040") for .562" case dia. & larger

Component Research • 1655 26th St., Santa Monica, CA 90404 • (310) 829-3615 Fax (310) 829-9584

Component Research

Metallized Polycarbonate Capacitor - G12

Specifications

Construction: Metallized polycarbonate dielectric, hermetically sealed, extended metal film electrodes, axial leads isolated from case.

Environmental: Capacitors meet all environmental requirements and are qualified to MIL-C-83421.

Operating Temperature: -65°C to +100°C
At full rated voltage, derate linearly to 50% of rated voltage at 125°C.

Dielectric Absorption: 0.1% maximum
At 25°C when measured per MIL-C-83421.

Dissipation Factor: 0.15% maximum
At 25°C when measured per MIL-C-83421.

AC Square Wave: 100 Hz, 60 seconds minimum
At 25°C at a peak to peak voltage of 2 times rated DC voltage, terminal to terminal per Mil-C-83421.

Dielectric Strength: 200% rated DC voltage
At 25°C from terminal to terminal to case for 60 seconds minimum.

Temperature Coefficient: ±2% ; From +25°C to +125°C
–0% to –2%; From 25°C to –55°C

Capacitance Stability: ±0.2.5%
When measured at any two corresponding temperature points taken in five successive temperature cycles from -65°C to +125°C.

Hermetic Seal: $1x10^{-6}$ atm/cm^3/sec.
Maximum leak rate

Insulation Resistance: See Insulation Resistance Table
Measured from terminal to terminal at rated DC voltage and 5 minutes charge time. Values greater than 1 µF, allow an additional minute / µF charge time.

Minimum Insulation Resistance At Rated DC Voltage

For values over 0.1 µf divide limit shown by µF to obtain minimum I.R.

Example: A 0.18 µF capacitor at 25°C is 100,000 ÷ 0.18 = 555,555 megohms

Range	25°C	85°C	100°C	125°C
.001 to 0.1 F	1,000,000 Megohms	60,000 Megohms	30,000 Megohms	10,000 Megohms
Greater Than 0.1µ F	100,000 Megohms- µF	6,000 Megohms- µF	3,000 Megohms- µF	1,000 Megohms-µF

Quality Conformance Inspection

Test No.	Test	Test Conditions	Test Meth. MIL-C-83421	Test Limit	Quality Level
1	Burn-In	48 Hrs. minimum at 125°C, at 140% rated DC voltage	4.7.2	No physical damage	100% Test
2	Thermal Aging	10 cycles minimum from -65°C to +125°C	4.7.3	No physical damage	100% Test
3	Seal Test (Fine Leak)	Helium bomb 45 PSi for 1 hr. minimum, check for helium leak	4.7.5	1x10-6 atm/cm3/sec. max.	100% Test
4	Seal Test (Gross Leak)	Per MIL-C-83421	4.7.5	No continuous bubble stream	100% Test
5	AC square wave (Terminal To Terminal)	Apply 100 Hz at a peak to peak voltage of 2 times DC rated voltage for 60 seconds minimum'	4.7.6	No shorts	100% Test
6	DC Hi-Pot (Terminal to Terminal and Terminals to Case)	Apply 200% of rated DC voltage for 60 seconds minimum.	4.7.6	No shorts	100% Test
7	Insulation Resistance (Terminal to Terminal)	At 25°C at rated DC voltage	4.7.7	100,000 megohm-uF, need not exceed 1,000,000 meohms	100% Test
8	% Capacitance Tolerance	At 25°C at 1 KHz	4.7.8	Per Part Number	100% Test
9	% Dissipation Factor	At 25°C at 1 KHZ, values above 1 µF measure at 0.1 Khz	4.7.9	0.15% max.	100% Test
10	Visual and Mechanical Inspection	For marking dimensions, and workmanship	4.7.1	Per specification	1.0% AQL

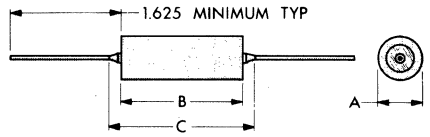
1. Capacitors are packaged and shipped with Certification of Conformance. **2.** Traceability to production and test records by permanent marking of parts with date code lot. **3.** Process and inspection date is maintained on file per NHB 5300.4 (1C), MIL-Q-9858 and MIL-STD-790.

Component Research

Metallized Polycarbonate Capacitor - G12

Case Dimensions:
"A" Diameter
"B" Case Length
"C" Bead to Bead Max. Length

Tolerance Limits (inches)
±0.10Without Sleeving; +0.02 / -0.00 With Mylar Sleeving
±0.03 With or Without Sleeving
The lengths shown in table are maximum and include solder beads.



Case Dimensions

For special values and tolerances please contact our application department

	30VDC				50VDC				100VDC				200VDC			
µF	Basic P/N	Diam. A	Length B	Length C	Basic P/N	Diam. A	Length B	Length C	Basic P/N	Diam. A	Length B	Length C	Basic P/N	Diam. A	Length B	Length C
.001	G12A102	.170	.500	.600	G12B102	.170	.500	.600	G12C102	.170	.500	.600	G12D102	.170	.500	.600
.0012	G12A122	.170	.500	.600	G12B122	.170	.500	.600	G12C122	.170	.500	.600	G12D122	.170	.500	.600
.0015	G12A152	.170	.500	.600	G12B152	.170	.500	.600	G12C152	.170	.500	.600	G12D152	.170	.500	.600
.0018	G12A182	.170	.500	.600	G12B182	.170	.500	.600	G12C182	.170	.500	.600	G12D182	.170	.500	.600
.002	G12A202	.170	.500	.600	G12B202	.170	.500	.600	G12C202	.170	.500	.600	G12D202	.170	.500	.600
.0022	G12A222	.170	.500	.600	G12B222	.170	.500	.600	G12C222	.170	.500	.600	G12D222	.170	.500	.600
.0027	G12A272	.170	.500	.600	G12B272	.170	.500	.600	G12C272	.170	.500	.600	G12D272	.170	.500	.600
.0033	G12A332	.170	.500	.600	G12B332	.170	.500	.600	G12C332	.170	.500	.600	G12D332	.170	.500	.600
.0039	G12A392	.170	.500	.600	G12B392	.170	.500	.600	G12C392	.170	.500	.600	G12D392	.170	.500	.600
.0047	G12A472	.170	.500	.600	G12B472	.170	.500	.600	G12C472	.170	.500	.600	G12D472	.170	.500	.600
.005	G12A502	.170	.500	.600	G12B502	.170	.500	.600	G12C502	.170	.500	.600	G12D502	.170	.500	.600
.0056	G12A562	.170	.500	.600	G12B562	.170	.500	.600	G12C562	.170	.500	.600	G12D562	.170	.500	.600
.0068	G12A682	.170	.500	.600	G12B682	.170	.500	.600	G12C682	.170	.500	.600	G12D682	.170	.500	.600
.0075	G12A752	.170	.500	.600	G12B752	.170	.500	.600	G12C752	.170	.500	.600	G12D752	.170	.562	.662
.0082	G12A822	.170	.500	.600	G12B822	.170	.500	.600	G12C822	.170	.500	.600	G12D822	.170	.562	.662
.01	G12A103	.170	.500	.600	G12B103	.170	.500	.600	G12C103	.170	.500	.600	G12D103	.170	.687	.787
.012	G12A123	.170	.500	.600	G12B123	.170	.500	.600	G12C123	.170	.500	.600	G12D123	.170	.687	.787
.015	G12A153	.170	.500	.600	G12B153	.170	.500	.600	G12C153	.170	.500	.600	G12D153	.170	.687	.787
.018	G12A183	.170	.500	.600	G12B183	.170	.500	.600	G12C183	.170	.562	.662	G12D183	.193	.687	.787
.02	G12A203	.170	.500	.600	G12B203	.170	.500	.600	G12C203	.170	.562	.662	G12D203	.193	.687	.787
.022	G12A223	.170	.500	.600	G12B223	.170	.500	.600	G12C223	.170	.562	.662	G12D223	.193	.687	.787
.027	G12A273	.170	.500	.600	G12B273	.170	.500	.600	G12C273	.170	.562	.662	G12D273	.193	.687	.787
.033	G12A333	.170	.500	.600	G12B333	.170	.500	.600	G12C333	.170	.562	.662	G12D333	.193	.687	.787
.039	G12A393	.170	.500	.600	G12B393	.170	.500	.600	G12C393	.170	.562	.662	G12D393	.235	.687	.787
.047	G12A473	.170	.500	.600	G12B473	.170	.500	.600	G12C473	.193	.562	.662	G12D473	.235	.687	.787
.05	G12A503	.170	.500	.600	G12B503	.170	.500	.600	G12C503	.193	.562	.662	G12D503	.235	.687	.787
.056	G12A563	.170	.500	.600	G12B563	.170	.500	.600	G12C563	.193	.562	.662	G12D563	.235	.687	.787
.068	G12A683	.170	.500	.600	G12B683	.170	.562	.662	G12C683	.235	.562	.662	G12D683	.312	.687	.787
.075	G12A753	.170	.500	.600	G12B753	.170	.562	.662	G12C753	.235	.562	.662	G12D753	.312	.687	.787
.082	G12A823	.170	.562	.662	G12B823	.170	.562	.662	G12C823	.235	.562	.662	G12D823	.312	.687	.787
.1	G12A104	.193	.562	.662	G12B104	.193	.562	.662	G12C104	.235	.687	.787	G12D104	.312	.687	.787
.12	G12A124	.193	.562	.662	G12B124	.193	.562	.662	G12C124	.235	.687	.787	G12D124	.312	.687	.913
.15	G12A154	.193	.562	.662	G12B154	.193	.562	.662	G12C154	.235	.687	.787	G12D154	.312	.813	.913
.18	G12A184	.235	.562	.662	G12B184	.235	.562	.662	G12C184	.235	.687	.787	G12D184	.312	.813	.913
.20	G12A204	.235	.562	.662	G12B204	.235	.562	.662	G12C204	.235	.687	.787	G12D204	.312	.813	.913
.22	G12A224	.235	.562	.662	G12B224	.235	.562	.662	G12C224	.235	.687	.787	G12D224	.312	.813	1.163
.27	G12A274	.235	.562	.662	G12B274	.235	.687	.787	G12C274	.312	.687	.787	G12D274	.312	1.063	1.163
.33	G12A334	.235	.562	.662	G12B334	.235	.687	.787	G12C334	.312	.813	.913	G12D334	.312	1.063	1.163
.39	G12A394	.235	.687	.787	G12B394	.235	.687	.787	G12C394	.312	.813	.913	G12D394	.400	1.063	1.163
.47	G12A474	.235	.687	.787	G12B474	.312	.687	.787	G12C474	.400	.687	.787	G12D474	.400	1.063	1.163
.50	G12A504	.235	.687	.787	G12B504	.312	.687	.787	G12C504	.400	.687	.787	G12D504	.400	1.063	1.163
.56	G12A564	.235	.687	.787	G12B564	.312	.687	.787	G12C564	.400	.687	.787	G12D564	.400	1.063	1.163
.68	G12A684	.235	.813	.913	G12B684	.312	.687	.787	G12C684	.400	.813	.913	G12D684	.500	1.125	1.225
.75	G12A754	.235	.813	.913	G12B754	.312	.687	.787	G12C754	.400	.813	.913	G12D754	.500	1.125	1.225
.82	G12A824	.235	.813	.913	G12B824	.312	.687	.787	G12C824	.400	.813	.913	G12D824	.500	1.375	1.425
1.0	G12A105	.235	.813	.913	G12B105	.312	.813	.913	G12C105	.400	1.063	1.163	G12D105	.500	1.375	1.475
1.2	G12A125	.312	.813	.913	G12B125	.312	.813	.913	G12C155	.400	1.063	1.163	G12D125	.500	1.375	1.475
1.5	G12A155	.312	.813	.913	G12B155	.400	.813	.913	G12C185	.400	1.375	1.475				
1.8	G12A185	.312	.813	.913	G12B185	.400	.813	.913	G12C205	.400	1.375	1.475				
2.0	G12A205	.312	.813	.913	G12B205	.400	.813	.913	G12C225	.500	1.375	1.475				
2.2	G12A225	.312	.813	.913	G12B225	.400	.813	.913	G12C255	.500	1.375	1.475				
2.5	G12A255	.312	1.063	1.163	G12B255	.400	.813	.913	G12C275	.500	1.375	1.475				
2.7	G12A275	.312	1.063	1.163	G12B275	.400	1.063	1.163	G12C305	.500	1.375	1.475				
3.0	G12A305	.312	1.063	1.163	G12B305	.400	1.063	1.163	G12C335	.500	1.375	1.475				
3.3	G12A335	.312	1.063	1.163	G12B335	.400	1.063	1.163								
3.9	G12A395	.400	1.063	1.163	G12B395	.400	1.375	1.475								
4.7	G12A475	.400	1.063	1.163	G12B475	.500	1.375	1.475								
5.0	G12A505	.400	1.063	1.163	G12B505	.500	1.375	1.475								
5.6	G12A565	.400	1.063	1.163	G12B565	.500	1.375	1.475								
6.8	G12A685	.400	1.375	1.475	G12B685	.500	1.375	1.475								
7.5	G12A755	.400	1.375	1.475	G12B755	.500	1.375	1.475								
8.2	G12A825	.400	1.375	1.475	G12B825	.500	1.375	1.475								
10.0	G12A106	.500	1.375	1.475												

G12 - A - 104 - J - S - W

Style

Voltage
A= 30VDC
B=50VDC
C=100VDC
D=200VDC

Picofarad Code: First two digits represent significant figures, Last digit represents number of zeros to follow. Example: 104= 100,000 picofarads

Capacitance Tolerance
K=10% F=1% B=1/4%
J=5% D=1/2% A=.1%
G=2%

Sleeving Code
S=Mylar Sleeve
X=No Sleeve

Lead Code
W = Tinned copper clad steel: #22 (.025") for .312" case dia. & smaller; #20(.032"0 for .400" & .500" case dia.

Component Research • 1655 26th St., Santa Monica, CA 90404 • (310) 829-3615 Fax (310) 829-9584

Component Research

Metallized Polycarbonate Capacitor - P12

Specifications

Construction: Metallized polycarbonate dielectric, hermetically sealed, extended metal film electrodes, axial leads isolated from case.

Environmental: Capacitors meet all environmental requirements and are qualified to MIL-C-83421/1.

Operating Temperature: -65°C to +100°C
At full rated voltage, derate linearly to 50% of rated voltage at 125°C.

Dielectric Absorption: 0.1% maximum
At 25°C when measured per MIL-C-83421.

Dissipation Factor: 0.15% maximum
At 25°C when measured per MIL-C-83421

AC Square Wave: 100 Hz, 60 seconds
At 25°C at a peak to peak voltage of 2 times rated DC voltage, terminal to terminal per MIl-C-83421.

Dielectric Strength: 150% rated DC voltage
At 25°C from terminal to terminal to case for 60 seconds minimum.

Temperature Coefficient: +1.5% to –1.0%; From +25°C to +125°C
–0.5% to –1.5%; From –55°C to –55°C

Capacitance Stability: ±0.2.5%
When measured at any two corresponding temperature points taken in five successive temperature cycles from –65°C to +125°C.

Hermetic Seal: $1x10^{-6}$ atm/cm^3/sec.
Maximum leak rate

Insulation Resistance: See Insulation Resistance Table
Measured from terminal to terminal at rated DC voltage and 5 minutes charge time. Values greater than 1 µF, allow an additional minute / µF charge time.

Minimum Insulation Resistance At Rated DC Voltage

For values over 0.5 µf divide limit shown by µF to obtain minimum I.R.

Example: A 0.68 µF capacitor at 25°C is 200,000 ÷ 0.68 = 294,000 megohms

Range	25°C	85°C	100°C	125°C
.001 to 0.5 F	4,000,000 Megohms	2,000,000 Megohms	30,000 Megohms	2,500 Megohms
Greater Than 0.5µ F	200,000 Megohms- µF	100,00 Megohms- µF	15,000 Megohms- µF	15,000 Megohms-µF

Quality Conformance Inspection

Test No.	Test	Test Conditions	Test Meth. MIL-C-83421	Test Limit	Quality Level
1	Burn-In	48 Hrs. minimum at 100°C, at 120% rated AC voltage at 400Hz	4.7.2	No physical damage	100% Test
2	Thermal Aging	10 cycles minimum from –65°C to +125°C	4.7.3	No physical damage	100% Test
3	Seal Test (Fine Leak)	Helium bomb 45 PSi for 1 hr. minimum, check for helium leak	4.7.5	$1x10^{-6}$ atm/cm^3/sec. max.	100% Test
4	Sel Test (Gross Leak)	Per MIL-C-83421	4.7.5	No continuous bubble stream	100% Test
5	AC square wave (Terminal to Terminal)	Apply 100 Hz at a peak to peak voltage of 2 times DC rated voltage for 60 seconds minimum'	4.7.6	No shorts	100% Test
6	DC Hi-Pot (Terminal to Terminal and Terminals to case)	Apply 150% of rated DC voltage for 60 seconds minimum.	4.7.6	No shorts	100% Test
7	Insulation Resistance (Terminal to Terminal)	At 25°C at rated DC voltage	4.7.7	20,000 megohm-uF need not exceed 400,000 megohms	100% Test
8	% Capacitance Tolerance	At 25°C at 1 KHz	4.7.8	Per Part Number	100% Test
9	% Dissipation Factor	At 25°C at 1 KHZ, values above 1 µF measure at 0.1 Khz	4.7.6	0.15% max.	100% Test
10	Visual and Mechanical Inspection	For marking dimensions, and workmanship	4.7.1	Per specification	1.0% AQL

1. Capacitors are packaged and shipped with Certification of Conformance. **2.** Traceability to production and test records by permanent marking of parts with date code lot. **3.** Process and inspection date is maintained on file per NHB 5300.4 (1C), MIL-Q-9858 and MIL-STD-790.

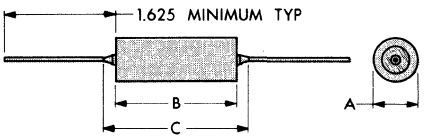
Component Research • 1655 26th St., Santa Monica, CA 90404 • (310) 829-3615 Fax (310) 829-9584

Component Research

Metallized Polycarbonate Capacitor - P12

Case Dimensions:
"A" Diameter
"B" Case Length
"C" Bead to Bead Max. Length

Tolerance Limits (inches)
±0.10 Without Sleeving; +0.02 / -0.00 With Mylar Sleeving
±0.03 With or Without Sleeving
The lengths shown in table are maximum and include solder beads.



Case Dimensions

For special values and tolerances please contact our application department

	50VDC			100VDC			200VDC			400VDC		
µF	Diam. A	Length B	Length C	Diam. A	Length B	Length C	Diam. A	Length B	Length C	Diam. A	Length B	Length C
.001	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.0012	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.0015	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.0018	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.002	.170	.500	.600	.170	.500	.600	.170	.662	.662	.193	.562	.662
.0022	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.562	.662
.0027	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.687	.787
.0033	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.687	.787
.0039	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.687	.787
.0047	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.687	.787
.005	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.687	.787
.0056	.170	.500	.600	.170	.500	.600	.170	.562	.662	.193	.687	.787
.0068	.170	.500	.600	.170	.500	.600	.193	.562	.662	.235	.687	.787
.0075	.170	.500	.600	.170	.500	.600	.193	.562	.662	.235	.687	.787
.0082	.170	.500	.600	.170	.500	.600	.193	.562	.662	.235	.687	.787
.01	.170	.500	.600	.170	.562	.662	.193	.687	.787	.312	.687	.787
.012	.170	.500	.600	.170	.562	.662	.193	.687	.787	.312	.687	.787
.015	.170	.500	.600	.170	.562	.662	.193	.687	.787	.312	.687	.787
.018	.170	.562	.662	.193	.562	.662	.235	.687	.787	.312	.813	.913
.02	.170	.562	.662	.193	.562	.662	.235	.687	.787	.312	.813	.913
.022	.170	.562	.662	.193	.562	.662	.235	.687	.787	.312	.813	.913
.027	.170	.562	.662	.193	.562	.662	.235	.687	.787	.312	.813	.913
.033	.170	.562	.662	.193	.562	.662	.235	.687	.787	.312	.813	.913
.039	.170	.562	.662	.193	.562	.662	.235	.687	.787	.312	.813	.913
.047	.193	.562	.662	.193	.687	.787	.312	.687	.787	.400	.813	.913
.05	.193	.562	.662	.193	.687	.787	.312	.687	.787	.400	.813	.913
.056	.193	.562	.662	.193	.687	.787	.312	.687	.787	.400	.813	.913
.068	.193	.562	.662	.193	.687	.787	.312	.687	.787	.400	.813	.913
.075	.193	.687	.787	.235	.687	.787	.312	.813	.913	.400	1.063	1.163
.082	.193	.687	.787	.235	.687	.787	.312	.813	.913	.400	1.063	1.163
.1	.193	.687	.787	.235	.687	.787	.312	.813	.913	.400	1.063	1.163
.12	.193	.687	.787	.235	.687	.787	.312	.813	.913	.400	1.063	1.163
.15	.235	.687	.787	.312	.687	.787	.312	.813	.913	.500	1.125	1.225
.18	.235	.687	.787	.312	.687	.787	.400	.813	.913	.500	1.125	1.225
.20	.235	.687	.787	.312	.687	.787	.400	.813	.913	.500	1.125	1.225
.22	.235	.687	.787	.312	.687	.787	.400	.813	.913	.500	1.125	1.225
.27	.312	.687	.787	.312	.813	.913	.400	1.063	1.163	.562	1.375	1.475
.33	.312	.687	.787	.312	.813	.913	.400	1.063	1.163	.562	1.375	1.475
.39	.312	.687	.787	.312	.813	.913	.400	1.063	1.163	.562	1.375	1.475
.47	.312	.813	.913	.400	.813	.913	.500	1.125	1.225	.670	1.375	1.475
.50	.312	.813	.913	.400	.813	.913	.500	1.125	1.225	.670	1.375	1.475
.56	.312	.813	.913	.400	.813	.913	.500	1.125	1.225	.670	1.375	1.475
.68	.400	.813	.913	.400	1.063	1.163	.562	1.375	1.475	.670	1.375	1.475
.75	.400	.813	.913	.400	1.063	1.163	.562	1.375	1.475	.670	1.375	1.475
.82	.400	.813	.913	.400	1.063	1.163	.562	1.375	1.475	.670	1.375	1.475
1.0	.400	.813	.913	.400	1.063	1.163	.562	1.375	1.475	.750	1.875	1.975
1.2	.400	1.063	1.163	.500	1.125	1.225	.670	1.375	1.475	.750	1.875	1.975
1.5	.400	1.063	1.163	.500	1.125	1.225	.670	1.375	1.475	.750	1.875	1.975
1.8	.500	1.125	1.225	.500	1.375	1.475	.670	1.875	1.975	1.000	1.875	1.975
2.0	.500	1.125	1.225	.500	1.375	1.475	.670	1.875	1.975	1.000	1.875	1.975
2.2	.500	1.125	1.225	.500	1.375	1.475	.670	1.875	1.975	1.000	1.875	1.975
2.5	.562	1.375	1.475	.670	1.375	1.475	.750	1.875	1.975	1.000	2.375	2.475
2.7	.562	1.375	1.475	.670	1.375	1.475	.750	1.875	1.975	1.000	2.375	2.475
3.0	.562	1.375	1.475	.670	1.375	1.475	.750	1.875	1.975	1.000	2.375	2.475
3.3	.562	1.375	1.475	.670	1.375	1.475	.750	1.875	1.975	1.000	2.375	2.475
3.9	.562	1.375	1.475	.670	1.375	1.475	.750	1.875	1.975			
4.7	.670	1.375	1.475	.670	1.875	1.975	1.000	1.875	1.975			
5.0	.670	1.375	1.475	.670	1.875	1.975	1.000	1.875	1.975			
5.6	.670	1.375	1.475	.670	1.875	1.975	1.000	1.875	1.975			
6.8	.670	1.375	1.475	.670	1.875	1.975	1.000	2.375	2.475			
7.5	.670	1.875	1.975	.750	1.875	1.975	1.000	2.375	2.475			
8.2	.670	1.875	1.975	.750	1.875	1.975	1.000	2.375	2.475			
10.0	.670	1.875	1.975	.750	1.875	1.975	1.000	2.375	2.475			
12.0	.750	1.875	1.975	1.000	1.875	1.975						
15.0	.750	1.875	1.975	1.000	1.875	1.975						
18.0	1.000	1.875	1.975	1.000	2.375	2.475						
20.0	1.000	1.875	1.975	1.000	2.375	2.475						
22.0	1.000	1.875	1.975	1.000	2.375	2.475						
25.0	1.000	2.375	2.475									
27.0	1.000	2.375	2.475									

P12 - B - 104 - J - S - W

Style

Voltage
B=50VDC
C=100VDC
D=200VDC
E=400VDC

Picofarad Code: First two digits represent significant figures, Last digit represents number of zeros to follow. Example: 104= 100,000 picofarads

Capacitance Tolerance
K=10% F=1% B=1/4%
J=5% D=1/2% G=2%

Sleeving Code
S=Mylar Sleeve
X=No Sleeve

Lead Code
W = Tinned copper clad steel: #22 (.025") for .312" case dia. & smaller; #20(.032" for .400" & .500" case dia.
C = Tinned oxygen-free copper:#18(.040") for .562" case dia. & larger

Component Research • 1655 26th St., Santa Monica, CA 90404 • (310) 829-3615 Fax (310) 829-9584

Component Research

Metallized Polypropylene Capacitor - C15

Specifications

Construction: Metallized polypropylene dielectric, hermetically sealed, extended metal film electrodes, axial leads isolated from case.

Operating Temperature: -55°C to +105°C
At voltage and current shown in table.

Dielectric Absorption: 0.2% maximum
At 25°C when measured per MIL-C-83421.

Dissipation Factor: 0.07% maximum
At 25°C when measured per MIL-C-83421 at 1KHz.

AC Square Wave: 1000 Hz, 60 seconds minimum
At 25°C at a peak to peak voltage of 3 times rated DC voltage, terminal to terminal. Do not exceed 800V P/P.

Dielectric Strength: 200% rated DC voltage
At 25°C from terminal to terminal and terminals to case for 60 seconds minimum.

Dielectric Strength: 200% rated DC voltage
At 25°C from terminal to terminal and terminals to case for 60 seconds minimum.

Temperature Coefficient: 0 to -4% max; From 25°C to +105°C
0 to +3% max; From 25°C to -55°C

Capacitance Stability: ±0.25% max.
When measured at any two corresponding temperature points taken in five successive temperature cycles from -55°C to +105°C.

Hermetic Seal: $1x10^{-6}$ atm/cm^3/sec.
Maximum leak rate

Insulation Resistance: See Insulation Resistance Table
Measured from terminal to terminal at rated DC voltage and 5 minutes charge time. Values greater than 1 µF, allow an additional minute / µF charge time.

Equivalent Series Resistance: Per Table
At 25°C at 100KHz.

Minimum Insulation Resistance At Rated DC Voltage

For values over 0.1 µf divide limit shown by µF to obtain minimum I.R.

Example: A 0.18 µF capacitor at 25°C is 300,000 ÷ 0.18 = 1,666,666 megohms

Range	25°C	85°C	105°C
.001 to 0.1 uF	3,000,000 Megohms	150,000 Megohms	20,000 Megohms
Greater Than 0.1µ F	300,000 Megohms- µF	15,00 Megohms- µF	2,000 Megohms- µF

Quality Conformance Inspection

Test No.	Test	Test Conditions	Test Meth. MIL-C-83421	Test Limit	Quality Level A12
1	Burn-In	24 Hrs. minimum at 85°C, at rated current at 40KHz	4.7.2	No physical damage	100% Test
2	Thermal Aging	10 cycles minimum from -65°C to +105°C	4.7.3	No physical damage	100% Test
3	Seal Test (Fine Leak)	Helium bomb 45 PSi for 1 hr. minimum, check for helium leak	4.7.5	$1x10^{-6}$ atm/cm^3/sec. max.	100% Test
4	Sel Test (Gross Leak)	Per MIL-C-83421	4.7.5	No continuous bubble stream	100% Test
5	AC square wave (Terminal to Terminal)	Apply 100 Hz at a peak to peak voltage of 3 times DC rated voltage for 60 seconds minimum'	4.7.6	No shorts	100% Test
6	DC Hi-Pot (Terminal to Terminal and Terminals to case)	Apply 200% of rated DC voltage for 60 seconds minimum.	4.7.6	No shorts	100% Test
7	Insulation Resistance (Terminal to Terminal)	At 25°C at rated DC voltage	4.7.7	300,000 megohms-uF need not exceed 3,000,000 megohms	100% Test
8	% Capacitance Tolerance	At 25°C at 1 KHz	4.7.8	0.07% max.	100% Test
9	% Dissipation Factor	At 25°C at 100KHz 1 µF measure at 0.1 Khz	4.7.9	Per table.	100% Test
10	Equivalent Series Resistance	At 25° at 100KHz	TBD	Per table.	100% Test
11	Visual & Mechanical Inspection	For marking, dimensions, & workmanship	4.7.1	Per specification	1.0% AQL

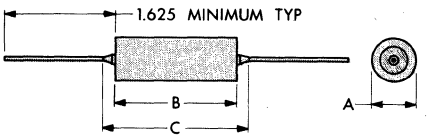
1. Capacitors are packaged and shipped with Certification of Conformance. **2.** Traceability to production and test records by permanent marking of parts with date code lot. **3.** Process and inspection date is maintained on file per NHB 5300.4(1C), MIL-Q-9858 and MIL-STD-790.

Component Research

Metallized Polypropylene Capacitor - C15

Case Dimensions:
"A" Diameter
"B" Case Length
"C" Bead to Bead Max. Length

Tolerance Limits (inches)
±0.10Without Sleeving; =0.02 / -0.00 With Mylar Sleeving
±0.03 / -.09 With or Without Sleeving
"C" dimension is 0.2" maximum more than "B" dimensions in table



Case Dimensions • AC Ratings

For special values and tolerances please contact our application department

* Part No.	uF	Rated VDC	Diam. A	E. S. R. Length B	(Ohms) Max. @ 100kHz	Rated VRMS @ 400Hz	25°C Max. ARMS	35°C Max. ARMS	45°C Max. ARMS	55°C Max. ARMS	65°C Max. ARMS	75°C Max. ARMS	85°C Max. ARMS	95°C Max. ARMS	105°C Max. ARMS
C15C474-SC	0.470	100	0.400	0.875	0.025	60	5.3	4.9	4.6	4.2	3.7	3.2	2.6	1.9	0.8
C15C564-SC	0.560	100	0.500	0.875	0.024	60	6.0	5.6	5.2	4.8	4.3	3.7	3.0	2.1	1.0
C15C684-SC	0.680	100	0.500	0.875	0.023	60	6.2	5.8	5.4	4.9	4.4	3.8	3.1	2.2	1.0
C15C824-SC	0.820	100	0.500	0.875	0.022	60	6.3	5.9	5.5	5.0	4.5	3.9	3.2	2.2	1.0
C15C105-SC	1.000	100	0.562	0.906	0.017	60	7.7	7.2	6.7	6.1	5.4	4.7	3.9	2.7	1.2
C15C205-SC	2.000	100	0.670	1.094	0.014	60	10.3	9.7	8.9	8.2	7.3	6.3	5.2	3.7	1.6
C15C305-SC	3.000	100	0.750	1.094	0.013	60	11.4	10.7	9.9	9.0	8.1	7.0	5.7	4.0	1.8
C15C505-SC	5.000	100	0.750	1.406	0.012	60	13.6	12.7	11.8	10.7	9.6	8.3	6.8	4.8	2.1
C15C106-SC	10.000	100	1.000	1.687	0.010	60	15.0	15.0	15.0	14.3	12.8	11.1	9.1	6.4	2.9
C15C206-SC	20.000	100	1.000	2.437	0.009	60	15.0	15.0	15.0	15.0	15.0	14.1	11.5	8.2	3.6
C15C256-SC	25.000	100	1.000	2.437	0.008	60	15.0	15.0	15.0	15.0	15.0	14.4	11.7	8.3	3.7
C15D184-SC	0.180	200	0.400	0.875	0.031	120	4.8	4.5	4.0	3.8	3.4	2.9	2.4	1.7	0.8
C15D224-SC	0.220	200	0.500	0.875	0.030	120	5.4	5.1	4.7	4.3	3.8	3.3	2.7	1.9	0.9
C15D274-SC	0.270	200	0.500	0.875	0.029	120	5.5	5.2	4.8	4.4	3.9	3.4	2.8	2.0	0.9
C15D334-SC	0.330	200	0.500	0.875	0.028	120	5.6	5.3	4.9	4.5	4.0	3.5	2.8	2.0	0.9
C15D394-SC	0.390	200	0.562	0.906	0.026	120	6.2	5.8	5.4	4.9	4.4	3.8	3.1	2.2	1.0
C15D474-SC	0.470	200	0.562	1.094	0.025	120	7.0	6.5	6.1	5.5	4.9	4.3	3.5	2.5	1.1
C15D564-SC	0.560	200	0.562	1.094	0.024	120	7.2	6.7	6.2	5.7	5.1	4.4	3.6	2.5	1.1
C15D684-SC	0.680	200	0.670	1.094	0.023	120	8.0	7.5	6.9	6.3	5.7	4.9	4.0	2.8	1.3
C15D824-SC	0.820	200	0.670	1.094	0.022	120	8.2	7.7	7.1	6.5	5.8	5.0	4.1	2.9	1.3
C15D105-SC	1.000	200	0.670	1.094	0.021	120	8.4	7.9	7.3	6.7	6.0	5.2	4.2	3.0	1.3
C15D205-SC	2.000	200	0.750	1.406	0.017	120	11.1	10.4	9.6	8.8	7.8	6.8	5.5	3.9	1.8
C15D305-SC	3.000	200	1.000	1.437	0.015	120	13.9	13.0	12.0	11.0	9.8	8.5	7.0	4.9	2.2
C15D505-SC	5.000	200	1.000	1.687	0.013	120	15.0	15.0	14.2	12.9	11.6	10.0	8.2	5.8	2.6
C15E102-SW	0.0010	400	0.235	0.562	1.000	240	0.49	0.46	0.42	0.39	0.35	0.30	0.25	0.17	0.08
C15E122-SW	0.0012	400	0.235	0.562	0.950	240	0.50	0.47	0.44	0.40	0.36	0.31	0.25	0.18	0.08
C15E152-SW	0.0015	400	0.235	0.562	0.900	240	0.52	0.48	0.45	0.41	0.37	0.32	0.26	0.18	0.08
C15E182-SW	0.0018	400	0.235	0.562	0.850	240	0.53	0.50	0.46	0.42	0.38	0.33	0.27	0.19	0.08
C15E202-SW	0.0020	400	0.235	0.562	0.750	240	0.57	0.53	0.49	0.45	0.40	0.35	0.28	0.20	0.09
C15E222-SW	0.0022	400	0.235	0.562	0.700	240	0.59	0.55	0.51	0.46	0.41	0.36	0.29	0.21	0.09
C15E272-SW	0.0027	400	0.235	0.562	0.650	240	0.61	0.57	0.53	0.48	0.43	0.37	0.30	0.22	0.10
C15E332-SW	0.0033	400	0.235	0.562	0.600	240	0.63	0.59	0.55	0.50	0.45	0.39	0.32	0.22	0.10
C15E392-SW	0.0039	400	0.235	0.562	0.550	240	0.66	0.62	0.57	0.52	0.47	0.41	0.33	0.23	0.10
C15E472-SW	0.0047	400	0.235	0.562	0.500	240	0.69	0.65	0.60	0.55	0.49	0.42	0.35	0.25	0.11
C15E562-SW	0.0056	400	0.235	0.687	0.450	240	0.80	0.74	0.69	0.63	0.56	0.49	0.40	0.28	0.13
C15E682-SW	0.0068	400	0.235	0.687	0.350	240	0.90	0.84	0.78	0.71	0.64	0.55	0.45	0.32	0.14
C15E822-SW	0.0082	400	0.235	0.687	0.300	240	0.97	0.91	0.84	0.77	0.69	0.60	0.49	0.34	0.15
C15E103-SW	0.0100	400	0.235	0.687	0.260	240	1.05	0.98	0.91	0.83	0.74	0.64	0.52	0.37	0.17
C15E123-SW	0.0120	400	0.235	0.687	0.200	240	1.19	1.12	1.03	0.94	0.84	0.73	0.60	0.42	0.19
C15E153-SW	0.0150	400	0.312	0.813	0.120	240	1.95	1.82	1.69	1.54	1.38	1.19	0.97	0.69	0.31
C15E183-SW	0.0180	400	0.312	0.813	0.110	240	2.04	1.90	1.76	1.61	1.44	1.25	1.02	0.72	0.32
C15E203-SW	0.0200	400	0.312	0.813	0.100	240	2.14	2.00	1.85	1.69	1.51	1.31	1.07	0.75	0.34
C15E223-SW	0.0220	400	0.312	0.813	0.090	240	2.25	2.11	1.95	1.78	1.59	1.38	1.13	0.80	0.36
C15E273-SW	0.0270	400	0.312	0.813	0.090	240	2.32	2.17	2.01	1.83	1.64	1.42	1.16	0.82	0.37
C15E333-SC	0.0330	400	0.400	0.875	0.080	240	1.85	2.66	2.47	2.25	2.01	1.74	1.42	1.01	0.45
C15E393-SC	0.0390	400	0.400	0.875	0.070	240	3.04	2.85	2.64	2.41	2.15	1.86	1.52	1.08	0.48
C15E473-SC	0.0470	400	0.400	0.875	0.060	240	3.29	3.08	2.85	2.60	2.32	2.01	1.64	1.16	0.52
C15E563-SC	0.056	400	0.400	0.875	0.058	240	3.5	3.3	3.0	2.8	2.5	2.1	1.7	1.2	0.6
C15E683-SC	0.068	400	0.500	0.875	0.046	240	4.4	4.1	3.8	3.5	3.1	2.7	2.2	1.5	0.7
C15E823-SC	0.082	400	0.500	0.875	0.039	240	4.7	4.4	4.1	3.7	3.4	2.9	2.4	1.7	0.7
C15E104-SC	0.100	400	0.500	0.875	0.035	240	5.0	4.7	4.4	4.0	3.6	3.1	2.5	1.8	0.8
C15E124-SC	0.120	400	0.562	0.906	0.033	240	5.5	5.2	4.8	4.4	3.9	3.4	2.8	2.2	0.9
C15E154-SC	0.150	400	0.670	0.906	0.032	240	6.2	5.8	5.3	4.9	4.4	3.8	3.1	2.2	1.0
C15E184-SC	0.180	400	0.670	0.906	0.031	240	6.3	5.9	5.4	5.0	4.4	3.8	3.1	2.2	1.0
C15E224-SC	0.220	400	0.670	1.094	0.030	240	7.0	6.6	6.1	5.6	5.0	4.3	3.5	2.5	1.1
C15E274-SC	0.270	400	0.670	1.094	0.029	240	7.2	6.7	6.2	5.7	5.1	4.4	3.6	2.5	1.1
C15E334-SC	0.330	400	0.670	1.094	0.028	240	7.3	6.8	6.3	5.8	5.2	4.5	3.7	2.6	1.2
C15E394-SC	0.390	400	0.750	1.094	0.026	240	7.9	7.4	6.8	6.2	5.6	4.8	3.9	2.8	1.2
C15E474-SC	0.470	400	0.750	1.094	0.025	240	8.1	7.6	7.0	6.4	5.7	4.9	4.0	2.9	1.3
C15E564-SC	0.560	400	0.750	1.406	0.025	240	9.2	8.6	7.9	7.2	6.5	5.6	4.6	3.2	1.4
C15E684-SC	0.680	400	0.750	1.406	0.024	240	9.4	8.8	8.1	7.4	6.6	5.7	4.7	3.3	1.5
C15E824-SC	0.820	400	0.750	1.656	0.023	240	10.4	9.7	9.0	8.2	7.4	6.4	5.2	3.7	1.6
C15E105-SC	1.000	400	0.750	1.656	0.022	240	10.7	10.0	9.3	8.5	7.6	6.5	5.3	3.8	1.7
C15E205-SC	2.000	400	1.000	1.938	0.017	240	15.0	14.1	13.0	11.9	10.6	9.2	7.5	5.3	2.4

*** To complete Part Number, select capacitance-tolerance letter from list below, and insert as 8th character.**

K = 10%
J = 5%
G = 2%
F = 1%
D = 1/2%
B = 1/4%
A = 1/10%

If insulated sleeving is not desired then replace the ninth character "S" with and "X".

Component Research

Metallized Teflon Capacitor - J11

Specifications

Construction: Metallized teflon dielectric, hermetically sealed, extended metal film electrodes, axial leads isolated from case.

Environmental: Capacitors meet all environmental requirements of MIL-C-83421, except vibration at 20g & shock at 50g.

Operating Temperature: -65°C to +125°C
At full rated voltage.

Dielectric Absorption: 0.01% maximum
At 25°C when measured per MIL-C-83421.

Dissipation Factor: 0.05% maximum
At 25°C when measured per MIL-C-83421

Dielectric Strength: 200% rated DC voltage
At 25°C from terminal to terminal and terminals to case for 60 seconds minimum.

Temperature Coefficient: Referenced to 25°C
-55°C; From -0.5°C to +1.0°C

Temperature Coefficient (cont.): -25°C; From -0.35% to +0.75%
0°C; From -0.1% to +0.45%
50°C; From -0.2% to +0.2%
85°C; From -0.45% to +0.4%
100°C; From -0.65% to +0.45%
125°C; From -1.0% to +0.5%

Capacitance Stability: ±0.10%
When measured at any two corresponding temperature points taken in five successive temperature cycles from -65°C to +125°C.

Hermetic Seal: $1x10^{-6}$ atm/cm^3/sec.
Maximum leak rate

Insulation Resistance: See Insulation Resistance Table
Measured from terminal to terminal at rated DC voltage and 5 minutes charge time. Values greater than 1 µF, allow an additional minute/ µF charge time.

Minimum Insulation Resistance At Rated DC Voltage

For values over 0.1 µf divide limit shown by µF to obtain minimum I.R.

Example: A 0.68 µF capacitor at 25°C is 1,000,000/0.68 = 1,475,000 megohms.

Range	25°C	55°C	85°C	100°C	125°C
.001 to 0.1 F	10,000,000 Megohms	5,000,000 Megohms	2,000,000 Megohms	1,000,000 Megohms	250,000 Megohms
Greater Than 0.1µ F	1,000,000 Megohms- µF	500,000 Megohms- µF	200,000 Megohms- µF	100,000 Megohms-µF	25,000 Megohms- µF

Quality Conformance Inspection

Test No.	Test	Test Conditions	Test Meth. MIL-C-83421	Test Limit	Quality Level A12
1	Burn-In	48 Hrs. minimum at 125°C, at 140% rated DC voltage	4.7.2	No physical damage	100% Test
2	Thermal Aging	10 cycles minimum from -65°C to +125°C	4.7.3	No physical damage	100% Test
3	Seal Test (Fine Leak)	Helium bomb 45 PSi for 1 hr. minimum, check for helium leak	4.7.5	$1x10^{-6}$ atm/cm^3/sec. max.	100% Test
4	Seal Test (Gross Leak)	Per MIL-C-83421	4.7.5	No continuous bubble stream	100% Test
5	DC Hi-Pot	Apply 200% of rated DC voltage for 60 seconds minimum	4.7.6	No shorts	100% Test
6	Insulation Resistance (Terminal to Terminal)	At 25°C at rated DC voltage	4.7.7	Per I.R. Table	100% Test
7	% Capacitance Tolerance	At 25°C at 1 KHz	4.7.8	Per Part Number	100% Test
8	% Dissipation Factor	At 25°C at 1 KHZ, values above 1 µF measure at 0.1 Khz	4.7.9	0.05% max.	100% Test
9	Visual and Mechanical Inspection	For marking dimensions, and workmanship	4.7.1	Per specification	1.0% AQL

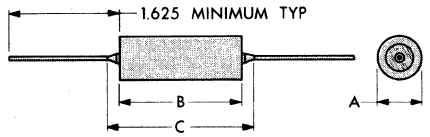
1. Capacitors are packaged and shipped with Certification of Conformance. **2.**Traceability to production and test records by permanent marking of parts with date code lot. **3.** Process and inspection date is maintained on file per NHB 5300.4 (1C), MIL-Q-9858 and MIL-STD-790.

Component Research

Metallized Teflon Capacitor - J11

Case Dimensions:
"A" Diameter
"B" Case Length
"C" Bead to Bead Max. Length

Tolerance Limits (inches)
±0.010 Without Sleeving; +0.02 /-0.00 With Mylar Sleeving
±0.03 With or Without Sleeving
The lengths shown in table are maximum and include solder beads.



Case Dimensions

For special values and tolerances please contact our application department

	50 VDC				100 VDC				200 VDC			
UF	J11	Diam. A	Length B	Length C	J11	Diam. A	Length B	Length C	J11	Diam. A	Length B	Length C
.001	J11B102	.235	.687	.887	J11C102	.235	.687	.887	J11D102	.235	.687	.887
.0012	J11B122	.235	.687	.887	J11C122	.235	.687	.887	J11D122	.235	.687	.887
.0015	J11B152	.235	.687	.887	J11C152	.235	.687	.887	J11D152	.235	.687	.887
.0018	J11B182	.235	.687	.887	J11C182	.235	.687	.887	J11D182	.235	.687	.887
.002	J11B202	.235	.687	.887	J11C202	.235	.687	.887	J11D202	.235	.687	.887
.0022	J11B222	.235	.687	.887	J11C222	.235	.687	.887	J11D222	.235	.687	.887
.0027	J11B272	.235	.687	.887	J11C272	.235	.687	.887	J11D272	.235	.687	.887
.0033	J11B332	.235	.687	.887	J11C332	.235	.687	.887	J11D332	.235	.687	.887
.0039	J11B392	.235	.687	.887	J11C392	.235	.687	.887	J11D392	.235	.687	.887
.0047	J11B472	.235	.687	.887	J11C472	.235	.687	.887	J11D472	.235	.687	.887
.005	J11B502	.235	.687	.887	J11C502	.235	.687	.887	J11D502	.235	.687	.887
.0056	J11B562	.235	.687	.887	J11C562	.235	.687	.887	J11D562	.235	.687	.887
.0068	J11B682	.235	.687	.887	J11C682	.235	.687	.887	J11D682	.235	.687	.887
.0082	J11B822	.235	.687	.887	J11C822	.235	.687	.887	J11D822	.235	.687	.887
.01	J11B103	.235	.687	.887	J11C103	.235	.687	.887	J11D103	.235	.687	.887
.012	J11B123	.235	.687	.887	J11C123	.235	.687	.887	J11D123	.235	.687	.887
.015	J11B153	.312	.687	.887	J11C153	.312	.687	.887	J11D153	.312	.687	.887
.018	J11B183	.312	.687	.887	J11C183	.312	.687	.887	J11D183	.312	.813	1.013
.02	J11B203	.312	.687	.887	J11C203	.312	.687	.887	J11D203	.312	.813	1.013
.022	J11B223	.312	.687	.887	J11C223	.312	.687	.887	J11D223	.312	.813	1.013
.027	J11B273	.312	.687	.887	J11C273	.312	.813	1.013	J11D273	.312	.813	1.013
.033	J11B333	.312	.687	.887	J11C333	.312	.813	1.013	J11D333	.400	.813	1.013
.039	J11B393	.312	.687	.887	J11C393	.400	.813	1.013	J11D393	.400	1.063	1.263
.047	J11B473	.312	.687	.887	J11C473	.400	.813	1.013	J11D473	.400	1.063	1.263
.05	J11B503	.312	.687	.887	J11C503	.400	.813	1.013	J11D503	.400	1.063	1.263
.056	J11B563	.312	.813	1.013	J11C563	.400	.813	1.013	J11D563	.400	1.063	1.263
.068	J11B683	.312	.813	1.013	J11C683	.400	.813	1.013	J11D683	.400	1.063	1.263
.082	J11B823	.312	.937	1.137	J11C823	.400	1.063	1.263	J11D823	.500	1.125	1.325
.1	J11B104	.312	.937	1.137	J11C104	.400	1.063	1.263	J11D104	.500	1.125	1.325
.12	J11B124	.312	1.063	1.263	J11C124	.500	1.125	1.325	J11D124	.500	1.375	1.575
.15	J11B154	.312	1.063	1.263	J11C154	.500	1.125	1.325	J11D154	.562	1.375	1.575
.18	J11B184	.400	1.063	1.263	J11C184	.500	1.125	1.325	J11D184	.562	1.375	1.575
.20	J11B204	.400	1.063	1.263	J11C204	.562	1.125	1.325	J11D204	.562	1.375	1.575
.22	J11B224	.400	1.063	1.263	J11C224	.562	1.125	1.325	J11D224	.562	1.375	1.575
.27	J11B274	.400	1.063	1.263	J11C274	.562	1.125	1.325	J11D274	.670	1.375	1.575
.33	J11B334	.500	1.125	1.325	J11C334	.562	1.125	1.325	J11D334	.670	1.375	1.575
.39	J11B394	.500	1.125	1.325	J11C394	.562	1.375	1.575	J11D394	.562	1.875	2.075
.47	J11B474	.562	1.125	1.325	J11C474	.670	1.375	1.575	J11D474	.670	1.875	2.075
.50	J11B504	.562	1.125	1.325	J11C504	.670	1.375	1.575	J11D504	.670	1.875	2.075
.56	J11B564	.562	1.125	1.325	J11C564	.670	1.375	1.575	J11D564	.670	1.875	2.075
.68	J11B684	.562	1.125	1.325	J11C684	.670	1.875	2.075	J11D684	.750	1.875	2.075
.82	J11B824	.562	1.375	1.575	J11C824	.670	1.875	2.075	J11D824	.750	1.875	2.075
1.0	J11B105	.670	1.375	1.575	J11C105	.670	1.875	2.075	J11D105	.750	1.875	2.075
1.5	J11B155	.670	1.875	2.075	J11C155	.750	1.875	2.075	J11D155	1.00	1.875	2.075
2.0	J11B205	.670	1.875	2.075	J11C205	1.00	1.875	2.075	J11D205	1.00	2.375	2.575

J11 - B - 104 - J - S - A

Style

Voltage
B=50VDC
C=100VDC
D=200VDC

Picofarad Code: First two digits represent significant figures, Last digit represents number of zeros to follow. Example: 104= 100,000 picofarads

Capacitance Tolerance
K=10% D = 1/2%
J=5% B = 1/4%
G=2% A = .1%
F=1%

Sleeving Code
S=Mylar Sleeve
X=No Sleeve

Lead Code
W=Tinned copper clad steel: #22 (.025") for .312" case dia. & smaller; #20(.032") for .400" case dia. & larger.

Component Research • 1655 26th St., Santa Monica, CA 90404 • (310) 829-3615 Fax (310) 829-9584

Component Research

Polystyrene Capacitor - J93

Specifications

Operating Temperature: -65°C to +85°C
At full rated voltage.

Dielectric Absorption: 0.02% maximum
At 25°C when measured per MIL-C-83421.

Dissipation Factor: 0.02% maximum
At 25°C when measured per MIL-C-83421

Dielectric Strength: 200% rated DC voltage
At 25°C from terminal to terminal & terminals to case for 60 seconds minimum.

Temperature Coefficient: -80 ±50 PPM/°C; For values 0.001uF to 0.0082uF; -60 ±50 PPM/°C; For values 0.01uF to 2.7uF
Special polystrene capacitors can be supplied with a temperature coefficient of -

Temperature Coefficient (cont.): 20 to -100 PPM/°C that is linear to ± 30 PPM/°C & ±10 PPM/°C. A wide selection is available of large uF values in bethtub & custom cases.

Capacitance Stability: ±0.03%
With five cycles from -25°C to +85°C

Hermetic Seal: $1x10^{-6}$ atm/cm^3/sec.
Maximum leak rate

Insulation Resistance: See Insulation Resistance Table
Measured from terminal to terminal at rated DC voltage and 5 minutes charge time. Values greater than 1 µF, allow an additional minute / µF charge time.

Minimum Insulation Resistance At Rated DC Voltage

For values over 0.1 µf divide limit shown by µF to obtain minimum I.R.

Example: A 2.0 µF capacitors at 25°C is 1,000,000/2 = 500,000 megohms.

Range	25°C	55°C	85°C
.001 to 0.1 F	10,000,000 Megohms	5,000,000 Megohms	1,000,000 Megohms
Greater Than 0.1µ F	1,000,000 Megohms- µF	500,000 Megohms- µF	100,000 Megohms- µF

Quality Conformance Inspection

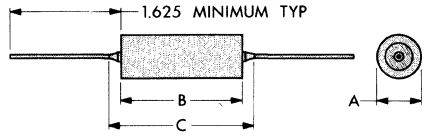
Test No.	Test	Test Conditions	Test Meth. MIL-C-83421	Test Limit	Quality Level A12
1	Burn-In	48 Hrs. minimum at 85°C, at 140% rated DC voltage	4.7.2	There shall be no physical damage	100% Test
2	Thermal Aging	5 cycles minimum from -65°C to +85°C	4.7.3	There shall be no physical damage	100% Test
3	Seal Test (Fine Leak)	Helium bomb 45 PSi for 1 hr. minimum, check for helium leak	4.7.5	$1x10^{-6}$ atm/cm^3/sec. max.	100% Test
4	Seal Test (Gross Leak)	Place in 85°C hot water for 60 seconds minimum & observe for bubbles	4.7.5	No continuous bubble stream	100% Test
5	AC square wave (Terminal to Terminal)	Apply 100 Hz at a peak to peak voltage of 3 times DC rated voltage for 60 seconds minimum. Do not exceed 800 volts peak to peak.	4.7.6	No shorts	100% Test
6	DC Hi-Pot (Terminal to Terminal and Terminals to case)	Apply 200% of rated DC voltage for 60 seconds minimum.	4.7.6	No shorts	100% Test
7	Insulation Resistance (Terminal to Terminal)	At 25°C at rated DC voltage	4.7.7	Per I.R. Table	100% Test
8	% Capacitance Tolerance	At 25°C at 1 KHz	4.7.8	Per Part Number	100% Test
9	% Dissipation Factor	At 25°C at 1 KHZ, values above 1 µF measure at 0.1 Khz	4.7.6	0.02% max.	100% Test
10	Visual and Mechanical Inspection	For marking dimensions, and workmanship	4.7.1	Per specification	1.0% AQL

Component Research

Polystyrene Capacitor - J93

Case Dimensions:
"A" Diameter
"B" Case Length
"C" Bead to Bead Max. Length

Tolerance Limits (inches)
±0.010 Without Sleeving; +0.02 / -0.00 With Mylar Sleeving
±0.03 With or Without Sleeving
The lengths shown in table are maximum and include solder beads.



Case Dimensions

For special values and tolerances please contact our application department

	50VDC				100VDC				200VDC				400VDC			
µF	Basic P/N	Diam. A	Length B	Length C	Basic P/N	Diam. A	Length B	Length C	Basic P/N	Diam. A	Length B	Length C	Basic P/N	Diam. A	Length B	Length C
.001	93B102	.193	.562	.662	93C102	.193	.687	.787	93D102	.235	.687	.787	93E102	.312	.687	.787
.0012	93B122	.193	.562	.662	93C122	.193	.687	.787	93D122	.235	.687	.787	93E122	.312	.687	.787
.0015	93B152	.193	.562	.662	93C152	.193	.687	.787	93D152	.235	.687	.787	93E152	.312	.687	.787
.0018	93B182	.193	.562	.662	93C182	.193	.687	.787	93D182	.235	.687	.787	93E182	.312	.687	.787
.002	93B202	.193	.562	.662	93C202	.193	.687	.787	93D202	.235	.687	.787	93E202	.312	.687	.787
.0022	93B222	.193	.562	.662	93C222	.193	.687	.787	93D222	.235	.687	.787	93E222	.312	.687	.787
.0027	93B272	.193	.562	.662	93C272	.193	.687	.787	93D272	.235	.687	.787	93E272	.312	.687	.787
.0033	93B332	.193	.562	.662	93C332	.193	.687	.787	93D332	.235	.687	.787	93E332	.312	.687	.787
.0039	93B392	.193	.562	.662	93C392	.193	.687	.787	93D392	.235	.687	.787	93E392	.312	.687	.787
.0047	93B472	.193	.562	.662	93C472	.193	.687	.787	93D472	.235	.687	.787	93E472	.312	.687	.787
.005	93B502	.193	.562	.662	93C502	.193	.687	.787	93D502	.235	.687	.787	93E502	.312	.687	.787
.0056	93B562	.193	.562	.662	93C562	.193	.687	.787	93D562	.235	.687	.787	93E562	.312	.687	.787
.0068	93B682	.193	.562	.662	93C682	.193	.687	.787	93D682	.235	.687	.787	93E682	.312	.687	.787
.0075	93B752	.193	.687	.787	93C752	.193	.813	.913	93D752	.235	.813	.913	93E752	.312	.813	.913
.0082	93B822	.193	.687	.787	93C822	.193	.813	.913	93D822	.235	.813	.913	93E822	.312	.813	.913
.01	93B103	.193	.687	.787	93C103	.193	.813	.913	93D103	.235	.813	.913	93E103	.312	.813	.913
.012	93B123	.193	.687	.787	93C123	.193	.813	.913	93D123	.235	.813	.913	93E123	.312	.813	.913
.015	93B153	.235	.687	.787	93C153	.235	.813	.913	93D153	.312	.813	.913	93E153	.400	.813	.913
.018	93B183	.235	.813	.913	93C183	.312	.813	.913	93D183	.400	.813	.913	93E183	.400	1.063	1.163
.02	93B203	.235	.813	.913	93C203	.312	.813	.913	93D203	.400	.813	.913	93E203	.400	1.063	1.163
.022	93B223	.235	.813	.913	93C223	.312	.813	.913	93D223	.400	.813	.913	93E223	.400	1.063	1.163
.027	93B273	.235	.813	.913	93C273	.312	.813	.913	93D273	.400	.813	.913	93E273	.400	1.063	1.163
.033	93B333	.235	.813	.913	93C333	.312	.813	.913	93D333	.400	.813	.913	93E333	.400	1.063	1.163
.039	93B393	.312	.813	.913	93C393	.400	.813	.913	93D393	.400	1.063	1.163	93E393	.500	1.125	1.225
.047	93B473	.312	.813	.913	93C473	.400	.813	.913	93D473	.400	1.063	1.163	93E473	.500	1.125	1.225
.05	93B503	.312	.813	.913	93C503	.400	.813	.913	93D503	.400	1.063	1.163	93E503	.500	1.125	1.225
.056	93B563	.312	.813	.913	93C563	.400	.813	.913	93D563	.400	1.063	1.163	93E563	.500	1.125	1.225
.068	93B683	.400	.813	.913	93C683	.400	1.063	1.163	93D683	.500	1.125	1.225	93E683	.500	1.375	1.475
.075	93B753	.400	.813	.913	93C753	.400	1.063	1.163	93D753	.500	1.125	1.225	93E753	.500	1.375	1.475
.082	93B823	.400	.813	.913	93C823	.400	1.063	1.163	93D823	.500	1.125	1.225	93E823	.500	1.375	1.475
.1	93B104	.400	.813	.913	93C104	.400	1.063	1.163	93D104	.500	1.125	1.225	93E104	.500	1.375	1.475
.12	93B124	.400	.813	.913	93C124	.400	1.063	1.163	93D124	.500	1.125	1.225	93E124	.500	1.375	1.475
.15	93B154	.400	1.063	.1.163	93C154	.500	1.125	1.125	93D154	.500	1.375	1.475	93E154	.562	1.375	1.475
.18	93B184	.400	1.063	1.163	93C184	.500	1.125	1.125	93D184	.500	1.375	1.475	93E184	.562	1.375	1.475
.20	93B204	.400	1.063	1.163	93C204	.500	1.125	1.125	93D204	.500	1.375	1.475	93E204	.562	1.375	1.475
.22	93B224	.400	1.063	1.163	93C224	.500	1.125	1.125	93D224	.500	1.375	1.475	93E224	.562	1.375	1.475
.27	93B274	.500	1.125	1.225	93C274	.500	1.375	1.475	93D274	.562	1.375	1.475	93E274	.670	1.375	1.475
.33	93B334	.500	1.125	1.225	93C334	.500	1.375	1.475	93D334	.562	1.375	1.475	93E334	.670	1.375	1.475
.39	93B394	.500	1.375	1.475	93C394	.562	1.375	1.475	93D394	.670	1.375	1.475	93E394	.670	1.875	1.975
.47	93B474	.562	1.375	1.475	93C474	.670	1.375	1.475	93D474	.670	1.875	1.975	93E474	.750	1.875	1.975
.50	93B504	.562	1.375	1.475	93C504	.670	1.375	1.475	93D504	.670	1.875	1.975	93E504	.750	1.875	1.975
.56	93B564	.562	1.375	1.475	93C564	.670	1.375	1.475	93D564	.670	1.875	1.975	93E564	.750	1.875	1.975
.68	93B684	.670	1.375	1.475	93C684	.670	1.875	1.975	93D684	.750	1.875	1.975	93E684	1.000	1.875	1.975
.75	93B754	.670	1.875	1.975	93C754	.750	1.875	1.975	93D754	1.000	1.875	1.975	93E754	1.000	2.375	2.475
.82	93B824	.670	1.875	1.975	93C824	.750	1.875	1.975	93D824	1.000	1.875	1.975	93E824	1.000	2.375	2.475
1.0	93B105	.670	1.875	1.975	93C105	.750	1.875	1.975	93D105	1.000	1.875	1.975	93E105	1.000	2.375	2.475
1.2	93B125	.750	1.875	1.975	93C125	1.000	1.875	1.975								
1.5	93B155	.750	1.875	1.975	93C155	1.000	1.875	1.975								
1.8	93B185	1.000	1.875	1.975	93C185	1.000	2.375	2.475								
2.0	93B205	1.000	1.875	1.975	93C205	1.000	2.375	2.475								
2.2	93B225	1.000	1.875	1.975												
2.5	93B255	1.000	2.375	2.225												
2.7	93B275	1.000	2.375	2.225												

J93 - B - 104 - J - S - W

Style

Voltage
B=50VDC
C=100VDC
D=200VDC
E=400VDC

Picofarad Code: First two digits represent significant figures, Last digit represents number of zeros to follow. Example: 104= 100,000 picofarads

Capacitance Tolerance
K=10% F=1% B=1/4%
J=5% D=1/2% A=.1%
G=2%

Sleeving Code
S=Mylar Sleeve
X=No Sleeve

Lead Code
W=Tinned copper clad steel: #22 (.025") for .312" case dia. & smaller; #20(.032") for .400" & .500" case dia.

Component Research • 1655 26th St., Santa Monica, CA 90404 • (310) 829-3615 Fax (310) 829-9584

Component Research

Foil Polycarbonate Capacitor - A52

Specifications

Construction: Polycarbonate dielectric, extended foil electrodes, hermetically sealed, leads isolated from case.

Environmental: Capacitors meet all environmental requirements of MIL-C-8321 except vibration & shock. Vibration is at 20g's & shock at 50G's.

Operating Temperature: -65°C to +100°C
At full rated voltage, derate linearly to 50% of rated voltage at 125°C.

Dielectric Absorption: 0.1% maximum
At 25°C when measured per MIL-C-83421.

Dissipation Factor: 0.15% maximum
At 25°C when measured per MIL-C-83421

AC Square Wave: 100 Hz, 60 seconds minimum
At 25°C at a peak to peak voltage of 3 times rated DC voltage, terminal to terminal per MIl-C-83421.

Dielectric Strength: 200% rated DC voltage
At 25°C from terminal to terminal to case for 60 seconds minimum.

Temperature Coefficient: ±2% maximum capacitance change; From -55°C to +125°C

Capacitance Stability: ±0.2.5%
When measured at any two corresponding temperature points taken in five successive temperature cycles from -65°C to +125°C.

Hermetic Seal: $1x10^{-6}$ atm/cm^3/sec. Maximum leak rate

Insulation Resistance: See Insulation Resistance Table
Measured from terminal to terminal at rated DC voltage and 5 minutes charge time. Values greater than 1 µF, allow an additional minute / µF charge time.

Minimum Insulation Resistance At Rated DC Voltage

For values over 0.1 µf divide limit shown by µF to obtain minimum I.R.

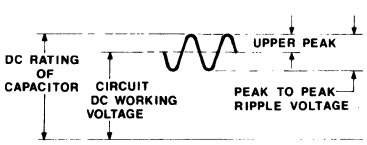
Example: A 0.18 µF capacitance at 25°C is 100,000/0.18 = 555,000 megohms

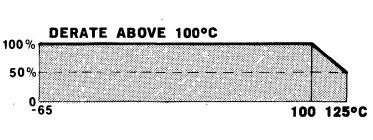
Range	25°C	85°C	125°C
.001 to 0.1 F	1,000,000 Megohms	500,000 Megohms	30,000 Megohms
Greater Than 0.1µ F	100,000 Megohms- µF	50,000 Megohms- µF	3,000 Megohms- µF

Quality Conformance Inspection

Test No.	Test	Test Conditions	Test Meth. MIL-C-83421	Test Limit	Quality Level A12
1	Burn-In	48 Hrs. minimum at 100°C, at 120% rated DC voltage at 400Hz not to exceed 240VRMS	4.7.2	No physical damage	100% Test
2	Thermal Aging	10 cycles minimum from -65°C to +125°C	4.7.3	No physical damage	100% Test
3	Sel Test (Gross Leak)	Per MIL-C-83421	4.7.5	No continuous bubble stream	100% Test
4	AC square wave	Apply 100 Hz at a peak to peak voltage of 3 times DC rated voltage for 60 seconds minimum. Do not exceed 800 volts peak to peak.	4.7.6	No shorts	100% Test
5	DC Hi-Pot (Terminal to Terminal and Terminals to case)	Apply 200% of rated DC voltage for 60 seconds minimum.	4.7.6	No shorts	100% Test
6	Insulation Resistance (Terminal to Terminal)	At 25°C at rated DC voltage	4.7.7	100,000 megohms-uF, need not exceed 1,000,000 megohms	100% Test
7	% Capacitance Tolerance	At 25°C at 1 KHz	4.7.8	Per Part Number	100% Test
8	% Dissipation Factor	At 25°C at 10 KHZ	4.7.9	25% max.	100% Test
9	Visual and Mechanical Inspection	For marking dimensions, and workmanship	4.7.1	Per specification	1.0% AQL

1. The combined DC & AC voltages should not exceed the DC ratings, see figure.
2. Capacitors may be operated at higher frequencies, at reduced RMS voltage such that max. AC current ratings are not exceeded.
3. Type A52 capacitors can handle much higher pulse repetition rates than metallized capacitors.



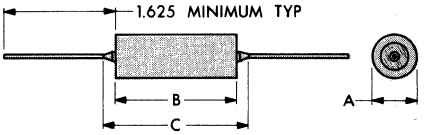


Component Research

Foil Polycarbonate Capacitor - A52

Case Dimensions:
"A" Diameter
"B" Case Length
"C" Bead to Bead Max. Length

Tolerance Limits (inches)
±0.10 Without Sleeving; +0.02 / -0.00 With Mylar Sleeving
±0.03 With or Without Sleeving
"C" Dimensions is 0.2" maximum more than "B" dimension in table



Case Dimensions - AC Ratings

For special values and tolerances please contact our application department

	Type A52C 100 VDC					Type A52D 200 VDC					Type A52V 300 VDC					Type A52E 400 VDC				
			AC Ratings					AC Ratings					AC Ratings					AC Ratings		
uF	Dia. A	Length B	Max. RMS Volts 20 KHz	Max. RMS Volts 100 KHz	Max. RMS Amps	Dia. A	Length B	Max. RMS Volts 20 KHz	Max. RMS Volts 100 KHz	Max. RMS Amps	Dia. A	Length B	Max. RMS Volts 20 KHz	Max. RMS Volts 100 KHz	Max. RMS Amps	Dia. A	Length B	Max. RMS Volts 20 KHz	Max. RMS Volts 100 KHz	Max. RMS Amps
.001	.193	.562	60	60	.038	.193	.562	120	120	.075	.193	.562	180	180	.113	.193	.687	240	240	.15
.0012	.193	.562	60	60	.045	.193	.562	120	120	.090	.193	.562	180	180	.135	.193	.687	240	240	.18
.0015	.193	.562	60	60	.056	.193	.562	120	120	.112	.193	.562	180	180	.169	.193	.687	240	240	.22
.0018	.193	.562	60	60	.067	.193	.562	120	120	.135	.193	.562	180	180	.202	.193	.687	240	240	.27
.002	.193	.562	60	60	.075	.193	.562	120	120	.150	.193	.562	180	180	.225	.193	.687	240	240	.30
.0022	.193	.562	60	60	.083	.193	.562	120	120	.165	.193	.562	180	180	.248	.193	.687	240	240	.33
.0027	.193	.562	60	60	.101	.193	.562	120	120	.202	.193	.687	180	180	.304	.193	.687	240	240	.4
.0033	.193	.562	60	60	.124	.193	.562	120	120	.247	.193	.687	180	180	.371	.193	.687	240	240	.5
.0039	.193	.562	60	60	.146	.193	.562	120	120	.293	.193	.687	180	180	.439	.193	.687	240	240	.6
.0047	.193	.562	60	60	.176	.193	.687	120	120	.353	.193	.687	180	180	.529	.235	.687	240	240	.7
.005	.193	.562	60	60	.188	.193	.687	120	120	.375	.193	.687	180	180	.562	.235	.687	240	240	.75
.0056	.193	.562	60	60	.210	.193	.687	120	120	.420	.193	.687	180	180	.623	.235	.687	240	240	.85
.0068	.193	.687	60	60	.255	.193	.687	120	120	.511	.235	.687	180	180	.766	.312	.687	240	240	1.0
.0075	.193	.687	60	60	.282	.235	.687	120	120	.563	.235	.687	180	180	.845	.312	.687	240	240	1.13
.0082	.193	.687	60	60	.308	.235	.687	120	120	.615	.235	.687	180	180	.923	.312	.687	240	240	1.23
.01	.235	.687	60	60	.375	.235	.687	120	120	.750	.312	.687	180	180	1.13	.312	.687	240	224	1.4
.012	.235	.687	60	60	.451	.235	.687	120	120	.902	.312	.687	180	172	1.3	.312	.687	240	200	1.5
.015	.235	.687	60	60	.561	.312	.687	120	120	1.12	.312	.687	180	150	1.4	.312	.813	240	190	1.8
.018	.312	.687	60	60	.674	.312	.687	120	120	1.35	.312	.687	180	134	1.5	.312	.813	240	178	2.0
.02	.312	.687	60	60	.750	.312	.687	120	112	1.4	.312	.813	180	132	1.65	.400	.813	240	168	2.1
.022	.312	.687	60	60	.822	.312	.687	120	110	1.5	.312	.813	180	130	1.8	.400	.813	240	158	2.2
.027	.312	.687	60	60	1.02	.312	.813	120	106	1.8	.312	.813	180	118	2.0	.400	.813	240	148	2.5
.033	.312	.687	60	60	1.22	.312	.813	120	98	2.0	.400	.813	180	108	2.2	.400	1.063	240	130	2.7
.039	.312	.813	60	60	1.46	.400	.813	120	90	2.2	.400	.813	180	98	2.4	.400	1.063	240	117	2.9
.047	.312	.813	60	60	1.76	.400	.813	120	82	2.4	.400	.813	180	85	2.5	.400	1.063	240	102	3.0
.05	.400	.813	60	60	1.88	.400	.813	120	80	2.5	.400	1.063	180	83.2	2.6	.500	1.125	240	102	3.2
.056	.400	.813	60	60	2.07	.400	.813	120	73	2.5	.400	1.063	180	78	2.7	.500	1.125	240	100	3.5
.068	.400	.813	60	53	2.2	.400	1.063	120	65	2.7	.400	1.063	180	67	2.8	.500	1.125	240	96	4.0
.075	.400	.813	60	50	2.4	.400	1.063	120	61	2.9	.400	1.063	180	63	3.0	.500	1.375	240	97	4.6
.082	.400	.813	60	49	2.5	.400	1.063	120	59	3.0	.500	1.125	180	61	3.15	.500	1.375	240	98	5.0
.1	.400	1.063	60	44	2.7	.500	1.125	120	55	3.4	.500	1.125	180	56	3.50	.562	1.375	240	85	5.3
.12	.400	1.063	60	37	2.8	.500	1.125	120	48	3.6	.500	1.125	180	53	4.00	.562	1.375	240	75	5.6
.15	.400	1.063	60	37	2.9	.500	1.125	120	43	4.00	.500	1.375	180	48	4.50	.562	1.375	240	53	6.0
.18	.400	1.063	60	27	3.0	.500	1.375	120	40	4.50	.500	1.375	180	45	5.00					
.20	.500	1.125	60	26	3.3	.500	1.375	120	38	4.75	.562	1.375	180	45	5.63					
.22	.500	1.125	60	25	3.4	.500	1.375	120	37	5.00	.562	1.375	180	45	6.00					
.27	.500	1.125	60	22	3.8	.562	1.375	120	33	5.50										
.33	.500	1.125	60	20	4.13	.562	1.375	120	29	6.00										
.39	.500	1.375	60	20	5.00															
.47	.562	1.375	60	20	6.00															

A52 - C - 104 - J - S - W

Style

Voltage
C=100VDC
D=200VDC
V=300VDC
E=400VDC

Picofarad Code: First two digits represent significant figures, Last digit represents number of zeros to follow. Example: 104= 100,000 picofarads

Capacitance Tolerance
K=10% G=2%
J=5% F=1%

Sleeving Code
S=Mylar Sleeve
X=No Sleeve

Lead Code
W=Tinned copper clad steel: #22 (.025") for .312" case dia. & smaller; #20(.032") for .400" & .500" case dia.
C=Tinned oxygen-free copper: #18 (.040") for .562" case dia. & larger.

Component Research • 1655 26th St., Santa Monica, CA 90404 • (310) 829-3615 Fax (310) 829-9584

Foil Polycarbonate Capacitor B52 • Dimensions & AC Ratings

Type B52F 400 VRMS Rated								Type B52P 600 VRMS Rated							
	600VDC Rated or 600 Volts Peak (AC Plus DC Volts)			Max. AC Rating -65°C to 100°C				800VDC Rate or 840 Volts Peak (AC Plus DC Volts)			Max. AC Rating -65°C to 100°C			
mF	Part No.	D	L	RMS Volts at 400Hz	RMS Volts at 4KHz	RMS Volts at 40KHz	Max. RMS Amps	Part No.	D	L	RMS Volts at 400Hz	RMS Volts at 4KHz	RMS Volts at 40KHz	Max. RMS Amps
.033	B52F333KSC	.400	1.063	400	400	360	3.0	B52P333KSC	.500	1.375	600	600	600	5.0
.039	B52F393KSC	.400	1.063	400	400	308	3.0	B52P393KSC	.500	1.375	600	600	513	5.0
.047	B52F473KSC	.500	1.125	400	400	306	3.6	B52P473KSC	.500	1.375	600	600	426	5.0
.056	B52F563KSC	.500	1.125	400	400	255	3.6	B52P563KSC	.500	1.375	600	600	357	5.0
.068	B52F683KSC	.500	1.125	400	400	235	4.0	B52P683KSC	.562	1.375	600	600	353	6.0
.075	B52F753KSC	.500	1.375	400	400	235	4.4	B52P753KSC	.562	1.375	600	600	320	6.0
.082	B52F823KSC	.500	1.375	400	400	235	4.8	B52P823KSC	.562	1.375	600	600	293	6.0
.092	B52F923KSC	.562	1.375	400	400	230	5.3	B52P923KSC	.670	1.375	600	600	305	7.0
.1	B52F104KSC	.562	1.375	400	400	220	5.5	B52P104KSC	.670	1.375	600	600	280	7.0
.12	B52F124KSC	.562	1.375	400	400	200	6.0	B52P124KSC	.670	1.375	600	600	233	7.0
.15	B52F154KSC	.562	1.375	400	400	160	6.0	B52P154KSC	.670	1.875	600	600	214	8.0
.18	B52F184KSC	.670	1.375	400	400	155	7.0	B52P184KSC	.670	1.875	600	600	178	8.0
.22	B52F224KSC	.670	1.375	400	400	127	7.0	B52P224KSC	.670	1.875	600	600	146	8.0
.27	B52F274KSC	.670	1.875	400	400	118	8.0	B52P274KSC	.750	1.875	600	600	133	9.0
.33	B52F334KSC	.670	1.875	400	400	97	8.0	B52P334KSC	.750	1.875	600	600	109	9.0
.39	B52P394KSC	.670	1.875	400	400	82	8.0	B52P394KSC	.750	2.375	600	600	103	10.0
.47	B52F474KSC	.750	1.875	400	400	77	9.0	B52P474KSC	.750	2.375	600	600	85.1	10.0
.56	B52F564KSC	.750	1.875	400	400	64	9.0							
.68	B52F684KSC	.750	2.375	400	400	53	9.0							
.75	B52F754KSC	.750	2.375	400	400	53	10.0							
.82	B52F824KSC	.750	2.375	400	400	49	10.0							

Metallized Polycarbonate Capacitor B12 • Dimensions & AC Ratings

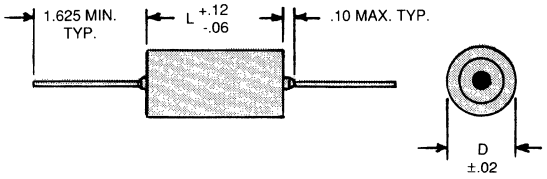
Type B12F 400 VRMS Rated								Type B12P 600 VRMS Rated							
	600VDC Rated or 600 Volts Peak (AC Plus DC Volts)			Max. AC Rating -65°C to 100°C				800VDC Rate or 840 Volts Peak (AC Plus DC Volts)			Max. AC Rating -65°C to 100°C			
uF	Part No.	D	L	RMS Volts at 400Hz	RMS Volts at 4KHz	RMS Volts at 40KHz	Max. RMS Amps	Part No.	D	L	RMS Volts at 400Hz	RMS Volts at 4KHz	RMS Volts at 40KHz	Max. RMS Amps
.01	B12F103KSW	.312	.813	400	400	400	1.0	B12P103KSC	.400	1.063	600	600	600	1.5
.012	B12F123KSW	.312	.813	400	400	400	1.2	B12P123KSC	.400	1.063	600	600	600	1.8
.015	B12F153KSW	.312	.813	400	400	400	1.5	B12P153KSC	.400	1.063	600	600	600	2.3
.018	B12F183KSW	.312	.813	400	400	355	1.6	B12P183KSC	.400	1.063	600	600	600	2.7
.022	B12F223KSC	.400	.813	400	400	309	1.7	B12P223KSC	.400	1.063	600	600	509	2.8
.027	B12F273KSC	.400	.813	400	400	252	1.7	B12P273KSC	.400	1.063	600	600	414	2.8
.033	B12F333KSC	.400	.813	400	400	218	1.8	B12P333KSC	.400	1.063	600	600	339	2.8
.039	B12F393KSC	.400	.813	400	400	205	2.0	B12P393KSC	.500	1.063	600	600	287	2.8
.047	B12F473KSC	.400	1.063	400	400	187	2.2	B12P473KSC	.500	1.125	600	600	272	3.2
.056	B12F563KSC	.400	1.063	400	400	164	2.3	B12P563KSC	.500	1.125	600	600	236	3.3
.068	B12F683KSC	.400	1.063	400	400	159	2.7	B12P683KSC	.500	1.125	600	600	200	3.4
.075	B12F753KSC	.400	1.063	400	400	149	2.8	B12P753KSC	.500	1.375	600	600	200	3.75
.082	B12F823KSC	.500	1.125	400	400	146	3.0	B12P823KSC	.500	1.375	600	600	195	4.0
.092	B12F923KSC	.500	1.125	400	400	140	3.2	B12P923KSC	.562	1.375	600	600	191	4.4
.1	B12F104KSC	.500	1.125	400	400	128	3.2	B12P104KSC	.562	1.375	600	600	180	4.5
.12	B12F124KSC	.500	1.375	400	400	110	3.3	B12P124KSC	.562	1.375	600	600	160	4.8
.15	B12F154KSC	.500	1.375	400	400	110	4.1	B12P154KSC	.562	1.375	600	600	134	5.0
.18	B12F184KSC	.562	1.375	400	400	95	4.3	B12P184KSC	.670	1.375	600	600	120	5.4
.22	B12F224KSC	.562	1.375	400	400	91	5.0	B12P224KSC	.670	1.375	600	600	102	5.6
.27	B12F274KSC	.562	1.375	400	400	74	5.0	B12P274KSC	.670	1.875	600	600	101	6.8
.33	B12F334KSC	.670	1.375	400	400	67	5.5	B12P334KSC	.670	1.875	600	600	82	6.8
.39	B12F394KSC	.670	1.375	400	400	57	5.5	B12P394KSC	.670	1.875	600	600	70	6.8
.47	B12F474KSC	.670	1.875	400	400	47	5.5	B12P474KSC	.750	1.875	600	600	61	7.2
.56	B12F564KSC	.670	1.875	400	400	42	5.9	B12P564KSC	.750	1.875	600	535	53.5	7.5
.68	B12F684KSC	.670	1.875	400	400	40	6.8	B12P684KSC	.750	1.875	600	470	47	8.0
.75	B12F754KSC	.750	1.875	400	400	40	7.5	B12P754KSC	.750	2.375	600	533	53.3	10.0
.82	B12F824KSC	.750	1.875	400	366	36	7.5	B12P824KSC	1.0	2.375	600	488	48.8	11.0
.92	B12F924KSC	.750	2.375	400	370	37	8.5							
1.0	B12F105KSC	.750	2.375	400	340	34	8.5							
1.2	B12F125KSC	.750	2.375	400	333	33.3	10.0							

Technical & Ordering Information B52 & B12

Technical Information: High Current AC Power Capacitors rated to 40 Khz, 400 VAC (600 VDC), 600 VAC (800 VDC) -65 to +100°C,100% A.C. Burn-in @ 400 Hz @ 100°C, Snubber and pulse applications

Ordering Information: Part numbers listed in the table have a capacitance tolerance of ±10% (other tolerances are available on special order).

Part Dimensions and Tolerances



LEAD SIZE: .032 ±.003 (#20AWG) Tinned copper-clad steel for case diameter .312, .041±.003 (#18AWG) tinned copper for case diameter .400 and larger

CRC Component Research • 1655 26th St., Santa Monica, CA 90404 • (310) 829-3615 Fax (310) 829-9584

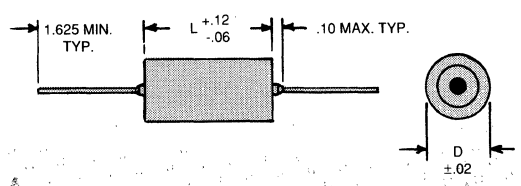
Foil Polypropylene Capacitor B55 • Dimensions & Ratings •

Type B55F 400 VRMS Rated	600VDC Rated or 600 Volts Peak (AC Plus DC Volts)			Max. AC Rating -55°C to 85°C				Type B55P 600 VRMS Rated	800VDC Rated or 800 Volts Peak (AC Plus DC Volts)			Max. AC Rating -55°C to 85°C			
uF	Part No.	D	L	RMS Volts at 400Hz	RMS Volts at 4KHz	RMS Volts at 40KHz	Max. RMS Amps	Part No.	D	L	RMS Volts at 400Hz	RMS Volts at 4KHz	RMS Volts at 40KHz	Max. RMS Amps
.033	B55F333KSC	.400	1.063	400	400	400	4	B55P333KSC	.500	1.375	600	600	600	6
.039	B55F393KSC	.400	1.063	400	400	400	4	B55P393KSC	.500	1.375	600	600	600	6
.047	B55F473KSC	.500	1.125	400	400	400	5	B55P473KSC	.500	1.375	600	600	511	6
.056	B55F563KSC	.500	1.125	400	400	357	5	B55P563KSC	.500	1.375	600	600	428	6
.068	B55F683KSC	.500	1.125	400	400	294	5	B55P683KSC	.562	1.375	600	600	412	7
.075	B55F753KSC	.500	1.375	400	400	320	6	B55P753KSC	.562	1.375	600	600	373	7
.082	B55F823KSC	.500	1.375	400	400	293	6	B55P823KSC	.562	1.375	600	600	342	7
.092	B55F923KSC	.562	1.375	400	400	305	7	B55P923KSC	.670	1.375	600	600	348	8
.1	B55F104KSC	.562	1.375	400	400	280	7	B55P104KSC	.670	1.375	600	600	360	8
.12	B55F124KSC	.562	1.375	400	400	233	7	B55P124KSC	.670	1.375	600	600	266	8
.15	B55F154KSC	.562	1.375	400	400	187	7	B55P154KSC	.670	1.875	600	600	214	8
.18	B55F184KSC	.670	1.375	400	400	178	8	B55P184KSC	.670	1.875	600	600	200	9
.22	B55F224KSC	.670	1.375	400	400	146	8	B55P224KSC	.670	1.875	600	600	164	9
.27	B55F274KSC	.670	1.875	400	400	133	9	B55P274KSC	.750	1.875	600	600	178	12
.33	B55F334KSC	.670	1.875	400	400	109	9	B55P334KSC	.750	1.875	600	600	145	12
.39	B55P394KSC	.670	1.875	400	400	92.7	9	B55P394KSC	.750	2.375	600	600	144	14
.47	B55F474KSC	.750	1.875	400	400	102.0	12	B55P474KSC	.750	2.375	600	600	119	14
.56	B55F564KSC	.750	1.875	400	400	85.7	12							
.68	B55F684KSC	.750	2.375	400	400	70.6	12							
.75	B55F754KSC	.750	2.375	400	400	74.6	14							
.82	B55F824KSC	.750	2.375	400	400	68.3	14							

Metallized Polypropylene Capacitor B15 • Dimensions & Ratings •

Type B15F 400 VRMS Rated	600VDC Rated or 600 Volts Peak (AC Plus DC Volts)			Max. AC Rating -65°C to 100°C				Type B15P 600 VRMS Rated	800VDC Rate or 840 Volts Peak (AC Plus DC Volts)			Max. AC Rating -65°C to 100°C			
uF	Part No.	D	L	RMS Volts at 400Hz	RMS Volts at 4KHz	RMS Volts at 40KHz	Max. RMS Amps	Part No.	D	L	RMS Volts at 400Hz	RMS Volts at 4KHz	RMS Volts at 40KHz	Max. RMS Amps
.01	B15F103KSW	.312	.813	400	400	400	2.5	B15P103KSC	.400	1.063	600	600	600	3.5
.012	B15F123KSW	.312	.813	400	400	400	2.5	B15P123KSC	.400	1.063	600	600	600	3.5
.015	B15F153KSW	.312	.813	400	400	400	2.5	B15P153KSC	.400	1.063	600	600	600	3.5
.018	B15F183KSW	.312	.813	400	400	400	2.5	B15P183KSC	.400	1.063	600	600	600	3.5
.022	B15F223KSC	.400	.813	400	400	400	3.0	B15P223KSC	.400	1.063	600	600	600	3.5
.027	B15F273KSC	.400	.813	400	400	400	3.0	B15P273KSC	.400	1.063	600	600	518	3.5
.033	B15F333KSC	.400	.813	400	400	364	3.0	B15P333KSC	.400	1.063	600	600	424	3.5
.039	B15F393KSC	.400	.813	400	400	308	3.0	B15P393KSC	.400	1.063	600	600	369	3.5
.047	B15F473KSC	.400	1.063	400	400	298	3.5	B15P473KSC	.500	1.125	600	600	340	4
.056	B15F563KSC	.400	1.063	400	400	250	3.5	B15P563KSC	.500	1.125	600	600	286	4
.068	B15F683KSC	.400	1.063	400	400	206	3.5	B15P683KSC	.500	1.125	600	600	235	4
.075	B15F753KSC	.400	1.063	400	400	187	3.5	B15P753KSC	.500	1.375	600	600	267	5
.082	B15F823KSC	.500	1.125	400	400	195	4	B15P823KSC	.500	1.375	600	600	244	5
.092	B15F923KSC	.500	1.125	400	400	174	4	B15P923KSC	.562	1.375	600	600	261	6
.1	B15F104KSC	.500	1.125	400	400	160	4	B15P104KSC	.562	1.375	600	600	240	6
.12	B15F124KSC	.500	1.375	400	400	167	5	B15P124KSC	.562	1.375	600	600	200	6
.15	B15F154KSC	.500	1.375	400	400	134	5	B15P154KSC	.562	1.375	600	600	160	6
.18	B15F184KSC	.562	1.375	400	400	133	6	B15P184KSC	.670	1.375	600	600	155	7
.22	B15F224KSC	.562	1.375	400	400	109	6	B15P224KSC	.670	1.375	600	600	127	7
.27	B15F274KSC	.562	1.375	400	400	88.8	6	B15P274KSC	.670	1.875	600	600	118	8
.33	B15F334KSC	.670	1.375	400	400	84.7	7	B15P334KSC	.670	1.875	600	600	96.8	8
.39	B15F394KSC	.670	1.375	400	400	72.1	7	B15P394KSC	.670	1.875	600	600	82.4	8
.47	B15F474KSC	.670	1.875	400	400	68.1	8	B15P474KSC	.750	1.875	600	600	93.6	11
.56	B15F564KSC	.670	1.875	400	400	57	8	B15P564KSC	.750	1.875	600	600	78.5	11
.68	B15F684KSC	.670	1.875	400	400	47	8	B15P684KSC	.750	1.875	600	600	64.7	11
.75	B15F754KSC	.750	1.875	400	400	58.6	11	B15P754KSC	.750	2.375	600	600	69.3	13
.82	B15F824KSC	.750	1.875	400	366	53.7	11	B15P824KSC	1.0	2.375	600	600	63.4	15
.92	B15F924KSC	.750	2.375	400	370	56.6	13							
1.0	B15F105KSC	.750	2.375	400	340	52	13							
1.2	B15F125KSC	.750	2.375	400	333	43.3	13							

Part Dimensions and Tolerances



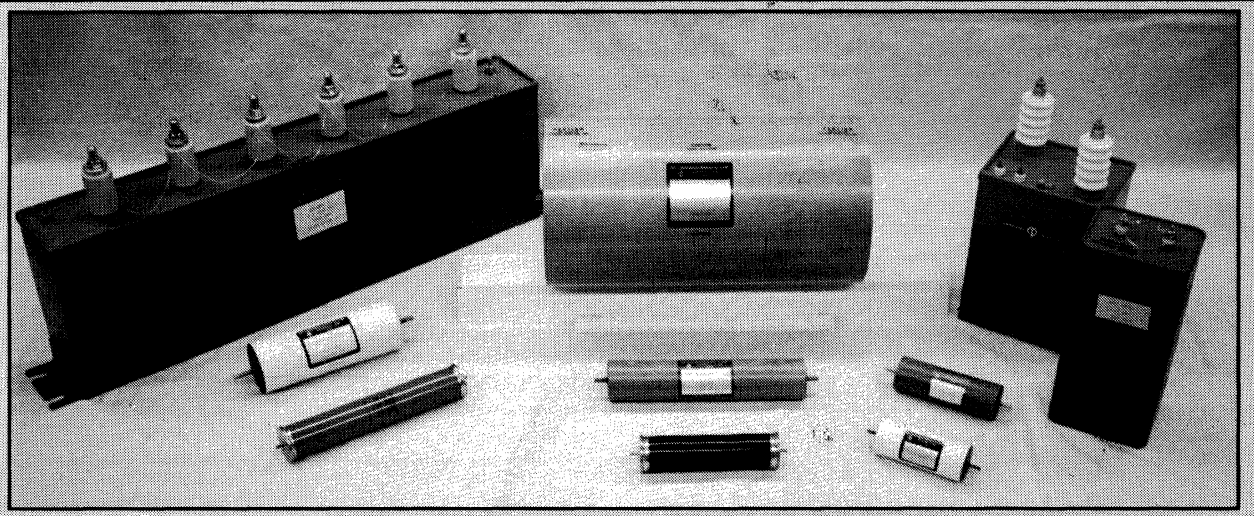
LEAD SIZE: .032 ±.003 (#20AWG) Tinned copper-clad steel for case diameter .312, .041 ± .003 (#18AWG) tinned copper for case diameter .400 and larger

Technical & Ordering Information B55 & B15

Technical Information: High Current AC Power Capacitors rated to 40 Khz, 400 VAC (600 VDC), 600 VAC (800 VDC) -65 to +85°C
100% A.C. Burn-in @ 400 Hz @ 85°C, Resonant power applications.

Ordering Information: Part numbers listed in the table have a capacitance tolerance of ±10% (other tolerances are available on special order).

High Voltage, Oil Filled Capacitors



Our Capacitors & Their Applications

KM & CPO Series	Composite dielectric of kraft tissue &polyester film with a mineral oil impregnant. A proven standard for the industry, with DC filter, limited AC, and pulse discharge applications.
KN Series	Composite dielectric of kraft tissue & polypropylene film. An economical unit for DC filter, limited AC, and pulse applications.
NS & TS Series	Polypropylene film & teflon film respectively, with a silicone fluid impregnant. Extremely low loss & excellent high frequency characteristics allow for very high rep. rate discharge service and high frequency operation into the megahertz band.
NX Series	Ideally suited for pulse and AC applications. Low loss characteristics allow operation in both pulse discharge and AC applications up to 10 kilohertz (when operated in accordance with the applicable derating graphs for both maximum operating voltage and temperature).
MO Series	Very efficient performer for low voltage and high capacitance applications – i.e., pulse discharge, induction heating, flash photolysis, DC filter. More compact for low voltage applications compared to other standard rated capacitors.

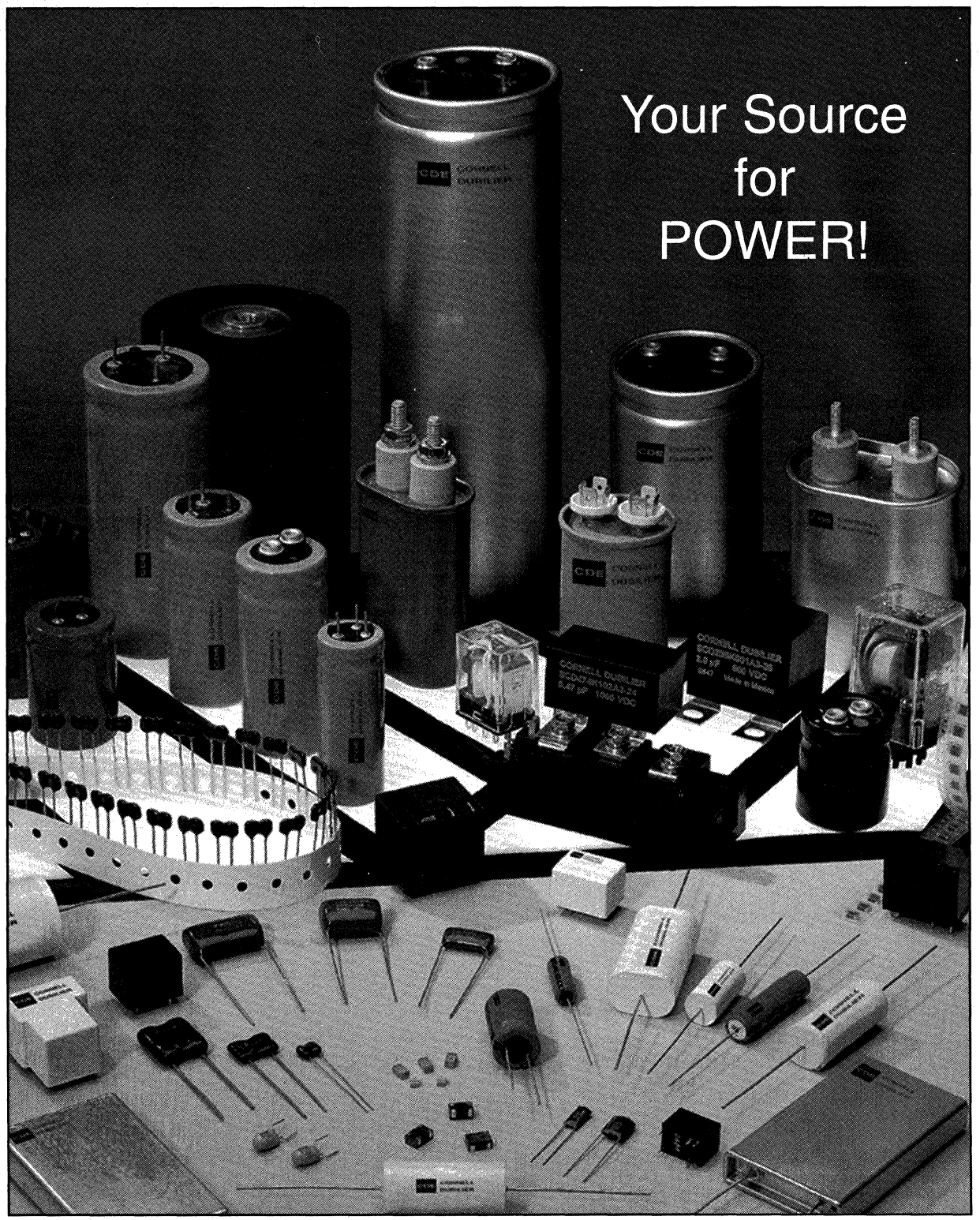
Our Capacitor Specifications

SERIES	CONTAINER	CAPACITANCE MAXIMUM	VOLTAGE MAXIMUM	TEMPERATURE	DIELECTRIC SYSTEM
					KM/CPO
KMOC	CAN	500 mfd.	150KV	-40°C to +85°C	Kraft/Mylar
KMOB	PHENOLIC TUBE	150 mfd.	250 KV	-55°C to +85°C	Kraft/Mylar
KMOP	THERMO PLASTIC TUBE	150 mfd.	250KV	-40°C to +65°C	Kraft/Mylar
KMOG	GLASS	2 mfd.	100 KV	-40°C to +85°C	Kraft/Mylar
CPOC	CAN	500 mfd.	150 KV	-40°C to +85°C	Kraft/Mylar
					KN
KNOC	CAN	300 mfd.	150 KV	-40°C to +65°C *	Kraft/Polypropylene
KNOB	PHENOLIC TUBE	150 mfd.	250 KV	-40°C to +65°C *	Kraft/Polypropylene
KNOP	THERMO PLASTIC TUBE	150 mfd.	250 KV	-40°C to +65°C	Kraft/Polypropylene
KNOG	GLASS	2 mfd.	100 KV	-40°C to +65°C *	Kraft/Polypropylene
					N
NSC	CAN	50 mfd.	50 KV	-40°C to +65°C *	Polypropylene
NSB	PHENOLIC TUBE	60 mfd.	100 KV	-40°C to +65°C *	Polypropylene
NSG	GLASS	1 mfd.	60 KV	-40°C to +65°C *	Polypropylene
					T
TSC	CAN	5 mfd.	50 KV	-55°C to +125°C	Teflon
TSB	PHENOLIC TUBE	1.5 mfd.	100 KV	-55°C to +125°C	Teflon
TSG	GLASS	.04 mfd.	60 KV	-55°C to +125°C	Teflon
					N
NXC	CAN	200 mfd.	3,000 VAC	-40°C to +65°C *	Polypropylene
NXB	PHENOLIC TUBE	60 mfd.	70,000 VAC	-40°C to +65°C *	Polypropylene
NXG	GLASS	3 mfd.	30,000 VAC	-40°C to +65°C *	Polypropylene
					M
MOC	CAN	250 mfd.	3,000 V/Peak	-55°C to +85°C	Mylar

* Derated to 85°C

Condenser Products
2131 Broad St., Brooksville, FL 34609
Phone (352) 796-3561 • Fax (352) 799-0221

1-800-382-6874
E-mail:sales@condenser.com
Website: http://www.condenser.com



CDE CORNELL DUBILIER
An ISO 9000 Registered Company

Corporate HQ:	Wayne, NJ	(973) 694-8600
Aluminum Electrolytics:	Liberty, SC	(864) 843-2277
Relays:	Calexico, CA	(011) 526-561-6519
All Other Products:	New Bedford, MA	(508) 996-8564

http://www.cornell-dubilier.com

See Our Other Page In Volume B, Section 4500

Aluminum Electrolytic Capacitors

Cornell Dubilier manufactures a broad variety of aluminum electrolytic capacitors. Types include Axial Leaded, Radial Leaded, Snapmount and Computer Grades. Some of CDE's more popular aluminum electrolytics include:

❑ Type 7P Photoflash Capacitors with 10-times the Life:

Rated Voltage:	330 or 360 Vdc
Capacitance:	300 to 2800 µF -10% +20%
Discharge Life:	100,000 minimum at 30 s interval
Shelf Life:	500 h at 55°C
Oper. Temp. Range:	-20°C to 55°C
Case Sizes:	30 x 25mm to 40 x 80mm

❑ Snapmount Aluminum Capacitors. 39 case sizes from 22 x 20mm to 40 x 80mm:

Type	380L	380LX/382LX	381L	381LX/383LX
Maximum Capacitance	33,000µF	120,000µF	33,000µF	150,000µF
Maximum Rated Voltage	450 Vdc	500 Vdc	400 Vdc	450 Vdc
Operating Temperature -40°C (-25°C @ 315V+)	85°C	85°C	105°C	105°C
Ripple Current Example, 85°C 1000µF/200V	3.9A	3.3A	4.0A	3.4A
Full Ripple Life @ Rated Temp.	2,000 hrs	2,000 hrs	2,000 hrs	2,000 hrs
Shelf Life Test @ Rated Temp.	1,000 hrs	1,000 hrs	1,000 hrs	1,000 hrs
Advantage Compared to Other Types	Low ESR Standard	High Cap. Smaller	High Ripple Low ESR	High Ripple Smaller

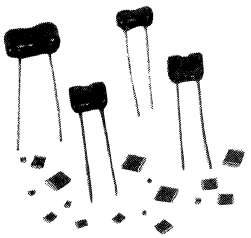
❑ Computer Grade Capacitors. Thermal Pack construction improves cooling and delivers service life of more than 15 years:

Type	DCMC	500C	101C	520C	550C
Max. Cap. @ 100 V	160,000 µF	140,000 µF	63,000 µF		
Max. Cap. @ 200 V	51,000	47,000	25,000	39,000	34,000
Max. Cap. @ 450 V	12,000	10,000		10,000	7,600
Rated Voltage	6.3 to 500 V	6.3 to 500 V	6.3 to 250 V	200 to 500 V	200 to 450 V
Oper. Temp. Range	-40°C to 85°C	-40°C to 95°C	-55°C to 105°C	-40°C to 85°C	-40° to 105°C
Ripple Current Ex. 85°C 4700 F 450V	13.6 A 3 x 5 1/8	14.9 A 3 x 5 5/8		18.3 A 3 x 5 5/8	21.0 A 3 x 8 5/8
Full Ripple Life, 85°C	2000 h	5000 h	5000 h	8,000 h	10,000 h
Advantage	max. cap.	long life	-55°C & low ESR	85°C inverters	105°C inverters

❑ MLP/MLS—Flatpack Series:

	Type MLP	Type MLS
Capacitance	160 to 47,000 µF	220 to 47,000 µF
Voltage	6.3 to 420 Vdc	5.0 to 250 Vdc
Operates	-55°C to 85°C*	-55°C to 125°C
Life Test	2000 h @ 85°C	2000 h @ 125°C
		10,000 h @ 85°C
Case Sizes	.5 x 1.75 x 1.5 & .5 x 1.75 x 3 in.	

*MLP 350 & 400 Vdc operate at: -40°C to 85°C



Mica Capacitors

Cornell Dubilier is the leader in Mica Capacitors with 85% market share in the U.S. in both leaded and surface mount capacitors. Types include **Radial Leaded** (standard dipped, miniature dipped, high-frequency for snubber, RF, and CATV applications, ultra-high frequency, MIL-C-5), **Radial Leaded High Reliability** (MIL-C-39001), **Surface Mount** (Mica chip), **Transmitting** (rectangular, cylindrical & potted-case).

Dipped Mica Can Provide the Following:

- ❑ dV/dt of 100,000 V/µs minimum capability
- ❑ Up to 9 amperes continuous current
- ❑ Up to 2,500 Vdc, 400 Vac
- ❑ Virtually no capacitance change with voltage, temperature or frequency

Mica Chips used in tuned and antenna coupling circuits have:

- ❑ No piezoelectric effect
- ❑ No cracking in wave soldering
- ❑ Same inherent stability as dipped micas

Mica Chips can be found in the following equipment:

- ❑ CATV
- ❑ Mobile Radio
- ❑ Measuring Equipment
- ❑ Transmission and Communications
- ❑ Broadcast and Video
- ❑ Medical Equipment

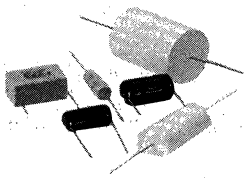
CDE CORNELL DUBILIER

An ISO 9000 Registered Company

Corporate HQ:	Wayne, NJ	(973) 694-8600
Aluminum Electrolytics:	Liberty, SC	(864) 843-2277
Relays:	Calexico, CA	(011) 526-561-6519
All Other Products:	New Bedford, MA	(508) 996-8564

For product specifications, outline drawings, and application support visit our web side at http://www.cornell-dubilier.com

See Our Other Page In Volume B, Section 4500



Film Capacitors

CDE offers an extensive range of DC and AC rated film capacitors:

- ❑ Twenty-six different series available in axial, radial dipped and plastic box configurations.
- ❑ Three most cost effective and performance enhanced film dielectrics are utilized: polyester, polypropylene and polycarbonate.
- ❑ Product presentation ideally suited for both general purpose and more demanding application specific needs.
- ❑ Various series are available in both film/foil and metallized construction:

  Voltage Range: 50 Vdc to 3000 Vdc
  35 Vac to 500 Vac

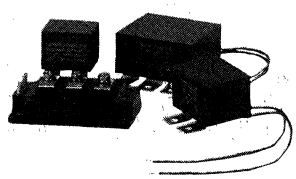
  Capacitance Range: .00047 µF to 65.0 µF

Recent new product introductions:

DME Series: metallized polyester for volumetric efficiency, low cost; ideal for general purpose applications such as blocking, bypass, coupling and de-coupling

Power Film Capacitors: Type 940 series utilizes polypropylene in both metallized and film/foil construction; very cost effective design for high frequency and high pulse current applications such as snubbers used to protect power semi-conductors and IGBTs.

MPX Series: Class X2 metallized polypropylene; multiple regulatory approvals; ideal for cross-the-line and interference suppressions circuit applications.



IGBT Snubber Modules

CDE has developed a family of snubbers which are designed specifically for IGBT module protection. The "IGBT Snubber Modules" mount directly to the screw terminals of the IGBT module making assembly a simple task. Some of the characteristics which make this snubber package ideal for IGBT applications include:

- ❑ Ease of mounting
- ❑ Very low inductance
- ❑ High peak current carrying capability
- ❑ High RMS current carrying capability
- ❑ Very low loss

Style SCD Direct Mount:

Part#	Cap. µF	Vdc	dV/dt (V/µs)	Arms (55°C)	Dimensions W	L	H
SCD474K601A3Z25	0.47	600	250	9.2	0.970	1.850	0.950
SCD684K601A3Z25	0.68	600	250	11.5	1.140	1.850	1.050
SCD105K601A3Z25	1.0	600	200	14.0	1.140	1.850	1.050
SCD155K601A3Z25	1.5	600	150	17.1	1.140	1.850	1.050
SCD205K601A3Z25	2.0	600	150	20.7	1.270	1.775	1.400
SCD335K601A3Z25	3.3	600	300	35.0	1.500	2.050	1.500
SCD475K601A3Z25	4.7	600	250	46.2	1.825	2.225	1.975
SCD474K102D3Z25	0.47	1000	700	12.1	1.140	1.850	1.050
SCD684K102D3Z25	0.68	1000	500	14.4	1.140	1.850	1.050
SCD105K102D3Z25	1.0	1000	400	17.5	1.140	1.850	1.050
SCD155K102D3Z25	1.5	1000	400	22.4	1.370	1.775	1.400
SCD205K102D3Z25	2.0	1000	400	26.2	1.500	2.050	1.500
SCD224K122A3Z25	0.22	1200	650	7.9	0.970	1.850	0.950
SCD334K122A3Z25	0.33	1200	650	10.0	1.140	1.850	1.050
SCD474K122A3Z25	0.47	1200	500	12.0	1.140	1.850	1.050
SCD684K122A3Z25	0.68	1200	500	15.1	1.370	1.775	1.400
SCD105K122A3Z25	1.0	1200	500	18.5	1.370	1.775	1.400
SCD155K122A3Z25	1.5	1200	400	23.9	1.500	2.050	1.500
SCD205K122A3Z25	2.0	1200	400	30.1	1.825	2.225	1.975
SCD305K122C3Z25	3.0	1200	400	39.7	3.000	2.475	1.500
SCD224K162A3Z25	0.22	1600	650	7.9	0.970	1.850	0.950
SCD334K162A3Z25	0.33	1600	650	10.0	1.140	1.850	1.050
SCD474K162A3Z25	0.47	1600	650	12.6	1.270	1.775	1.400
SCD684K162A3Z25	0.68	1600	650	15.3	1.370	1.775	1.400
SCD105K162A3Z25	1.0	1600	500	19.5	1.500	2.050	1.500
SCD155K162A3Z25	1.5	1600	400	25.6	1.600	2.700	1.500
SCD205K162A3Z25	2.0	1600	400	30.6	1.750	2.625	1.825
SCD224K202A3Z25	0.22	2000	800	8.2	0.970	1.850	0.950
SCD334K202A3Z25	0.33	2000	800	10.5	1.140	1.850	1.050
SCD474K202A3Z25	0.47	2000	600	13.0	1.350	2.200	1.200
SCD684K202A3Z25	0.68	2000	600	16.1	1.500	2.050	1.500
SCD105K202A3Z25	1.0	2000	600	21.3	1.825	2.225	1.975

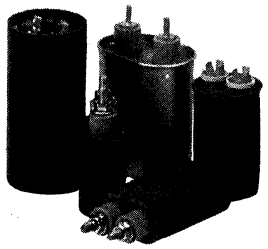
NOTE: RCD Snubber Modules also available.

CDE CORNELL DUBILIER
An ISO 9000 Registered Company

Corporate HQ:	Wayne, NJ	(973) 694-8600
Aluminum & KV^{x}:	Liberty, SC	(864) 843-2277
Relays:	Calexico, CA	(011) 526-561-6519
All Other Products:	New Bedford, MA	(508) 996-8564

For product specifications, outline drawings, and application support visit our web side at http://www.cornell-dubilier.com

See Our Other Page In Volume B, Section 4500



AC and DC Capacitors

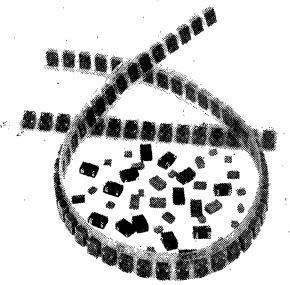
Cornell Dubilier provides a wide variety of capacitors for both AC and DC applications:

- ❑ **Type SCRN** for (silicon controlled rectifier) commutating applications where high peak & rms current is required.
- ❑ **Type SNU** for SCR snubber circuits by limiting the rate of voltage rise.
- ❑ **Type T** for DC use in filters and power supplies and for blocking applications.
- ❑ **Type OT** also for use in filters and power supplies and for blocking applications.
- ❑ **Type ETW** for motor starting applications in air conditioning and other appliance type applications.
- ❑ **Types K and S** for motor run, air conditioning, electronic power conversion equipment, battery chargers, ferroresonant power supplies, and HID lighting applications.

Typical Ratings:

- ❑ **Types K and S:**
  from 1 μF thru 120 μF at 370 Vac and 440 Vac
  from 1 μF thru 40 μF at 660 Vac at 70°C
- ❑ **Types T and OT**:
  from .01 μF to 35 μF at 1000 Vac to 5000 Vac
- ❑ **Type SCRN:**
  from .25 μF to 70 μF at 200 to 2000 Vac peak
- ❑ **Type SNU:**
  from .1 μF to 2.0 μF @ 1000 Vac peak
  from .06 μF to 1.0 μF @ 2000 Vac peak

Mounting hardware and other options are available for most of the types addressed above.



Surface Mount Capacitors

Cornell Dubilier offers a variety of surface mount capacitors including polymer/aluminum electrolytic (Type ESR, ESRD), Tantalum (Type TCS), Mica (Type MC), and Aluminum Electrolytic "Top Hats" (Types AVS, AHA,AFC).

Type ESRD Capacitor Ratings:

Cap. μF	Catalog # (Tape & Reel)	Catalog # for Bulk Qty Less than 3,500 pcs	Max. Ripple Current* @100 kHz -20°C to +100°C (AMPS rms)	Maximum Impedance @ 400 kHz, +20°C (Ohms)
		4.0 Vdc		
56	ESRD560M04R	ESRD560M04B	1.6	0.05
		6.3 Vdc		
10	ESRD100M06R	ESRD100M06B	1.0	0.13
22	ESRD220M06R	ESRD220M06B	1.3	0.09
33	ESRD330M06R	ESRD330M06B	1.6	0.06
47	ESRD470M06R	ESRD470M06B	1.6	0.05
		8 Vdc		
8.2	ESRD8R2M08R	ESRD8R2M08B	1.0	0.14
15	ESRD150M08R	ESRD150M08B	1.3	0.11
22	ESRD220M08R	ESRD220M08B	1.6	0.09
33	ESRD330M08R	ESRD330M08B	1.6	0.06
		12.5 Vdc		
4.7	ESRD4R7M12R	ESRD4R7M12B	1.0	0.18
10	ESRD100M12R	ESRD100M12B	1.0	0.13
15	ESRD150M12R	ESRD150M12B	1.3	0.11
22	ESRD220M12R	ESRD220M12B	1.6	0.09
		16 Vdc		
2.2	ESRD2R2M16R	ESRD2R2M16B	1.0	0.26
4.7	ESRD4R7M16R	ESRD4R7M16B	1.0	0.18
6.8	ESRD6R8M16R	ESRD6R8M16B	1.0	0.15
8.2	ESRD8R2M16R	ESRD8R2M16B	1.0	0.14

* Ripple Current Correction Factors for Frequency

Frequency (kHz)	10	20	50	100	250	500	1000
Correction Factors for Sine Wave Current +20°C to +100°C	0.6	0.7	0.8	1.0	1.1	1.2	1.3

CDE CORNELL DUBILIER
An ISO 9000 Registered Company

Corporate HQ:	Wayne, NJ	(973) 694-8600
Aluminum & KV^{X}:	Liberty, SC	(864) 843-2277
Relays:	Calexico, CA	(011) 526-561-6519
All Other Products:	New Bedford, MA	(508) 996-8564

For product specifications, outline drawings, and application support visit our web side at http://www.cornell-dubilier.com

See Our Other Page In Volume B, Section 4500

Dearborn electronics, Inc.

The Leader in Paper & Film Capacitors

ISO9001 Certified

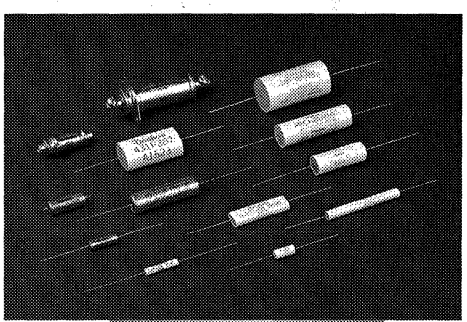
See our web page at www.dei2000.com

Your #1 Source For...

- ❑ High Frequency
- ❑ High Current
- ❑ Low Loss
- ❑ High Voltage
- ❑ High Temperature
- ❑ Low Leakage Current
- ❑ High Energy Storage

Your #1 Supplier Of...

- ❑ MIL-C-11693
- ❑ MIL-C-18312
- ❑ MIL-C-19978
- ❑ MIL-C-39022
- ❑ MIL-C-83421
- ❑ MIL-C-55514
- ❑ MIL-C-83439

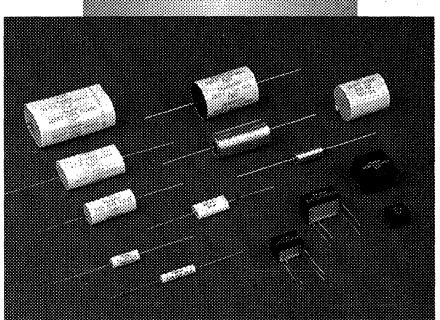


Other DEI Products & Services:

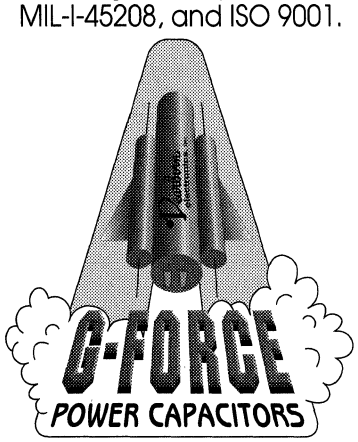
- ❑ EMI Filter Assembly
- ❑ Solid Tantalum Capacitors (Large Case)
- ❑ Small Coated & Patterned Film Capacitors

For over forty years Dearborn Electronics has been recognized as a leader in Paper & Film capacitor development and technology. Dearborn has gained international recognition for outstanding technical expertise, unprecedented quality and superlative service.

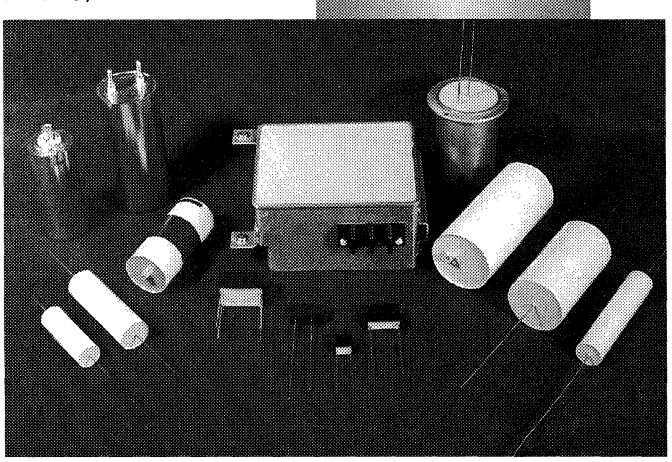
Not only can Dearborn provide competitively priced commercial and industrial products, but is qualified to over twenty-eight different military specifications. Our application engineers are recognized as the most talented in the industry, having designed and manufactured thousands of custom capacitors for special applications. Energy storage and high frequency applications are our specialty.



Quality and Reliability are of major concern to Dearborn and are maintained by strict adherence to specification requirements and state-of-the-art production and test methods. We maintain a complete military approved environmental testing facility meeting the requirements of MIL-STD-45662, MIL-STD-790, MIL-I-45208, and ISO 9001.



See Our "G FORCE" Power Capacitor Line on the Following Pages or at our new web Page at www.dei2000.com



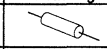
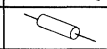
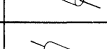
Dearborn electronics, Inc.

SALES INFORMATION: PHONE: (407) 695-6562 • FAX: (407) 695-6889
ADDRESS: 1221 NORTH HIGHWAY 17-92, LONGWOOD, FL 32750
Web Page: www.dei2000.com
E-mail: dearborn92@worldnet.att.net

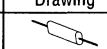
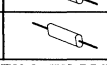
DEARBORN FILM CAPACITORS
PARAMETER SELECTION/COMPARISON GUIDE

See our web page at www.dei2000.com

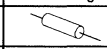
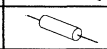
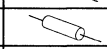
WRAP-AND-FILL METALLIZED - ROUND AXIALS

Type	Outline Drawing	Description	D.C. Voltage Range	Cap. Range (uF)	Cap. Tol. Available (±%)	MIL-C-Spec. Number	MIL. Style
430P		Economical Polyester -55 to 125°C	63 - 600	0.0047 - 10.0	20, 10, 5		
430P High Voltage		High Voltage Polyester -55 to +125°C	2,000 - 16,000	0.001 - 2.0	20, 10		
632P (LP66N)		Polycarbonate -55 to +125°C	50 - 400	0.001 - 10.0	10, 5, 2		
642P (LP88)		Miniature Polycarbonate -55 to +125°C	50 -200	0.001 - 15.0	10, 5, 2, 1	55514/07	CFR09
730P		High Freq. Polypropylene -55 to +105°C	100 - 630 DC 70 - 250 AC	0.022 - 10.0	20, 10, 5		
735P		High Current Polypropylene Leaded or Tabbed -55 to +105°C	100 - 400	1.0 - 30.0	20, 10, 5	55514/09	CFR13, CFR14
880P		High Temperature Polyphenylene Sulfide -55 to +150°C	30 - 400	0.0047 - 10.0	10, 5, 2		

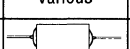
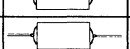
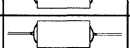
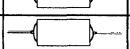
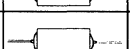
WRAP-AND-FILL METALLIZED - FLAT AXIALS

Type	Outline Drawing	Description	D.C. Voltage Range	Cap. Range (uF)	Cap. Tol. Available (±%)	MIL-C-Spec. Number	MIL. Style
431P		Polyester -55 to 125°C	50 - 600	0.01 - 15.0	20, 10, 5		
731P		Polypropylene -55 to +105°C	100 - 630	0.022 - 10.0	20, 10, 5		

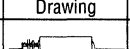
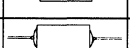
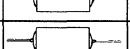
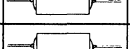
WRAP-AND-FILL FILM/FOIL ROUND AXIALS

Type	Outline Drawing	Description	D.C. Voltage Range	Cap. Range (uF)	Cap. Tol. Available (±%)	MIL-C-Spec. Number	MIL. Style
410P		Polyester -55 to 125°C	50 - 600	0.001 - 5.0	20, 10, 5		
610P		Polycarbonate -55 to +125°C	50 - 400	0.001 - 1.0	20, 10, 5		
710P		High Current Polypropylene -55 to +105°C	200 - 800	0.001 - 1.0	20, 10, 5	55514/10	CFR15
882P		"Zero TCC" Polyphenylene Sulfide -55 to +150°C	200	0.001 - 0.22	10, 5		

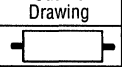
HERMETIC METAL-CASE METALLIZED FILM

Type	Outline Drawing	Description	D.C. Voltage Range	Cap. Range (uF)	Cap. Tol. Available (±%)	MIL-C-Spec. Number	MIL. Style
118P		Difilm -55 to +125°C	200 - 1000	0.001 - 12.0	20, 10, 5	18312/03, 39022/01 39022/02, 39022/08	CH12/CH09 CHR12/CHR19
144P	Various	Difilm Bathtub -55 to +125°C	200 - 600	3.0 - 25.0	20, 10	18312/4 & /5	CH53/CH54
218P		Polyester -55 to +125°C	100 - 400	0.001 - 12.0	20, 10, 5	18312/02, 39022/01 39022/08	CH09/CHR09 CHR12
251P		Teflon -55 to +200°C	50 -200	0.001 - 2.0	20, 10, 5		
259P		AC Rated Polycarbonate -55 to +105°C	80 - 440 Volts AC @ 400Hz	0.01 - 10.0	20, 10, 5	39022/07	CHR49
260P		Polycarbonate -55 to +105°C	200 - 600	0.01 - 10.0	20, 10		
620P (LP8/LP9)		Polycarbonate -55 to +125°C	50 - 400	0.01 - 15.0	10, 5, 2	39022/10	CHR10
621P		Polycarbonate -55 to +125°C	30 - 400	0.001 - 22.0	10, 5, 2, 1	83421/01	CHR01/CHR00
720P		Hi-Frequency Polypropylene -55 to +125°C	100 - 600	.033 - 20.0	10, 5	83421/02	CHR11-13

HERMETIC METAL-CASE FILM/FOIL

Type	Outline Drawing	Description	D.C. Voltage Range	Cap. Range (uF)	Cap. Tol. Available (±%)	MIL-C-Spec. Number	MIL. Style
103P & 629P		10 Ampere Thru-Pass Axial & Lug -55 to +125°C	50 - 600	0.001 - 15.0	20, 10	11693/07 & 83439 Types	CZ23/CZ24 CZR23/CZR24
127P		Polyester -55 to +150°C	30 - 2500	0.001 - 10.0	20, 10	19978/1, /13,/14, & /15	CQ08,9,12,13 CQR29,32,33
131P		Paper/Polyester -55 to +125°C	.001 - 1.0	200 - 1000	20, 10, 5	19978/9,/16	CQR09, CQR39
237P		Polycarbonate -55 to +125°C	.001 - 1.0	30 - 600	20, 10, 5	19978/5 & /8	CQ06, CQ07 CQR07

HIGH VOLTAGE & ENERGY STORAGE CAPACITORS

Type	Outline Drawing	Description	D.C. Voltage Range	Cap. Range (uF)	Cap. Tol. Available (±%)	MIL-C-Spec. Number	MIL. Style
205P		High Voltage Paper Polyester -55 to 125°C	2,000 - 10,000	0.0001 - 0.5	20, 10	19978/02	CQ20
681P		Energy Discharge Metallized Film 0 to +40°C	1,000 - 2,500	5 - 100	20, 10	Non-Hermetic Versions in MPP (682P) & MPE (684P)	

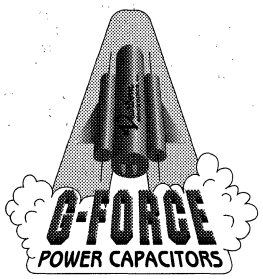
Dearborn electronics, Inc.
SALES INFORMATION: PHONE: (407) 695-6562 • FAX: (407) 695-6889
ADDRESS: 1221 NORTH HIGHWAY 17-92, LONGWOOD, FL 32750
Web Page: www.dei2000.com
E-mail: dearborn92@worldnet.att.net

Pearborn electronics, Inc.

The Leader in Paper & Film Capacitors

ISO9001 Certified

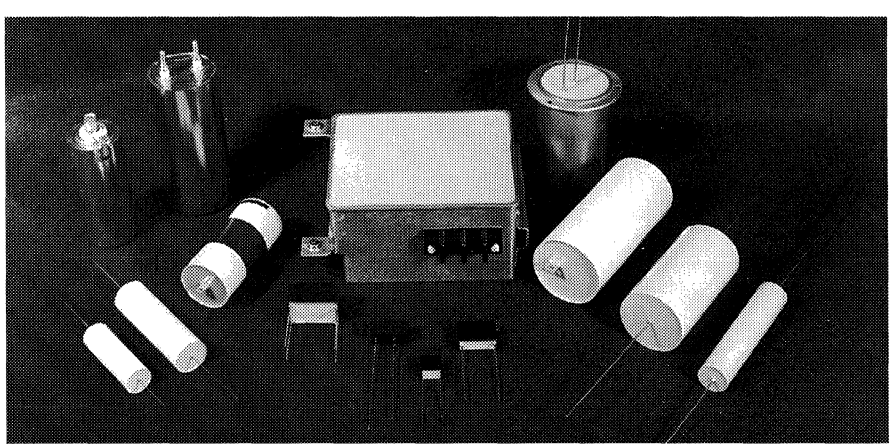
See our web page at www.dei2000.com



- ♦High Current
- ♦High Voltage
- ♦High Density
- ♦Commercial
- ♦Custom
- ♦Military

Type	Capacitance	DC Voltage	AC Voltage	Temp°C	Configuration
709G	.001 to 4.7	160 to 2000	100-700	-55 to 105	Polycarbonate/Carrier Film Round Axial Wrap & Fill
730G	.01 to 2.5	850 to 3000	450-750	-55 to 70	Metalized Polypropylene Round Axial Wrap & Fill
731G NEW	.022 to 2.00	850 to 3000	450-750	-55 to 70	Metalized Polypropylene Preformed Rectangular Box With Braided Terminals
734G	.47 to 10.0	400 to 600	200-277	-55 to 105	Metalized Polypropylene Small Oval Axial Wrap & Fill
744G	.47 to 3.5	600	—	-55 to 105	Metalized Polypropylene Rectangular Radial Plastic Case
883G NEW	.0047 to 10.0	50 to 600		-55 to 125	Polyphenylene Sulfide Preformed Retangular Box

See Our New WEB PAGE at www.dei2000.com



Pearborn electronics, Inc.

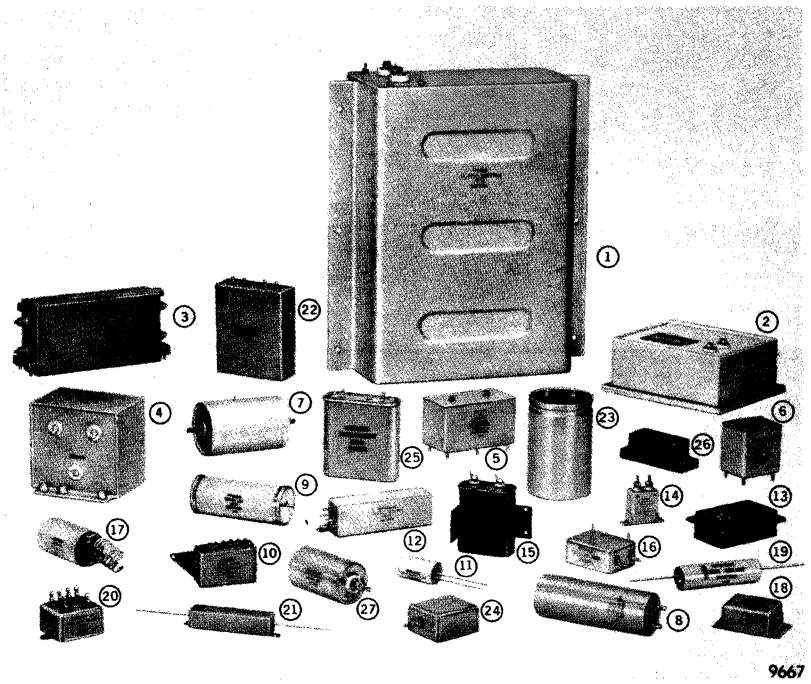
Sales Information: Phone: (407) 695-6562 • FAX: (407) 695-6889
Address: 1221 North Highway 17-92, Longwood, FL 32750
Web Page: www.dei2000.com
E-mail: dearborn92@worldnet.att.net

DEARBORN ELECTRONICS, INC.

CUSTOM DESIGNS...

See our web page at www.dei2000.com

1. **Metallized Paper-Polyester,** 350µF to 385µf. 3300 VDC peak
2. **Metallized Paper-Polyester,** 160µF, 1600 VDC peak
3. **Metallized Paper-Polyester,** 25µF, 1600 VDC peak
4. **Paper Polyester-Foil,** 2 x 0.05µF, 16,500 VDC
5. **Metallized Polycarbonate,** 26µF ±2%, 180 V RMS, 400 Hz
6. **Metallized Polycarbonate,** 40µF ±2%, 115 V RMS, 400 Hz
7. **Polyester-Foil,** 4.0µF ±5%, 2000 VDC
8. **Polyester-Foil,** 1.0µF ±10%, 350 VAC
9. **Paper-Polyester-Foil,** 0.20µF ±20%, 10,000 VDC
10. **Metallized Polycarbonate,** 8 x 1.0µF ±10%, 150 VDC; 2 x 1.0µF ±10%, 200 VDC
11. **Metallized Polyester,** 11µF $^{+25}_{-0}$% 750 VDC peak
12. **Polyester-Foil,** 1.8µF +16.2µF ±10%, 50 VDC
13. **Metallized Polycarbonate,** 28µF ±5%, 40V RMS, 400 Hz; 0.27µF ±5%, 600 VDC; 0.47µF ±5%, 600 VDC
14. **Polyester-Foil,** .057µF ±10%, 400 VDC, 115 VAC, 400 Hz
15. **Metallized Paper-Polyester,** 1.0µF ±10%, 2500 VDC



16. **Polyester-Foil,** 10.0µF ±10%, 30 VDC
17. **Polyester-Foil,** 0.20µF ±10%, 6000 VDC
18. **Metallized Polycarbonate,** 8.0µF ±10%, 120 V RMS, 400 Hz
19. **Metallized Polyvinylidene Fluoride** 80µF ±10%, 250 VDC
20. **Polystyrene-Foil,** 0.864µF ±1%, 50 VDC; 0.115µF ±1%, 50 VDC; 0.735µF ±1%, 50 VDC; 0.098µF ±1%, 50 VDC
21. **Metallized Polyvinylidene Fluoride** 40µF $^{+15}_{-25}$%, 250 VDC
22. **Metallized Polyphenylene-sulfide,** 60µF ±5%, 204 V RMS
23. **Metallized Paper-Polyester,** 30µF $^{+20}_{-10}$%, 3000 VDC
24. **Metallized Polycarbonate,** 30µF ±10%, 150 VAC, 400 Hz
25. **Polycarbonate-Foil,** 1.5µF ±5% 330 VAC
26. **Paper-Polyester-Foil,** 0.02µF ±10%, 10,000 VDC
27. **Metallized-Polyester,** 22µF ±5%, 1200 V

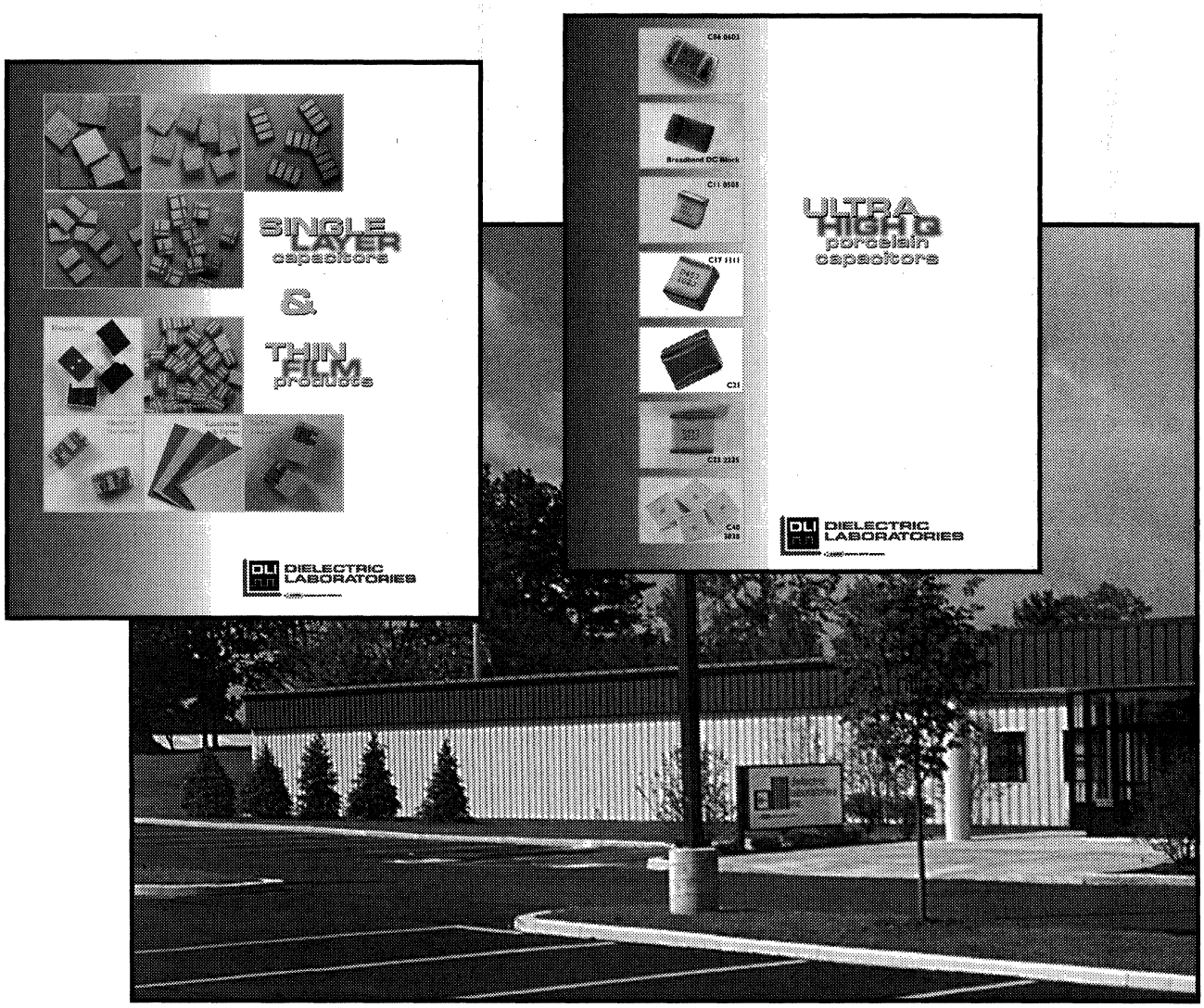
...AT STANDARD PRICES

Dearborn electronics, Inc.
SALES INFORMATION: PHONE: (407) 695-6562 • FAX: (407) 695-6889
ADDRESS: 1221 NORTH HIGHWAY 17-92, LONGWOOD, FL 32750
Web Page: www.dei2000.com
E-mail: dearborn92@worldnet.att.net

"We Listen To You"

And we respond...

- You needed microstrip width matching...
  We gave you DiCaps®...
- You needed High Q multilayers...
  We gave you C11 and C17...
- You needed integrated products...
  We gave you Bias Filter Networks...
- You needed smaller sizes...
  We launched C06...
- You needed higher voltage/power handling...
  We launched C21, C22, C40...
- You needed accurate computer models...
  We launched CapCad®...



DLI DIELECTRIC LABORATORIES
A DOVER TECHNOLOGIES COMPANY

2777 Route 20 East
Cazenovia, New York 13035
Phone: 315.655.8710 • Fax: 315.655.8179

"We Are Still Listening"

What can we launch for you?!

We have the qualified people, the best materials and state-of-the-art facilities to provide the products you need.

People + Materials + Facilities = Product

Quality System ISO 9001 Approved

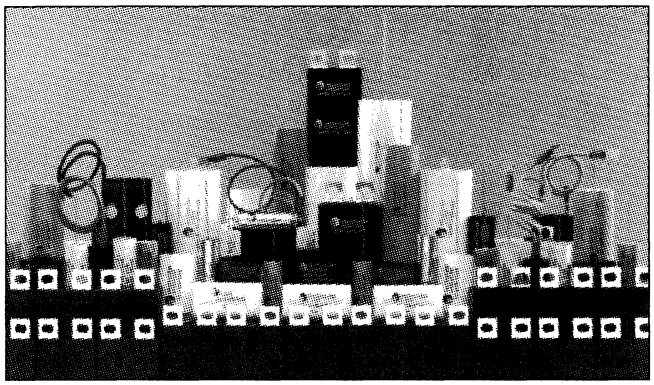
Contact us today to learn more about how we can help you.
Visit us on our web site http://www.dilabs.com

Bookmark EEM on the Web!

http://eemonline.com

Hearst Business Communications, Inc./UTP Division
645 Stewart Avenue, Garden City, NY 11530 • Tel: 516.227.1300 • FAX: 516.227.1901

ELECTROCUBE CUSTOM PRODUCTS AND CAPABILITIES



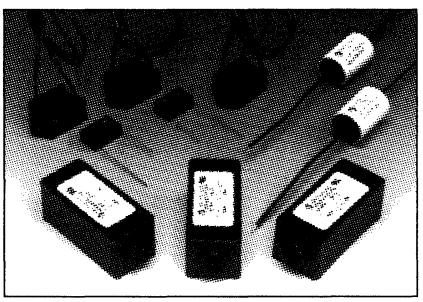
For over 35 years, Electrocube, Inc. has been delivering quality and performance in their extensive line of USA-made capacitors and related products. Electrocube's wide selection of film capacitors, RC networks, snubbers, EMI filters and aluminum foil transformers are designed for use in the electrical, electronics, industrial and aerospace markets.

Our custom design capabilities, modern manufacturing facilities, personalized customer service, excellent quality control/inspection/testing, competitive pricing and on-time delivery are the key elements responsible for Electrocube's continued success as an industry leader. Our products are available through a nationwide network of sales representatives and stocking distributors.

For the best USA-made capacitor products, "The Cube" delivers!

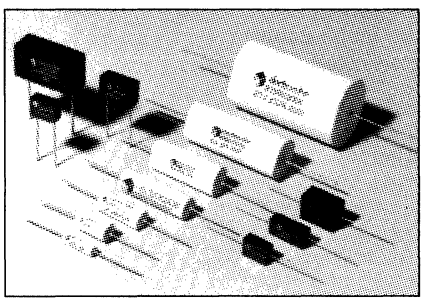
METALLIZED POLYPROPYLENE IGBT SNUBBERS

• low ESR • high voltage (VDC & VAC) • wide capacitance range • direct mount to IGBT or PCB depending upon style • low self-inductance • high RMS currents • low dielectric absorption • negative temperature coefficient



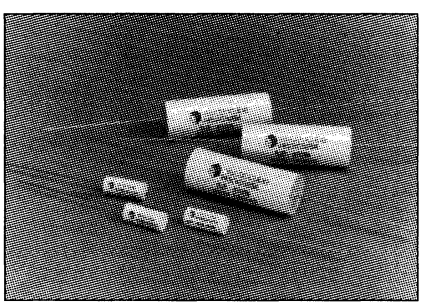
UL LISTED RC NETWORKS

• from 1 to as many as 40 networks • single or 3-phase operation • available in metal cans or epoxy cases • solid or stranded wire leads in varying lengths and terminations • commercial and industrial applications



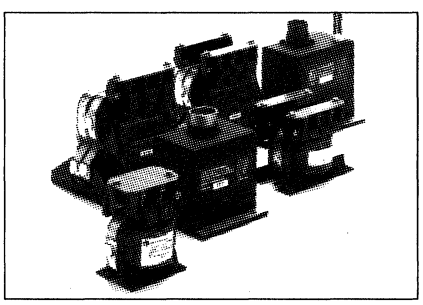
METALLIZED POLYPROPYLENE CAPACITORS

• stable capacitance versus frequency • self-healing • low ESR • wide operating frequency range • dv/dt range up to 7500 V/μ sec. • high voltage • negative temperature absorption • high ripple current ratings • low dielectric absorption



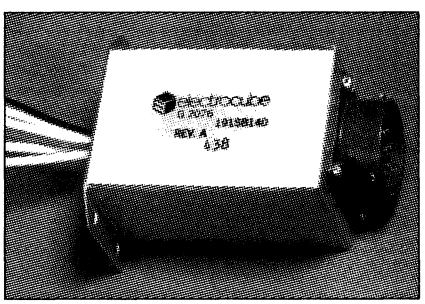
METALLIZED POLYPROPYLENE HEAVY EDGED CAPACITORS

• long operating life • self-healing • low ESR • negative temperature coefficient • high pulse operation • high voltage • high current carrying capabilities • wide operating frequency range • low dielectric absorption



ALUMINUM FOIL TRANSFORMERS

• 25 VA through 50 KVA power range • exceptional reliability and efficiency • commercial and military applications • FAA Certified Manufacturer • PMA • McDonnell-Douglas "Gold" Supplier • Boeing D1-9000 Approved



CUSTOM EMI FILTERS

• full custom design, manufacture and testing • complete inductor winding and filter production facilities • 0.1 amp to 500 amps • 1 VDC to 5000 VDC and up to 660 VAC • frequency up to 1000 Hz • military and commercial applications

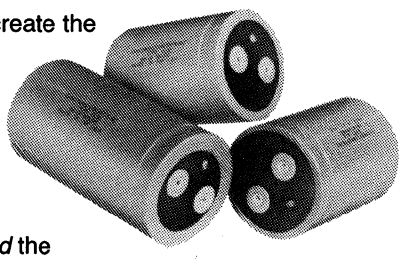
electrocube
1307 S. Myrtle Ave. • Monrovia, CA 91016
TEL: (626) 301-0122 • FAX: (626) 357-8099

ELECTRONIC CONCEPTS INC.

UNLYTIC® UL30 SERIES DRY FILM REPLACEMENT FOR ELECTROLYTICS

THE FIRST FILM DIELECTRIC CAPACITOR REPLACEMENT FOR ELECTROLYTIC CAPACITORS AND A NEW STANDARD FOR HIGH POWER SYSTEM DESIGNERS.

WITH OUR PATENTED ADVANCES IN DRY FILM TECHNOLOGY...THE IMPOSSIBLE IS NOW PRACTICAL!



Does the product create the need, or does the need create the product? With **UNLYTIC®** the argument can be made either way! Its availability established a new standard *and* the ongoing search for better answers created a void that **UNLYTIC®** is best able to fill!

Now for the first time, all of the superior performance characteristics of film capacitors are available in values and sizes previously achieved only by electrolytics! This will improve how high power systems are designed -- by improving reliability, extending service life, allowing for miniaturization, lowering production costs and maximizing performance. In addition, the packaging dimensions of the **UNLYTIC®** are identical to electrolytics for a direct replacement. Therefore, conceptual changes in system design are not required.

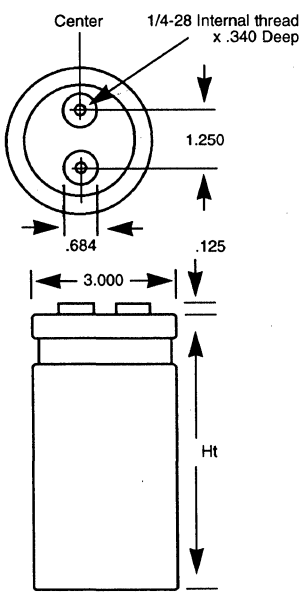
- **VOLTAGE TO 1000VDC**
- **RMS CURRENT TO 58 AMPS**
- **CAPACITANCE TO 1600µF**

UNLYTIC® VERSUS ELECTROLYTIC

- 10X greater current density
- 3x greater overvoltage protection
- Higher voltage ratings
- Superior performance over temperature range -55°C to 85°C
- 10 year shelf life
- Dry construction (no harmful electrolytes)
- Non-polar

DIMENSIONAL/ELECTRICAL DATA

Part Number	Cap (µF)	VDC	Ht	ESR (ohms@ Fres)	25C (Arms)	50C (Arms)	75C (Arms)	Joules	I Peak (amps)	dvdt (v/µs)	ESL (nH)	Fres (kHz)
UL30AR0600	600	200	3.125	0.0031	58.1	44.7	25.0	27	6218	10	30	38
UL30AR0900	900	200	4.125	0.0042	56.1	43.2	24.2	41	5954	7	48	24
UL30AR1250	1,250	200	5.125	0.0052	56.2	43.3	24.2	56	6008	5	68	17
UL30AR1600	1,600	200	6.125	0.0062	56.6	43.6	24.4	72	6090	4	87	13
UL30AT0400	400	300	3.125	0.0037	52.9	40.7	22.8	32	4974	12	30	46
UL30AT0650	650	300	4.125	0.0047	53.7	41.4	23.2	52	5160	8	48	29
UL30AT0900	900	300	5.125	0.0059	53.5	41.2	23.1	72	5191	6	68	20
UL30AT1100	1,100	300	6.125	0.0073	52.0	40.0	22.4	88	5024	5	87	16
UL30AX0230	230	400	3.125	0.0045	48.0	37.0	20.7	29	3813	17	30	61
UL30AX0360	360	400	4.125	0.0061	47.2	36.3	20.3	45	3810	11	48	38
UL30AX0500	500	400	5.125	0.0077	46.9	36.1	20.2	63	3845	8	68	27
UL30AX0650	650	400	6.125	0.0090	47.5	36.6	20.5	81	3959	6	87	21
UL30BC0165	165	600	3.125	0.0044	48.7	40.5	30.2	30	3800	23	30	72
UL30BC0260	260	600	4.125	0.0060	47.6	39.6	29.5	47	3822	15	48	45
UL30BC0360	360	600	5.125	0.0076	47.1	39.2	29.2	65	3845	11	68	32
UL30BC0450	450	600	6.125	0.0093	46.2	38.5	28.7	81	3806	8	87	25
UL30BF0100	100	750	3.125	0.0054	42.8	35.6	26.5	28	2879	29	30	92
UL30BF0170	170	750	4.125	0.0071	44.0	36.6	27.3	48	3124	18	48	56
UL30BF0230	230	750	5.125	0.0092	42.6	35.5	26.4	65	3071	13	68	40
UL30BF0290	290	750	6.125	0.0113	42.0	35.0	26.1	82	3066	11	87	32
UL30BJ0075	75	900	3.125	0.0059	42.1	35.0	26.1	30	2591	35	30	106
UL30BJ0120	120	900	4.125	0.0082	41.2	34.3	25.5	49	2646	22	48	66
UL30BJ0160	160	900	5.125	0.0109	39.3	32.7	24.4	65	2563	16	68	48
UL30BJ0200	200	900	6.125	0.0134	38.5	32.0	23.8	81	2538	13	87	38
UL30BL0050	50	1000	3.125	0.0073	36.6	30.5	22.7	25	2015	40	30	130
UL30BL0085	85	1000	4.125	0.0097	37.4	31.2	23.2	43	2187	26	48	79
UL30BL0120	120	1000	5.125	0.0123	37.2	31.0	23.1	60	2243	19	68	56
UL30BL0150	150	1000	6.125	0.0152	36.4	30.3	22.6	75	2220	15	87	44



ELECTRONIC CONCEPTS INC.

P.O. BOX 1278
EATONTOWN, NEW JERSEY 07724

TEL: (732) 542-7880
FAX: (732) 542-0524
E-mail sales@eci-capacitors.com
WWW http//:www.eci-capacitors.com

ELECTRONIC CONCEPTS INC.

UNLYTIC® UP36 SERIES DRY FILM REPLACEMENT FOR ELECTROLYTICS

MINIATURE UP36 FILM CAPACITORS BEST CHOICE FOR "DECOUPLING" IN HIGH-POWER CONVERTER DESIGNS

WITH OUR PATENTED DRY FILM TECHNOLOGY *BETTER* ANSWERS ARE NOW POSSIBLE

Allows maximum space utilization for system miniaturization / enhances reliability and lowers production costs by simplifying system design and reducing assembly time / for safety, eliminates the possibility of caustic electrolyte leakage and its harmful effects to the environment.

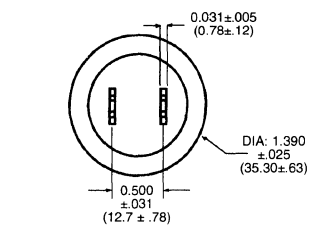
THE NEW STANDARD FOR HIGH POWER SYSTEMS DESIGNERS

Spade lug terminals for high current carrying capacity.

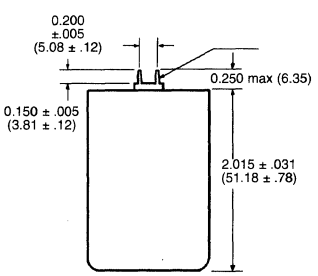
UNLYTIC® VERSUS ELECTROLYTIC

- 10x greater current density
- 3x greater overvoltage protection
- Higher voltage ratings
- Superior performance over temperature range -55°C to 105°C
- Dry construction (no harmful electrolytes)
- Non-polar
- Voltage ratings convenient for European Design

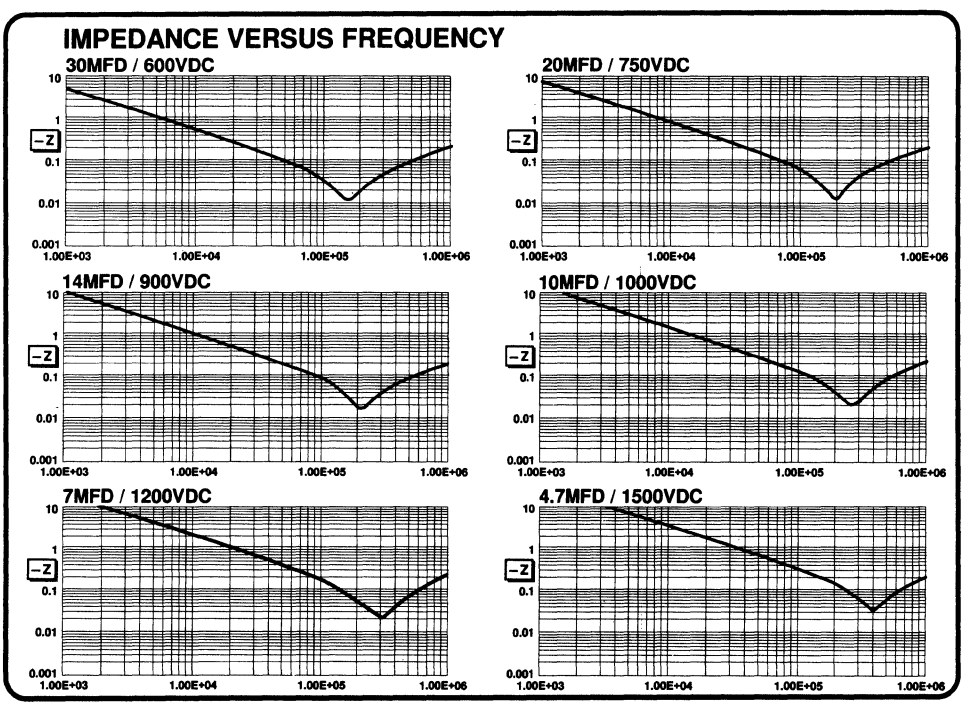
Part Number	CAP (µF)	VDC	ESR 100 KHZ	25C Amps	50C Amps	75C Amps	ESL (nH)	Fres (kHz)
UP36BC0300	30	600	0.011	20.4	16.9	12.4	35	155
UP36BF0200	20	750	0.013	18.8	15.6	11.4	35	189
UP36BJ0140	14	900	0.015	17.3	14.4	10.5	35	226
UP36BL0100	10	1000	0.017	15.7	13.0	9.5	35	268
UP36BN0070	7	1200	0.020	13.6	11.3	8.3	35	320
UP36BS0047	4.7	1500	0.023	12.7	10.5	7.7	35	391



PIN: 0.050 (1.27) BASE TAPERED TO 0.035 (.88) DIA. TIP (2 PL)



ALL CASE DIMENSIONS INCLUDE INSULATION (METRIC DIMENSIONS IN PARENTHESIS)



ELECTRONIC CONCEPTS INC.

P.O. BOX 1278
EATONTOWN, NEW JERSEY 07724

TEL: (732) 542-7880
FAX: (732) 542-0524
E-mail sales@eci-capacitors.com
WWW http//:www.eci-capacitors.com

ELECTRONIC CONCEPTS INC.

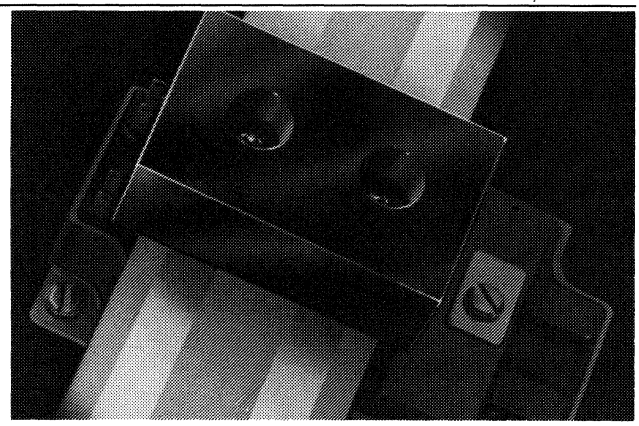
TYPE MP80 IGBT MOUNTABLE POWER SUPPLY CAPACITORS METALLIZED POLYPROPYLENE

NO LEAD WIRES/NO LEAD WIRE INDUCTANCE

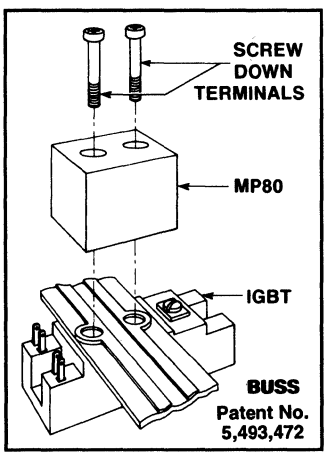
The EC MP80 represents the first snubber circuit power capacitor that is designed to fit IGBT terminal spacing for direct mounting. The result is a drastic reduction of inductance to levels not previously attainable with conventional leaded capacitors. This was accomplished by the inhouse development of a revolutionary way to build a capacitor with close to zero inductance, without lead wires.

The benefit to the power converter designer is measurable cost savings as a result of simplification of both the system design and manufacturing operation. Because of its wide voltage range and exceptional electrical characteristics, the MP80 is well suited for across-the-buss power usages, which includes electric vehicles, motor applications, controllers, high power inverters and power conditioning systems.

- Reduces inductance up to 90% – eliminates spiking
- Uses screw down terminals instead of lead wires
- Compact case sizes/rugged monolithic construction

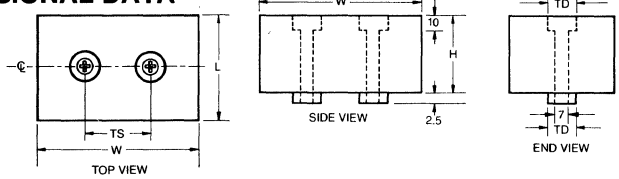


SIMPLIFIES SYSTEM DESIGN, REDUCES ASSEMBLY TIME, IMPROVES RELIABILITY, MAXIMIZES PERFORMANCE



- Voltage ratings of 400 to 1500 VDC
- Continuous current carrying capacity to 45 amps
- ESR as low as 0.003 ohms
- Operating temperature: –55°C to +105°C

DIMENSIONAL DATA



Part Number	VDC	Cap (µF)	W (mm)	L (mm)	H (mm)	TS (mm)	TD (mm)	ESR (ohms)	25 C (Arms)	50 C (Arms)	85 C (Arms)	I peak (A)	DVDT (V/us)	ESL (nH)	F res (kHz)
MP80_J505	400	5.0	38	51	24	23	10	.005	19	15	9	409	82	23	491
MP80_J106		10.0	38	67	32	23	10	.003	28	22	14	817	82	23	347
MP80_J156		15.0	58	72	24	28	14	.005	23	19	12	709	47	31	242
MP80_J206		20.0	58	89	25	28	14	.004	29	23	14	945	47	31	210
MP80_J256		25.0	58	95	24	28	14	.003	33	27	17	1181	47	31	188
MP80_J306		30.0	58	70	45	28	14	.003	37	30	19	1417	47	31	171
MP80_J506		50.0	63	89	51	28	14	.003	45	36	23	2207	44	32	130
MP80_Q405	500	4.0	38	51	24	23	10	.005	19	15	9	381	95	23	549
MP80_Q805		8.0	38	67	32	23	10	.003	28	22	14	763	95	23	388
MP80_Q126		12.0	58	72	24	28	14	.005	23	19	12	661	55	31	271
MP80_Q166		16.0	58	89	25	28	14	.004	29	23	14	882	55	31	235
MP80_Q206		20.0	58	95	24	28	14	.004	29	23	14	1102	55	31	210
MP80_Q256		25.0	58	70	45	28	14	.003	37	30	19	1378	55	31	188
MP80_Q406		40.0	63	89	51	28	14	.003	45	36	23	2060	51	32	145
MP80_K305	600	3.0	38	51	24	23	10	.006	17	14	9	327	109	23	634
MP80_K605		6.0	38	67	32	23	10	.004	24	19	12	654	109	23	448
MP80_K106		10.0	58	72	24	28	14	.005	23	19	12	630	63	31	297
MP80_K126		12.0	58	89	25	28	14	.005	26	21	13	756	63	31	271
MP80_K156		15.0	58	95	24	28	14	.004	29	23	14	945	63	31	242
MP80_K206		20.0	58	70	45	28	14	.003	37	30	19	1260	63	31	210
MP80_K306		30.0	63	89	51	28	14	.003	45	36	23	1766	59	32	168
MP80_N205	800	2.0	38	51	24	23	10	.007	16	13	8	272	136	23	777
MP80_N405		4.0	38	67	32	23	10	.004	24	19	12	545	136	23	549
MP80_N605		6.0	58	72	24	28	14	.006	21	17	11	472	79	31	383
MP80_N805		8.0	58	89	25	28	14	.005	26	21	13	630	79	31	332
MP80_N106		10.0	58	95	24	28	14	.004	29	23	14	787	79	31	297
MP80_N126		12.0	58	70	45	28	14	.004	32	26	16	945	79	31	271
MP80_N206		20.0	63	89	51	28	14	.003	45	36	23	1471	74	32	205
MP80_L684	1200	.68	38	51	24	23	10	.005	19	15	9	352	517	23	1389
MP80_L155		1.5	38	67	32	23	10	.003	28	22	14	776	517	23	935
MP80_L225		2.2	58	72	24	28	14	.005	23	19	12	596	271	31	647
MP80_L305		3.0	58	89	25	28	14	.004	29	23	14	813	271	31	554
MP80_L355		3.5	58	95	24	28	14	.004	29	23	14	948	271	31	513
MP80_L405		4.0	58	70	45	28	14	.004	32	26	16	1083	271	31	480
MP80_L685		6.8	63	89	51	28	14	.003	45	36	23	1682	247	32	358
MP80_M564	1500	.56	38	51	24	23	10	.006	17	14	9	326	582	23	1530
MP80_M125		1.2	38	67	32	23	10	.003	28	22	14	698	582	23	1045
MP80_M205		2.0	58	72	24	28	14	.005	23	19	12	609	305	31	679
MP80_M255		2.5	58	89	25	28	14	.004	29	23	14	762	305	31	607
MP80_M305		3.0	58	95	24	28	14	.004	29	23	14	914	305	31	554
MP80_M355		3.5	58	70	45	28	14	.004	32	26	16	1067	305	31	513
MP80_M565		5.6	63	89	51	28	14	.003	45	36	23	1558	278	32	394

ELECTRONIC CONCEPTS PART NUMBER SYSTEM

MP80 C J 506 K

STYLE
Rectangular/direct IGBT Mountable

TERMINAL LOCATIONS
Centered (off-center terminal location can be specified, contact company direct for ordering instructions)

DC VOLTAGE
J= 400VDC Q= 500VDC K= 600VDC
N= 800VDC L= 1200VDC M= 1500VDC

CAPACITANCE IN PICOFARADS
The first two digits are significant, the third digit represents the number of zero (e.g. 506 = 50,000,000 pfd = 50 mfd.)

TOLERANCE
M= ±20% K= ±10% J= ±5%
Closer tolerances available on request

QUALITY CONTROL

Capacitors are 100% tested for:

- CAPACITANCE TOLERANCE
- DISSIPATION FACTOR
- DIELECTRIC WITHSTANDING VOLTAGE
- INSULATION RESISTANCE

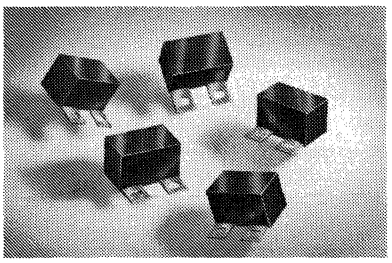
ELECTRONIC CONCEPTS INC.
P.O. BOX 1278
EATONTOWN, NEW JERSEY 07724
TEL: (732) 542-7880
FAX: (732) 542-0524
E-mail sales@eci-capacitors.com
WWW http//:www.eci-capacitors.com

ELECTRONIC CONCEPTS INC.

LO-HENRY® 88 SERIES METALLIZED POLYPROPYLENE SNUBBER CAPACITORS

LO-HENRY® MP88/PT88

Now for the first time, the MP88 and PT88 make available to the circuit designer the best of both worlds: superior physical/performance characteristics and economy of price! In addition, because of an exclusive dual element design with no internal wire connections, there is also a higher degree of in-the-field reliability. Uses encompass a wide range of motor applications, electric vehicles, controllers, high power converters and power conditioning systems.

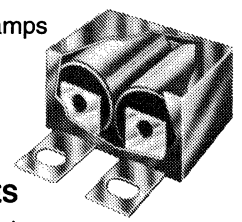


Part Number	Cap (µF)	Case	VDC	VAC	ESR (100kHz)	25 C (Arms)	50 C (Arms)	85 C (Arms)	I Peak (Amps)	dvdt (v/µs)	ESL (nH)	Fres (kHz)
PT88BG104-	0.10	1	800	460	0.0036	26.4	21.9	13.5	1317	13174	<15	4062
PT88BG124-	0.12	1	800	460	0.0032	27.9	23.2	14.2	1475	12295	<15	3708
PT88BG154-	0.15	1	800	460	0.0029	29.4	24.5	15.0	1581	10539	<15	3317
PT88BG184-	0.18	1	800	460	0.0026	30.8	25.6	15.7	1739	9661	<15	3028
PT88BG224-	0.22	1	800	460	0.0024	32.2	26.8	16.5	1932	8782	<15	2739
PT88BG274-	0.27	1	800	460	0.0022	33.7	28.0	17.2	2134	7904	<15	2472
PT88BG334-	0.33	1	800	460	0.0020	34.9	29.0	17.8	2319	7026	<15	2236
PT88BG394-	0.39	2	800	460	0.0023	41.6	34.6	21.3	2157	5531	<25	1613
PT88BG474-	0.47	2	800	460	0.0022	43.0	35.8	22.0	2363	5029	<25	1469
PT88BG564-	0.56	2	800	460	0.0020	44.2	36.7	22.6	2534	4526	<25	1346
PT88BG684-	0.68	2	800	460	0.0019	45.9	38.1	23.4	2907	4274	<25	1222
PT88BG754-	0.75	2	800	460	0.0019	46.2	38.4	23.6	3923	3897	<25	1163
PT88BL104-	0.10	1	1000	460	0.0036	26.4	21.9	13.5	1317	13174	<15	4062
PT88BL124-	0.12	1	1000	460	0.0032	27.9	23.2	14.2	1475	12295	<15	3708
PT88BL154-	0.15	1	1000	460	0.0029	29.4	24.5	15.0	1581	10539	<15	3317
PT88BL184-	0.18	1	1000	460	0.0026	30.8	25.6	15.7	1739	9661	<15	3028
PT88BL224-	0.22	1	1000	460	0.0024	32.2	26.8	16.5	1932	8782	<15	2739
PT88BL274-	0.27	1	1000	460	0.0022	33.7	28.0	17.2	2134	7904	<15	2472
PT88BL334-	0.33	2	1000	460	0.0025	40.3	33.6	20.6	1991	6034	<25	1753
PT88BL394-	0.39	2	1000	460	0.0023	41.6	34.6	21.3	2157	5531	<25	1613
PT88BL474-	0.47	2	1000	460	0.0022	43.0	35.8	22.0	2363	5029	<25	1469
PT88BL564-	0.56	2	1000	460	0.0020	44.2	36.7	22.6	2534	4526	<25	1346
PT88BN104-	0.10	1	1200	460	0.0036	26.4	21.9	13.5	1317	13174	<15	4062
PT88BN124-	0.12	1	1200	460	0.0032	27.9	23.2	14.2	1475	12295	<15	3708
PT88BN154-	0.15	1	1200	460	0.0029	29.4	24.5	15.0	1581	10539	<15	3317
PT88BN184-	0.18	1	1200	460	0.0026	30.8	25.6	15.7	1739	9661	<15	3028
PT88BN224-	0.22	1	1200	460	0.0024	32.2	26.8	16.5	1932	8782	<15	2739
PT88BN274-	0.27	2	1200	460	0.0026	39.1	32.6	20.0	1901	7040	<25	1939
PT88BN334-	0.33	2	1200	460	0.0025	40.3	33.6	20.6	1991	6034	<25	1753
PT88BN394-	0.39	2	1200	460	0.0023	41.6	34.6	21.3	2157	5531	<25	1613
PT88BN474-	0.47	2	1200	460	0.0022	43.0	35.8	22.0	2363	5029	<25	1469
MP88BG394-	0.39	1	800	460	0.0077	18.0	14.9	9.2	295	758	<15	2057
MP88BG474-	0.47	1	800	460	0.0073	18.6	15.4	9.5	320	682	<15	1874
MP88BG564-	0.56	1	800	460	0.0069	19.0	15.8	9.7	339	606	<15	1717
MP88BG684-	0.68	1	800	460	0.0063	19.9	16.6	10.2	386	568	<15	1558
MP88BG754-	0.75	1	800	460	0.0062	20.1	16.7	10.3	398	530	<15	1483
MP88BG824-	0.82	1	800	460	0.0060	20.7	17.2	10.6	435	530	<15	1419
MP88BG105-	1.00	1	800	460	0.0056	21.1	17.5	10.8	455	455	<15	1285
MP88BG125-	1.20	2	800	460	0.0073	23.4	19.5	12.0	452	377	<25	920
MP88BG145-	1.40	2	800	460	0.0068	24.2	20.2	12.4	496	354	<25	851
MP88BG155-	1.50	2	800	460	0.0065	24.8	20.7	12.7	532	354	<25	822
MP88BG185-	1.80	2	800	460	0.0063	25.3	21.0	12.9	558	310	<25	751
MP88BG205-	2.00	2	800	460	0.0061	25.6	21.3	13.1	576	288	<25	712
MP88BG225-	2.20	2	800	460	0.0060	25.7	21.4	13.1	585	266	<25	679
MP88BG255-	2.50	2	800	460	0.0056	26.8	22.3	13.7	664	266	<25	637
MP88BL334-	0.33	1	1000	460	0.0082	17.4	14.5	8.9	275	833	<15	2236
MP88BL394-	0.39	1	1000	460	0.0077	18.0	14.9	9.2	295	758	<15	2057
MP88BL474-	0.47	1	1000	460	0.0073	18.6	15.4	9.5	320	682	<15	1874
MP88BL564-	0.56	1	1000	460	0.0069	19.0	15.8	9.7	339	606	<15	1717
MP88BL684-	0.68	1	1000	460	0.0063	19.9	16.6	10.2	386	568	<15	1558
MP88BL754-	0.75	1	1000	460	0.0062	20.1	16.7	10.3	398	530	<15	1483
MP88BL824-	0.82	2	1000	460	0.0089	21.2	17.6	10.8	345	421	<25	1112
MP88BL105-	1.00	2	1000	460	0.0080	22.4	18.6	11.4	399	399	<25	1007
MP88BL125-	1.20	2	1000	460	0.0073	23.4	19.5	12.0	452	377	<25	920
MP88BL145-	1.40	2	1000	460	0.0068	24.2	20.2	12.4	496	354	<25	851
MP88BL155-	1.50	2	1000	460	0.0065	24.8	20.7	12.7	532	354	<25	822
MP88BL185-	1.80	2	1000	460	0.0063	25.3	21.0	12.9	558	310	<25	751
MP88BN274-	0.27	1	1200	460	0.0090	16.7	13.9	8.5	245	909	<15	2472
MP88BN334-	0.33	1	1200	460	0.0082	17.4	14.5	8.9	275	833	<15	2236
MP88BN394-	0.39	1	1200	460	0.0077	18.0	14.9	9.2	295	758	<15	2057
MP88BN474-	0.47	1	1200	460	0.0073	18.6	15.4	9.5	320	682	<15	1874
MP88BN564-	0.56	1	1200	460	0.0069	19.0	15.8	9.7	339	606	<15	1717
MP88BN684-	0.68	2	1200	460	0.0096	20.4	17.0	10.4	316	465	<25	1222
MP88BN754-	0.75	2	1200	460	0.0092	20.8	17.3	10.6	332	443	<25	1163
MP88BN824-	0.82	2	1200	460	0.0089	21.2	17.6	10.8	345	421	<25	1112
MP88BN105-	1.00	2	1200	460	0.0080	22.4	18.6	11.4	399	399	<25	1007
MP88BN125-	1.20	2	1200	460	0.0073	23.4	19.5	12.0	452	377	<25	920
MP88BN145-	1.40	2	1200	460	0.0068	24.2	20.2	12.4	496	354	<25	851
MP88BT104-	0.10	1	1600	920	0.0086	17.0	14.2	8.7	313	3125	<15	4062
MP88BT124-	0.12	1	1600	920	0.0080	17.7	14.7	9.0	338	2813	<15	3708
MP88BT154-	0.15	1	1600	920	0.0073	18.5	15.4	9.5	375	2500	<15	3317
MP88BT184-	0.18	1	1600	920	0.0069	19.0	15.8	9.7	394	2188	<15	3028
MP88BT224-	0.22	1	1600	920	0.0062	20.0	16.6	10.2	447	2031	<15	2739
MP88BT274-	0.27	1	1600	920	0.0057	20.9	17.4	10.7	506	1875	<15	2472
MP88BT334-	0.33	2	1600	920	0.0072	23.5	19.5	12.0	488	1478	<25	1753
MP88BT394-	0.39	2	1600	920	0.0070	23.9	19.9	12.2	504	1293	<25	1613
MP88BT474-	0.47	2	1600	920	0.0062	25.5	21.2	13.0	608	1293	<25	1469
MP88BT564-	0.56	2	1600	920	0.0060	25.7	21.4	13.2	621	1109	<25	1346
MP88CA104-	0.10	1	2000	920	0.0086	17.0	14.2	8.7	313	3125	<15	4062
MP88CA124-	0.12	1	2000	920	0.0080	17.7	14.7	9.0	338	2813	<15	3708
MP88CA154-	0.15	1	2000	920	0.0073	18.5	15.4	9.5	375	2500	<15	3317
MP88CA184-	0.18	1	2000	920	0.0069	19.0	15.8	9.7	394	2188	<15	3028
MP88CA224-	0.22	2	2000	920	0.0084	21.8	18.1	11.1	406	1848	<25	2148
MP88CA274-	0.27	2	2000	920	0.0078	22.7	18.9	11.6	449	1663	<25	1939
MP88CA334-	0.33	2	2000	920	0.0072	23.5	19.5	12.0	488	1478	<25	1753
MP88CA394-	0.39	2	2000	920	0.0070	23.9	19.9	12.2	504	1293	<25	1613
MP88CB104-	0.10	1	2400	920	0.0086	17.0	14.2	8.7	313	3125	<15	4062
MP88CB124-	0.12	1	2400	920	0.0080	17.7	14.7	9.0	338	2813	<15	3708
MP88CB154-	0.15	1	2400	920	0.0073	18.5	15.4	9.5	375	2500	<15	3317
MP88CB184-	0.18	2	2400	920	0.0092	20.8	17.3	10.6	366	2032	<25	2374
MP88CB224-	0.22	2	2400	920	0.0084	21.8	18.1	11.1	406	1848	<25	2148
MP88CB274-	0.27	2	2400	920	0.0078	22.7	18.9	11.6	449	1663	<25	1939
MP88CB334-	0.33	2	2400	920	0.0072	23.5	19.5	12.0	488	1478	<25	1753
MP88CD104-	0.10	1	3000	920	0.0086	17.0	14.2	8.7	313	3125	<15	4062
MP88CD124-	0.12	1	3000	920	0.0080	17.7	14.7	9.0	338	2813	<15	3708
MP88CD154-	0.15	2	3000	920	0.0100	19.9	16.6	10.2	333	2217	<25	2601
MP88CD184-	0.18	2	3000	920	0.0092	20.8	17.3	10.6	366	2032	<25	2374
MP88CD224-	0.22	2	3000	920	0.0084	21.8	18.1	11.1	406	1848	<25	2148
MP88CD274-	0.27	2	3000	920	0.0078	22.7	18.9	11.6	449	1663	<25	1939

EXCLUSIVE DUAL ELEMENT DESIGN

lowers inductance up to 70% – with:

- Less than 15nH
- Ripple current to 46.2 amps
- DVDT to 10,000 + v/µs

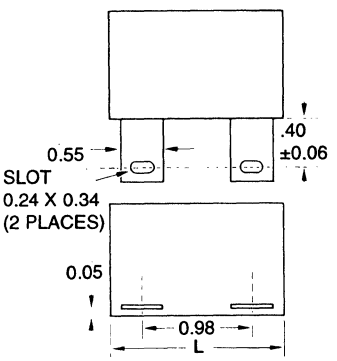


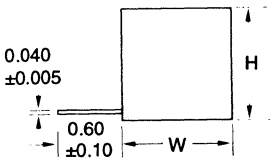
ADDITIONAL FEATURES

- No internal wire connections
- Direct-to-element tab attachment
- Terminals accommodate 23-28mm spacing
- Voltage ratings of 800 to 3000 VDC
- ESR as low as 0.0019 ohms
- Operating temperature: -55° to +105°C

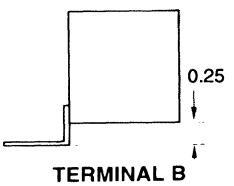
CASE	L	W	H
1	1.62 (41.1mm)	1.00 (25.4mm)	1.00 (25.4mm)
2	1.67 (42.4mm)	1.38 (35.0mm)	1.27 (32.3mm)

DIMENSIONAL DATA





TERMINAL A



TERMINAL B

ELECTRONIC CONCEPTS INC.
P.O. BOX 1278
EATONTOWN, NEW JERSEY 07724
TEL: (732) 542-7880
FAX: (732) 542-0524
E-mail sales@eci-capacitors.com
WWW http//:www.eci-capacitors.com

ELECTRONIC CONCEPTS INC.

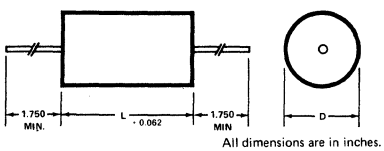
TYPE 5MP SWITCH-MODE POWER SUPPLY CAPACITORS METALLIZED POLYPROPYLENE

Type 5MP capacitors have been developed by Electronic Concepts for use in switching power supplies. These metallized polypropylene capacitors are manufactured by using special techniques in order to achieve the optimum characteristics for high current, high capacitance, low ESR applications.

For filter designs where capacitance of 50 mfd or less is suitable for the circuit, type 5MP affords the opportunity to improve general system design. These unique capacitors also exhibit none of the "roll-off" of capacitance with frequency often associated with electrolytics.

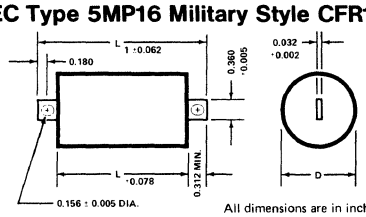
In addition to the features which make type 5MP particularly suitable for switching applications, they are also characterized by low losses. Other advantages of polypropylene are long-term stability, retrace, low dielectric absorbtion, and high insulation resistance.

EC Type 5MP12 Military Style CFR13



All dimensions are in inches.

EC Type 5MP16 Military Style CFR14



All dimensions are in inches.

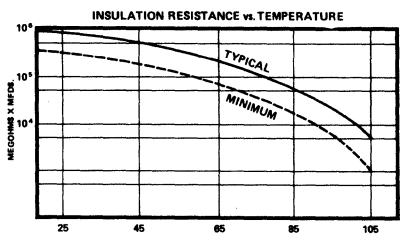
Catalog Numbering System

5MP 16 D 106 K

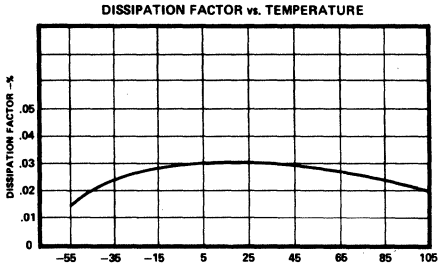
- TYPE
- STYLE — Wrap and fill lug termination
- VOLTAGE — D = 100 VDC; F = 200 VDC; J = 400 VDC
- CAPACITANCE — Expressed in Picofarads, the first two digits are significant figures. The third is the number of zeros. (e.g., 106 equals 10,000,000 pF)
- TOLERANCE — M-20% K-10% J-5% Closer Tolerances upon request

Commercial EC Part Number	Equivalent Military Designation	Capacitance Nominal (µF)	D Diameter	L Length	Lead Dia.	ESR Ohms 20-100 kHz Max	Maximum Ripple Current (AMP RMS) 20-100 kHz Case Temperature +25°C	+35°C	+45°C	+55°C	+65°C	+75°C	+85°C	Resonant Frequency in kHz	I Peak	DVDT
100 VDC						**EC Type 5MP12 Military Style CFR13**										
5MP12D105-	CFR13ALB105--	1.0	.469 ±.062	.750	.032	.015	9.2	8.5	7.8	7.0	6.0	4.9	4.5	1065	407	407
5MP12D205-	CFR13ALB205--	2.0	.534 ±.062	.938	.032	.012	10.8	10.0	9.1	8.2	7.0	5.8	5.3	703	528	264
5MP12D305-	CFR13ALB305--	3.0	.624 ±.093	.938	.040	.011	12.1	11.2	10.3	9.2	8.0	6.5	5.9	574	790	263
5MP12D505-	CFR13ALB505--	5.0	.640 ±.093	1.250	.040	.010	13.8	12.7	11.6	10.4	9.0	7.4	6.7	385	828	166
5MP12D106-	CFR13ALB106--	10.0	.805 ±.093	1.500	.040	.009	15.0	15.0	14.2	12.7	11.0	9.0	8.2	248	1280	128
5MP12D206-	CFR13ALB206--	20.0	.875 ±.125	2.250	.040	.008	15.0	15.0	15.0	15.0	13.6	11.1	10.0	141	1517	76
5MP12D306-	CFR13ALB306--	30.0	1.075 ±.125	2.250	.040	.006	15.0	15.0	15.0	15.0	15.0	12.4	11.4	115	2277	76
5MP12D506-	(Not Available)	50.0	1.375 ±.125	2.250	.040	.004	15.0	15.0	15.0	15.0	15.0	13.6	12.4	89	3795	76
200 VDC																
5MP12F105-	CFR13ALC105--	1.0	.450 ±.062	1.250	.032	.020	7.3	7.3	7.3	7.3	7.2	5.9	5.4	861	250	250
5MP12F205-	CFR13ALC205--	2.0	.605 ±.093	1.250	.032	.015	12.0	12.0	11.3	10.1	8.7	7.1	6.5	609	498	249
5MP12F305-	CFR13ALC305--	3.0	.654 ±.093	1.500	.040	.013	15.0	13.8	12.6	11.3	9.8	8.0	7.3	452	576	192
5MP12F505-	CFR13ALC505--	5.0	.769 ±.093	1.750	.040	.011	15.0	15.0	14.7	13.1	11.4	9.3	8.5	323	782	156
5MP12F106-	CFR13ALC106--	10.0	.905 ±.125	2.250	.040	.009	15.0	15.0	15.0	15.0	13.8	11.3	10.3	200	1139	114
5MP12F206-	CFR13ALC206--	20.0	1.315 ±.125	2.250	.040	.006	15.0	15.0	15.0	15.0	15.0	14.1	12.8	141	2277	114
400 VDC																
5MP12J105-	CFR13ALE105--	1.0	.620 ±.093	1.500	.040	.019	9.5	9.5	9.5	9.5	9.5	7.8	7.1	784	319	319
5MP12J205-	CFR13ALE205--	2.0	.802 ±.093	1.750	.040	.015	15.0	15.0	15.0	13.4	11.6	9.5	8.7	511	521	260
5MP12J305-	CFR13ALE305--	3.0	.961 ±.125	1.750	.040	.012	15.0	15.0	15.0	15.0	13.1	10.7	9.8	417	781	260
5MP12J505-	CFR13ALE505--	5.0	1.067 ±.125	2.250	.040	.010	15.0	15.0	15.0	15.0	15.0	12.5	11.4	283	950	190
5MP12J106-	CFR13ALE106--	10.0	1.543 ±.125	2.250	.040	.006	15.0	15.0	15.0	15.0	15.0	15.0	14.1	200	1898	190
100 VDC						**EC Type 5MP16 Military Style CFR14**										
5MP16D105-	CFR14LLB105--	1.0	.469 ±.062	.922	1.640	.015	10.3	9.5	8.7	7.8	6.7	5.5	5.0	949	407	407
5MP16D205-	CFR14LLB205--	2.0	.534 ±.062	1.110	1.828	.012	12.0	11.0	10.0	8.9	7.8	6.3	5.8	617	528	264
5MP16D305-	CFR14LLB305--	3.0	.624 ±.093	1.110	1.828	.011	13.3	12.3	11.2	10.0	8.7	7.1	6.5	504	790	263
5MP16D505-	CFR14LLB505--	5.0	.640 ±.093	1.422	2.140	.010	14.8	13.7	12.5	11.2	9.7	7.9	7.2	347	828	166
5MP16D106-	CFR14LLB106--	10.0	.805 ±.093	1.672	2.390	.009	17.8	16.5	15.0	13.5	11.7	9.5	8.7	227	1280	128
5MP16D206-	CFR14LLB206--	20.0	.875 ±.125	2.422	3.140	.008	21.6	20.0	18.3	16.4	14.2	11.6	10.6	133	1517	76
5MP16D306-	CFR14LLB306--	30.0	1.075 ±.125	2.422	3.140	.006	24.3	22.5	20.5	18.4	15.9	13.0	11.9	108	2277	76
5MP16D506-	(Not Available)	50.0	1.375 ±.125	2.422	3.140	.004	29.6	27.3	25.5	23.6	20.6	20.0	19.7	84	3795	76
200 VDC																
5MP16F105-	CFR14LLC105--	1.0	.450 ±.062	1.422	2.140	.020	7.3	7.3	7.3	7.3	7.3	6.4	5.8	776	250	250
5MP16F205-	CFR14LLC205--	2.0	.605 ±.093	1.422	2.140	.015	14.3	13.3	12.1	10.8	9.4	7.7	7.0	548	498	249
5MP16F305-	CFR14LLC305--	3.0	.654 ±.093	1.672	2.390	.013	15.9	14.7	13.5	12.0	10.4	8.5	7.8	414	576	192
5MP16F505-	CFR14LLC505--	5.0	.769 ±.093	1.922	2.640	.011	18.3	17.0	15.5	13.9	12.0	9.8	8.9	299	782	156
5MP16F106-	CRF14LLC106--	10.0	.905 ±.125	2.422	3.140	.009	22.4	20.7	18.9	16.9	14.6	12.0	10.9	188	1139	114
5MP16F206-	CFR14LLC206--	20.0	1.315 ±.125	2.422	3.140	.006	27.4	25.4	23.2	20.7	17.9	14.7	13.4	133	2277	114
400 VDC																
5MP16J105-	CFR14LLE105--	1.0	.620 ±.093	1.672	2.390	.019	9.5	9.5	9.5	9.5	9.5	8.3	7.5	716	319	319
5MP16J205-	CFR14LLE205--	2.0	.802 ±.093	1.922	2.640	.015	15.0	15.0	15.0	14.2	12.3	10.0	9.1	472	521	260
5MP16J305-	CFR14LLE305--	3.0	.961 ±.125	1.922	2.640	.012	21.1	19.5	17.8	15.9	13.8	11.3	10.3	386	781	260
5MP16J505-	CFR14LLE505--	5.0	1.067 ±.125	2.422	3.140	.010	24.4	22.6	20.6	18.5	16.0	13.1	11.9	265	950	190
5MP16J106-	CFR14LLE106--	10.0	1.543 ±.125	2.422	3.140	.006	30.0	27.8	25.4	22.7	19.7	16.1	14.7	188	1898	190

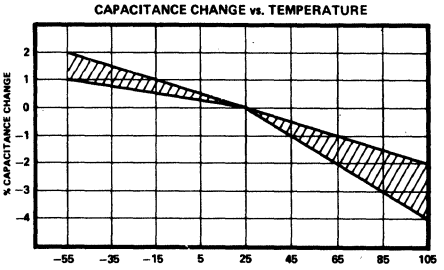
INSULATION RESISTANCE vs. TEMPERATURE



DISSIPATION FACTOR vs. TEMPERATURE



CAPACITANCE CHANGE vs. TEMPERATURE



ELECTRONIC CONCEPTS INC.

P.O. BOX 1278
EATONTOWN, NEW JERSEY 07724

TEL: (732) 542-7880
FAX: (732) 542-0524
E-mail sales@eci-capacitors.com
WWW http//:www.eci-capacitors.com

ELECTRONIC CONCEPTS INC.

TYPE 5MC SWITCH-MODE POWER SUPPLY CAPACITORS 125°C OPERATING TEMPERATURE

A new innovation pioneered by Electronic Concepts, Inc. leads the way to a new era of miniature metallized polycarbonate film capacitors physically designed to minimize circuit board real estate in switch mode power converters while maintaining a low ESR, excellent ripple capability and high resonant frequency. Electronic Concepts offers, in addition to conventional axial leaded termination, a flat tinned copper tab termination for increased current carrying capability and higher resonant frequency. To offer layout flexibility, the copper tab terminated versions are offered in both high and low profiles.

Excellent electrical characteristics and super miniaturization are offered to switch mode power supply designers with his requirements in mind.

5MC26 and 5MC27 type capacitors are qualified to MIL-C-55514/11, styles CFR26 and CFR27.
5MC29 type capacitors are qualified to MIL-C-55514/12, style CFR29.

CAP (µF)	AXIAL LEADS 5MC22			LOW PROFILE 5MC26			HIGH PROFILE 5MC27			COAXIAL 5MC29			ESR Milliohms 100 KHz	Ripple Current Max @ 25°	Resonant Frequency KHz 5MC22, 5MC26, 5MC27	Resonant Frequency KHz 5MC29
	T	H	L	T	H	L	T	H	L	T	W	H				
50 VDC																
1.0	.250	.343	.687										18	7.8	1106	
3.0	.406	.593	.687										15	9.8	638	
5.0	.406	.593	.812										13	10.6	460	
10.0	.562	.812	.812	.812	.562	.750	.562	.812	.750	.562	.862	.750	11	12.6	325	390
20.0	.718	.968	.937	.968	.718	.875	.718	.968	.875	.718	.968	.875	10	14.8	215	258
50.0	1.000	1.375	1.062	1.375	1.000	1.000	1.000	1.375	1.000	1.000	1.375	1.000	6	23.5	128	154
75 VDC																
1.0	.281	.375	.812										19	7.9	1028	
3.0	.468	.718	.812							.468	.718	.750	15	10.3	593	712
5.0	.500	.750	.937				.500	.750	.875	.500	.750	.875	13	11.6	431	517
10.0	.718	1.031	.937	1.031	.718	.875	.718	1.031	.875	.718	1.031	.875	12	13.5	305	366
20.0	.937	1.312	1.062	1.312	.937	1.000	.937	1.312	1.000	.937	1.312	1.000	11	16.5	203	244
50.0	1.312	1.687	1.312	1.687	1.312	1.250	1.312	1.687	1.250	1.312	1.687	1.250	6	24.2	116	139
100 VDC																
1.0	.281	.375	.937										20	8.0	963	
3.0	.437	.750	.937							.437	.750	.875	15	10.6	556	667
5.0	.593	.906	.937	.906	.593	.875	.593	.906	.875	.593	.906	.875	13	12.4	431	517
10.0	.781	1.093	1.062	1.093	.781	1.000	.781	1.093	1.000	.781	1.093	1.000	12	14.6	287	344
20.0	.906	1.281	1.312	1.281	.906	1.250	.906	1.281	1.250	.906	1.281	1.250	11	17.1	183	220
50.0	1.437	1.812	1.437	1.812	1.437	1.375	1.437	1.812	1.375	1.437	1.812	1.375	6	23.6	111	133

SPECIFICATIONS

Operating Temperature Range: –55°C to +125°C

Dissipation Factor: When measured at 1 KHz, the dissipation factor shall not exceed 0.3%.

Insulation Resistance: When measured at the applicable test temperature, and rated voltage, the insulation resistance shall equal or exceed the following values:

	25°C	85°C	125°C
Megohm x Microfarads	100,000	7,000	700
Except the insulation resistance in megohms need not exceed	200,000	70,000	7,000

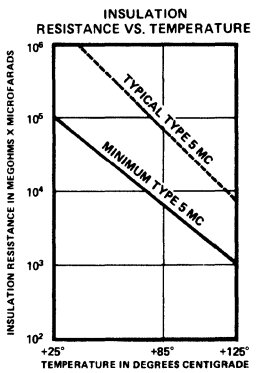
Capacitance Change: The Capacitance change vs. temperature for these capacitors shall not exceed the following:

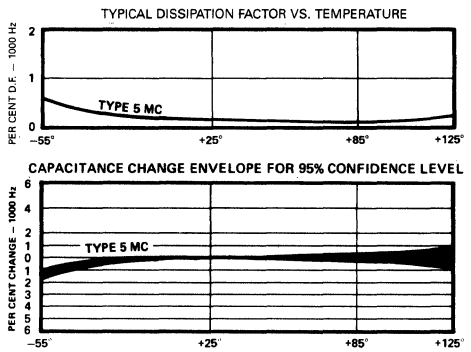
Temperature Degrees C.	–55	+25	+85	+125
Percent Change	–2.5	0	±1.0	±2.0

The measurement at each temperature shall be recorded when two successive readings taken at 5-minute intervals indicate no change in capacitance.

Capacitance Tolerance: Standard Tolerance is ±10%. Tolerances of ±20%, ±5%, ±2% and ±1% are available.

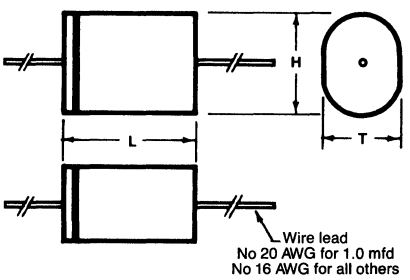
ELECTRICAL CHARACTERISTICS VS TEMPERATURE



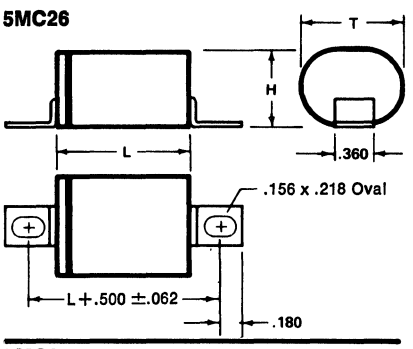


DIMENSIONAL DATA

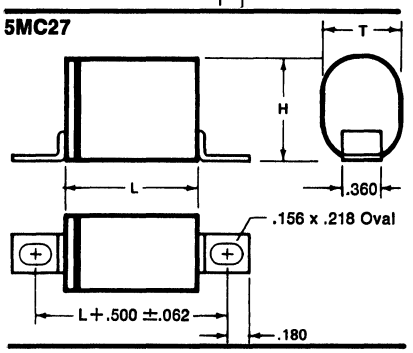
5MC22



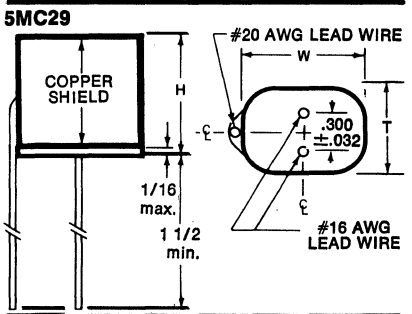
5MC26



5MC27



5MC29



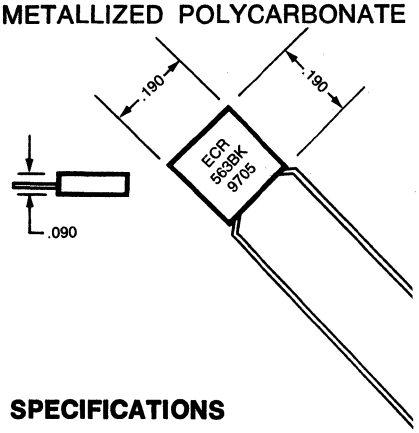
L: + 3/32, – 1/16
T & H & W: .291 thru .500 : + .062, – .156
.501 and greater : + .093, – .187

ELECTRONIC CONCEPTS INC.
P.O. BOX 1278
EATONTOWN, NEW JERSEY 07724
TEL: (732) 542-7880
FAX: (732) 542-0524
E-mail sales@eci-capacitors.com
WWW http//:www.eci-capacitors.com

ELECTRONIC CONCEPTS INC.

AVIONICAPS® ±1% TOLERANCE OFF THE SHELF 125°C OPERATING TEMPERATURE

METALLIZED POLYCARBONATE



TYPE ECR

- NO PIEZOELECTRIC EFFECT
- NOT FREQUENCY SENSITIVE
- NOT VOLTAGE SENSITIVE
- QUALIFIED TO MIL-C-55514/ , STYLES CFR12 AND CFR16

A new innovation pioneered by Electronic Concepts leads the way to a new era of smaller metallized film capacitors. Now a combination of excellent electrical characteristics and compactness is offered the equipment designer in a size equal to a ceramic CK05 capacitor.

Besides the superior electrical characteristics Type ECR are self-healing, as is the case with all metallized capacitors.

Additionally, these capacitors do not exhibit any of the drawbacks inherent in all ceramic capacitors.

SPECIFICATIONS

Operating Temperature Range: −55°C to +125°C.

Dissipation Factor: When measured at the frequency specified for capacitance measurements, the dissipation factor shall not exceed 0.3%.

Insulation Resistance: When measured at the applicable test temperature, and rated voltage, the insulation resistance shall equal or exceed the following values:

	25°C	85°C	125°C
Megohm x Microfarads	100,000	7,000	700
Except the insulation resistance in megohms need not exceed	200,000	70,000	7,000

Capacitance Change: The Capacitance change vs. temperature for these capacitors shall not exceed the following:

Temperature Degrees C.	−55	+25	+85	+125
Percent Change	−2.5	0	±1.0	±2.0

The measurement at each temperature shall be recorded when two successive readings taken at 5-minute intervals indicate no change in capacitance.

Capacitance Tolerance: Standard Tolerance is ±10%. Tolerances of ±20%, ±5%, ±2% and ±1% are available.

Note: Capacitance shall be measured at 25°C, and at or referred to a frequency of 1KHz.

VALUE (µF)	VDC	PHYSICAL SIZE T	H	L	LEAD SPACING LS	SEE FIGURE
.0010	250	.090	.190	.190	.200	1
.0012	250	.090	.190	.190	.200	1
.0015	250	.090	.190	.190	.200	1
.0018	250	.090	.190	.190	.200	1
.0022	250	.090	.190	.190	.200	1
.0027	250	.090	.190	.190	.200	1
.0033	250	.090	.190	.190	.200	1
.0039	200	.090	.190	.190	.200	1
.0047	200	.090	.190	.190	.200	1
.0056	200	.090	.190	.190	.200	1
.0068	150	.090	.190	.190	.200	1
.0082	150	.090	.190	.190	.200	1
.010	100	.090	.190	.190	.200	1
.012	100	.090	.190	.190	.200	1
.015	100	.090	.190	.190	.200	1
.018	100	.090	.190	.190	.200	1
.022	75	.090	.190	.190	.200	1
.027	75	.090	.190	.190	.200	1
.033	50	.090	.190	.190	.200	1
.039	50	.090	.190	.190	.200	1
.047	50	.090	.190	.190	.200	1
.056	50	.090	.190	.190	.200	1
.068	50	.095	.245	.295	.200	2
.082	50	.095	.245	.295	.200	2
.10	50	.095	.245	.295	.200	2
.12	50	.095	.295	.295	.200	2
.15	50	.095	.295	.295	.200	2
.18	50	.095	.295	.295	.200	2
.22	50	.095	.395	.395	.300	2
.27	50	.095	.395	.395	.300	2
.33	50	.095	.395	.395	.300	2
.39	50	.095	.395	.395	.300	2
.47	50	.145	.395	.395	.300	2
.56	50	.145	.395	.395	.300	2
.68	50	.195	.395	.395	.300	2
.82	50	.195	.395	.395	.300	2
1.0	50	.195	.395	.395	.300	2

DIMENSIONAL DATA

Figure 1

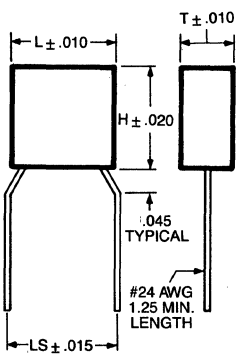
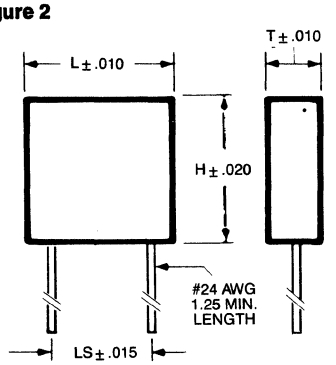
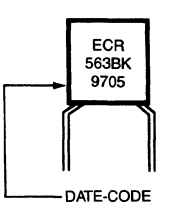


Figure 2



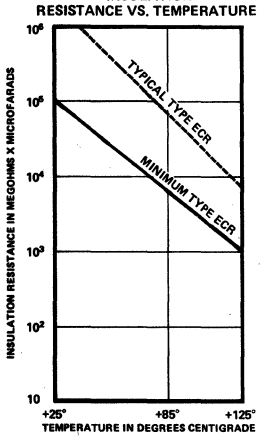
Part Marking



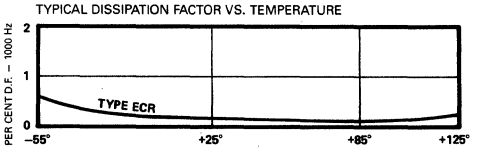
The first two digits represent the year, the second two digits represent the week. ie. 8452 is the 52nd week of 1984, 8512 is the 12th week of 1985.

ELECTRICAL CHARACTERISTICS VS TEMPERATURE

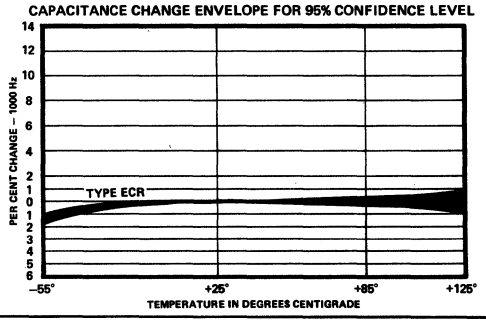
INSULATION RESISTANCE VS. TEMPERATURE



TYPICAL DISSIPATION FACTOR VS. TEMPERATURE



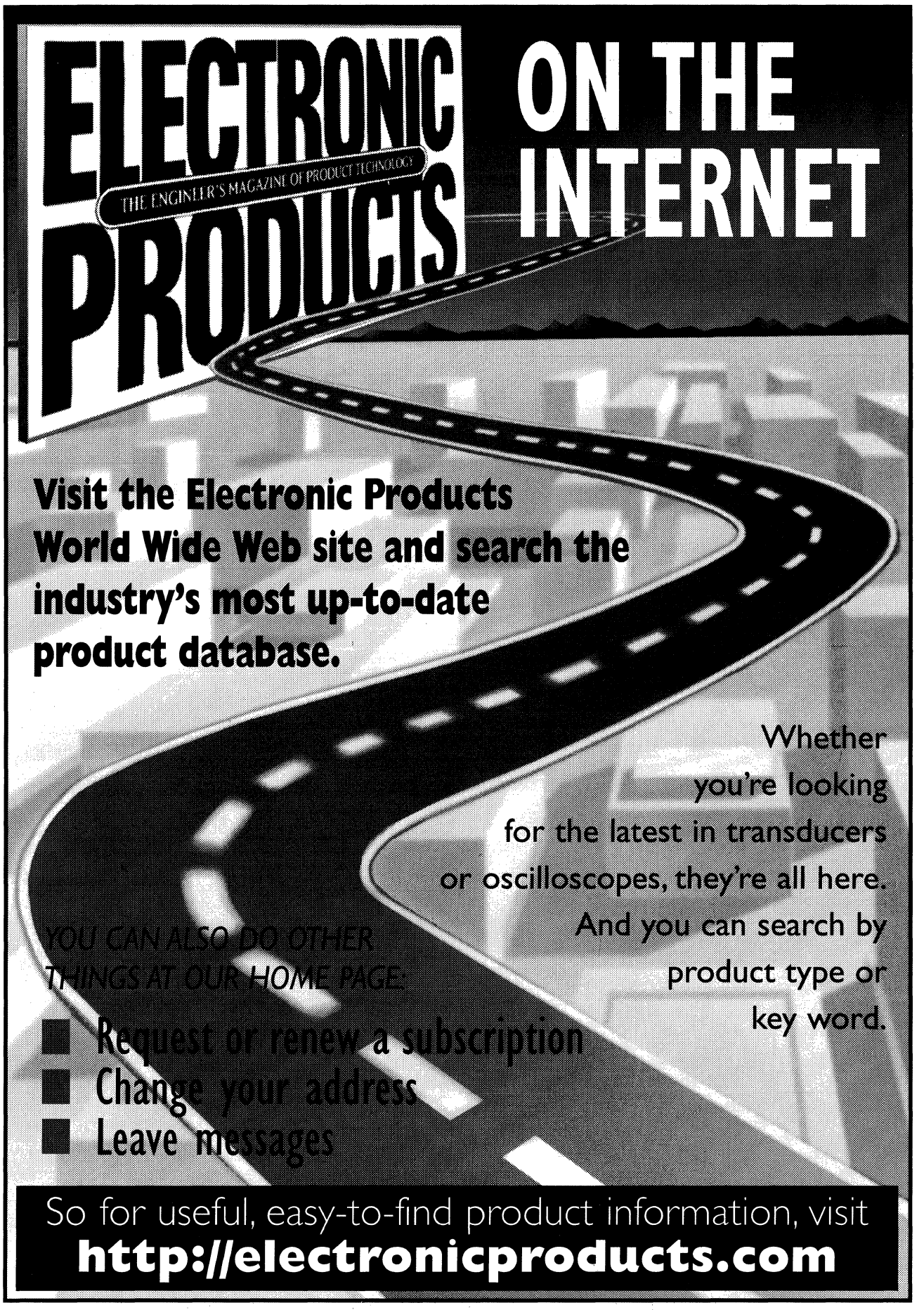
CAPACITANCE CHANGE ENVELOPE FOR 95% CONFIDENCE LEVEL



ELECTRONIC CONCEPTS INC.

P.O. BOX 1278
EATONTOWN, NEW JERSEY 07724

TEL: (732) 542-7880
FAX: (732) 542-0524
E-mail sales@eci-capacitors.com
WWW http//:www.eci-capacitors.com


ELECTRONIC PRODUCTS
THE ENGINEER'S MAGAZINE OF PRODUCT TECHNOLOGY
ON THE INTERNET
Visit the Electronic Products World Wide Web site and search the industry's most up-to-date product database.
Whether you're looking for the latest in transducers or oscilloscopes, they're all here. And you can search by product type or key word.
YOU CAN ALSO DO OTHER THINGS AT OUR HOME PAGE:
Request or renew a subscription
Change your address
Leave messages
So for useful, easy-to-find product information, visit
http://electronicproducts.com

ELECTRONIC FILM CAPACITORS, INC.

Reidville Industrial Park, 41 Interstate Lane, Waterbury, CT 06705 • Tel: (203) 755-5629 • Fax: (203) 755-0659

E.F.C., although a young company, was founded by a management team with a combined experience of over 50 years in the film capacitor business. We are dedicated to being the most responsible and reliable source for a complete line of precision tight tolerance film capacitors. We offer all metallized varieties of Polyester (Mylar*), Polypropylene, Polycarbonate, as well as foil versions of the above, including high quality Polystyrene with excellent capacitance stability.

METALLIZED POLYPROPYLENE

SP1213 are metallized polypropylene capacitors in a wrap and fill construction. Special metallization and HIGH-TECH terminations allow these capacitors to operate at up to 30 amps ripple current at frequencies up to 100KHZ. **SP1213** exhibit little or no capacitance rolloff, when compared to electrolytics, at these high frequencies.

Operating Temperature:
-55°C to 105°C at full voltage ratings

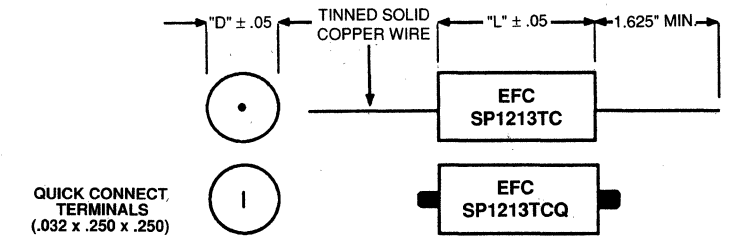
Capacitance Tolerances:
±1%, 2%, 5%, 10% & 20%

Dissipation Factor (1KHZ):
.1% maximum when measured at 25°C

Insulation Resistance:
150,000 megohm-microfarads (need not exceed 300,000 megohms) when measured at rated voltage at 25°C

ESR: see size chart

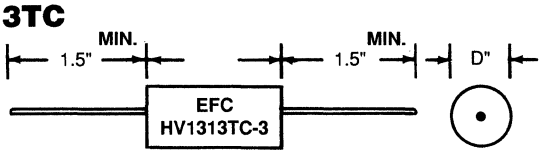
SP1213TC



Dimensional and Current Specifications					
Cap (UF)	D" x L"	Lead Dia.	ESR @ 100 KHZ (Milli Ohms)	Solid Wire Max Ripple Current (Amps)	Quick Connect @ 100 KHZ (25°)
100 VDC					
1.0	.580 x .781	.032	15	9.0	10
2.0	.630 x .906	.032	12	11.0	12
3.0	.750 x .906	.040	11	12.0	13
5.0	.780 x 1.250	.040	9	14.0	15
10.0	.940 x 1,531	.040	8	15.0	18
20.0	1.050 x 2,250	.040	7	15.0	22
30.0	1,250 x 2,250	.040	6	15.0	24
200 VDC					
1.0	.520 x 1.250	.032	20	7.5	8
2.0	.700 x 1,250	.032	15	12.0	14.5
3.0	.750 x 1,531	.040	13	15.0	16
5.0	.870 x 1,781	.040	11	15.0	18.5
10.0	1.030 x 2,250	.040	9	15.0	22.5
20.0	1,450 x 2,250	.040	6	15.0	27.5
400 VDC					
1.0	.720 x 1,531	.032	19	9.5	10.0
2.0	.900 x 1,781	.040	15	15.0	15.0
3.0	1.090 x 1,781	.040	12	15.0	21.0
5.0	1,190 x 2,250	.040	10	15.0	24.5
10.0	1,700 x 2,250	.040	7	15.0	30.0

HV1313TC

Notes: E.F.C. Series HV1313TC capacitors are designed for use with high voltage rectifiers, power supplies for electrostatic copiers and televisions. Operating Temperature: +85C D.F.: 1.0% Maximum at 1KHZ Dimensional Tolerances: ±.05



	2000 VDC		3000 VDC		4000 VDC		5000 VDC		6000 VDC		8000 VDC		10000 VDC		15000 VDC	
Capacitance	**D**	**L**	**D**	**L**	**D**	**L**	**D**	**L**	**D**	**L**	**D**	**L**	**D**	**L**	**D**	**L**
.001											.250	1.812	.281	2.00	.453	2.375
.0012									.250	1.312	.265	1.812	.312	2.00	.468	2.375
.0015									.265	1.312	.281	1.812	.328	2.00	.531	2.375
.0018									.296	1.312	.296	1.812	.359	2.00	.578	2.375
.0022							.250	1.312	.312	1.312	.328	1.812	.387	2.00	.656	2.375
.0027					.250	1.25	.281	1.312	.343	1.312	.375	1.812	.437	2.00	.703	2.375
.0033					.265	1.25	.296	1.312	.375	1.312	.390	1.812	.468	2.00	.562	3.00
.0039					.281	1.25	.312	1.312	.406	1.312	.437	1.812	.515	2.00	.609	3.00
.0047					.312	1.25	.343	1.312	.343	1.687	.468	1.812	.562	2.00	.656	3.00
.0056					.328	1.25	.375	1.312	.375	1.687	.500	1.812	.609	2.00	.718	3.00
.0068			.250	1.25	.359	1.25	.406	1.312	.406	1.687	.546	1.812	.671	2.00	.781	3.00
.0087			.265	1.25	.375	1.25	.343	1.687	.437	1.687	.484	2.312	.734	2.00	.859	3.00
.01	.218	1.25	.286	1.25	.409	1.25	.375	1.687	.484	1.687	.531	2.312	.796	2.00	.937	3.00
.012	.234	1.25	.317	1.25	.445	1.25	.406	1.687	.531	1.687	.562	2.312	.875	2.00	1.031	3.00
.015	.250	1.25	.343	1.25	.375	1.75	.437	1.687	.578	1.687	.625	2.312	.750	2.625	1.156	3.00
.018	.265	1.25	.375	1.25	.406	1.75	.500	1.687	.531	2.062	.687	2.312	.796	2.625		
.022	.296	1.25	.406	1.25	.428	1.75	.531	1.687	.578	2.062	.750	2.312	.875	2.625		
.027	.312	1.25	.359	1.75	.484	1.75	.578	1.687	.640	2.062	.875	2.312	.968	2.625		
.033	.343	1.25	.375	1.75	.531	1.75	.531	2.062	.703	2.062	.906	2.312	1.062	2.625		
.039	.375	1.25	.437	1.75	.562	1.75	.593	2.062	.796	2.062	.843	2.812				
.047	.359	1.50	.453	1.75	.515	2.25	.625	2.062	.828	2.062	.921	2.812				
.056	.375	1.50	.468	1.75	.562	2.25	.687	2.062	.906	2.062	1.000	2.812				
.068	.406	1.50	.453	2.25	.609	2.25	.750	2.062	.875	2.437	1.125	2.812				
.087	.453	1.50	.484	2.25	.671	2.25	.734	2.437	.953	2.437	1.250	2.812				
.10	.500	1.50	.531	2.25	.734	2.25	.875	2.437	1.062	2.437	1.375	2.812				

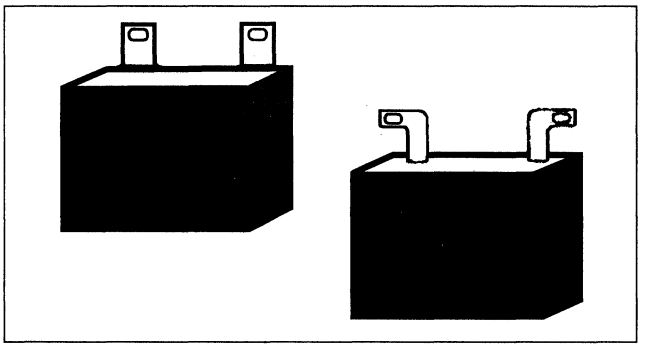
ELECTRONIC FILM CAPACITORS, INC.
Reidville Industrial Park 41 Interstate Lane, Waterbury, CT 06705 • Tel: (203) 755-5629 • Fax: (203) 755-0659

SERIES "PC" IGBT CAPACITORS

CONSTRUCTION:
- Polypropylene dielectric internal series design with double sided metallized carrier, non-impregnated

APPLICATIONS:
- Uninterruptable power supplies (UPS)
- SCR commutation
- Switch mode power supply (SMPS) protection
- IGBT module protection

CHARACTERISTICS:
- Low ESR
- Low dielectric absorption
- High RMS/Peak currents
- Low self-inductance
- Screw terminals for easy IGBT mounting



SPECIFICATIONS:
Capacitance: 0.1 µF to 1.5 µF
Voltage: 850 VDC to 2000 VDC (450 VAC to 660 VAC)

SERIES PC 1213EFR - IGBT CAPACITORS

850VDC/450VAC

Dimensions and Ratings								
CAP µF	T In.(mm)	H In.(mm)	L In.(mm)	Case Code	I (Peak) amps	I (RMS) amps	ERS MΩ	dV/dT V/µS
0.47	0.95 (24.0)	1.06 (27.0)	1.61 (41.0)	V	153	6.50	16	325
0.56	0.95 (24.0)	1.06 (27.0)	1.61 (41.0)	V	182	6.50	14	325
0.68	0.95 (24.0)	1.06 (27.0)	1.61 (41.0)	V	221	6.50	12	325
0.82	0.95 (24.0)	1.06 (27.0)	1.61 (41.0)	V	267	6.50	11	325
1.00	0.95 (24.0)	1.06 (27.0)	1.61 (41.0)	V	325	6.50	9	325
1.20	1.30 (33.0)	1.38 (35.0)	1.61 (41.0)	Z	390	7.00	7	325
1.50	1.30 (33.0)	1.38 (35.0)	1.61 (41.0)	Z	488	7.00	5	325

1200VDC/500VAC

Dimensions and Ratings								
CAP µF	T In.(mm)	H In.(mm)	L In.(mm)	Case Code	I (Peak) amps	I (RMS) amps	ERS MΩ	dV/dT V/µS
0.15	0.95 (24.0)	1.06 (27.0)	1.61 (41.0)	V	90	7.3	22	600
0.22	0.95 (24.0)	1.06 (27.0)	1.61 (41.0)	V	132	7.3	15	600
0.33	0.95 (24.0)	1.06 (27.0)	1.61 (41.0)	V	198	7.3	10	600
0.47	0.95 (24.0)	1.06 (27.0)	1.61 (41.0)	V	282	7.3	7	600
0.56	0.95 (24.0)	1.06 (27.0)	1.61 (41.0)	V	336	7.3	6	600
0.68	0.95 (24.0)	1.06 (27.0)	1.61 (41.0)	V	408	7.3	5	600
0.82	1.30 (33.0)	1.38 (35.0)	1.61 (41.0)	Z	492	7.5	4	600
1.00	1.30 (33.0)	1.38 (35.0)	1.61 (41.0)	Z	600	7.5	3	600

2000VDC/660VAC

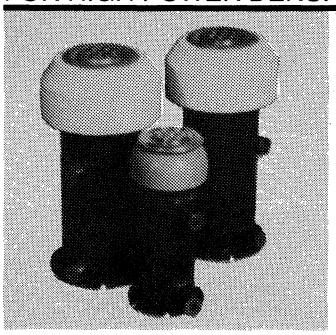
Dimensions and Ratings								
CAP µF	T In.(mm)	H In.(mm)	L In.(mm)	Case Code	I (Peak) amps	I (RMS) amps	ERS MΩ	dV/dT V/µS
0.10	0.95 (24.0)	1.06 (27.0)	1.61 (41.0)	V	85	7.5	19	850
0.12	0.95 (24.0)	1.06 (27.0)	1.61 (41.0)	V	102	7.5	16	850
0.15	0.95 (24.0)	1.06 (27.0)	1.61 (41.0)	V	128	7.5	13	850
0.22	0.95 (24.0)	1.06 (27.0)	1.61 (41.0)	V	187	7.5	9	850
0.33	1.30 (33.0)	1.38 (35.0)	1.61 (41.0)	Z	281	8.1	6	850
0.47	1.30 (33.0)	1.38 (35.0)	1.61 (41.0)	Z	400	8.1	4	850

EFC will manufacture to any non-standard value or size. Please consult factory for special requirements.

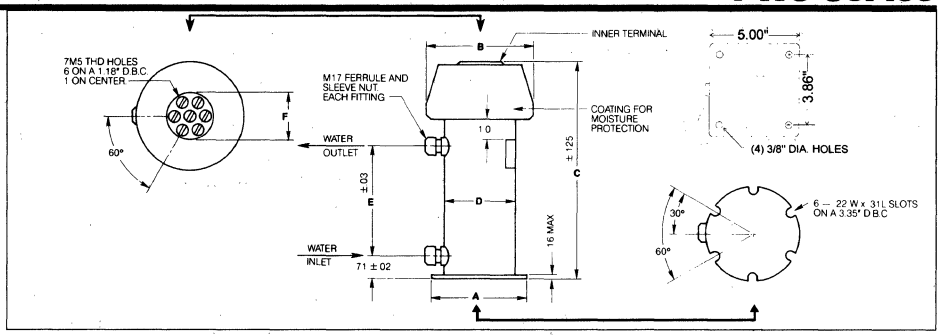
HIGH ENERGY CORP. Ceramic RF Capacitors

HF HIGH VOLTAGE CERAMIC WATER COOLED CAPACITORS FOR HIGH POWER DENSITY

PWC Series



The left represent a very small part of our product capability. Please contact factory for your specific need with any special mounting requirements.

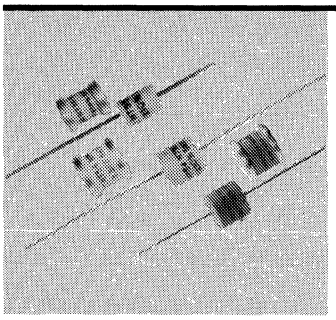


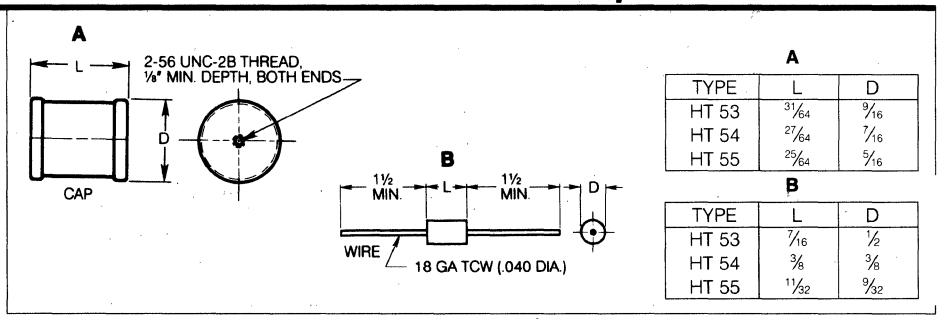
Rated Voltage	I* Max	KVA* Max	Freq* Max MHz	Cap	P/N	A	B	C	D	E	F
12 KVPK	150 Amps	1275	0.56	5000 pF	PWC12502MA	3.74	4.18	8.66	2.75	4.53	1.50
14 KVPK	200 Amps	2000	0.64	5000 pF	PWC14502MA	5.32	5.83	9.76	4.00	5.28	2.00
14 KVPK	250 Amps	3000	0.65	7500 pF	PWC14752MR	5.32	5.83	11.38	4.00	5.28	2.00
14 KVPK	250 Amps	2500	0.53	7600 pF	PWC14762MA	**	5.83	11.93	4.00	5.28	2.00
16 KVPK	250 Amps	2830	0.70	5000 pF	PWC16502MA	5.32	5.83	9.84	4.00	5.28	2.00
16 KVPK	250 AMPS	2830	0.58	6000 pF	PWC16602MA	5.32	5.83	10.70	4.00	5.28	2.00
18 KVPK	250 Amps	2500	0.52	7600 pF	PWC18762MA	**	5.83	16.54	4.00	5.28	2.00
20 KVPK	250 Amps	3000	0.66	5000 pF	PWC20502MA	5.32	5.83	11.25	4.00	5.28	2.00

*These maximum ratings are dependent on each other. Refer to factory for relationships of I, KVA, and Frequency.
**Capacitors noted have square base as shown above.

RF TRANSMITTING CAPACITORS

HT53, 54 and 55 Series





A

TYPE	L	D
HT 53	31/64	9/16
HT 54	27/64	7/16
HT 55	25/64	5/16

B

TYPE	L	D
HT 53	7/16	½
HT 54	⅜	⅜
HT 55	11/32	9/32

NPO designation now available in ±10ppm/°C, ±20ppm/°C, ±30ppm/°C and ±60ppm/°C. Call for details.

HT 53 Series 5 KVDC

Body TC	Cap (pF)	Part No.	Maximum Current Rating 1 MHZ	10 MHZ	30 MHZ
NPO	7	HT53T709DA	.16*	1.54*	3.8
	10	HT53T100KA	.22*	2.20*	4.0
	15	HT53T150KA	.33*	2.8	4.1
	20	HT53T200KA	.44*	2.9	4.5
	25	HT53T250KA	.55*	3.0	4.8
	30	HT53T300KA	.66*	3.1	5.0
N-750	35	HT53T350KA	.77*	3.6	5.1
	40	HT53T400KA	.89*	3.7	5.2
	45	HT53T450KA	1.00*	3.8	5.3

HT 54 Series 5 KVDC

Body TC	Cap (pF)	Part No.	Maximum Current Rating 1 MHZ	10 MHZ	30 MHZ
NPO	1	HT54T109DA	.022*	.22*	.67*
	2	HT54T209DA	.044*	.44*	1.33*
	3	HT54T309DA	.067*	.66*	2.0*
	4	HT54T409DA	.089*	.88*	2.1
	5	HT54T509DA	.11*	1.1*	2.2
	6	HT54T609DA	.13*	1.3*	2.3
	7	HT54T709DA	.15*	1.5*	2.4
	8	HT54T809DA	.18*	1.7*	2.5
	9	HT54T909DA	.20*	1.9	2.6
	10	HT54T100DA	.22	2.2	2.8
	12	HT54T120KA	.26	2.5	2.9
	14	HT54T140KA	.31*	2.7	3.2

HT 54 Series 5 KVDC (continued)

Body TC	Cap (pF)	Part No.	Maximum Current Rating 1 MHZ	10 MHZ	30 MHZ
N-750	15	HT54T150KA	.33*	2.9	4.1
	20	HT54T200KA	.44*	3.6	5.3
	25	HT54T250KA	.55*	3.7	5.4
	30	HT54T300KA	.66*	3.7	5.5
	35	HT54T350KA	.77*	3.8	5.6
	40	HT54T400KA	.89*	3.8	5.6

HT 55 Series 5 KVDC

Body TC	Cap (pF)	Part No.	Maximum Current Rating 1 MHZ	10 MHZ	30 MHZ
NPO	1	HT55T109DA	.022*	.22*	1.2
	2	HT55T209DA	.044*	.44*	1.3
	3	HT55T309DA	.067*	.66*	1.4
	4	HT55T409DA	.088*	.88*	1.5
	5	HT55T509DA	.11*	.90	1.7
	6	HT55T609DA	.13*	.92	2.1
	7	HT55T709DA	.16*	.95	2.2
N-750	8	HT55T809DA	.18*	.96	2.4
	9	HT55T909DA	.20*	.97	2.5
	10	HT55T100DA	.22*	.98	2.8
	11	HT55T110KA	.24*	1.0	2.9
	12	HT55T120KA	.27*	1.0	2.9
	13	HT55T130KA	.29*	1.1	3.0
	14	HT55T140KA	.31*	1.1	3.0
	15	HT55T150KA	.33*	1.1	3.0

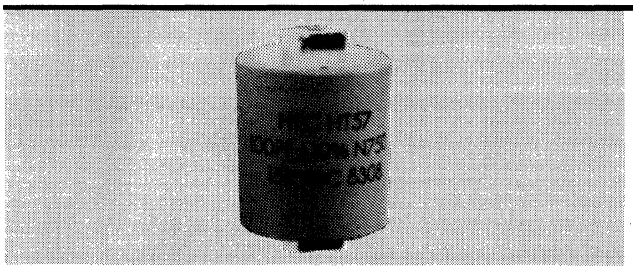
* Data is based on not exceeding the maximum rated voltage. All other data is based on a 30°C rise above a 25°C ambient in still air.

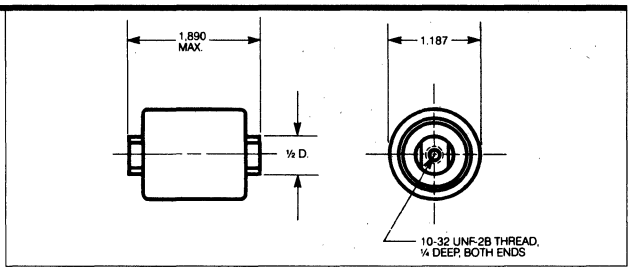
NOTES:
1. Reactive power ratings (KVAR) can be calcutated from given currents.
2. Capacitors data is based on actual tests of current necessary to obtain a 30°C rise. In operation, capacitors may be driven to a 50°C rise over a 25°C ambient and still have a 10°C service factor.
3. Final suffix "A" designates terminal cap. For wire termination, change suffix to "B".
4. Capacitance tolerance is ±.5 pF with letter "D" as second from end in part number, or is ±10% pF with letter "K" as second from end in part number. For tighter tolerance part change "D" to "C" for ±.25 pF and change "K" to "J" for ±5% pF.

HIGH ENERGY CORP. LOWER VALLEY ROAD, PARKESBURG, PENNSYLVANIA 19365-9603, 610-593-2800, FAX: 610-593-2985
Please Visit Our Internet Web Site: http://www.highenergycorp.com and contact us on e-mail: sales@highenergycorp.com

HIGH ENERGY CORP. Ceramic RF Capacitors

RF TRANSMITTING CAPACITORS — HH57 and HT57 Series





HT57 / 15KVDC

Body TC	Cap (pF)	Part No.	Maximum Current Rating 1 MHZ	10 MHZ	30 MHZ
NPO	10	HT57Y100MA	.66*	10.1	11.3
	25	HT57Y250MA	1.66*	11.5	12.5
	50	HT57Y500MA	3.33*	12.5	13.0
	60	HT57Y600MA	3.80	12.5	13.0
N-750	75	HT57Y750MA	3.80	11.1	13.1
	100	HT57Y101MA	3.80	11.1	13.7
	120	HT57Y121MA	4.10	11.9	13.7
	150	HT57Y151MA	4.60	11.9	14.5
	170	HT57Y171MA	4.60	12.0	14.5
	200	HT57Y201MA	5.10	12.5	15.0
N-3300	250	HT57Y251MA	2.60	6.2	7.0
	300	HT57Y301MA	3.10	6.2	7.0
	400	HT57Y401MA	3.70	6.5	7.5
N-4700	500	HT57Y501MA	2.60	5.8	6.9

Available in 10 KVDC

HT57 / 15KVDC

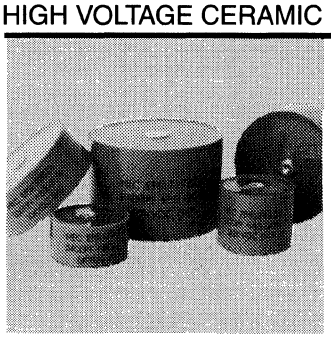
Body TC	Cap (pF)	Part No.	Maximum Current Rating 1 MHZ	10 MHZ	30 MHZ
X5T	750	HH57Y751MA	2.60	5.8	6.9
	1000	HH57Y102MA	2.10	3.8	5.1
	1200	HH57Y122MA	2.10	3.8	5.1
X5V	1500	HH57Y152MA	2.40	4.1	5.3

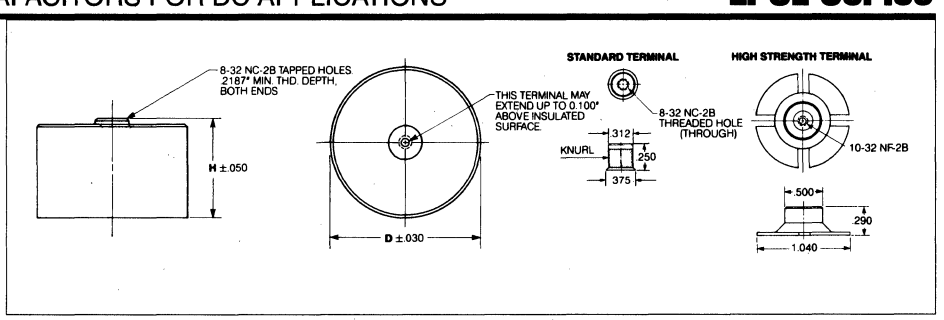
Available in 10 KVDC

* Data is based on not exceeding the maximum rated voltage. All other data is based on a 30°C rise above a 25°C ambient in still air.

NOTES:
1. Reactive power ratings (KVAR) can be calcutated from given currents.
2. Capacitor data is based on actual tests of current necessary to obtain a 30°C rise. In operation, capacitors may be driven to a 50°C rise over a 25°C ambient and still have a 10°C serivce factor.
3. Capacitance tolerance is ±20% with letter "M" as second from end in part number. For ±10%, change this leter to "K".

HIGH VOLTAGE CERAMIC CAPACITORS FOR DC APPLICATIONS — EPSL Series





STANDARD RATINGS

Cap (pF)	Rated Voltage (KVDC)	Part Number	Dimensions (Inches) ±.030 D	±.050 H
1100	6	EPSLU112ZS	.83	.69
2000	6	EPSLU202ZS	1.00	.69
3400	6	EPSLU342ZS	1.25	.69
5400	6	EPSLU542ZS	1.50	.69
8000	6	*EPSLU802ZS	1.75	.69
11000	6	*EPSLU113ZS	2.08	.69
14000	6	*EPSLU143ZS	2.25	.69
16000	6	*EPSLU163ZS	2.37	.69
680	10	EPSL1681ZS	.83	.81
1200	10	EPSL1122ZS	1.00	.81
2000	10	EPSL1202ZS	1.25	.81
3200	10	EPSL1322ZS	1.50	.81
4700	10	*EPSL1472ZS	1.75	.81
6500	10	*EPSL1652ZS	2.08	.81
8300	10	*EPSL1832ZS	2.25	.81
9300	10	*EPSL1932ZS	2.37	.81
470	15	EPSL2471ZS	.83	.95
800	15	EPSL2801ZS	1.00	.95
1300	15	EPSL2132ZS	1.25	.95
2200	15	EPSL2222ZS	1.50	.95
3200	15	*EPSL2322ZS	1.75	.95
4600	15	*EPSL2462ZS	2.08	.95
5800	15	*EPSL2582ZS	2.25	.95
6500	15	*EPSL2652ZS	2.37	.95

* Items marked with asterisk are also available with extra-cost high strength terminals.

STANDARD RATINGS

Cap (pF)	Rated Voltage (KVDC)	Part Number	Dimensions (Inches) ±.030 D	±.050 H
350	20	EPSL3351ZS	.83	1.13
500	20	EPSL3501ZS	1.00	1.13
600	20	EPSL3601ZS	1.25	1.13
1000	20	EPSL3102ZS	1.50	1.13
1600	20	EPSL3162ZS	1.75	1.13
2400	20	*EPSL3242ZS	2.08	1.13
3300	20	*EPSL3332ZS	2.25	1.13
4300	20	*EPSL3432ZS	2.37	1.13
4800	20	*EPSL3482ZS	2.37	1.13
260	30	EPSL5261ZS	.83	1.31
460	30	EPSL5461ZS	1.00	1.31
780	30	EPSL5781ZS	1.25	1.31
1200	30	EPSL5122ZS	1.50	1.31
1800	30	*EPSL5182ZS	1.75	1.31
2500	30	*EPSL5252ZS	2.08	1.31
3300	30	*EPSL5332ZS	2.25	1.31
3600	30	*EPSL5362ZS	2.37	1.31
180	40	EPSL7181ZS	.83	1.61
340	40	EPSL7341ZS	1.00	1.61
570	40	EPSL7571ZS	1.25	1.61
920	40	EPSL7921ZS	1.50	1.61
1300	40	*EPSL7132ZS	1.75	1.61
1900	40	*EPSL7192ZS	2.08	1.61
2400	40	*EPSL7242ZS	2.25	1.61
2700	40	*EPSL7272ZS	2.37	1.61

To order capacitors with high strength terminals, change suffix letter of part number for "S" to "H".

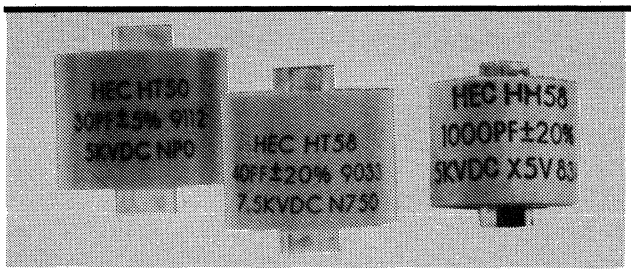
HIGH ENERGY CORP. LOWER VALLEY ROAD, PARKESBURG, PENNSYLVANIA 19365-9603, 610-593-2800, FAX: 610-593-2985
Please Visit Our Internet Web Site: http://www.highenergycorp.com and contact us on e-mail: sales@highenergycorp.com

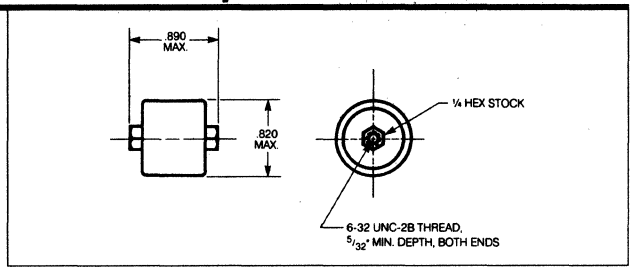
HIGH ENERGY CORP.

Ceramic RF Capacitors

RF TRANSMITTING CAPACITORS

HT50, HT58 and HH58 Series





HT50,HT58 / 7.5 KVDC

Body TC	Cap (pF)	Part No.	Maximum Current Rating 1 MHZ	10 MHZ	30 MHZ
NPO	10	HT50V100MA	.83	4.2	7.3
	15	HT50V150MA	.83	4.2	7.3
	25	HT50V250MA	.83*	4.9	7.9
	30	HT50V300MA	1.00*	5.0	8.0
	35	HT50V350MA	1.17*	5.0	8.3
	40	HT50V400MA	1.33*	5.1	8.3
	45	HT50V450MA	1.50*	5.1	8.4
	50	HT50V500MA	1.66*	5.2	8.5
	55	HT50V550MA	1.83*	5.2	8.6
	60	HT50V600MA	1.99*	5.3	8.7
	65	HT50V650MA	2.16*	5.3	8.9
N-750	40	HT58V400MA	1.33*	5.3	8.9
	45	HT58V450MA	1.50*	5.3	9.0
	50	HT58V500MA	1.66*	5.4	9.4
	55	HT58V550MA	1.83*	5.4	9.5
	60	HT58V600MA	1.99*	5.4	9.7
	65	HT58V650MA	2.16*	5.5	9.7

HH58 / 7.5 KVDC

Body TC	Cap (pF)	Part No.	Maximum Current Rating 1 MHZ	10 MHZ	30 MHZ
X5T	500	HH58V501MA	1.4	3.4	4.9
	600	HH58V601MA	1.4	3.4	5.0
	700	HH58V701MA	1.5	3.5	5.1
	800	HH58V801MA	1.6	3.6	5.2
	900	HH58V901MA	1.6	3.7	5.3

HT50,HT58 / 7.5 KVDC

Body TC	Cap (pF)	Part No.	Maximum Current Rating 1 MHZ	10 MHZ	30 MHZ
N-750	75	HT50V750MA	2.50*	6.5	9.7
	100	HT50V101MA	3.6	6.8	9.7
	120	HT50V121MA	3.7	6.9	9.9
	150	HT50V151MA	3.8	7.0	10.2
	170	HT50V171MA	3.9	7.1	10.4
N-3300	200	HT50V201MA	2.8	5.1	6.9
	250	HT50V251MA	2.8	5.2	7.1
	300	HT50V301MA	2.9	5.3	7.4
	350	HT50V351MA	2.9	5.4	7.6
	400	HT50V401MA	3.0	5.4	7.7
N-4700	500	HT50V501MA	3.2	6.0	7.3
	600	HT50V601MA	3.3	6.2	7.5
	700	HT50V701MA	3.5	6.4	7.9

Available in 5 KVDC

* Data is based on not exceeding the maximum rated voltage. All other data is based on a 30°C rise above a 25°C ambient in still air.

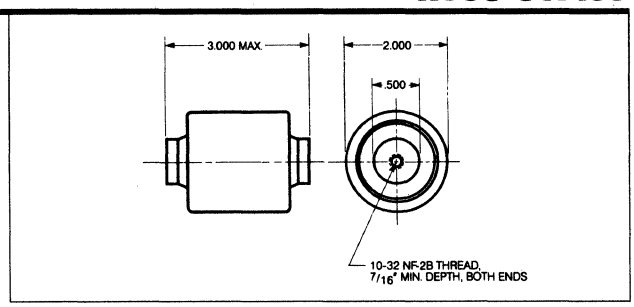
HH58 / 7.5 KVDC

Body TC	Cap (pF)	Part No.	Maximum Current Rating 1 MHZ	10 MHZ	30 MHZ
X5V	1000	HH58V102MA	1.6	3.8	5.6
	1500	HH58V152MA	1.7	4.0	6.0
	2000	HH58V202MA	1.7	4.2	6.3
	2500	HH58V252MA	1.8	4.4	6.6

Available in 5 KVDC

RF TRANSMITTING CAPACITORS

HT59 Series



25 KVDC

Body TC	Cap (pF)	Part No.	Maximum Current Rating 1 MHZ	10 MHZ	30 MHZ
NPO	50	HT594500MA	3.2	14.1	16.8
	75	HT594750MA	3.7	15.8	17.9
	100	HT594101MA	3.9	17.4	20.2
	130	HT594131MA	4.1	18.0	24.1
N-750	150	HT594151MA	4.1	18.1	25.6
	200	HT594201MA	5.3	18.2	30.0
	250	HT594251MA	6.5	18.3	35.5

25 KVDC

Body TC	Cap (pF)	Part No.	Maximum Current Rating 1 MHZ	10 MHZ	30 MHZ
N-3300	300	HT594301MA	5.3	13.0	22.1
	500	HT594501MA	6.3	13.6	23.0
	700	HT594701MA	7.0	14.1	24.5
N-4700	800	HT594801MA	7.1	13.2	23.0
	1000	HT594102MA	7.4	15.1	25.0
	1500	HT594152MA	8.0	18.0	28.1

Available in 15 KVDC and 20 KVDC

NOTES:
1. Reactive power ratings (KVAR) can be calcutated from given currents.
2. Capacitor data is based on actual tests of current necessary to obtain a 30°C rise. In operation, capacitors may be driven to a 50°C rise over a 25°C ambient and still have a 10°C serivce factor.
3. Capacitance tolerance is ±20% with letter "M" as second from end in part number. For ±10%, change this leter to "K".

HIGH ENERGY CORP. LOWER VALLEY ROAD, PARKESBURG, PENNSYLVANIA 19365-9603, 610-593-2800, FAX: 610-593-2985
Please Visit Our Internet Web Site: http://www.highenergycorp.com and contact us on e-mail: sales@highenergycorp.com

HIGH ENERGY CORP.

Ceramic RF Capacitors

High Frequency, High Power Capacitors

High Energy's CHE type capacitors are specifically designed for use in very high power, high frequency circuits. They are primarily used in induction heating applications.

Type CHE capacitors utilize metallized polypropylene dielectric, for self healing capability and low dielectric losses. The design of the CHE series capacitors maximizes current carrying ability and heat transfer to the busbar.

There are a variety of mounting options available, including metric or English threads, and additional holes to allow series stacking of capacitors.
Contact plates are silver plated copper .

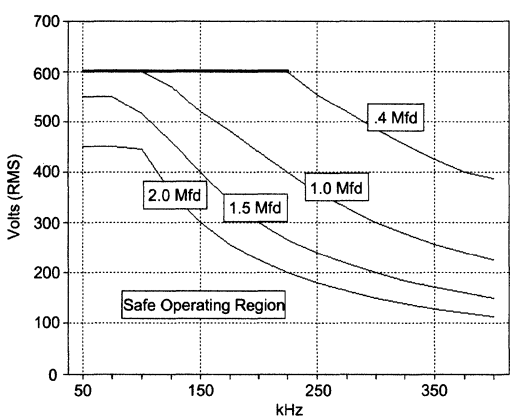
Our CHE type capacitors are an economical and efficient replacement for power mica type capacitors.

To utilize these capacitors at full rated power, they must be mounted on water cooled busbars. The minimum cooling required is 250 ml/min. of water to each side of the capacitor. The water exit temperature must be less than 45° C.

Part Numbers and Ratings

Part #	Mfd	Voltage
CHE6020	.2	600
CHE6040	.4	600
CHE6067	.67	600
CHE6100	1.0	600
CHE5150	1.5	550
CHE4200	2.0	450

Other values available, contact the factory.

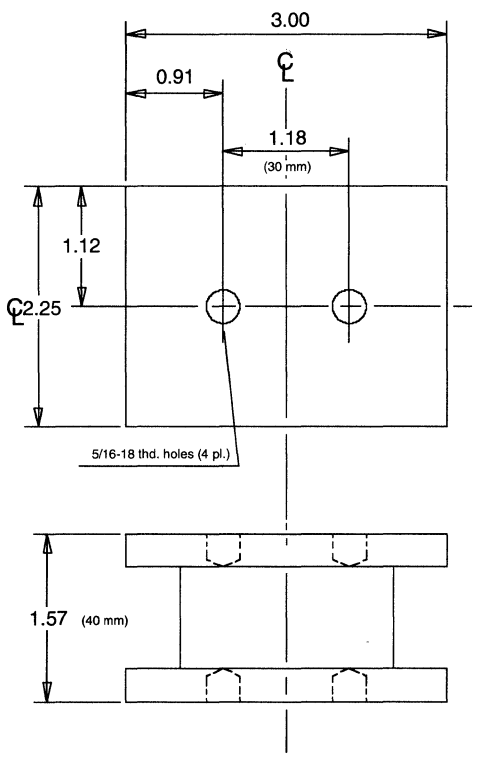


Formulas for sine wave conditions on a capacitor

$I = 2\pi fcv10^{-6}$

$KVAR = 2\pi fcv^2 10^{-9}$

where:
f = Hz and c = µfd



HIGH ENERGY CORP.

Ceramic RF Capacitors

Useful Formulas Relating to Capacitors

Capacitors in Series

$$c_t = \frac{1}{\frac{1}{c_1} + \frac{1}{c_2} + \frac{1}{c_n}}$$

voltage drops on capacitors in series are in inverse proportion to the capacitance

Capacitors in Parallel

$$c_t = c_1 + c_2 + c_n$$

Capacitive Reactance

$$X_c = 1/(2\pi fc)$$

Dissipation Factor

$$DF = ESR/X_c$$

$$Q = 1/DF$$

Resonant Frequency

$$f_0 = 1/(2\pi\sqrt{Lc})$$

Skin Depth

in copper, in centimeters

$$\delta = 6.62/\sqrt{f}$$

Energy Discharge Calculations

Stored Energy

$$\text{Joules (watt-seconds)} = {}^1/_2 cv^2$$

Peak Current

where circuit resistance is very small

$$I_{pk} \cong v_c\sqrt{c/L}$$

Voltage Reversal

peak value of the first reversal

$$v_r = v\text{-}(1/2\pi r)\sqrt{c/L}$$

Critical Damping Resistance

$$r = 2\sqrt{L/c}$$

Square Wave Conditions

(commutation and similar applications)

Current

$$I_{pk} = (\Delta v\pi c)/(2t)$$

$$I_{rms} = I_{pk}\sqrt{f/t}$$

c = Farads
L = Henries
ESR = equivalent series resistance
f = Hertz
t = rise time (seconds)
r = ohms

High Energy manufactures a wide variety of capacitors for both high voltage and high current applications. End uses include energy storage, induction heating, snubbers and commutation, filters, and doublers. Call us for help with your application.

HIGH ENERGY CORP. LOWER VALLEY ROAD, PARKESBURG, PENNSYLVANIA 19365-9603, 610-593-2800, FAX: 610-593-2985
Please Visit Our Internet Web Site: http://www.highenergycorp.com and contact us on e-mail: sales@highenergycorp.com

eem

MINIGLOSSARY CAPACITORS

Anode: One of two plates or conductors. In polarized capacitors, the anode should be connected to the positive conductor in the circuit.

Capacitive Reactance: The opposition (in ohms) of capacitance to the flow of alternating current, equal to the reciprocal of the product of the angular frequency (2π times frequency in Hertz) of the current times the capacitance in farads.

Cathode: One of two plates or conductors. In electrostatic capacitors the cathode is metallic. In electrolytic capacitors the cathode is a liquid, gel or other conductive material which is in intimate contact with a metallic cathodic connection.

Dielectric Constant: The ratio of the capacitance of a capacitor with some material other than air between the capacitor plates to the capacitance of the same capacitor with air between the plates. For example, the dielectric constants of air, Teflon®, polystyrene and ruby mica are 1, 2.1, 2.6 and 5.4, respectively.

Electrolytic: A capacitor with one metallic conductor (generally the anode) and with a liquid or semiconductor cathode. Nonpolarized electrolytic capacitors generally have two equal anodes as well as the liquid cathode. These anodes operate alternately as anode and cathodic connection as alternating current is applied.

Electrostatic: One of two general classes of capacitors in which two or more discrete metallic conductors are present and separated by an insulating dielectric material. Examples include: mica, ceramic, film, and paper types.

Farad: The basic unit of measure in capacitors. A capacitor charged to one volt with a charge of one coulomb (one ampere flowing for one second) has a capacitance of one farad. Capacitors are generally rated at portions of a farad (microfarads or picofarads).

1 farad (F) = 1,000,000 microfarads (μF) 1 microfarad (μF) = 1,000,000 picofarads (pF)

Impedance: All capacitors exhibit impedance. It is a function of capacitor type and internal construction. This can be particularly important in certain applications such as filters for switching power supplies. Capacitors used in these applications often have special multiple tab construction to shorten current paths and to reduce internal resistance.

Leakage Current: Expressed as dcl for electrolytic capacitors, a measure of the intrinsic losses in a charged capacitor. Generally speaking, the lower the dcl, the higher quality the capacitor.

Power Factor: A measure of the overall efficiency of a capacitor. Power factor ratings take all internal losses into consideration in a complex formula. This parameter of certain capacitors is often very important in AC applications such as motor-start and/or motor-run capacitors

Rated Voltage: The rated working voltage of a capacitor. Generally expressed in DC Volts (Vdcw). This is the voltage at which a capacitor may be safely operated at 25°C continuously within its overall parameters.

Ripple Current: The total amount of alternating and direct current that may be applied to an electrolytic capacitor under stated conditions. In general, the higher the ripple current applied, the shorter the operating life of the capacitor will be. Application of significantly higher than rated ripple currents can shorten the capacitor life dramatically and may even cause catastrophic failure (explosion).

Surge Voltage: The momentary surge voltage which may be applied for a stated length of time without doing permanent damage to the unit.

Temperature: Capacitors are generally rated at 25°C at sea level under specific humidity conditions. Operating temperature ranges are also given, along with derating (reliability) curves for operation at temperatures other than 25°C.

Temperature Coefficient: Expressed as TC in ppm (parts per million) or in percent (%) from the norm of 25°C. This is seldom a straight line and may vary widely for certain types. Most capacitors have positive TC in that the capacitance increases as temperature increases. Some types, however, have negative TC in that the capacitance decreases as temperature increases.

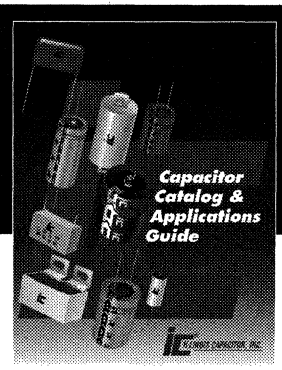
Ceramic Capacitor Codes
(Capacitance Given In pF)

Color	Digit	Multiplier	Tolerance			Temperature Coefficient ppm°C	Significant Figure	Multiplier
			Class 1					
			10pF or less	Over 10pF	Class 2			
Black	0	1	±2.0pF	±20%	±20%	0	0.0	–1
Brown	1	10	±0.1pF	±1%		–33		–10
Red	2	100		±2%		–75	1.0	–100
Orange	3	1000		±3%		–150	1.5	–1000
Yellow	4	10000			+100% –0%	–220	2.0	–10000
Green	5		±0.5pF	±5%	±5%	–330	3.3	+1
Blue	6					–470	4.7	+10
Violet	7					–750	7.5	+100
Gray	8	0.01	±0.25pF		+80% –20%	+150 to –1500		+1000
White	9	0.1	±1.0pF	±10%	±10%	+100 to –750		+10000
Silver								
Gold								

ILLINOIS CAPACITOR, INC.

3757 West Touhy Avenue, Lincolnwood, Il 60645
(847) 675-1760 • Fax: (847) 673-2850
email: sales@illcap.com • website: www.illcap.com

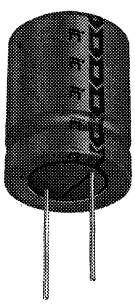
Ask for FREE catalog
Ask about samples



Go For The Winning Combination with Illinois Capacitor

PRODUCT SELECTOR

Aluminum Electrolytic Capacitors



Radial Lead

	SERIES	DESCRIPTION	CAPACITANCE (µF)	WVDC	TEMP. RANGE	LOAD LIFE (Hrs.)	FEATURES
Miniatures	PUM	7mm Height	4.7 to 220	6.3 to 50	-40°C to +85°C	1000	High C/V, Small Size
	PGM	High Temperature 7mm Height	0.1 to 100	6.3 to 50	-55°C to +105°C	1000	Extended Temperature (+105°C) Small Size
	PLM	Low Leakage 7mm Height	0.1 to 100	6.3 to 50	-40°C to +85°C	1000	Small Size Tantalum Alternative
	PBM	Non-Polarized 7mm Height	.47 to 100	6.3 to 50	-40°C to +85°C	1,000	Small Size
Low Profile	RSS	Low Profile	1.0 to 2200	6.3 to 50	-40°C to +85°C	1,000	Small Size
	SAK	Low Profile	22 to 10,000	6.3 to 50	-40°C to +85°C	2,000	Low Profile
Standard	CKS	Subminiature	22 to 15,000	6.3 to 100	-40°C to +85°C	2,000	General Purpose Smaller Size
	CKR	Standard	0.1 to 15,000	6.3 to 450	-40°C to +85°C	2,000	General Purpose
Extended Life	RMR	High Temperature (Not for new designs)	0.1 to 2200	10 to 450	-40°C to +105°C	1,000	Extended Temperature(+105°C)
	CKH	High Temperature	0.1 to 15,000	6.3 to 450	-55°C to +105°C	1,000	Extended Temperature (+105°C)
Low Impedance Low ESR	LSR	High Frequency/ High Temperature	.47 to 15,000	6.3 to 63	-55°C to +105°C	2,000 to 5,000	High Ripple Current Lowset Impedance
	RZM	High Frequency/ High Temperature	.47 to 15,000	6.3 to 50	-55°C to +105°C	2,000 to 3,000	Small Size High Frequency, (100kHz)
	RZS	High Frequency/ High Temperature	22 to 22,000	6.3 to 63	-55°C to +105°C	2,000	High Frequency, Low ESR High Ripple Current
	RLS	Low Leakage	0.15 to 1,000	6.3 to 50	-40°C to +85°C	2,000	Timing Circuits, Tantalum Alternative
	BPS	Non-Polarized	.47 to 1,000	10 to100	-40°C to +85°C	2,000	Polarity Reversing Crossover Circuits

Axial Lead

	TTA	Standard	.47 to 22,000	10 to 450	-40°C to +85°C	2,000	General Purpose
	TLS	Low Leakage	0.1 to 100	10 to 50	-40°C to +85°C	2,000	Timing Circuits, Tantalum Alternative
	BPA	Non-Polarized	.47 to 1,000	16 to100	-40°C to +85°C	2,000	Polarity Reversing, Crossover Circuits

Snap-In

Snap Mount	LBA	Snap-Mount	47 to 47,000	10 to 450	-40°C to +85°C	2,000	High Ripple Current, Power Supplies
	LMU	Snap-Mount	47 to 47,000	10 to 450	-40°C to +105°C	2,000	High Ripple Current, Power Supplies, (+105°C)

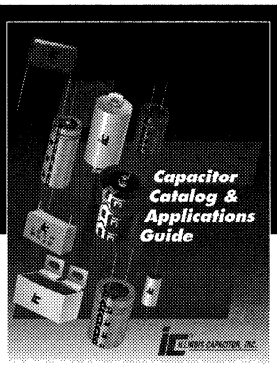
Surface Mount

Surface Mount	SPH	Surface Mount Electrolytic	.47 to 150	4 to 50	-55°C to +105°C	1,500 to 2,000	Extended Temperature, Low Profile

ILLINOIS CAPACITOR, INC.

3757 West Touhy Avenue, Lincolnwood, Il 60645
(847) 675-1760 • Fax: (847) 673-2850
email: sales@illcap.com • website: www.illcap.com

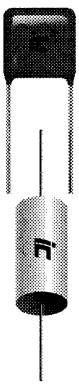
Ask for FREE catalog
Ask about samples



Go For The Winning Combination with Illinois Capacitor

PRODUCT SELECTOR

Aluminum Electrolytic Capacitors

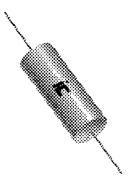


Polyester

	SERIES	DESCRIPTION	TYPE	CAPACITANCE RANGE (µF)	WVDC (VAC)	TEMP. RANGE	APPLICATION
Metallized Film	MWM MWR	Metallized Polyester	Axial Wrap & Filled	.001 to 22	50 to 1,000 (30 to 250)	-55°C to +125°C	Tuned Circuits, Audio, Digital
	MSR	Metallized Polyester	Radial, Epoxy Resin Dipped	.01 to 10	100 to 1,000 (63 to 250)	-55°C to +125°C	Tuned Circuits, Audio, Digital
	MMR	Metallized Polyester Reduced Size	Radial, Epoxy Resin Dipped	.01 to 10	100 to 630 (63 to 250)	-40°C to +105°C	Bypass, Coupling
	STR	Metallized Polyester Stacked Film	Radial, Epoxy Resin Dipped	.01 to 2.2	50 to 100 (40 to 63)	-40°C to +105°C	High Density Circuit Boards
Film/Foil	FFR	Polyester Film/Foil Non-Inductive	Radial, Epoxy Resin Dipped	.001 to .47	100 (63)	-25°C to +85°C	Audio, Bypass, Coupling
	UMR	Polyester Film/Foil Non-Inductive	Radial,Epoxy Resin Dipped	.001 to .47	100 (63)	-25°C to +85°C	Audio, Bypass, Coupling, Ceramic Alternative

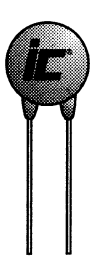
Polypropylene

	SERIES	DESCRIPTION	TYPE	CAPACITANCE RANGE (µF)	WVDC (VAC)	TEMP. RANGE	APPLICATION
Standard	MPW	Metallized Polypropylene	Axial Wrap & Filled	.001 to 10	160 to 630 (90 to 250)	-55°C to +105°C	AC Circuits, Audio, Digital, Pulse Discharge
	MPR	Metallized Polypropylene	Radial, Epoxy Resin Dipped	.01 to 2.2	250 to 630 (200 to 250)	-55°C to +105°C	AC Circuits, Audio Digital, Pulse Discharge
Class X2	MKP	Metallized Polypropylene	Radial Box	.0047 to 1.0	250 VAC 275 VAC	-40°C to +85°C	EMI, RFI Suppression
High Frequency	PHC	Metallized Polypropylene High Current	Axial Wrap & Filled	.15 to 40	250 to 850 (160 to 450)	-40°C to +85°C	SMPS, Ballasts, Motor Run
	MPH MPL	High Current Metallized Polypropylene	Axial Wrap & Filled	1.0 to 30	100, 200, 400	-55°C to +105°C	High Frequency AC Circuits, High Current Power Supplies
Snubbers	PPA	Double Sided Metallized Electrodes, Polypropylene Dielectric, High Current/Pulse	Axial Wrap & Filled	.0068 to 3.9	700 to 3,000 (380 to 750)	-40°C to +85°C	Snubbers, SMPS, SCR Communication
	PPB		Box	.001 to 6.8	250 to 2,000 (160 to 700)	-55°C to +100°C	
IGBT Snubbers	PMB	Double Sided Metallized Electrodes, Polypropylene Dielectric, Lug Leads	Box	.047 to 3.5	700 to 3,000	-40°C to +85°C	IGBT Snubbers, Direct Mount
	PMC	Metallized Polypropylene Lug Leads	Box	1.5 to 35	250 to 700	-40°C to +85°C	Resonant SMPS, IGBT Snubber



Polycarbonate

	SERIES	DESCRIPTION	TYPE	CAPACITANCE RANGE (µF)	WVDC (VAC)	TEMP. RANGE	APPLICATION
	MCW	Metallized Polycarbonate	Axial Wrap & Filled	.001 to 22	63 to 400 (40 to 200)	-40°C to +125°C	Telecommunication Circuits



Ceramics

	SERIES	DESCRIPTION	CAPACITANCE µF	WVDC	STANDARD TOLERANCE	TEMPERATURE CHARACTERISTICS	APPLICATION
	BCR	Temperature Stable	1pF to 680pF	50	±10%	NPO, N750, N1000,Y5E	Tuned Circuits
Discs	GCR	General Purpose	.001 to .1	50	20% -20%, +80%	Y5P, Y5V, Y5U, Z5U	Bypass& Coupling
	GHR	General Purpose	100pF to 10,000pF	1000	±10%	Y5P	Bypass& Coupling
	GMR	Miniature General Purpose	.01 to .47	12	±20% -20%, +80%	Y5T, Y5U	Bypass& Coupling
	GQR	General Purpose	.001 to .01	500	±20% -20%, +80%	Y5P Y5U	Bypass & Coupling

The Inter-Technical Group, Inc. WIMA Division

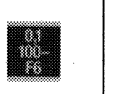
CAPACITORS FOR ELECTRONIC EQUIPMENT

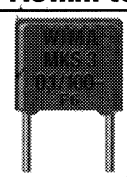
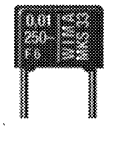
www.wimausa.com e-mail: sales@wimausa.com

SMD

MKS & MKC 7.5 mm to 37.5 mm Metallized

SMD / Metallized | **7.5 mm to 37.5 mm** / Metallized

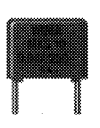
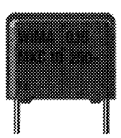
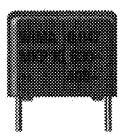
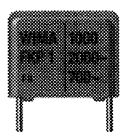
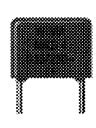


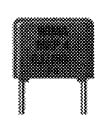



	SMD 2220		SMD2824			SMD 6560	SMD 7.3	MKS 3	MKS 33	MKC 3	
Dielectric	Polyester film		Polyester film			Polyester film	Polyester film	Polyester film	Polyester film	Polycarbonate film	
Temperature ranges	-55°C to 100°C		-55°C to 100°C			-55°C to 100°C	-55°C to 100°C	-55°C to 100°C	-55°C to 100°C	-55°C to 100°C	
Dissipat. factor tan ò at 1 kHz and +20°C	≤8 x 10^{-3}		≤8 x 10^{-3}			≤8 x 10^{-3} >1µF: ≤ 10 x 10^{-3}	≤8 x 10^{-3}	≤8 x 10^{-3}	≤8 x 10^{-3}	≤3 x 10^{-3}	
Insulation resistance at +20°C	≥3.75 x 10^3 MΩ >0.33: ≥1250 s		≥3.75 x 10^3 MΩ >0.33: ≥1250 s			≥3.75 x 10^3 MΩ >0.33: ≥1250 s	≥3.75 x 10^3 MΩ >0.33: ≥1250 s	≥1 x 10^4 MΩ >0.33: ≥1500 s	≥3.75 x 10^3 MΩ	≥3.75 x 10^3 MΩ >0.33: ≥1250 s	
Voltage ranges	50V	100V	40V	63V	100V	40V to 400V	63V to 400V	50V to 250V	63V to 360V	100V	250V
Capacitance	0.22uf to 1000pf	0.1uf to 1000pf	1.0uf to 0.68uf	0.47uf to .01uf	0.1uf to 0.01uf	4.7uf to .047uf	1.0uf to .01uf	2.2uf to .01uf	.15uf to 1000pf	0.68uf to .068uf	0.1uf to .01uf

PCM 7.5 mm to 37.5 mm Metallized

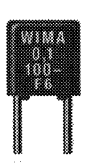
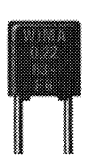
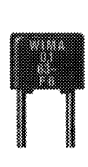
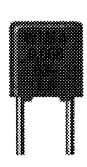
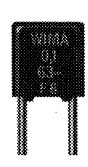
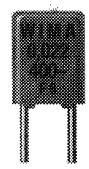
For High Current Ratings / with double-metallized film electrodes | **For Stringent Requirements**



	MKS 10	MKC 10	MKP 10	FKP 1	MKS 4	MKC 4	MKP 4
Dielectric	Polyester film	Polycarbonate film	Polypropylene film	Polypropylene film	Polyester film	Polycarbonate film	Polypropylene film
Temperature ranges	-55°C to 100°C	-55°C to 100°C	-55°C to 100°C	-55°C to 100°C	-55°C to 100°C	-55°C to 100°C	-55°C to 100°C
Dissipat. factor tan ò at 1 kHz and +20°C	≤6 x 10^{-3} >1µF: ≤ 8 x 10^{-3}	≤2 x 10^{-3} >1µF: ≤ 4 x 10^{-3}	≤3 x 10^{-4}	≤3 x 10^{-4}	≤8 x 10^{-3} >1µF: ≤ 10 x 10^{-3}	≤3 x 10^{-3}	≤1 x 10^{-3}
Insulation resistance at +20°C	≥1.5 x 10^4 MΩ >0.33: ≥5000 s	≥3 x 10^4 MΩ >0.33: ≥10000 s	≥1 x 10^5 MΩ >0.33: ≥30000 s	≥1 x 10^5 MΩ >0.1: ≥10000 s	≥1.5 x 10^4 MΩ >0.33:≥5000 s	≥1.5 x 10^4 MΩ >0.33: ≥5000 s	≥1 x 10^5 MΩ >0.33: ≥30000 s
Voltage Range	100V to 400V	250V to 1000V	160V to 2000V	400V to 2000V	63V to 2000V	63V to 400V	160V to 1000V
Capacitance	6.8uf to 0.01uf	1.5uf to 0.01uf	10uf to 1000pf	0.22uf to 100pf	22uf to 1000pf	10uf to 0.01uf	10uf to 1000pf

PCM 5 mm Metallized

	MKS 2	MKS 2-i	MKS 22	MKC 2		MKI 2		MKP 2
Dielectric	Polyester film	Polyester film	Polyester film	Polycarbonate film		Polyphenylene-sulphide film (PPS)		Polypropylene film
Temperature ranges	-55°C to 100°C	-55°C to 100°C	-55°C to 100°C	-55°C to 100°C		-55°C to 140°C		-55°C to 100°C
Dissipat. factor tan ò at 1 kHz and +20°C	≤8 x 10^{-3} >1 µF: ≤10 x 10^{-3}	≤8 x 10^{-3}	≤8 x 10^{-3} >1 µF: ≤10 x 10^{-3}	≤3 x 10^{-3}		≤15 x 10^{-4} >0.1 µF: ≤20 x 10^{-4}		≤0.5 x 10^{-3}
Insulation resistance at +20°C	≥5 x 10^3 MΩ >0.33: ≥1000 s	≥1.5 x 10^4 MΩ >0.33: ≥5000 s	≥3.75 x 10^3 MΩ >0.33: ≥1250 s	≥3.75 x 10^3 MΩ >0.33: ≥1250 s		≥1 x 10^4 MΩ >0.47: ≥3000 s		≥3 x 10^4 MΩ
Voltage range	16V to 400V	63V to 400V	50V to 100V	63V	100V	63V	100V	100V to 630V
Capacitance	4.7uf to 0.01uf	1.0uf to 0.01uf	2.2uf to 1000pf	0.47uf to .033uf	0.33uf to 0.01uf	0.47uf to .01uf	0.1uf to 0.01uf	0.15uf to 0.01uf

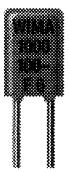
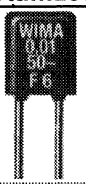
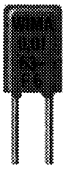
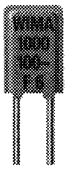
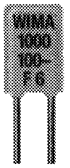
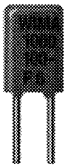
The Inter-Technical Group, Inc. WIMA Division
175 Clearbrook Road, P. O. Box 535, Elmsford, NY 10523-0535 • TEL: (914) 347-2474 • FAX: (914) 347-7230

The Inter-Technical Group, Inc. WIMA Division

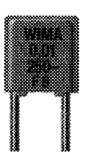
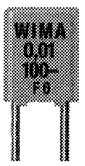
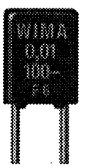
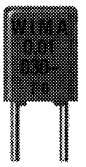
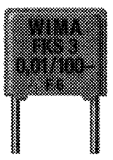
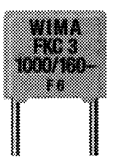
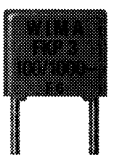
CAPACITORS FOR ELECTRONIC EQUIPMENT

www.wimausa.com e-mail: sales@wimausa.com

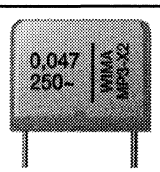
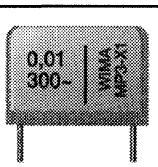
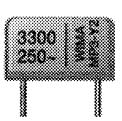
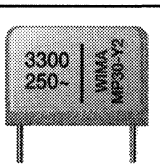
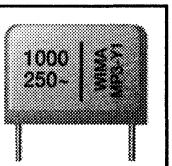
PCM 2.5 mm

	Metallized			Film/Foil		
	 MKS 02	 MKS 022	 MKC 02	 FKS 02	 FKC 02	 FKP 02
Dielectric	Polyester film	Polyester film		Polycarbonate film	Polyester film	Polycarbonate film	Polycarbonate film
Temperature ranges	-55°C to 100°C	-55°C to 100°C		-55°C to 100°C	-55°C to 100°C	-55°C to 100°C	-55°C to 100°C
Dissipat, factor tan ò at 1 kHz and +20°C	≤8 x 10^{-3}	≤8 x 10^{-3}		≤3 x 10^{-3}	≤7 x 10^{-3}	≤2 x 10^{-3}	≤4 x 10^{-4}
Insulation resistance at +20°C	≥3.75 x 10^{3} MΩ >0.33: ≥1250 s	≥3.75 x 10^{3} MΩ		≥3.75 x 10^{3} MΩ	≥3 x 10^{4} MΩ	≥5 x 10^{5} MΩ	≥5 x 10^{5} MΩ
Voltage range	16V to 100V	50V	63V	63V	100V	100V	100V
Capacitance	1.0uf to 1000pf	0.1uf to 0.01uf	6800pf to 1000pf	0.1uf to 0.01uf	0.01uf to 1000pf	0.01uf to 100pf	0.01uf to 100pf

PCM 5mm to 37.5m Film/Foil

	 FKS 2	 FKC 2	 FKI 2	 FKP 2	 FKS 3	 FKC 3	 FKP 3
Dielectric	Polyester film	Polycarbonate film	Polyphenylene-sulphide film (PPS)	Polyphenylene film	Polyester film	Polycarbonate film	Polypropylene film
Temperature range	-55°C to 100°C	-55°C to 100°C	-55°C to140°C	-55°C to 100°C	-55°C to 100°C	-55°C to 100°C	-55°C to 100°C
Dissipat, factor tan ò at 1 kHz and +20°C	≤7 x 10^{-3}	≤2 x 10^{-3}	≤15 x 10^{-4}	≤3 x 10^{-4} >1000 pF: ≤ 4 x 10^{-4}	≤8 x 10^{-3}	≤2 x 10^{-3}	≤4 x 10^{-4}
Insulation resistance at +20°C	≥3 x 10^{4} MΩ	≥5 x 10^{5} MΩ	≥5 x 10^{5} MΩ	≥5 x 10^{5} MΩ	≥3 x 10^{4} MΩ	≥5 x 10^{5} MΩ	≥5 x 10^{5} MΩ
Voltage range	100V to 400V	100V to 400V	100V to 400V	63V to 630V	100V to 630V	160V to 1000V	100V to 1000V
Capacitance	0.01uf to 220pf	0.015uf to 100pf	0.015uf to 100pf	0.033uf to 100pf	0.1uf to 1000pf	0.047uf to 100pf	0.1uf to 100pf

RFI CAPACITORS

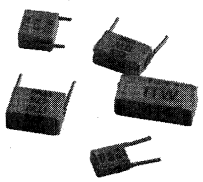
	 MP 3-X2	 MP 3-X1	 MP 3Y2	 MP 30-Y2	 MP 3-Y1
	Paper, resin impregnated				
Temperature ranges	-40°C to 110°C	-40°C to 110°C	-40°C to 110°C	-40°C to 110°C	-40°C to 110°C
Dissipat, factor tan ò at 1 kHz and +20°C	≤13 x 10^{-3}	≤13 x 10^{-3}	≤13 x 10^{-3}	≤13 x 10^{-3}	≤13 x 10^{-3}
Insulation resistance at +20°C	≥12 x 10^{3} MΩ >0.33: ≥4000 s	≥12 x 10^{3} MΩ	≥12 x 10^{3} MΩ	≥12 x 10^{3} MΩ	≥12 x 10^{3} MΩ
Voltage Ranges	250 VAC / 275 VAC	300 VAC	250 VAC	250 VAC	250 VAC
Capacitance	1.0uf to 1000pf / 1.0uf to 1000pf	0.22uf to 1000pf	0.022uf to 1000pf	0.1uf to 1000pf	4700pf to 560pf

The Inter-Technical Group, Inc. WIMA Division
175 Clearbrook Road, P. O. Box 535, Elmsford, NY 10523-0535 • TEL: (914) 347-2474 • FAX: (914) 347-7230

Not Just Another Line...

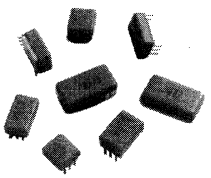
It's ITW Paktron's Premier Line of Film Capacitors.

RA



- Angstor© Capacitor
- MLP (Multilayer Polymer)
- .01µf to 3.3µf
- ±5, 10, 20%
- 63 to 400VDC
- Full voltage rating to 125°C
- 7.5, 10 & 15 mm lead spacing
- Smallest film construction available
- Excellent RFI attributes

CS CB

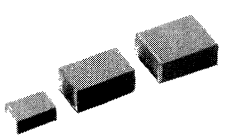


- Capstick© Capacitor
- Ultra low ESR
- MLP (Multilayer Polymer)
- High frequency ripple filter capacitor/RFI sink
- .33µf to 20.0µf Voltages 50, 100, 400VDC
- Ideal for frequencies 200 KHZ to over 10 MHZ
- Ideal for 48 V telecom bus
- Low ESL
- Surface mount on FR4

PP

- Micromatic© Capacitor
- Polypropylene/foil
- .0015µf to .047µf
- ±1, 2, 5, 10%
- 100–400VDC
- Sealed polypropylene case
- *"The 1% solution"*
- Tight T.C. applications

ST



- Film Chip
- Reflow solder on FR4
- MLC replacement
- 1.0µf–2.2µf 100 V

X2

- Polypropylene X Cap
- Agency approved
- Small size

Q

- Quencharc© Capacitor
- Metallized polyester R/C snubber network
- .1µf & .50µf
- 200 to 600VDC, 125 to 660VAC
- 1/2 watt carbon composition series resistor (high current)
- U.L./CSA recognized version available
- Flame retardant coating
- Arc/transient suppression
- PLC protection

- Location–Lynchburg, VA, USA
- Maturity–40+ years in the film capacitor business
- Technical Leadership–Over 60 US patents related to capacitor construction
- Stability–A division of Illinois Tool Works Inc.
- Technical Expertise–Paktron's innovative Interleaf© Technology has been licensed to major companies in Europe and Japan
- Specialized Applications–DC to DC conversion, RFI/EMI filtering, Solid state ignitions, Electronic ballast and lighting accessories
- Availability–Contact one of Paktron's stocking distributors ...

ITW Paktron
FILM CAPACITORS
An integral part of tomorrow's technology

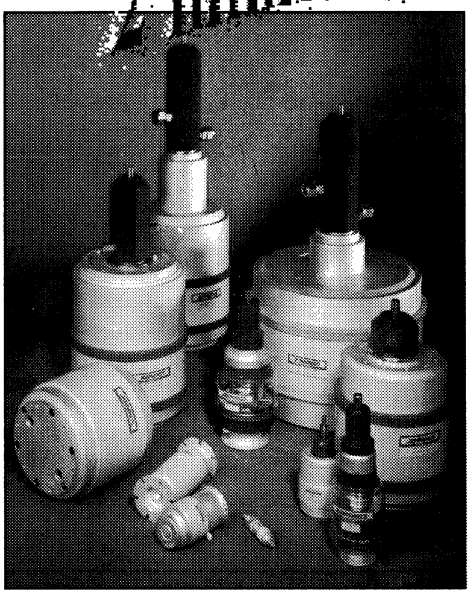
P.O. Box 4539; 1205 McConville Rd., Lynchburg, VA 24502
804-239-6941 • FAX: 804-239-4730 • E-MAIL: itwpaktron@compuserve.com
http://www.paktron.com
A Division of Illinois Tool Works Inc.

Available through these distributors: ADVACOM (1-800-678-0512) • ADVENT (1-800-323-1270) • • ATLANTIC COMPONENTS (1-800-433-6600) • FUTURE (1-800-388-8731) • GOPHER (1-800-592-9519) • KENT (1-800-422-8005) • MALLORY (1-317-273-2424) •

NEW!
Capacitors up to 2 million cycles

JENNINGS

Vacuum & Gas Filled Capacitors



Jennings offers long life, quality capacitors, available in various capacitance values, voltages, current ratings, and designs.
Over 800 models
New models rate up to 1 million cycles
Up to 5,000 pF
Voltage range from 2 to 100 kV
Current up to 420 amps RMS air-cooled and 1,000 amps water-cooled
Ceramic or glass envelopes
Common applications include use in the semiconductor industry, communications, power, industrial, & medical industries.
The models listed are only a sampling of our 800+ models. For a comprehensive catalog or technical assistance please call the number referenced below.

Jennings Technology Corporation
970 McLaughlin Ave.
San Jose, CA 95122, U.S.A.
Phone: (408) 292-4025
Fax: (408) 286-1789
URL: http://www.jenningstech.com

	Peak Voltage kV Test 60 Hz	RF (1) Working	Model Number	Capacity, pF	Cont. RMS (2) Amps Max.	Nominal Dimen. (3) Length (Inches)	Diameter (Inches)
VACUUM FIXED CAPACITORS	12	7	CFDS	1000	95	4.6	3.6
	15	9	CFDP	1500, 2000	200	3.3	5.6
	15	9	CFEB	80, 100, 120, 150	70	2.05	1.35
	25	15	CFED	500, 750, 1000	180	3.8	4.6
	30	20	CKT	150, 200, 250	90-100	6.5	2.66
	30	20	CLF1	150, 200, 250	100	6.5	2.6
	30	18	CFED	150, 300	140	3.6	3.4
	30	18	CFFM	2500	400	5.8	8.2
	35	25	CKT	6, 12, 25, 50, 75, 100	47-87	6.5	2.32
	35	25	CLF1	6, 12, 25, 50, 75, 100	85	6.5	2.3
	35	21	CFFP	2000	390	5.8	8.2
	50	30	CFHP	1000	350	6.2	7.2
	55	33	CFHP	450	300	5.5	5.6
	60	36	CFHD	12, 25, 50, 100, 200, 300	240	5.4	4.6
VACUUM VARIABLE CAPACITORS	3	3	CMV1	8-1000	40	4.3	1.8
	3	2	CSV4	8-1400	45	5.6	2.4
	5	3	CSV3	5-500	45	5.8	2.4
	5	3	CACA (4)	5-125	22	4.2	1.3
	5	3	CSV1 (4)	5-500	45	5.8	2.4
	5	3	CVCJ	7-1000	70	7.6	3.1
	5	3	CACA	5-250	22	4.3	1.3
	5	3	CVCD	10-1500, 20-2000, 50-3000	100	8.3	4.6
	5	5	CMV1	25-4000	70	6.6	3.2
	15	9	CADD (4)	3-30	20	4.1	1.3
	15	9	CVDD	3-30	20	4.3	2.1
	15	9	CVDD	6.5-50, 10-100	65	6.6	2.4
	15	9	CVDD	10-300, 20-500	95	7.5	3.4
	15	9	CSVF (4)	12-500	65	7.9	3.5
	15	9	CVDD	25-750, 25-1000	150	8.0	4.6
	15	9	CVDP	35-1500, 50-2300	160	9.8	5.6
	15	9	CVEP	100-2000	200	10.2	7.2
	15	9	CVED	100-5000	250	21.3	9.3
	20	12	CVEP	25-500, 50-1000, 100-1500	210	10.2	7.2
	35	21	CVFP	100-1500, 100-2000	220	14.5	8.2
	40	24	CVFP	15-250, 25-450	170	9.6	5.6
	40	24	CVFP	20-750, 35-1000	225	11.7	7.2
	40	24	CAV2	35-1000 Air-Cooled	425	11.7	7.6
	40	24	CWV2	100-1600 Water-Cooled	790	25.0	8.6
	50	30	CAV3	40-1000 Air-Cooled	500	14.5	8.6
	50	30	CWV5	100-1000 Water-Cooled	700	17.9	8.6
	50	30	CVHP	60-1000	250	14.5	8.0
	55	33	CVHP	10-250 25-450, 30-650	240	11.9	7.2
	60	36	CWV4	100-1600 Water-Cooled	1000	21.5	12.9
	60	36	CWV1	100-1600 Water-Cooled	1000	23.0	12.6

	Peak Voltage kV Test 60 Hz	RF + DC	RF (1) Working	Model Number	Capacity, pF	Cont. RMS (2) Amps Max.	Nominal Dimen. (3) Length (Inches)	Diameter (Inches)
GAS VARI. & FIXED	5	N/A	3	CHV1 (4)	1.5-45	18	3.5	0.9
	35	30	20	CGF2	1000	270	4.0	6.0
	50	40	25	CGF2	500	240	5.5	5.7

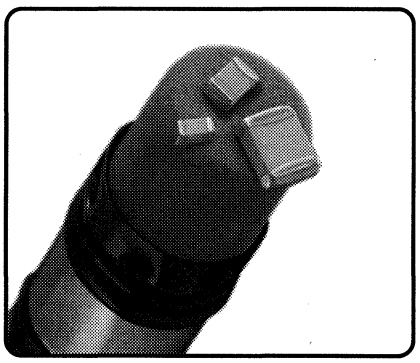
(1) *The Maximum RF working voltage that can be applied over the 2-32 MHz frequency range while not exceeding the RF current rating.* (2) *RF current rating is dependent upon capacity, frequency and working voltage. Rating shown is highest voltage in series. Write for complete applications data.* (3) *Available with metric thread mounting-upon request.* (4) *Non-magnetic version available.*

Indexing Available

JOHANSON DIELECTRICS
www.johanson-caps.com
Sylmar, CA • (818) 364 9800 Fax (818) 364 9800

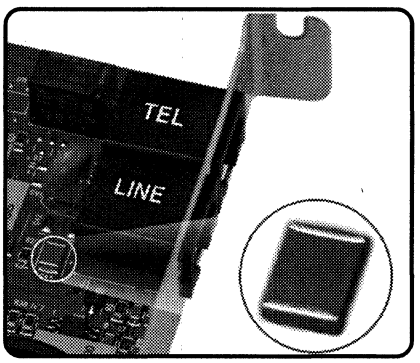
MULTI-LAYER CERAMIC CHIP CAPACITORS

Johanson Dielectrics, Inc. offers an unique combination of high volume manufacturing capacity, SPC driven quality, ceramic product diversity, and unparalleled flexibility and customer service. If you've experienced slow or inflexible service or are looking for a source for all your ceramic capacitors, maybe it's time to check out Johanson Dielectrics.



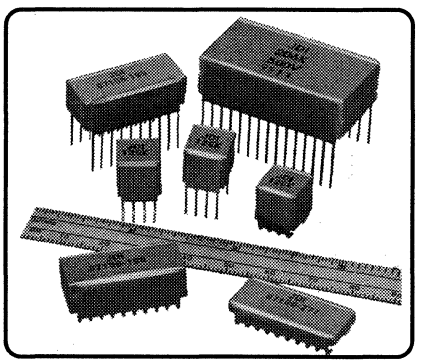
• SURFACE MOUNT MLCCs

Billions shipped worldwide, millions in stock!. Size 0402-1825, 16-200 VDC, NPO, X7R, Z5U, Y5V. Call now for fast, flexible, service of your requirements.



• HIGH VOLTAGE CERAMIC CHIPS

For surge suppression, de-coupling, and tip & ring applications in fax modem and network and telecom applications. Voltage ratings include 250 - 5,000 VDC.



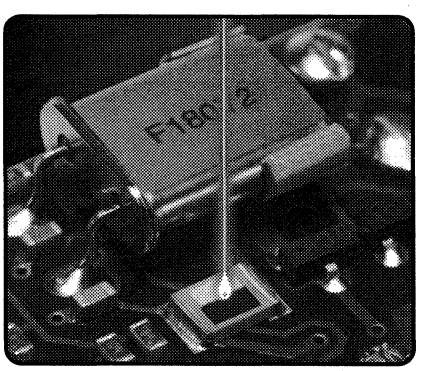
• SMPS CAPACITORS

Feature high capacitance values and low ESR required for input and output filtering of switch mode power supply signals. Listed in DESC 87106 and 88011drawings

JOHANSON TECHNOLOGY
www.johanson-caps.com
Camarillo, CA • Tel (805) 389 1166 Fax (805) 389 1821

RF/WIRELESS CERAMIC CHIP CAPACITORS

Johanson Technology Inc. was incorporated to focus specifically on RF/Wireless ceramic components and has formed key partnerships with the world's top wireless manufacturers to develop world class solutions to their high frequency passive component needs. Put our new product R&D engineering staff to work on solutions for you today !

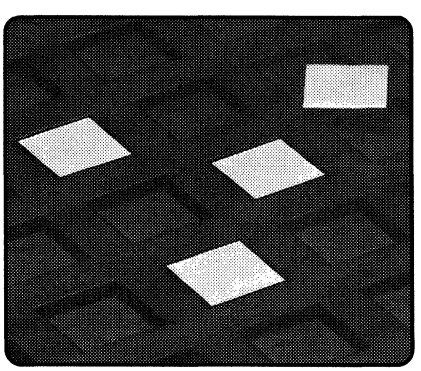


• LASERTRIM® ADJUSTABLE CAPS

For automated, high resolution tuning of RF/Wireless circuits. Several tuning application notes are available including reference oscillators & bandpass filter circuit examples.

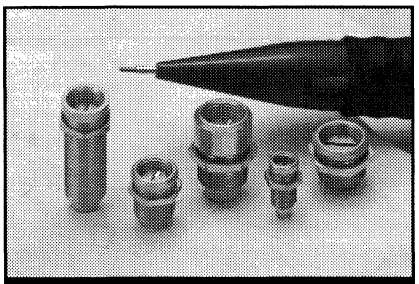
• HIGH FREQUENCY MLCCs

Excellent performance from DC to 5.0 GHz at substantially lower cost! Data available demonstrating comparable performance to standard porcelain and thin film chip capacitors.



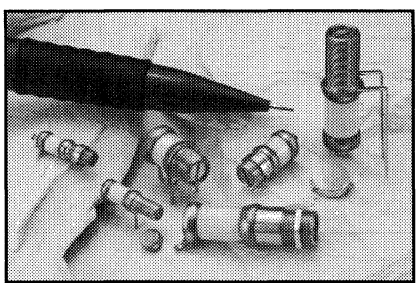
• SINGLE LAYER CAPACITORS

Low profile parallel plate design exhibits low insertion loss operation over microwave frequencies to 50 GHz in bypass, DC blocking and tuning applications. Thick & thin film metalization available.



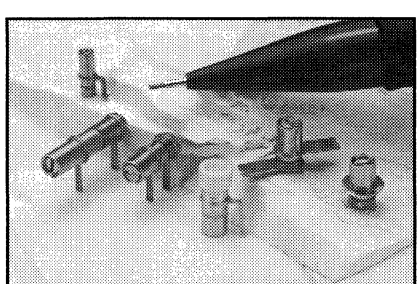
Microwave Tuning Elements

- Unique money-saving means of introducing a variable reactance to waveguides, cavities, and other microwave structures
- Low loss, high resolution tuning
- Self-locking constant torque adjustment mechanism
- Engineering prototype kit JK-690



Standard and Miniature Air Capacitors

- Capacitance ranges: 0.35-3.5 to 1-30 pF
- Q's to >10,000
- Excellent tuning stability and low dynamic noise
- Self-locking constant torque adjustment mechanism
- Qualified to MIL-C-14409D, QPL approved
- Ideal for miniature microwave, VHF and UHF applications
- Engineering prototype kit JK-500



Giga-Trim® Capacitors

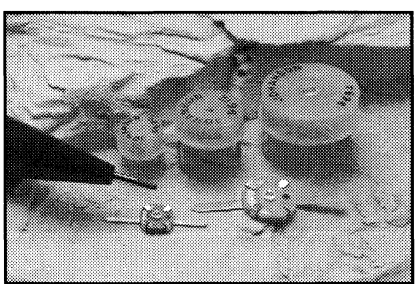
- Capacitance ranges: 0.3-1.2 to 0.8-8 pF
- Q's over 4000 at 250 MHz
- Ideal for microwave oscillators and filters
- Qualified to MIL-C-14409D, QPL approved
- New Zero TC ceramic dielectric versions
- Engineering prototype kit JK-272

Contact Johanson for Free Catalog
Visit our Website at
www.johansonmfg.com

Johanson Variable Components

Since 1945, the name Johanson has been synonymous with leadership in the design and manufacture of high quality variable components. Our engineers have the experience to solve your critical application problems. We invite your inquiries. When you specify Johanson, you specify the finest in variable components.

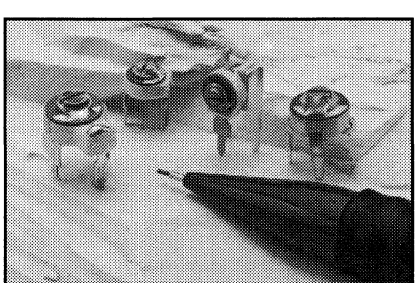
Electronic Accuracy Through Mechanical Precision



Thin-Trim®/Seal-Trim® Ceramic Capacitors

- Capacitance ranges: .5-2.5 to 20-100 pF
- Q's to >3,000 at 100 MHz
- Ideal for sub-miniature hybrid circuits
- Seal-Trims impervious to all standard PCB cleaning solvents
- Conform to MIL-C-81 requirements
- Engineering prototype kits available

U.S. Patent No. Re 4,179,722

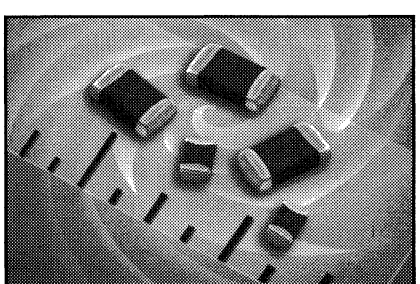


Cost Effective Ceramic Capacitors

- Low cost
- Broad tuning ranges: 1.8-5 to 12-100 pF
- Three mounting styles available
- Ideal for crystal oscillators, CATV amplifiers and all varieties of test and communication equipment
- Engineering prototype kit JK-930

2 GHz Thin-Trim® Ceramic Capacitors

- Ultra-miniature, high performance
- Capacitance ranges: 0.25-0.7 to 1.5-4 pF
- High Q up to 2 GHz and beyond
- Butterfly electrode pattern with very low ESR and ESL
- Engineering prototype kit JK-941



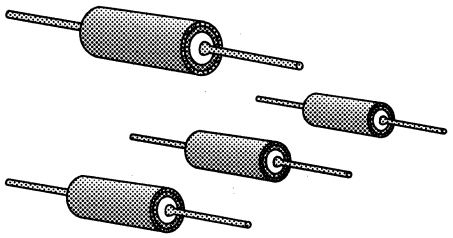
Ferrite Chip Suppressors and Inductors

- Available in standard EIA sizes
- Inductance values 0.047 µH to 220 µH
- Suppressor impedance values of 11±25% to 600±25% ohms at 100 MHz
- Nickel barrier termination

Johanson Manufacturing Corporation
Rockaway Valley Rd., Boonton, NJ 07005
Tel: 973-334-2676 Fax: 973-334-2954

KEMET® *SOLID TANTALUM CAPACITORS*

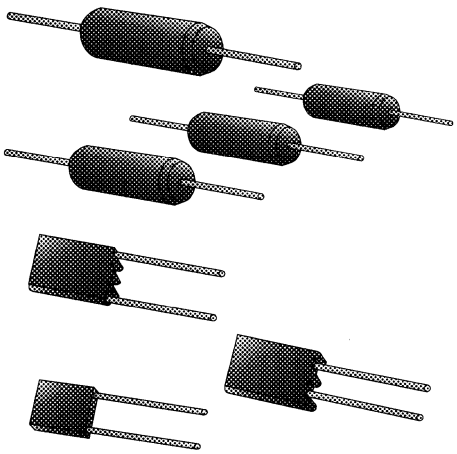
HERMETICALLY SEALED TANTALUM



AXIAL

T110, T212 (CSR13), **T222** (CSR09), **T242** (CSR23), **T252** (CSR33), and **T262** (CSR21) per MIL-C-39003 also available. Capacitance values from 0.0047 - 1000µF; ±20% ±10%, and 5% tolerance; 6 - 125VDC. 4 Case sizes. Higher CV values available in **T140** series. Ultra miniature **T222** capacitance values from 0.0047 - 22µF. Available on tape and reel.

MOLDED TANTALUM



AXIAL

Miniature molded gold color epoxy. Laser marked. Low impedance at high frequencies. Capacitance values from 0.1 - 330µF; 2 - 50VDC. 6 Case sizes. **T323** (CX01 & CX05) per MIL-C-49137 available. Available on tape and reel.

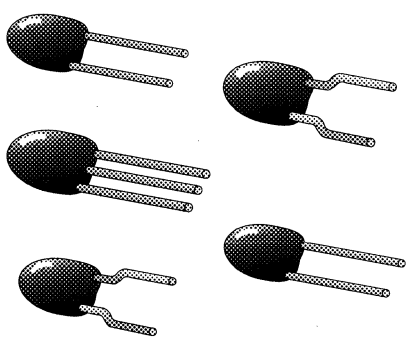
RADIAL

Precision molded gold color epoxy. Laser marked. Rectangular case, plus a radius on positive side of case. Capacitance values from 0.1 - 330µF; 6 - 50VDC. 6 Case sizes.

MICRONS

Complete line of microminiature solid tantalum capacitors. Microns consist of ultra small anode assemblies encapsulated in epoxy. Capacitance values from 0.68 - 220µF; 3 - 35VDC.

DIPPED TANTALUM



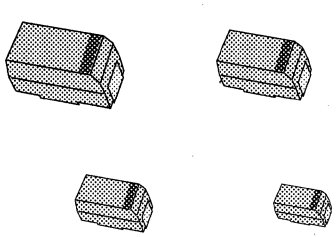
RADIAL

T35X "UltraDip II" miniature dipped solid tantalum capacitors. Gold color epoxy. Laser marked. Compact design plus low DC leakage and DF. Capacitance values from 0.1 - 680µF; 3 - 50VDC. 12 Case sizes.

T36X Mil-C-49137 radial dipped capacitors are available in capacitance values from 0.1µF - 330µF; 6 - 50 volts.

T39X "Ultra Dip III" Three-Leaded design with anode lead in middle for "fail-safe" insertion. Capacitance values from 0.1 - 680µF; 3 - 50 VDC. Gold color epoxy. Laser marked. 12 Case sizes.

CHIPS TANTALUM

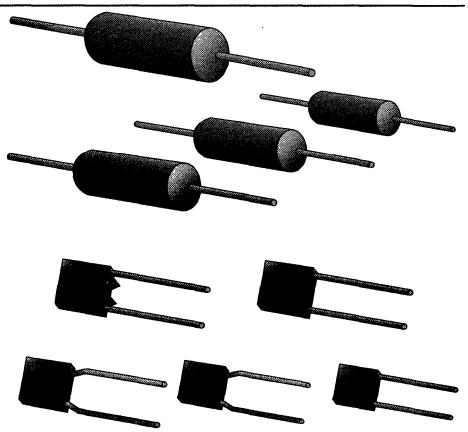


SOLID TANTALUM CHIP CAPACITORS

T491 Industrial Grade; **T492** (CWR11), per MIL-C-55365; **T494** Low ESR, Industrial Grade; **T495** Low ESR, Surge Robust, **T496** Fail-Safe Fused Chip and **T510** Ultra-Low ESR. Molded tantalum chip capacitors mount directly to printed circuit boards. Same worldproven solid tantalum anode used in KEMET's leaded devices. Permanently attached to a solder coated lead frame. Assembly precision molded. Outstanding dimensional consistency. Beveled case denotes positive (+) polarity. Gold color epoxy. Laser marked. Capacitance values from 0.1 - 470µF; 3 - 50VDC. Cap. tolerance ±20% and ±10%. Available on 8mm and 12mm tape on 7" and 13" reels.

KEMET® *MULTILAYER CERAMIC CAPACITORS*

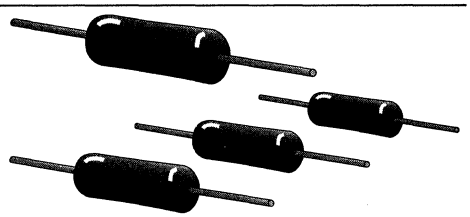
MOLDED MULTILAYER CERAMIC



AXIAL AND RADIAL

Molded gold color epoxy multilayer ceramic capacitors. Available in Ultrastable (C0G) or Stable (X7R) (Military BX or BR) temperature characteristics. Military versions conform to MIL-C-39014, MIL-C-11015, MIL-C-123 and MIL-C-20 standards. Capacitance values from 1.0pF - 3.3µF; 50, 100 and 200 volts.

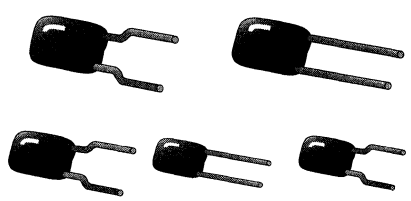
CONFORMALLY COATED MULTILAYER CERAMIC



AXIAL

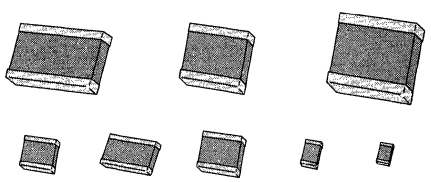
Aximax conformally coated multilayer ceramic capacitors. Available in C0G, X7R, and Z5U temperature characteristics. 5 Case sizes include over 138 CV values in capacitance range of 10 pF - 1.0µF; 50 And 100 volts. Gold color epoxy. Laser marked. Available on tape and reel.

RADIAL



Golden Max dipped multilayer ceramic capacitors. Reliable and economical. Available in C0G, X7R, or Z5U temperature characteristics. Gold color epoxy. Laser marked. Capacitance values from 1.0pF - 6.8µF; 50, 100 and 200 volts. 6 Case sizes.

CHIPS CERAMIC



MULTILAYER CERAMIC CHIPS

Available in the most popular characteristics - C0G/NP0, X7R, Z5U and Y5V. Approved against the stringent requirements of Mil-C-55681, Mil-C-123, and ISO9002. Capacitance values range from 0.5pF through 2.2µF, with voltage ratings up to 200 volts. Wide range of chip sizes, including 0402, 0603, 0805, 1005, 1206, 1210, 1805, 1808, 1812, 1825, 2220 and 2225. Ceramic Array Capacitors are now available in C0G and X7R dielectrics. Capacitance range of 10-100,000 pF with 16, 25 and 50 volt ratings are available. Most commercial chips can be marked, including both the KEMET identifier, as well as capacitance value. All are available with nickel barrier layer, to ensure excellent soldering with no leaching. Available in tape and reel packaging for economical, high-speed placement. 0402 and 0603 sizes are now available in bulk cassette packaging.

KOA SPEER ELECTRONICS, INC.

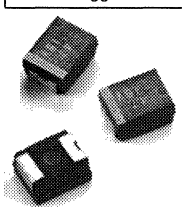
TANTALUM CHIP CAPACITORS

TYPE TMC: *STANDARD CAPACITANCE RANGE*

STANDARD VALUES		VOLTAGE CODE	0G	0J	1A	1C	1D	1E	1V	1H
85°C	RATED VOLTAGE (VDC)		4	7	10	16	20	25	35	50
	SURGE VOLTAGE (VDC)		5	9	13	20	26	32	46	63
125°C	DERATED VOLTAGE (VDC)		2.5	4	6.3	10	13	16	23	32
CAPACITANCE (uF)		CAP CODE								
0.1		104							A	A
0.15		154							A	B
0.22		224							A	B
0.33		334							A	B
0.47		474						A	B	C
0.68		684					A		B	C
1.0		105				A			B	C
1.5		155			A			B	C	D,E
2.2		225		A			B		C	D,E
3.3		335	A			B			C	
4.7		475			B			C	D,E	
6.8		685		B			C		D,E	
10		106	B			C		D,E		
15		156			C		D,E			
22		226		C		D,E				
33		336	C		D,E					
47		476		D,E						
68		686	D,E							

TYPE TMC-M: *EXTENDED CAPACITANCE RANGE*

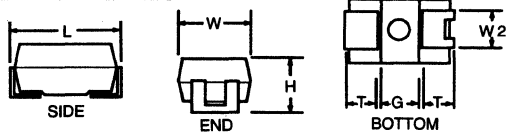
STANDARD VALUES		VOLTAGE CODE	0E	0G	0J	1A	1C	1D	1E	1V	1H
85°C	RATED VOLTAGE (VDC)		2.5	4	7	10	16	20	25	35	50
	SURGE VOLTAGE (VDC)		3.2	5	9	13	20	26	32	46	63
125°C	DERATED VOLTAGE (VDC)		1.6	2.5	4	6.3	10	13	16	23	32
CAPACITANCE (uF)		CAP CODE									
0.1		104						P		A	A
0.15		154						P		A	A,B
0.22		224						P		A	A,B
0.33		334						P		A	B
0.47		474					AP	P	A	A,B	B,C
0.68		684				P	AP	P,A	A	A,B	B,C
1.0		105			P	P	P,A	A	A	A,B	C
1.5		155		P	P	P,A	A	A	A,B	B,C	C,D,E
2.2		225	P	P	P,A	A	A	A,B	B	B,C	C,D,E
3.3		335	P	P,A	P,A	A	A,B	A,B	B	B,C	D,E
4.7		475	P	P,A	A	A,B,C	A,B,C	A,B,C	B,C	C,D,E	D,E
6.8		685	P,A	A	A,B	A,B,C	A,B,C	B,C	C	C,D,E	D
10		106	A	A,B	A,B	B,C	B,C	B,C	C,D,E	D,E	
15		156	A	A,B	A,B,P	B,C	B,C	C,D,E	C,D,E	D,E	
22		226	A,B	A,B	A,B,C	B,C,D,E	B,C,D,E	C,D,E	D,E		
33		336	A,B	A,B,C	B,C	C,D,E	C,D,E	D,E			
47		476	B	B,C,D	B,C,D,E	C,D,E	C,D,E	D,E			
68		686	B,C	B,C,D,E	C,D,E	D,E	D,E				
100		107	B,C	C,D,E	C,D,E	D,E	D,E				
150		157	C,D,E	D,E	D,E	D,E					
220		227	C,D	D,E	D,E						
330		337	D,E	D,E							



FEATURES

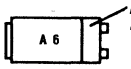
- Epoxy Molded Body, UL94V-0 Flammability
- EIA-U.S. and EIA-Japan Compatible Sizes
- 100% Burn-in and End-of-Line Testing
- Extended Values Per Case Size
- Excellent Humidity and Solder Resistance

CASE DIMENSIONS



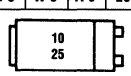
PART MARKING STANDARD RANGE

A & B Case

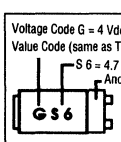


Value (uf)	.1	.15	.22	.33	.47	.68	1.0	1.5	2.2	3.3	4.7	6.8	10.0
Marking	A 5	E 5	J 5	N 5	5 5	W 5	A 6	E6	J 6	N 6	S 6	W 6	A 7

C, D & E Case



PART MARKING EXTENDED RANGE

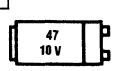


Voltage	4	7	10	16	20	25	35	50
Marking	G	J	A	C	D	E	V	H

C, D & E Case

A & B & P Case

Same marking as TMC except letter "V" added



Upper number indicates capacitance in uf — Lower number indicates rated voltage in VDC

Case Size KSE / EIA		L	W	H	T	G	W2
P/2012	mm	2.0 ± 0.2	1.25 ± 0.2	1.2 ± 0.2	0.5 ± 0.2	0.8 ± 0.2	0.9 ± 0.1
	inch	0.078 ±0.008	0.049 ±0.008	0.05 ±0.008	0.020 ±0.008	0.03 ±0.008	0.035 ±0.004
A/3216	mm	3.2 ± 0.2	1.6 ± 0.2	1.6 ± 0.2	0.7 ± 0.2	1.4 ± 0.2	1.2 ± 0.2
	inch	0.126 ±0.008	0.063 ±0.008	0.063 ±0.008	0.028 ±0.12	0.055 ±0.008	0.047 ±0.008
B/3528	mm	3.4 ± 0.2	2.6 ± 0.2	1.9 ± 0.2	0.8 ± 0.3	1.4 ± 0.2	1.8 ± 0.2
	inch	0.134 ±0.008	0.102 ±0.008	0.073 ±0.008	0.031 ±0.012	0.055 ±0.008	0.071 ±0.008
C/6032	mm	6.0 ± 0.3	3.2 ± 0.2	2.5 ± 0.2	1.3 ± 0.3	2.4 ± 0.2	2.4 ± 0.2
	inch	0.236 ±0.12	0.126 ±0.008	0.098 ±0.008	0.051 ±0.012	0.094 ±0.008	0.094 ±0.008
D/---- (EIA -J)	mm	5.8 ± 0.2	4.5 ± 0.2	3.1 ± 0.2	1.3 ± 0.3	2.5 ± 0.2	3.3 ± 0.2
	inch	0.228 ±0.112	0.177 ±0.008	0.122 ±0.008	0.051 ±0.012	0.098 ±0.008	0.130 ±0.008
E/7343 (EIA D)	mm	7.3 ± 0.3	4.3 ± 0.3	2.8 ± 0.2	1.3 ± 0.3	3.8 ± 0.2	2.4 ± 0.2
	inch	0.287 ±0.012	0.169 ±0.012	0.110 ±0.008	0.051 ±0.012	0.15 ±0.008	0.094 ±0.008

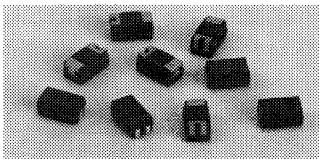
ORDERING & SPECIFYING INFORMATION

TMC	1E	C	475	M	L	R	H
Type	**Voltage Code**	**Case Size**	**Nominal Capacitance**	**Tolerance**	**Packaging**	**Polarity Orientation**	**Leader Length Cover/Carrier**
	0E: 2.5V 0G: 4V 0J: 7V 1A: 10V 1C: 16V 1D: 20V 1E: 25V 1V: 35V 1H: 50V	P: 2012 A: 3216 B: 3528 C: 6032 D: EIA-J E: EIA-D	See Cap Code Table TMC or TMC-M	M: ±20% K: ±10%	L - Tape/Reel Plastic P Case: 3000 A, B, Case: 2000 C, D, E, Case: 500	R (Std - Taping)	H 200mm Min (Std)

SPEER ELECTRONICS, INC.

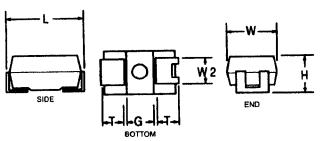
TANTALUM CHIP CAPACITORS

TMX FUSIBLE CAPACITOR



- Epoxy Molded Body, UL94V-0 Flammability
- EIA - US Compatible Sizes
- Fusible for Safety Application
- Low ESR and Low Inductance
- Fusing characteristics:
  - — B, C, D case less than 100 sec @ 1.5A or 5secs @ 5A
  - — E, F case in less than 5sec @ 1.5A

DIMENSIONS



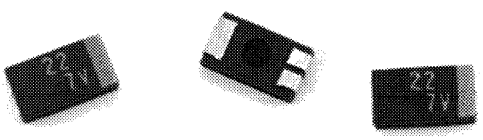
Case Size		L	W	H	T	W2
B	mm	3.5 ± /0.2	2.8 ± 0.2	1.9 ± 0.2	0.7 ± 0.2	1.8 ± 0.2
	inch	0.138 ±0.008	0.110 ±0.008	0.075 ±0.008	0.028 ±0.012	0.071 ±0.008
C	mm	5.8 ± 0.2	3.2 ± 0.2	2.5 ± 0.2	1.1 ± 0.3	2.2 ± 0.2
	inch	0.228 ±0.008	0.126 ±0.008	0.098 ±0.008	0.043 ±0.012	0.087 ±0.008
D	mm	5.8 ± 0.2	4.5 ± 0.2	3.1 ± 0.2	1.3 ± 0.3	3.1 ± 0.2
	inch	0.228 ±0.008	0.177 ±0.008	0.122 ±0.008	0.051 ±0.012	0.122 ±0.008
E	mm	7.3 ± 0.2	4.5 ± 0.2	2.8 ± 0.2	1.3 ± 0.3	3.1 ± 0.2
	inch	0.287 ±0.008	0.159 ±0.008	0.11 ±0.008	0.051 ±0.012	0.122 ±0.008
F	mm	7.3 ± 0.2	5.8 ± 0.2	3.5 ± 0.2	1.3 ± 0.3	3.5 ± 0.2
	inch	0.287 ±0.008	0.228 ±0.008	0.138 ±0.008	0.051 ±0.012	0.138 ±0.008

RATED VOLT (VDC)		10	16	20	25	35	50
85°C	SURGE VOLTAGE (VDC)	13	20	26	32	45	63
125°C	DERATED VOLTAGE (VDC)	6.3	10	13	16	22	32
	SURGE VOLTAGE (VDC)	8	13	16	20	28	40
CAPACITANCE (uF)	CAP CODE	1A	1C	1D	1E	1V	1H
1.0	105					B	C
1.5	155				B	C	C
2.2	225			B	B	C	C,D
3.3	335		B	B		C	D,E
4.7	475	B	B		C	C,D	F
6.8	685	B		C	C,D	D,E	
10	106		C	C,D	D,E	F	
15	156	C	C,D	D,E	F		
22	226	C,D	D,E	E,F			
33	336	D,E	E,F	F			
47	476	E,F	F				
68	686	F					

ORDERING & SPECIFYING INFORMATION

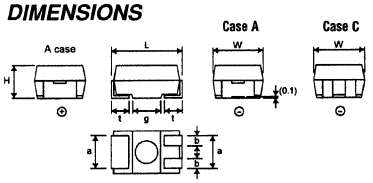
TMX	1E	C	475	M	L	R	H
Type	Voltage Code	Case Size	Nominal Capacitance	Tolerance	Packaging	Polarity Orientation	Leader Length Cover/Carrier
	1A: 10V 1C: 16V 1D: 20V 1E: 25V 1V: 35V 1H: 50V	B: 3528 C: 6032 D: EIA-J E: EIA-D F: 7358	See Cap Code (Table Above)	K: ±10% M: ±20%	L - Tape/Reel Plastic B, Case: 2000 pcs. C,D,E,F Case: 500 pcs.	R (Std - Taping)	H 200mm Min (Std)

TMU LOW PROFILE CAPACITOR



- Epoxy Molded Body, UL94V-0 Flammability
- EIA - US Compatible Sizes
- Low Profile: UA, -1.2max, UC -1.5max
- 100% Burn-in & End-of-Line Testing
- Extended Range of Values
- Excellent Humidity and Solder Resistance

DIMENSIONS



Case Size		L ±0.008 (±0.2)	W ±0.008 (±0.2)	H max.	g ±0.008 (±0.2)	t ±0.008 (±0.2)	a ±0.008 (±0.2)	b ±0.008 (±0.2)
A	in	0.126	0.063	0.047	0.069	0.028	0.039	0.014
	(mm)	(3.2)	(1.6)	(1.2)	(1.75)	(0.7)	(1.0)	(0.35)
C	in	0.228	0.126	0.059	0.118	0.043	0.087	0.035
	(mm)	(5.8)	(3.2)	(1.5)	(3.0)	(1.1)	(2.2)	(0.9)

RATED VOLT (VDC)		4	7	10	16	20
85°C	SURGE VOLTAGE (VDC)	5	8	13	20	26
125°C	DERATED VOLTAGE (VDC)	2.5	4	6.3	10	13
	SURGE VOLTAGE (VDC)	3.2	5	8	13	16
CAPACITANCE (uF)	CAP CODE	0G	0J	1A	1C	1D
0.1	104					A
0.15	154					A
0.22	224					A
0.33	334					A
0.47	474					A
0.68	684				A	A
1.0	105			A	A	
1.5	155		A	A		
2.2	225	A	A			
3.3	335	A				C
4.7	475					C
6.8	685				C	C
10	106			C	C	
15	156		C	C		
22	226	C	C			
33	336	C				

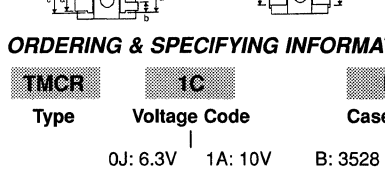
ORDERING & SPECIFYING INFORMATION

TMU	1D	C	475	M	L	R	H
Type	Voltage Code	Case Size	Nominal Capacitance	Tolerance	Packaging	Polarity Orientation	Leader Length Cover/Carrier
	0G: 4V 0J: 7V 1A: 10V 1C: 16V 1D: 20V	A: 3216 C: 6032	See Cap Code (Table Above)	K: ±10% M: ±20%	L - Tape/Reel Plastic A Case: 3000 C Case:1000	R (Std - Taping)	H 200mm Min (Std)

TMCR LOW ESR • SOLID ELECROLYTIC CAPACITOR

- Epoxy Molded Body, UL94V-0 Flammability
- EIA - US & EIA - Japan Compatible Sizes
- Low ESR Type
- Extended Values per Case Size
- Excellent Humidity and Solder Resistance

DIMENSIONS



Size Code	EIA Code	0.008 (L±0.2)	0.008 (W±0.2)	0.008 (H±0.2)	0.008 (g±0.2)	0.008 (t±0.2)	0.008 (a±0.2)	0.008 (b±0.2)	0.004 (c±0.1)
B in	3528	0.134	0.182	0.075	0.055	0.031	0.079	0.026	0.087
(mm)		(3.4)	(2.6)	(1.9)	(1.4)	(0.8)	(2.0)	(0.7)	(2.2)
C in	6032	0.228	0.126	0.098	0.094	0.051	0.087	0.026	0.094
(mm)		(5.8)	(3.2)	(2.5)	(2.4)	(1.3)	(2.2)	(0.7)	(2.4)
D in	5846	0.228	0.177	0.122	0.098	0.051	0.122	0.039	0.130
(mm)		(5.8)	(4.5)	(3.1)	(2.5)	(1.3)	(3.1)	(1.0)	(3.3)
E in (mm) (EIAD)	7343	0.287 (7.3)	.169±.012 (4.3±0.3)	0.110 (2.8)	0.149 (3.8)	0.051 (1.3)	0.118 (3.0)	0.047 (1.2)	0.094 (2.4)

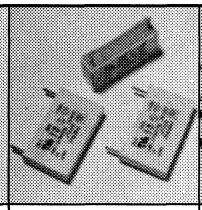
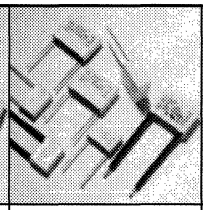
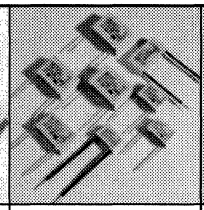
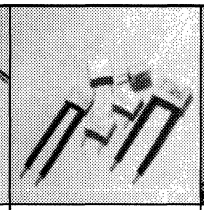
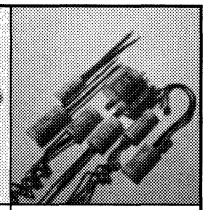
VOLTAGE CODE		0J	1A	1C	1D	1E	1V
RATED VOLTAGE		6.3	10	16	20	25	35
RECOMMENDED MAX. APPLICATION VOLTAGE		2.5	3.5	5	6	8	12
10	106	B	B	B	C	D,E	D,E
15	156	B	B	C	C	D,E	
22	226	B	C	C	D,E	D,E	
33	336	C	C	D,E	D,E		
47	476	C	D,E	D,E			
68	686	D,E	D,E	D,E			
100	107	D,E	D,E	D,E			
150	157	D,E	D,E				
220	227	D,E					

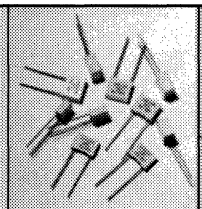
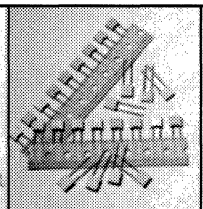
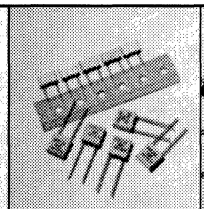
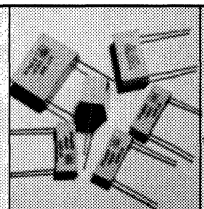
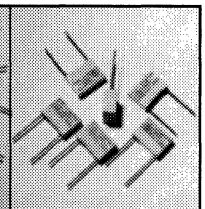
ORDERING & SPECIFYING INFORMATION

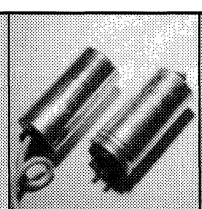
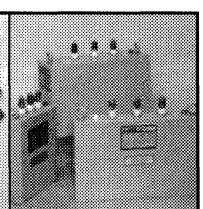
TMCR	1C	B	106	M	L	R	H
Type	Voltage Code	Case Size	Nominal Capacitance	Tolerance	Packaging	Polarity Orientation	Leader Length Cover/Carrier
	0J: 6.3V 1A: 10V 1C: 16V 1D: 20V 1E: 25V 1V: 35	B: 3528 C: 6032 D: 5846 E: 7343	See Cap Code (Table Above)	K: ±10% M: ±20%	L - Tape/Reel Plastic	R (Std - Taping)	H 200mm Min (Std)

Iskra

CAPACITORS

Radio Frequency Interference Suppression Capacitors					
Class	X1	X1	X2	Y2	X1Y2
Series	KNB1540	KNB1550	KNB1530	KNB2520	KNB7300
Voltage Range	250VAC	275VAC	275VAC	250VAC	250/275VAC
Capacitance Range	0.0022µF to 0.68µF	0.01µF to 1.0µF	0.01µF to 2.2µF	0.001µF to 0.047µF	.022µF to 0.47µF(X1) .0027µF to .027µF(Y2)
Standard and Custom EMI Filters available for all applications!					

DC Capacitors for Electronics					
Material	Polyester Film	Matallized Polyester-5mm to 27.5mm Pitch	Matallized Polyester-Axial Leads	Polypropylene Film	Matallized Polypropylene
Series	KFU1910	KEU1940/1930 KEU1910	KEU1012	KLI1910	KNI1910 KNU1910
Voltage Range DC	100 to 1,000	50 to 630	63 to 1,000	630 10 2,000	250 to 1,600
Capacitance Range	1,000µF to 1.0µF	1,000µF to 22µF	1000µF to 10µF	0.001µF to 0.22µF	0.001µF to 2.7µF
Complete In-House CE, FCC & MIL-STD EMC Testing and Design Services!					

Motor Run & Power Factor Capacitors		
Material	Matallized Polypropylene	Mixed
Series	KNM/KNF	KNK/KLV
Voltage Range AC	250 to 450	208 to 10.1kV
Capacitance Range	0.16µF to 30.0µF	See Catalog
HF Chokes, Coils and other suppression components available from stock!		

Full *In-House* EMC/EMI Testing & Design Services

LCR will provide you with a practical, cost effective solution that will bring your product into compliance.

ALL IN A MATTER OF DAYS!

Call LCR for all your suppression needs:

TOLL FREE : 1-888-895-6496

Appliance Filters, Power Line Filters, Industrial Filters, Data Line Filters, HF Chokes, Coils.

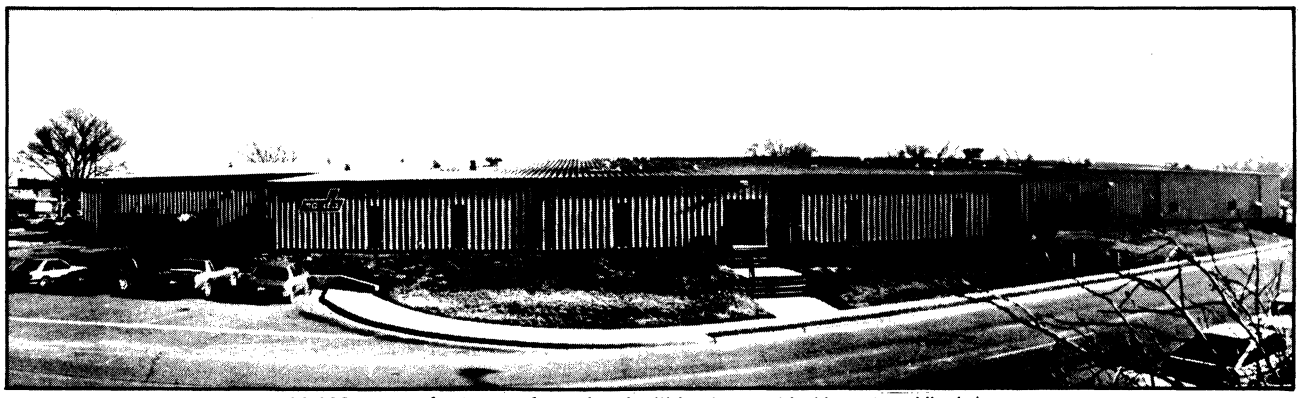
LCR ELECTRONICS, INC.

YOUR RESOURCE FOR EMC COMPLIANCE

9 South Forest Avenue ◆ Norristown PA 19401 ◆ Tel: (610) 278-0840 Fax: (610) 278-0935 E-mail: lcrmail@lcr-inc.com Web: www.lcr-inc.com

CERAMIC CAPACITORS &
METAL OXIDE VARISTORS

MAIDA DEVELOPMENT COMPANY
"DOMESTIC MANUFACTURERS SINCE 1947"



90,000 square foot manufacturing facilities located in Hampton, Virginia

Maida

See our Metal Oxide Varistor Listings - Section 4700.

serving the electronics industry as partners in progress for more than fifty years.

Maida Development Company is a domestically owned and operated manufacturer of a wide variety of electronic ceramic components. Since 1947, we have specialized in the custom design and fabrication of ceramic disc capacitors - from ceramic dielectric powder formulation through finished devices - to meet the specific requirements of our customers. Maida's major capacitor products include (1) Class I, Class II, and Class III high voltage disk capacitors, 1 KVDC thru 30 KVDC; (2) capacitors safety-recognized by UL, CSA, and VDE for across-the-line, line-by-pass, and antenna-coupling applications; (3) capacitor/sparkgap combinations.

Maida Development Company also produces a complete line of metal oxide varistors (MOV's) designed for transient voltage suppression and surge energy absorption. We are now the only U.S. manufacturer of these components, with ceramic formulation, powder preparation, fabrication and assembly facilities all located in this country. Maida's varistors are recognized by UL, CSA, and VDE. Please contact Maida's Sales Department to request our full-line varistors catalog.

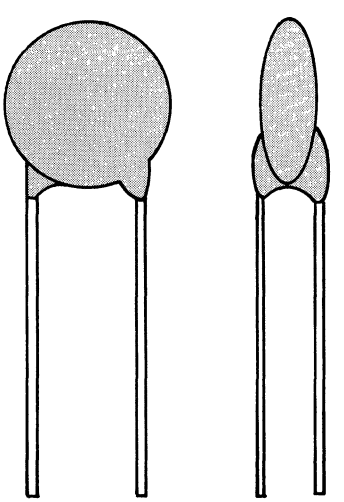
Delivery is both timely and reliable - with either bulk or tape and reel packaging.

Our sales representatives are strategically located throughout the USA and world. Maida welcomes the opportunity to discuss and bid on requirements not covered by this catalog. Please contact our Engineering Department.

CERAMIC DISC CAPACITORS — 500V THRU 6KV

CLASS	T.C.	Maximum Capacitance, pF						
		VDC 500V	VDC 1KV	VDC 2KV	VDC 3KV	VDC 4KV	VDC 5KV	VDC 6KV
1	P100	81	68	51	36	27	22	18
1	NP0	910	910	750	470	360	300	240
1	N033	910	910	750	470	360	300	240
1	N075	1000	1000	820	560	430	330	270
1	N150	560	560	430	300	200	180	150
1	N220	620	620	470	330	240	200	160
1	N330	750	750	560	360	270	220	190
1	N470	1300	1300	1100	750	560	470	390
1	N750	1500	1500	1300	820	620	510	430
1	N1500	2700	2700	2200	1500	1100	910	750
1	N2200	3900	3900	3300	2200	1600	1300	1100
1	N3300	6800	6800	5600	3600	3700	2200	1800
1	N4700	22000	22000	18000	12000	9100	7500	4700
1	N5600	8200	8200	6200	4300	3000	2400	2000
2	X5F	10000	10000	7500	5100	3900	3000	2700
2	Z5P	18000	18000	9100	6200	4700	3600	3000
2	X5P	15000	15000	12000	7500	5600	4700	3900
2	X7R	20000	20000	15000	10000	7500	6200	5100
2	X5R	27000	27000	20000	15000	10000	8200	6800
3	Z5U	62000	62000	47000	33000	24000	20000	16000
3	X5U	18000	18000	9100	6200	4700	3600	3000

APPLICATIONS:
CLASS 1. High-Q, temperature compensating, or stable capacitance requirements.
CLASS 2. Semi-Stable General Purpose. CLASS 3. General Purpose Line-by-line, Coupling, etc.



20 LIBBY STREET / P.O. BOX 3529 / HAMPTON, VIRGINIA 23663 / (757) 723-0785 / FAX (757) 722-1194
E-MAIL: maidadev@maida.com / WEBSITE: maida.com

CERAMIC CAPACITORS

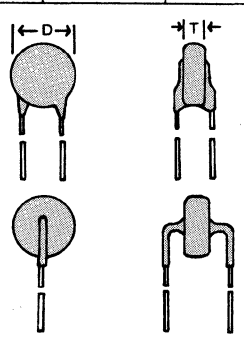
MAIDA DEVELOPMENT COMPANY

"DOMESTIC MANUFACTURERS SINCE 1947"

HIGH VOLTAGE DISCS

MAX. NOM. CAP. ±20% pF	10KV "T" MAX. 0.360 X5R	10KV Z5U	12KV "T" MAX. 0.400 X5R	12KV Z5U	15KV "T" MAX. 0.460 X5R	15KV Z5U	20KV "T" MAX X5R	20KV Z5U
100	D68	—	D68	—	D689	—	D689	—
200	D68	—	D68	—	D619	—	D719	—
250	D68	—	D61	—	D719	—	D719	—
500	D71	D68	D63	D68	D699	D619	D649	D719
750	D69	D61	D64	D61	D639	D719	D679	D629
1000	D64	D71	D63	D71	D679	D699	D769	D699
1500	D67	D62	D65	D69	D669	D649	D709	D639
2200	D66	D64	D66	D63	D709	D679	—	D769
2500	D66	D63	D70	D67	—	D659	—	D669
3000	D70	D63	D70	D67	—	D769	—	D669
4300	D70	D76	—	D66	—	D669	—	D709
5600	—	D66	—	D70	—	D709	—	—
6800	—	D70	—	D70	—	—	—	—

STYLE	MAX. "D"
D68/D689	0.406
D61/D619	0.469
D71/D719	0.532
D62/D629	0.594
D69/D699	0.659
D64/D649	0.719
D63/D639	0.781
D67/D679	0.840
D65/D659	0.969
D66/D669	1.100
D70/D709	1.350

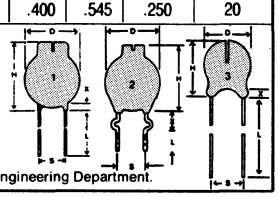


APPLICATIONS:
Voltage Multipliers, High Voltage Power Supplies

SPARK GAPS & CAPACITOR/SPARK GAPS

MDC STYLE	FIG. NO.	CAP. pF	TOL. CODE	GAP VOLTAGE RANGE, KVDC	MAX. DIAM. in.	MAX. HGHT. in.	LEAD SPACING in.	WIRE GAGE AWG
100	3	--	--	1.2-1.8	.440	.500	.200	22
100-1	3	--	--	1.2-1.8	.440	.500	.200	20
100-2	3	--	--	1.2-1.8	.440	.500	.250	22
100-3	3	--	--	1.2-1.8	.440	.500	.250	20
100-4	3	--	--	1.2-1.8	.440	.500	.200	22
100-5	3	--	--	2.0-3.0	.440	.500	.375	20
100H	3	--	--	3.0-4.5	.440	.500	.200	22
101	1	10000	Z	2.0-3.0	.750	1.000	.375	20
102	1	2700	Z	3.0-4.5	.875	1.125	.375	20
108	1	10000	M	2.0-3.0	.750	1.000	.375	20
109	1	4700	K	2.0-3.0	.532	.757	.375	20
111	1	4700	K	3.0-4.0	.656	.881	.375	20
112	1	2700	Z	3.5-5.0	.875	1.125	.375	20
117	1	10000	Z	1.8-2.6	.930	1.200	.375	20
117A	1	10000	Z	1.2-1.8	.750	1.000	.500	20
124	1	20000	P	1.0-2.0	1.000	1.175	.375	20
125	2	1000	Z	2.0-3.0	.437	.620	.375	20
126	1	1000	Z	1.0-2.0	.440	.750	.250	20
127	1	1000	M	1.0-2.0	.500	.675	.250	20
128	2	1000	Z	1.0-2.0	.440	.620	.250	20
130	1	10000	M	2.0-3.0	.875	1.000	.375	20
132	1	1000	P	2.0-3.0	.420	.570	.250	20
133	2	1000	P	2.0-3.0	.440	.620	.250	20
136	2	1000	Z	2.0-3.0	.440	.620	.250	20
137	1	9000	Z	1.0-2.2	.685	.900	.375	20
138	1	1000	M	2.0-3.0	.400	.545	.250	20

TOL. CODES:
K=+/-10%; M=+/-20%;
Z=+80%, -20%; P=+100%, -0%
WIRE DIAMS: 22 AWG=0.025 in.
20 AWG =0.032 in.



APPLICATIONS: Protection of low voltage circuits from high voltage surges.
For specific requirements, please contact our Engineering Department.

20 LIBBY STREET / P.O. BOX 3529
HAMPTON, VIRGINIA 23663
(757) 723-0785 / FAX (757) 722-1194
E-MAIL: maidadev@maida.com
WEBSITE: maida.com

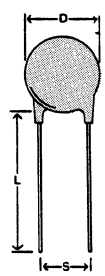
TYPE UW SAFETY-RECOGNIZED CERAMIC DISC CAPACITORS

MDC STYLE	CAP. pF ± 20%	DIMENSIONS, in. DMAX	HMAX	L.S	TEMP. COEFF. EIA	IEC	VDE 565-1 CLASS CODE
*D68UW101M	100	.394	.512	.300	Z5U	2B4	X1/Y2
D68UW121M	120	.394	.512	.300	Z5U	2B4	X1/Y2
*D68UW151M	150	.394	.512	.300	Z5U	2B4	X1/Y2
D68UW181M	180	.394	.512	.300	Z5U	2B4	X1/Y2
*D68UW221M	220	.394	.512	.300	Z5U	2B4	X1/Y2
D68UW271M	270	.394	.512	.300	Z5U	2B4	X1/Y2
D68UW331M	330	.394	.512	.300	Z5U	2B4	X1/Y2
D68UW391M	390	.394	.512	.300	Z5U	2B4	X1/Y2
*D61UW471M	470	.472	.590	.375	Z5U	2B4	X1/Y2
D61UW561M	560	.472	.590	.375	Z5U	2E4	X1/Y2
D61UW681M	680	.472	.590	.375	Z5U	2E4	X1/Y2
D61UW821M	820	.472	.590	.375	Z5U	2E4	X1/Y2
*D61UW102M	1000	.472	.590	.375	Z5U	2E4	X1/Y2
*D61UW122M	1200	.472	.590	.375	Z5U	2E4	X1/Y2
*D61UW152M	1500	.472	.590	.375	Z5U	2E4	X1/Y2
D61UW182M	1800	.472	.590	.375	Z5U	2E4	X1/Y2
D61UW202M	2000	.472	.590	.375	Z5U	2E4	X1/Y2
*D62UW222M	2200	.590	.708	.375	Z5U	2E4	X1/Y2
D62UW272M	2700	.590	.708	.375	Z5U	2E4	X1/Y2
D62UW332M	3300	.590	.708	.375	Z5U	2E4	X1/Y2
D62UW392M	3900	.590	.708	.375	Z5U	2E4	X1/Y2
*D64UW472M	4700	.748	.866	.375	Z5U	2E4	X1/Y2
D64UW562M	5600	.748	.866	.375	Z5U	2E4	X1/Y2
D64UW622M	6200	.748	.866	.375	Z5U	2E4	X1/Y2
*D63UW682M	6800	.787	.905	.375	Z5U	2E4	X1/Y2
D67UW822M	8200	.866	.984	.375	Z5U	2E4	X1/Y2
D65UW103M	10000	.905	1.02	.375	Z5U	2E4	X1/Y2

Voltage Ratings:

DC	- 4 KVDC	- all values
CSA C22.2	- 125 VAC	- all values
UL 1414	- 250 VAC	- all values
VDE 565-1	- 250 VAC	- all values
VDE 560-2	- 400 VAC	- selected values*

Type UW Capacitor Recognitions:
UL1414 – File No. E38785
CSA C22.2 – File No. LR33468
European CB Test Scheme – Certificate No. DE-1-5081
VDE565-1/IEC384-14 – VDE License No. 91838 (Class X1/Y2)
VDE560-2 – VDE License Nos. 58749 & 58820
SEMKO/IEC384-14 – Certificate No. 9606029 01
NEMKO/IEC384-14 – Certificate P96101225
DEMKO/IEC384-14 – Certificate SEMKO 9606029 01
FIMKO/IEC384-14 – Certificate SEMKO 9606029 01
SEV/IEC384-14 – SEV Certificate No. 96.7 70235.01



Type UV Capacitor Recognitions:
UL1414 – File No. E38785
CSA C22.2 – File No. LR33468 (also NRTL/C Certification to UL1414)
European CB Test Scheme – Certificate No. DE-1-5082
VDE565-1/IEC384-14 – VDE License No. 91837 (Class X1/Y2)
SEMKO/IEC384-14 – Certificate No. 9606031 01
NEMKO/IEC384-14 – Certificate P96101226
DEMKO/IEC384-14 – Certificate SEMKO 9606031 01
FIMKO/IEC384-14 – Certificate SEMKO 9606031 01
SEV/IEC384-14 – SEV Certificate No. 96.7 70235.01

Applications:
Line-by-pass, antenna couplings, across-the-line

TYPE UV SAFETY-RECOGNIZED CERAMIC DISC CAPACITORS

MDC STYLE	CAP. pF ± 20%	DIMENSIONS in. DMAX	MAX	L.S	TEMP. COEFF. EIA	IEC	IEC 384-14 CLASS CODE
D59UV101M	100	.276(7)	.394(10)	.200(5.0)	Y5V	2F4	X1/Y2
D59UV121M	120	.276(7)	.394(10)	.200(5.0)	Y5V	2F4	X1/Y2
D59UV151M	150	.276(7)	.394(10)	.200(5.0)	Y5V	2F4	X1/Y2
D59UV181M	180	.276(7)	.394(10)	.200(5.0)	Y5V	2F4	X1/Y2
D59UV221M	220	.276(7)	.394(10)	.200(5.0)	Y5V	2F4	X1/Y2
D59UV271M	270	.276(7)	.394(10)	.200(5.0)	Y5V	2F4	X1/Y2
D59UV331M	330	.276(7)	.394(10)	.200(5.0)	Y5V	2F4	X1/Y2
D59UV391M	390	.276(7)	.394(10)	.200(5.0)	Y5V	2F4	X1/Y2
D58UV471M	470	.315(8)	.433(11)	.200(5.0)	Y5V	2F4	X1/Y2
D58UV561M	560	.315(8)	.433(11)	.200(5.0)	Y5V	2F4	X1/Y2
D58UV681M	680	.315(8)	.433(11)	.200(5.0)	Y5V	2F4	X1/Y2
D58UV821M	820	.315(8)	.433(11)	.200(5.0)	Y5V	2F4	X1/Y2
D60UV102M	1000	.354(9)	.472(12)	.200(5.0)	Y5V	2F4	X1/Y2
D68UV122M	1200	.394(10)	.512(13)	.200(5.0)	Y5V	2F4	X1/Y2
D68UV152M	1500	.394(10)	.512(13)	.200(5.0)	Y5V	2F4	X1/Y2
D68UV182M	1800	.394(10)	.512(13)	.200(5.0)	Y5V	2F4	X1/Y2
D61UV202M	2000	.472(12)	.590(15)	.300(7.6)	Y5V	2F4	X1/Y2
D61UV222M	2200	.472(12)	.590(15)	.300(7.6)	Y5V	2F4	X1/Y2
D61UV272M	2700	.472(12)	.590(15)	.300(7.6)	Y5V	2F4	X1/Y2
D71UV332M	3300	.532(13)	.650(16.5)	.300(7.6)	Y5V	2F4	X1/Y2
D71UV392M	3900	.532(13.5)	.650(16.5)	.300(7.6)	Y5V	2F4	X1/Y2
D62UV472M	4700	.590(15)	.708(18)	.300(7.6)	Y5V	2F4	X1/Y2
D62UV562M	5600	.590(15)	.708(18)	.300(7.6)	Y5V	2F4	X1/Y2
D69UV622M	6200	.650(16.5)	.768(19.5)	.300(7.6)	Y5V	2F4	X1/Y2
D64UV682M	6800	.708(18)	.826(21)	.300(7.6)	Y5V	2F4	X1/Y2
D64UV822M	8200	.708(18)	.826(21)	.300(7.6)	Y5V	2F4	X1/Y2
D63UV103M	10000	.787(20)	.905(23)	.300(7.6)	Y5V	2F4	X1/Y2
D67UV123M	12000	.847(21.5)	.965(24.5)	.300(7.6)	Y5V	2F4	X1/Y2
D65UV153M	15000	.905(23)	1.025(26)	.300(7.6)	Y5V	2F4	X1/Y2
D76UV183M	18000	.965(24.5)	1.085(27.5)	.300(7.6)	Y5V	2F4	X1/Y2
D66UV203M	20000	1.100(28)	1.260(32)	.300(7.6)	Y5V	2F4	X1/Y2

PTC & NTC THERMISTORS

MAIDA DEVELOPMENT COMPANY
"DOMESTIC MANUFACTURERS SINCE 1947"

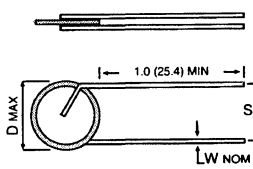
STANDARD PTC THERMISTORS FOR OVERCURRENT PROTECTION

MAIDA STYLE #	V MAXIMUM VOLTAGE (VOLTS)	R R_0 @ 25°C (±20%) (Ω)	I_{ns} MAXIMUM NO. SWITCH CURRENT (AMPS)	I_{ms} MINIMUM MUST SWITCH CURRENT (AMPS)	H HEAT CAPACITY (W•s/°C)	∂ DISSIPATION CONSTANT (mW/°C)	D MAXIMUM DIAMETER (INCHES)	W LEAD DIAMETER (INCHES)
6431PTC808M120150	15	0.8	0.89	1.58	0.57	15	0.650	0.032
6931PTC109M120150	15	1.0	0.77	1.37	0.48	14	0.600	0.032
6231PTC159M120150	15	1.5	0.56	0.99	0.32	11	0.500	0.025
7131PTC209M120150	15	2.0	0.46	0.82	0.25	10	0.450	0.025
6431PTC509M120500	50	5.0	0.36	0.63	0.85	15	0.650	0.032
7131PTC100M120500	50	10.0	0.21	0.37	0.38	10	0.450	0.025
6831PTC200M120500	50	20.0	0.13	0.23	0.21	8	0.350	0.025
6431PTC709M120131	132	7.0	0.31	0.55	1.41	16	0.650	0.032
6931PTC100M120131	132	10.0	0.25	0.45	1.19	15	0.600	0.032
6131PTC250M120131	132	25.0	0.13	0.23	0.48	10	0.400	0.025
6031PTC500M120131	132	50.0	0.08	0.15	0.25	8	0.300	0.025
5831PTC101M120131	132	100.0	0.05	0.10	0.16	7	0.250	0.025
7131PTC250M120261	265	25.0	0.14	0.25	0.94	12	0.450	0.025
6831PTC500M120261	265	50.0	0.09	0.16	0.53	9	0.350	0.025
5831PTC101M120261	265	100.0	0.06	0.10	0.24	8	0.250	0.025
6131PTC500M120401	400	50.0	0.10	0.18	0.96	12	0.400	0.025
6031PTC101M120401	400	100.0	0.06	0.11	0.49	9	0.300	0.025

All standard over-current protecting thermistors are uncoated, and have straight leads.

A variety of lead styles and a conformal coating are available upon request.

- Maximum voltage listed is either AC or DC.
- I_{ns} is the maximum amount of current that the device can carry without switching to its high resistance state. This parameter is determined at the maximum ambient temperature of 50°C.
- I_{ms} is the minimum amount of current required to switch the device into its high resistance state. This parameter is determined at the minimum ambient temperature of 0°C.

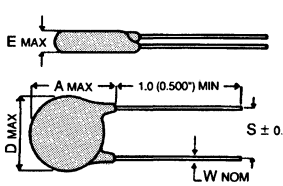


Lead Spacing (S) is 0.300" standard, 0.200" and 0.250" available upon request.

STANDARD IN-RUSH CURRENT LIMITERS

MAIDA STYLE #	R R_0 @ 25°C (±20%) (Ω)	I_{max} MAX. STEADY STATE CURRENT (AMPS)	R_I RESISTANCE @ I_{max} (Ω)	D MAX. DIAMETER OVER COATING (INCHES)	E MAX. THICKNESS OVER COATING (INCHES)	W LEAD DIAMETER (INCHES)	A SEATING HEIGHT (INCHES)
H63ICL708M120	0.70	12.00	0.030	0.750	0.200	0.040	0.875
H65ICL109M200	1.00	20.00	0.015	0.900	0.300	0.040	1.025
H71ICL139M809	1.30	8.00	0.050	0.500	0.200	0.040	0.625
H65ICL209M180	2.00	18.00	0.030	0.900	0.350	0.040	1.025
H68ICL259M309	2.50	3.00	0.150	0.400	0.250	0.032	0.525
H71ICL259M709	2.50	7.00	0.050	0.500	0.250	0.032	0.625
H62ICL259M909	2.50	9.00	0.040	0.600	0.250	0.032	0.725
H63ICL259M100	2.50	10.00	0.040	0.750	0.300	0.040	0.875
H65ICL259M150	2.50	15.00	0.030	0.900	0.300	0.040	1.025
H62ICL409M809	4.00	8.00	0.070	0.600	0.250	0.040	0.725
H65ICL409M140	4.00	14.00	0.050	0.900	0.350	0.040	1.025
H60ICL509M209	5.00	2.00	0.400	0.350	0.250	0.032	0.475
H73ICL509M289	5.00	2.80	0.250	0.375	0.200	0.032	0.500
H68ICL509M409	5.00	4.00	0.150	0.400	0.250	0.032	0.525
H71ICL509M609	5.00	6.00	0.100	0.500	0.250	0.032	0.625
H62ICL509M709	5.00	7.00	0.070	0.600	0.250	0.032	0.725
H69ICL509M809	5.00	8.00	0.050	0.650	0.250	0.040	0.775
H65ICL509M120	5.00	12.00	0.060	0.900	0.300	0.040	1.025
H71ICL709M409	7.00	4.00	0.200	0.500	0.300	0.040	0.625
H62ICL709M509	7.00	5.00	0.150	0.600	0.300	0.040	0.725
H60ICL100M209	10.00	2.00	0.300	0.350	0.250	0.032	0.475
H68ICL100M309	10.00	3.00	0.200	0.400	0.250	0.032	0.525
H71ICL100M509	10.00	5.00	0.150	0.500	0.350	0.040	0.625
H62ICL100M609	10.00	6.00	0.200	0.600	0.350	0.040	0.725
H63ICL100M809	10.00	8.00	0.100	0.750	0.350	0.040	0.875
H71ICL120M409	12.00	4.00	0.220	0.500	0.350	0.040	0.625
H60ICL160M179	16.00	1.70	0.600	0.350	0.250	0.032	0.475
H68ICL160M279	16.00	2.70	0.400	0.400	0.300	0.032	0.525
H63ICL160M409	16.00	4.00	0.250	0.750	0.250	0.040	0.875
H60ICL200M189	20.00	1.75	0.600	0.350	0.300	0.032	0.475
H68ICL250M179	25.00	1.70	0.600	0.400	0.300	0.032	0.525
H61ICL250M249	25.00	2.40	0.400	0.450	0.300	0.032	0.575
H71ICL400M209	40.00	2.00	0.600	0.500	0.250	0.032	0.625
H63ICL470M309	47.00	3.00	0.500	0.750	0.250	0.040	0.875
H68ICL500M119	50.00	1.10	0.900	0.400	0.300	0.032	0.525
H76ICL121M309	120.00	3.00	0.900	0.950	0.250	0.040	1.075

- All In-Rush Current Limiters are available with various lead styles and markings. Packaging may be bulk or tape and reel type. For special thermistor requirements, please contact Maida's Engineering Department.
- R_I is a typical value only as this parameter will vary with ambient temperature, air flow and mounting conditions. Typical values are obtained at 25°C in still air.



Lead Spacing (S) is 0.300" standard, 0.200" and 0.250" available upon request.

20 LIBBY STREET / P.O. BOX 3529 / HAMPTON, VIRGINIA 23663 / (757) 723-0785 / FAX (757) 722-1194
E-MAIL: maidadev@maida.com / WEBSITE: maida.com

MALLORY *custom aluminum electrolytic capacitors*

Features	Benefits
Hand-Selected Foils	• Eliminates traditional capacitor derating • Provides high voltage, ripple and temperature performance up to 500 V at 85°C with ripple current up to 50 amps (rms)
Vacuum-Impregnated	• Complete electrolyte penetration of cartridge • Guarantees superior performance and repeatability • High MTBF
Trough Aging	• Aged at 85°C to full voltage • Customer receives preformed capacitor • Lower D.C. leakage • Lower E.S.R. • Longer shelf life

EA capacitors are long-life aluminum electrolytic capacitors custom-designed for your extreme applications.

With capacitance ratings up to 500,000 µF, voltage ratings up to 500 V, ripple currents up to 50 amps (rms) and temperature stability up to 85C, Mallory EA capacitors provide superior performance across a wide range of application requirements.

When taking performance to extremes, look into EA capacitors form Mallory-Duracap International Inc.

Our engineering support team is waiting to assist in selecting the capacitor for your application.

Call today for a copy of our EA capacitor product guide.

Mallory-Duracap International Inc.
P.O. Box 210 - 59 Montclair Drive
Woodstock, Ontario N4V-1C5, Canada

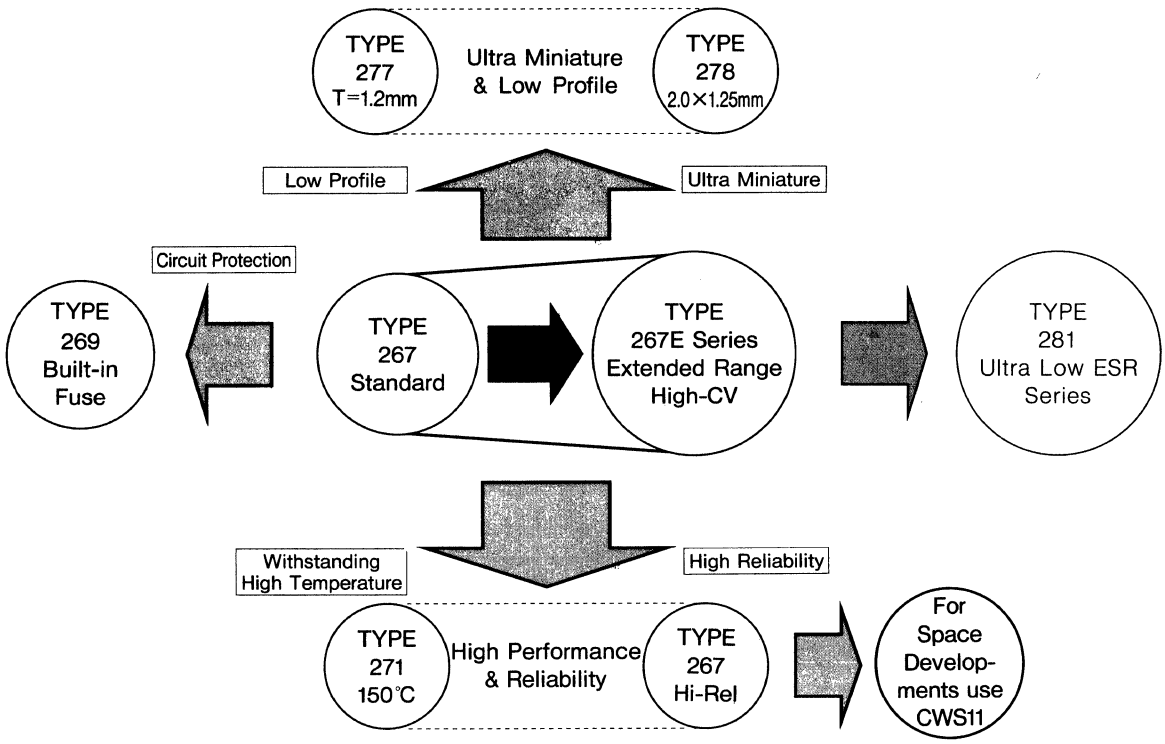
Phone (519) 539-4891
Fax (516) 539-6684

DURACAP INTERNATIONAL INCORPORATED
P.O. Box 210, 59 Montclair Drive, Woodstock, Ontario N4V-1C5, Canada
Phone: (519) 539-4891, Fax: (519) 539-6684

NCC® *New Concepts in Capacitors* SINCE 1949

MATSUO®

DEVELOPMENTS OF MATSUO TANTALUM CHIP CAPACITORS

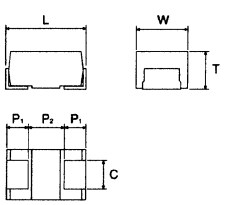


SOLID TANTALUM CAPACITORS TANCHIP® SERIES

Type 278 Ultra Miniature

Epoxy resin molding

DIMENSIONS : mm



Case Code	L±0.2	W±0.2	T max.	P_1±0.2	P_2min.	C±0.1
S	2.0	1.25	1.2	0.5	0.8	0.9

Type 278 is ultra miniature tantalum chip capacitor with case size 2012(2.0×1.25×1.2mm) and responds to market needs of miniaturization from electronics equipments.
Type 278 is satisfied with same requirement for surface mounting and high soldering heat resistance as type 267.

This type is suitable for ultra miniaturized applications such as handy phone, pager, PCMCIA card.

CHARACTERISTICS:

Failure rate level:	1%/1000h(M)
Operating temperature range:	−55～+85℃ to+125℃ with voltage derating
Rated voltage:	2.5V. 4V. 6.3V. 10V. 16V. 20VDC
Capacitance range:	0.1μF to 22μF
Capacitance tolerance:	±10%(K), ±20%(M)
Leakage current:	0.01CV or 0.5μA max.
Dissipation factor:	0.04max. (0.1～1.0μF) 0.06max. (1.5～4.7μF)

Cap(μF) \ RV(VDC)	2.5	4	6.3	10	16	20
0.1						S
0.15						S
0.22						S
0.33						S
0.47					S	S
0.68				S	S	S
1.0			S	S	S	
1.5		S	S	S		
2.2	S	S	S	S		
3.3	S	S	S	S		
4.7	S	S	S	S		
6.8	S	S	S			
10.0	S	S	S			
15.0	S	S				
22.0	S					

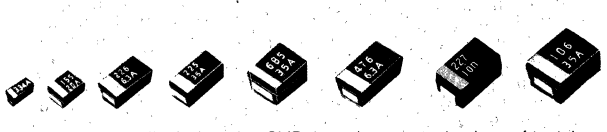
NCC® *New Concepts in Capacitors* SINCE 1949

MATSUO®

SOLID TANTALUM CAPACITORS TANCHIP® SERIES

Type 267

Epoxy resin molding



Type 267 is specially designed to SMD, based on our technology of tantalum chip capacitors acquired over many years.
Fully-molded construction provides excellent mechanical protection, superior moisture resistance and high soldering heat resistance.
Type 267 provides the following products which can meet actual environmental conditions and applications.
Please inquire with our sales department to confirm specifications prior to use.
Low E.S.R..... (#376 series)

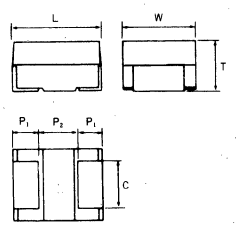
This series is suitable for high ripple current applications such as DC/DC converter, switching regulator, etc.

	case code	ratings (examples)	267M	267M #376
E.S.R. (at 100kHz)	A	16V/1μF	7.4Ωmax.	4.4Ωmax.
	B	16V/3.3μF	2.9Ωmax.	2.2Ωmax.
	C,C_3	16V/10μF	1.17Ωmax.	0.62Ωmax.
	D,D_3	16V/22μF	0.97Ωmax.	0.37Ωmax.
	H	16V/47μF	0.38Ωmax.	0.25Ωmax.
	E	16V/47μF	0.38Ωmax.	0.25Ωmax.

For Automotive — It is suitable for Automotive Electronics such as ECU, ABS and etc. due to its superior moisture resistance.

For Aero-space — NASDA-QTS-55365A/201
This type is approved by the National Space Development Agency of JAPAN (NASDA)

DIMENSIONS : mm



Each case size has different configuration of terminal.

Case Code	EIA Code	L±0.2	W±0.2	T±0.2	P_1±0.2	P_2min.	C±0.1
A	3216	3.2	1.6	1.6	0.75	1.4	1.2
B	3528	3.5	2.8	1.9	0.8	1.5	2.2
C	—	5.6	3.3	2.3	1.3	2.8	2.2
C_3	6032	6.0	3.2	2.5	1.3	3.0	2.2
D	—	5.6	4.6	3.2	1.3	2.8	3.2
D_3	7343	7.3	4.4	2.8	1.3	4.0	2.4
H	7343H	7.3	4.4	4.1	1.3	4.0	2.4
E	7257	7.3	5.8	3.5	1.3	4.0	3.5

FEATURES :
- Small size: A case 3.2×1.6mm
- E series brings 4 times of volume efficiency for same case size of M series
- Flame retardant resin molding conforms to UL94V-0.
- Precise dimensions allow high density packaging.
- Suitable for surface mounting.
- Symmetrical construction of positive and negative terminals provides "Self Alignment".
- Soldering: 260℃ for 10 seconds by re-flow or flow soldering.

CHARACTERISTICS :

Failure rate level :	1%/1000h(M)
Operating temperature range :	−55～+85℃ to+125℃ with voltage derating
Rated voltage :	2.5V.4V.6.3V.10V.16V. 20V. 25V.35V.50VDC
Capacitance range :	0.1μF to 220μF (at 267M series) 0.22μF to 330μF (at 267E series)
Capacitance tolerance :	±10%(K), ±20%(M)
Leakage current :	0.01CV or 0.5μA max.
Dissipation factor :	0.04max. (0.1～1.0μF) 0.06max. (1.5～68μF) 0.08max. (100～330μF)

267M

RV(VDC) / Cap(μF)	4	6.3	10	16	20	25	35	50
0.1							A	A
0.15							A	A,B
0.22							A	B
0.33							A	B
0.47						A	A,B	B,C,C_3
0.68					A	A	B	C,C_3
1.0				A	A		B	C,C_3
1.5			A	A		B	B,C,C_3	C,C_3,D,D_3
2.2		A	A		B	B	C,C_3	D,D_3
3.3	A	A		B	B	C_3	C,C_3,D_3	D,D_3
4.7	A		B	B	C_3	C,C_3	C,C_3,D_3	
6.8		B	B	C_3	C,C_3	C,C_3,D_3	D,D_3	
10	B	B	C_3	C,C_3	C,C_3	D,D_3	D,D_3,E	
15	B	C_3	C,C_3	C,C_3	D,D_3	D,D_3	H,E	
22	C_3	C,C_3	C,C_3	D,D_3	D,D_3	H,E	H	
33	C,C_3	C,C_3	D,D_3	D,D_3	H,E	H		
47	C,C_3	D,D_3	D,D_3	H,E	H			
68	D,D_3	D,D_3	H,E	H				
100	D,D_3	H,E	H,E					
150	H,E	H,E						
220	H,E							

267E

RV(VDC) / Cap(μF)	2.5	4	6.3	10	16	20	25	35	50
0.22									A
0.68								A	B
1.0							A	A	
1.5						A	A		
2.2					A	A		B	C_3
3.3				A	A	A	B	B	
4.7			A	A	A	B	B		D_3
6.8		A	A	A	B	B		C,C_3	
10		A	A	A,B	B	B	C,C_3		
15	A	A	A,B	B	B	C,C_3			
22	A	A,B	A,B	B	C,C_3	C,C_3			
33	A,B	B	B	B,C,C_3	C,C_3				
47	B	B	B,C,C_3	C,C_3	D,D_3				
68	B	B,C,C_3	C,C_3	D,D_3		H			
100		C,C_3	D,D_3	D_3	H				
150		D,D_3	D_3	H					
220		D_3	H	H					
330		H	H						

NCC® New Concepts in Capacitors SINCE 1949

MATSUO®

SOLID TANTALUM CAPACITORS TANCHIP® SERIES

Type 269 Built-in fuse

Epoxy resin molding

Dimensions are same as type 267.

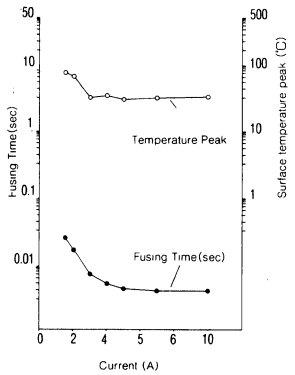
RV(VDC) / Cap(μF)	6.3	10	16	20	25	35	50
0.15							B
0.22							**B**
0.33							B
0.47							**B,C₃**
0.68							C₃
1.0					**B**	**B,C₃**	**C₃**
1.5				B	B	C₃	C₃,D,D₃
2.2			**B**	**B**		**C₃**	**D₃**
3.3			B		C₃	C₃,D,D₃	D₃
4.7		**B**	**B**	**C₃**	**C₃**	**D,D₃**	
6.8			C₃	C₃	D,D₃	D,D₃,E	
10		**C₃**	**C₃**	**D,D₃**	**D,D₃**	**E**	
15		C₃	D,D₃	D,D₃	E		
22			**D,D₃**	**D₃,E**			
33		D,D₃	D₃,E				
47		**D₃**	**E**				
68	D₃	E					
100	**E**	**E**					

TYPE 269 is built-in fuse tantalum chip capacitors.
Suitable for filtering of supply with low impedance circuit and bypassing of random noise of source line in ultra high speed logical circuit.

CHARACTERISTICS:

Failure rate level:	1%/1000h (M)
Operating temperature range:	−55～+85℃ to+125℃ with voltage derating
Rated voltage:	6.3V, 10V, 16V, 20V, 25V, 35V, 50VDC
Capacitance range:	0.15μF to 100μF
Capacitance tolerance:	±10%(K), ±20%(M)
Leakage current:	0.01CV or 0.5μA max.
Dissipation factor:	0.04max. (0.15～1.0μF) 0.06max. (1.5～68μF) 0.08max. (100μF)

FUSING CHARACTERISTICS (case code B)



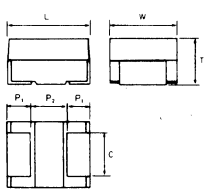
SOLID TANTALUM CAPACITORS TANCHIP® SERIES

Type 277

Low profile(1.2mm max.)

Epoxy resin molding

DIMENSIONS : mm



Case Code	L±0.2	W±0.2	T max.	P₁±0.2	P₂min.	C±0.1
A	3.2	1.6	1.2	0.8	1.4	1.2
B	3.5	2.8	1.2	0.8	1.5	2.2

Type 277 is low profile tantalum chip capacitors which hight is reduced to 1.2mm max. responding to miniaturization and low profile of electronic application such as IC card, pager.

CHARACTERISTICS:

Failure rate level:	1%/1000h(M)
Operating temperature range:	−55～+85℃ to +125℃ with voltage derating
Rated voltage:	4V. 6.3V. 10V. 16V. 20VDC
Capacitance range:	0.1μF to 15μF
Capacitance tolerance:	±20%(M)
Leakage current:	0.01CV or 0.5μA max.
Dissipation factor:	0.04max. (0.1～1.0μF) 0.06max. (1.5～15μF) 0.08max. (E series)

RV(VDC) / Cap(μF)	4	6.3	10	16	20
0.1					A
0.15					**A**
0.22					A
0.33					**A**
0.47					A
0.68				**A**	**A,B**
1.0			A	A	A,B
1.5		**A**	**A**	**A**	**A,B**
2.2	A	A	A	A,B	B
3.3	**A**	**A**	**A,B**	**B**	
4.7	A	A,B	B		
6.8	**A,B**	**A,B**	**B**		
10	A,B	B			
15	**B**				

NCC® *New Concepts in Capacitors* SINCE 1949

MATSUO®

SOLID TANTALUM CAPACITORS TANCHIP® SERIES

Type 271 High heat resistance

Epoxy resin molding

Solder heat resistance was improved to 330℃ and temperature range of continuous usage was improved to 150℃. Suitable for Electronics Control Unit, Automatic Transmission and others in the engine room, and for High Reliability applications such as PBX (Private Branch Exchange).

Dimensions are same as type 267

CHARACTERISTICS :

Failure rate level :	0.5%/1000h (N)
Operating temperature range :	−55～+105℃ to +150℃ with voltage derating
Moisture resistance :	85℃ 85% R.H. 1000h
Rated voltage :	4V, 6.3V 10V, 16V, 20V, 25V, 35VDC
Capacitance range :	0.1μF to 68μF
Capacitance tolerance :	±10%(K), ±20%(M)
Leakage current :	0.005CV or 0.3μA max.
Dissipation factor :	0.04max. (0.1～1.0μF) 0.06max. (1.5～68μF)
Equivalent series resistance (at f=10kHz) :	Case code A 7.5Ωmax. Case code B 3.0Ωmax. Case code C_3 1.2Ωmax. Case code D_3 1.0Ωmax.

RV(VDC) / Cap.(μF)	4	6.3	10	16	20	25	35
0.1							A
0.15							A
0.22							A
0.33							A
0.47						A	B
0.68					A		B
1.0				A			B
1.5			A			B	C_3
2.2		A			B		C_3
3.3	A			B			C_3
4.7			B			C_3	D_3
6.8		B			C_3		D_3
10	B			C_3		D_3	
15			C_3		D_3		
22		C_3		D_3			
33	C_3		D_3				
47		D_3					
68	D_3						

SOLID TANTALUM CAPACITORS TANCHIP® SERIES

Type 281 Ultra Low ESR

Epoxy resin molding

Ultra Low ESR series.
Suitable for medium to high frequency circuit as high speed PC, Switching Regulators, DC/DC converter, etc.

Dimensions are same as type 267

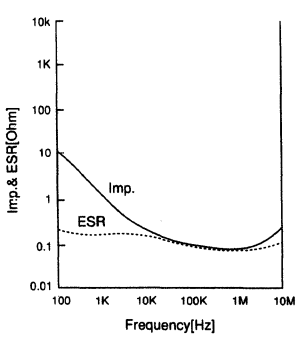
CHARACTERISTICS :

Failure rate level :	1%1000h (M)
Operating temperature range :	−55～+85℃ to +125℃ with voltage derating
Rated voltage :	4V, 6.3V, 10V, 16V, 20V, 25V, 35VDC
Capacitance range :	4.7μF to 330μF
Capacitance tolerance :	±10% (K), ±20% (M)
Leakage current :	0.01CV or 0.5μA max.
Dissipation factor :	0.06max. (4.7～68μF) 0.08max. (100～330μF)
Equivalent series resistance (at f=100kHz)	>150μF 0.1Ωmax. 47～100μF 0.2Ωmax. 10～33μF 0.3Ωmax. 4.7～6.8μF 0.4Ωmax.

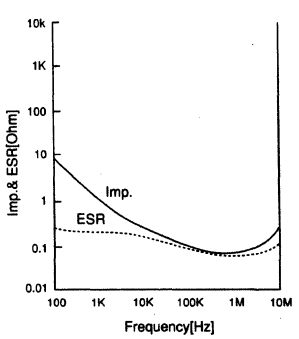
RV(VDC) / Cap(μF)	4	6.3	10	16	20	25	35
4.7							D_3
6.8							D_3
10							D_3
15						D_3	H
22					D_3	D_3,H	H
33				D_3	D_3,H	H	
47			D_3	D_3,H			
68		D_3	D_3,H	H	H		
100	D_3	D_3	D_3,H	H			
150	D_3	D_3	H				
220	D_3	H	H				
330		H					

FREQUENCY CHARACTERISTICS

Case code H 10V 150μF



Case code H 10V 220μF



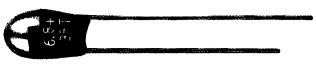
NCC® *New Concepts in Capacitors* SINCE 1949

MATSUO®

SOLID TANTALUM CAPACITORS BLUEDT® SERIES

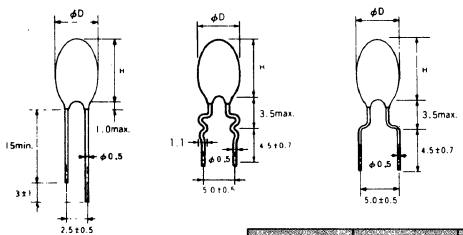
Type 202 Small size

Epoxy resin coating



DIMENSIONS AND LEAD STYLE: mm

(Style 4) (Style 2) (Style 3)



Case Code	D max.	H max.
1	3.6	6.0
2	3.8	6.5
3	4.0	7.0
4	4.8	7.5
5	5.0	8.0
6	5.5	8.5
7	5.5	9.5

CHARACTERISTICS:

Failure rate level:	2%/1000h (L)
Operating temperature range:	−55～+85℃
Rated voltage:	3.15V.6.3V.10V.16V.20V.25V.35VDC
Capacitance range:	0.1μF to 100μF (E6 series)
Capacitance tolerance:	±10%(K)
Leakage current:	0.01CV or 0.5μA max.
Dissipation factor:	0.04 max. (0.1～1.0μF) 0.06 max. (1.5～4.7μF) 0.08 max. (6.8～68μF) 0.10 max. (100μF)

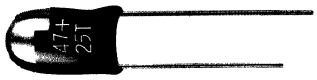
Cap(μF) \ RV(VDC)	3.15	6.3	10	16	20	25	35
0.1							1
0.15							**1**
0.22							1
0.33							**1**
0.47							1
0.68							**1**
1.0							1
1.5						**1**	**2**
2.2					1	2	3
3.3				**1**	**2**	**3**	**4**
4.7			1	2	3	4	5
6.8		**1**	**2**	**3**	**4**	**5**	**6**
10	1	2	3	4	5	6	7
15	**2**	**3**	**4**	**5**	**6**	**7**	
22	3	4	5	6	7		
33	**4**	**5**	**6**	**7**			
47	5	6	7				
68	**6**	**7**					
100	7						

Available 50V upon request.

SOLID TANTALUM CAPACITORS BLUEDT® SERIES

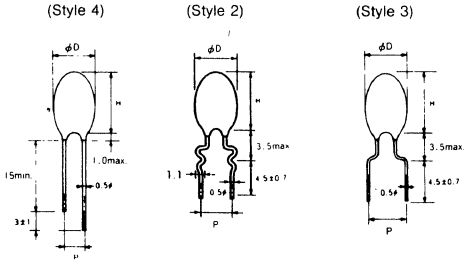
Type 204 High reliability

Epoxy resin coating



DIMENSIONS AND LEAD STYLE: mm

(Style 4) (Style 2) (Style 3)



Case Code	D max.	H max.	P±0.5		
			Style 2	Style 3	Style 4
1	3.6	6.5	5.0	5.0	2.5
2	3.8	7.0	5.0	5.0	2.5
3	4.0	7.5	5.0	5.0	2.5
4	4.8	8.0	5.0	5.0	2.5
5	5.0	8.5	5.0	5.0	2.5
6	5.5	9.5	5.0	5.0	2.5
7	6.0	10.0	5.0	5.0	2.5
8	6.5	11.5	5.0	5.0	3.2
9	7.5	13.0	—	5.0	5.0
10	8.0	14.0	—	5.0	5.0
11	8.5	20.0	—	5.0	5.0

CHARACTERISTICS:

Failure rate level:	1%/1000h (M), 0.5%/1000h (N)
Operating temperature range:	−55～+85℃ to +125℃ with voltage derating
Rated voltage:	3.15V.6.3V.10V.16V.20V.25V.35V 50VDC (F.R.level M only)
Capacitance range:	0.1μF to 470μF (E6 series)
Capacitance tolerance:	±10%(K), ±20%(M)
Leakage current:	0.01CV or 0.5μA max.
Dissipation factor:	0.04 max. (0.1～1.0μF) 0.06 max. (1.5～68μF) 0.08 max. (100～330μF) 0.10 max. (470μF)

Cap(μF) \ RV(VDC)	3.15	6.3	10	16	20	25	35	50
0.1							1	2
0.15							**1**	**2**
0.22							1	2
0.33							**1**	**2**
0.47							1	2
0.68							**1**	**2**
1.0							1	3
1.5						**1**	**2**	**4**
2.2					**1**	2	3	5
3.3				**1**	**2**	**3**	**4**	**6**
4.7			1	2	3	4	5	7
6.8		**1**	**2**	**3**	**4**	**5**	**6**	**8**
10	1	2	3	4	5	6	7	9
15	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**10**
22	3	4	5	6	7	8	9	11
33	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
47	5	6	7	8	9	10	11	
68	**6**	**7**	**8**	**9**	**10**	**11**		
100	7	8	9	10	11			
150	**8**	**9**	**10**	**11**				
220	9	10	11					
330	**10**	**11**						
470	11							

Case code 11 and 50V : Available for failure rate level M only.

NCC® *New Concepts in Capacitors* SINCE 1949

MATSUO®

CIRCUIT PROTECTION COMPONENTS

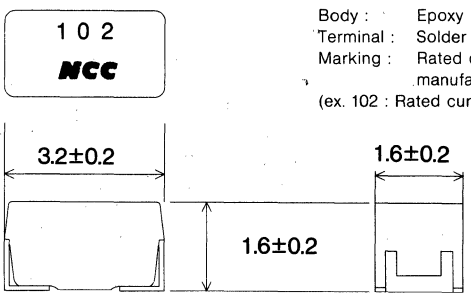
Type JAA

Epoxy resin molding **Circuit protector**

With wide use of portable electronic devices, the demand for high capacity batteries is increasing. Circuit protection components are designed for the protection of circuits using batteries against excessive current. Surface mount technology provides suitable products for miniaturization and portability.

FEATURES :
- Newly developed thermal element with a low melting point offers excellent fusing characteristics.
- Compatible with automatic mounting.
- Symmetrical construction of terminals provides "Self Alignment".
- Soldering : 260℃ for 10 seconds by re-flow or flow soldering.
- Package in tape and reel with 8 mm width.

DIMENSIONS : mm



Body : Epoxy mold.
Terminal : Solder plating.
Marking : Rated current and manufacture symbol.
(ex. 102 : Rated current at 1.0A.)

CHARCTERISTICS :

Operating temperature range :	−40～+125℃
Rated Current :	0.5, 0.63, 0.8, 1.0, 1.25, 1.6, 2.0A
Rated Voltage :	24VDC
Voltage Drop :	100mV max.
Insulation resistance :	1000MΩ min
Fusing Characteristics :	Fusing within 2 minutes 2.0×RC within 0.01 seconds 10×RC
Surface temperature :	Shall be less than 100℃ in fusing. (2.0×RC)

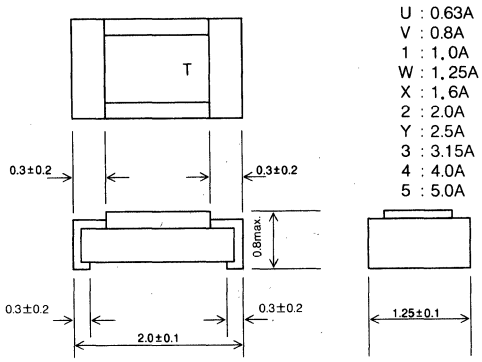
Catalog Number	Rated Current (A)	Internal Resistance (mΩ max.)	Voltage Drop (mV max.)	Rated Voltage (V D.C.)
JAA2402 501□[1]	0.5	240	120	24
JAA2402 631□[1]	0.63	160	100	24
JAA2402 801□[1]	0.8	125	100	24
JAA2402 102□[1]	1.0	100	100	24
JAA2402 132□[1]	1.25	80	100	24
JAA2402 162□[1]	1.6	60	100	24
JAA2402 202□[1]	2.0	50	100	24

Note)When ordering, insert "NA"or"ND" in□[1] for packaging(for bulk, leave□[1] blank)

Type KAB

Micro fuse (UL·CSA E171677(S)Approved)

DIMENSIONS : mm



Display code : Rated current
T : 0.5A
U : 0.63A
V : 0.8A
1 : 1.0A
W : 1.25A
X : 1.6A
2 : 2.0A
Y : 2.5A
3 : 3.15A
4 : 4.0A
5 : 5.0A

CHARACTERISTICS:

Operating temperature range:	−40～+125℃
Rated Current:	0.5, 0.63, 0.8, 1.0, 1.25, 1.6, 2.0, 2.5, 3.15, 4.0, 5.0A
Rated Voltage:	24VDC
Voltage Drop:	170mV max.
Insulation resistance:	1000MΩ min.
Fusing Characteristics:	Fusing within 1 minute 2.0×RC
Cut-off Characteristics	Cut-off voltage:24V Cut-off current:50A

Catalog Number	Rated Current (A)	Internal Resistance (mΩ max.)	Voltage Drop (mV max.)	Rated Voltage (V D.C.)
KAB 2402 501□	0.5	340	170	24
KAB 2402 631□	0.63	240	150	24
KAB 2402 801□	0.8	175	140	24
KAB 2402 102□	1.0	130	130	24
KAB 2402 132□	1.25	95	120	24
KAB 2402 162□	1.6	68	110	24
KAB 2402 202□	2.0	50	100	24
KAB 2402 252□	2.5	36	90	24
KAB 2402 322□	3.15	26	82	24
KAB 2402 402□	4.0	19	76	24
KAB 2402 502□	5.0	14	70	24

Note)When ordering, insert "NA" in □ for packaging

MINIGLOSSARY BASIC CAPACITOR FORMULAS

I. Capacitance (farads)

English: $C = \frac{.224\,K\,A}{t_D}$

Metric: $C = \frac{.0884\,K\,A}{t_D}$

II. Energy stored in capacitors (Joules, watt-sec)

$E = \frac{1}{2}\,CV^2$

III. Linear charge of a capacitor (Amperes)

$I = C\frac{dV}{dt}$

IV. Total Impedance of a capacitor (ohms)

$Z = \sqrt{R_s^2 + (X_C - X_L)^2}$

Where Rs = ESR

V. Capacitive Reactance (ohms)

$X_C = \frac{1}{2\pi fC}$

VI. Inductive Reactance (ohms)

$X_L = 2\pi fL$

VII. Phase Angles:

Ideal Capacitors: Current leads voltage 90°
Ideal Inductors: Current lags voltage 90°
Ideal Resistors: Current in phase with voltage

VIII. Dissipation Factor

$DF = \tan\delta \text{ (loss angle)} = \frac{ESR}{X_c} = (2\pi fC)\,(ESR)$

IX. Power Factor

PF = Sine δ (loss angle) = Cos φ (phase angle)
PF = DF (when less than 10%)

X. Quality Factor (dimensionless)

$Q = \text{Cotan } \delta \text{ (loss angle)} = \frac{1}{DF}$

XI. Equivalent Series Resistance (ohms)

$ESR = (DF)\,(Xc) = (DF)\,(\frac{1}{2}\pi fC)$

XII. Power Loss (watts)

Power loss $= (2\pi fCV^2)\,(DF)$

XIII. KVA (Kilowatts)

$KVA = 2\pi fCV^2 \times 10^{-3}$

XIV. Temperature Characteristic (ppm/°C)

$TC = \frac{Ct - C_{25}}{C_{25}\,(T_t - 25)} \times 10^6$

XV. Cap Drift (%)

$C.D. = \frac{C_1 - C_2}{C_1} \times 100$

XVI. Reliability of Ceramic Capacitors

$\frac{L_o}{L_t} = \left(\frac{V_t}{V_o}\right)^x \quad \left(\frac{T_t}{T_o}\right)^\tau$

XVII. Capacitors in Series (current the same)

Any number: $\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} \text{ --- } + \frac{1}{C_N}$

Two: $C_T = \frac{C_1\,C_2}{C_1 + C_2}$

XVIII. Capacitors in Parallel (voltage the same)

$C_T = C_1 + C_2 \text{ --- } + C_N$

XIX. Aging Rate

A.R. = % Δ C/decade of time

XX. Decibels

$db = 20 \log \frac{V_1}{V_2}$

Metric prefixes:

Pico	X 10^{-12}
Nano	X 10^{-9}
Micro	X 10^{-6}
Milli	X 10^{-3}
Deci	X 10^{-1}
Deca	X 10
Kilo	X 10^3
Mega	X 10^6
Giga	X 10^9
Tera	X 10^{12}

Symbols:

K	=	Dielectric Constant
A	=	Area of electrode overlap
t_D	=	Dielectric thickness
V	=	Voltage (volts)
t	=	time (hours)
R_S	=	Series Resistance (ohms)
f	=	frequency (Hertz)
L	=	Inductance (henries)
δ	=	Loss angle
ø	=	Phase angle
x+y	=	Exponent effect of voltage and temperature
L_O	=	Operating life (hours)
L_t	=	Test life (hours)
V_t	=	Test voltage (volts)
V_o	=	Operating voltage (volts)
T_t	=	Test temperature (°C)
T_o	=	Operating temperature (°C)

ISO 9001 CERTIFIED
4949 Greencraig Lane, San Diego, CA 92123
Phone 800-530-3351 • 619-576-7545
Fax 619-576-7672
e-mail:energyapplication@maxwell.com
http://www.maxwell.com
*Log on to **www.maxwell.com/energy** for full details and on-line application questionnaire*

Maxwell TECHNOLOGIES
Energy Products

Pulse Discharge-Energy Storage Capacitors

Maxwell high quality at competitive pricing from our modern ISO-9001 certified manufacturing facility. Our expert application engineering is No. 1 in the world. Our capacitors cover a wide range of applications from 500V to 2400 kV for almost every application.

- **Many Available from stock**-some models available from inventory
- **Large Quantities-Shorter Lead Times**-standard design materials are carried in stock; resulting in reduced delivery times.
- **Cost Effective Value** Based on higher volume production, you can now take advantage of Maxwell's high quality standard capacitors at ***lower prices.***

Selecting the Capacitor You Need

1. To define your applications, determine:

- Capacitance and tolerance (typically ±10%)
- Operating voltage
- Repetition rate and rms current
- Voltage reversal, normal and fault
- Required life, in charge/discharge cycles
- Maximum inductance
- Peak current and discharge time
- Environment and operating temperature
- Duty-continuous or burst mode (on/off time)

2. Review your application requirements while comparing them with the capacitors listed in the following pages. Consult the Maxwell Sales Department for additional assistance, Tel: 619-576-7545.

3. Fax, phone or e-mail your order into Maxwell.

Best of all...
Log on to www.maxwell/energy and use the on-line application questionnaire!!

The Results

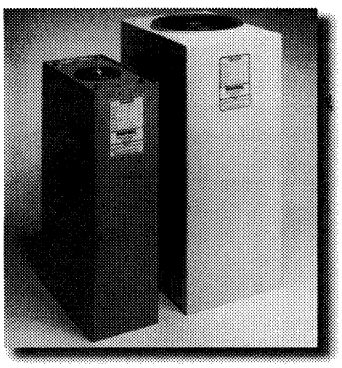
A high quality, cost-effective capacitor that best satisfies your requirements with fast delivery.

ISO 9001 CERTIFIED
4949 Greencraig Lane, San Diego, CA 92123
Phone 800-530-3351 • 619-576-7545
Fax 619-576-7672
e-mail:energyapplication@maxwell.com
http://www.maxwell.com

Maxwell TECHNOLOGIES
Energy Products

Log on to ***www.maxwell.com/energy*** *for full details and on-line application questionnaire*

Series C High Energy Storage H.V. Capacitors ■



Description

Maxwell has been at the forefront of energy storage capacitors for over 30 years. Our CL Series employ paper dielectric whilst the CM features the latest metallized designs with self healing capability. Energy densities of up to 2.5 J/cc are available with up to 100kJ in one can!!

Features and Benefits:

- Latest dielectric material technology for optimum performance and lifetime.
- Factory and on-site applications support on all aspects of your capacitor and general pulse power designs.
- Self healing designs offered by Series CM ensures optimum operational lifetime and safety.
- Simple and rugged construction of Series CL is ideal for high current, fast discharge applications.
- Maxwell's extensive engineering data for the most challenging pulse power applications.

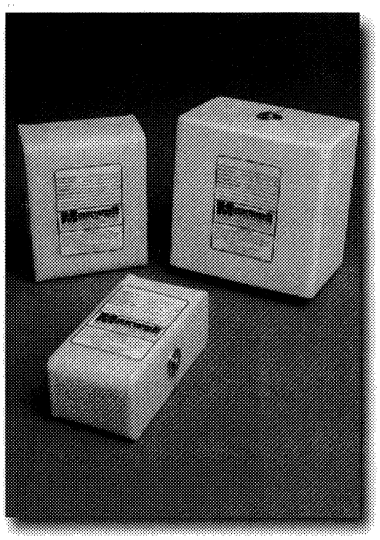
Model	Capacitance (μF)	Voltage (kV)	Case Dimension (inches)	Peak Current (kA)	Approx. ESL (nH)
Type CL-High Energy, Fast Discharge Capacitors					
411CL443	430	11	7.3 x 14 x 27.5	125	35
411CL453	525	11	8.4 x 14.0 x 27.5	125	35
411CL468	680	11	11.0 x 14.0 x 27.5	125	35
411CL483	830	11	12.0 x 16.0 x 27.5	150	40
422CL411	107	22	7.3 x 14 x 27.5	100	50
422CL413	130	22	8.4 x 14.0 x 27.5	100	50
422CL417	170	22	11.0 x 14.0 x 27.5	125	50
422CL421	206	22	12.0 x 16.0 x 27.5	150	45
444CL527	27	44	7.3 x 14 x 27.5	100	80
444CL532	32	44	8.4 x14.0 x 27.5	100	80
Above models are rated for 3,000 cycle life at 90% reliability for longer life, derate voltage using $V = Vo \times (Lo/L)^{1/7}$					
Type CM-High Energy, Self-healing Capacitors					
350CM338	3750	5	7.0 x 16.0 x 36.0	75	300
350CM375	7500	5	13.5 x 16.0 x 36.0	150	200
410CM494	938	10	7.0 x 16.0 x 36.0	40	500
410CM319	1875	10	13.5 x 16.0 x 36.0	75	400
415CM442	417	15	7.0 x 16.0 x 36.0	25	600
415CM483	833	15	13.5 x 16.0 x 36.0	50	500
420CM424	235	20	7.0 x 16.0 x 36.0	20	650
420CM447	469	20	13.5 x 16.0 x 36.0	40	550
425CM415	150	25	7.0 x 16.0 x 36.0	15	700
425CM430	300	25	13.5 x 16.0 x 36.0	30	600
Above models are rated for 20,000 cycle life with capacitance loss of less than 5% for longer life, derate voltage using $V=Vo \times [Lo/L]^{0.057}$					

- Please contact factory for assistance in applications where voltage reversal of more than 10% is expected.
- Operating temperature range is -10°C to +40°C.
- All units impregnated with non-hazardous vegetable oil. • All units protected against external fault conditions.

ISO 9001 CERTIFIED
4949 Greencraig Lane, San Diego, CA 92123
Phone 800-530-3351 • 619-576-7545
Fax 619-576-7672
e-mail:energyapplication@maxwell.com
http://www.maxwell.com
Log on to **www.maxwell.com/energy** for full details and on-line application questionnaire

Maxwell TECHNOLOGIES
Energy Products

Series PD & PM Plastic Case Pulse Discharge Capacitors



Description

Plastic-cased Capacitors for High Repetition Rate Pulse Discharge Applications. Designed for Industrial, OEM Laser Modulator and Accelerator Applications up to 50,000 Volts. Because of their low inductance, the PD & PM capacitors are an ideal replacement for ceramic capacitors in applications where several "doorknob" units are used in parallel to obtain low inductance.

Features:

- PD/PM Series are double ended designs with terminals at each end.
- High energy density provides a smaller and lighter capacitor than previously available for a compact system design.
- Low loss, high efficiency dielectric system supports high performance applications.
- Long, reliable pulse discharge life. Also suitable for DC filter applications
- Low inductance design for fast discharge circuits.
- High discharge and RMS current capability.

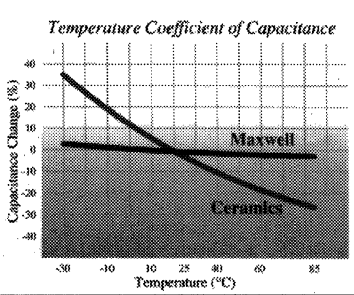
Specifications:

- Design Life of >1 x 10⁹ Charge/Discharge Cycles or 100,000 hours of DC Life.
- Standard capacitance tolerance of ±10%.
- Performance ratings are at 20% voltage reversal.
- Terminals are at opposite ends. Metric is available.
- Operating temperature range of -30 to +65°C.
- Contact Maxwell with your applications requirements that are not listed.
- Series PM inductance <20nH.
- Series PD inductance 40-120nH.

Model	Cap. Rating (nF)	Volt Rating (kV)	Case Dimension (inches)	RMS Current (A)	Peak Current (kA)
425PM825	25	25	2.3 x 5.9 x 3.0	25	25
425PM835	35	25	2.3 x 5.9 x 4.0	25	25
425PM845	45	25	2.3 x 5.9 x 5.0	25	25
430PM813	13	30	2.3 x 5.9 x 3.0	25	25
430PM822	22	30	2.3 x 5.9 x 4.0	25	25
430PM830	30	30	2.3 x 5.9 x 5.0	25	25
435PM810	10	35	2.3 x 5.9 x 3.0	25	25
435PM815	15	35	2.3 x 5.9 x 4.0	25	25
440PM970	7	40	2.3 x 5.9 x 3.0	25	25
440PM810	10	40	2.3 x 5.9 x 4.0	25	25
440PM815	15	40	2.3 x 5.9 x 5.0	25	25
450PM980	8	50	2.3 x 5.9 x 5.0	25	25
440PD810	10	40	4.0 x 6.0 x 5.0	35	50
440PD860	60	40	4.0 x 6.0 x 10.0	45	50
440PD720	200	40	4.0 x 6.0 x 24.5	60	50
450PD810	10	50	4.0 x 6.0 x 5.0	40	50
450PD840	40	50	4.0 x 6.0 x 10.5	40	50
450PD710	100	50	4.0 x 6.0 x 23.5	60	50

Temperature Characteristics

The typical capacitance change over the temperature range of -30°C to +85°C for Maxwell PD & PM capacitors and two familiar brands of ceramic capacitors are shown. The smaller temperature coefficient of capacitance exhibited by the PD/PM products ensures more consistent operation for industrial lasers where length-of-run and time-of-day temperature variations are common.

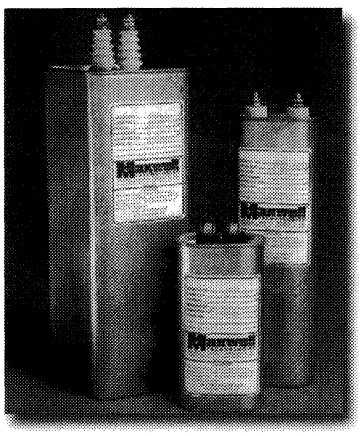


ISO 9001 CERTIFIED
4949 Greencraig Lane, San Diego, CA 92123
Phone 800-530-3351 • 619-576-7545
Fax 619-576-7672
e-mail:energyapplication@maxwell.com
http://www.maxwell.com

Maxwell TECHNOLOGIES
Energy Products

*Log on to **www.maxwell.com/energy** for full details and on-line application questionnaire*

Series DM Pulse Discharge Capacitors



Description

Self-Healing Metallized Capacitor Technology in Drawn Metal Cans for the Laser Markets. Designed for Industrial, OEM Rep Rate Applications up to 3,000 volts. Models above 3kV are available. Contact the sales department.

Features:

- Maxwell high quality at market competitive pricing from our modern, ISO-9001 manufacturing facility.
- Material maintained in inventory for quick delivery. J.I.T. delivery available against your forecasted schedule.
- High energy density allows for a smaller and lighter capacitor than previously available for a compact system design.
- Low loss, high efficiency dielectric system supports high performance applications.
- Long, reliable pulse discharge life.
- High discharge and RMS current capability.
- Environmentally friendly impregnant.

Model	Cap. Rating (µF)	Volt Rating (kV)	Case Dimension (inches)	RMS Current (A)	Peak Current (kA)
310DM550	50	1.0	1.91 x 2.91 x 4.75	15	0.8
310DM410	100	1.0	1.96 x 3.66 x 4.75	23	1.5
310DM415	150	1.0	2.86 x 4.56 x 4.00	31	2.3
310DM420	200	1.0	3.75 x 4.56 x 4.00	39	3.1
310DM430	300	1.0	3.75 x 4.56 x 5.00	52	4.6
310DM435	350	1.0	3.75 x 4.56 x 6.00	60	5.4
310DM445	450	1.0	3.75 x 4.56 x 7.25	60	6.9
310DM450	500	1.0	3.75 x 4.56 x 7.75	60	7.7
310DM460	600	1.0	3.75 x 4.56 x 8.75	60	9.2
310DM475	750	1.0	3.75 x 4.56 x 10.5	60	11.6
315DM550	50	1.5	1.96 x 3.66 x 4.75	16	1.2
315DM410	100	1.5	2.86 x 4.56 x 5.00	28	2.3
315DM415	150	1.5	3.75 x 4.56 x 6.00	39	3.5
315DM420	200	1.5	3.75 x 4.56 x 7.25	49	4.6
315DM425	250	1.5	3.75 x 4.56 x 8.75	59	5.8
315DM433	330	1.5	3.75 x 4.56 x 10.5	60	7.7
320DM550	50	2.0	2.86 x 4.56 x 6.00	21	1.5
320DM410	100	2.0	3.75 x 4.56 x 7.25	35	3.1
320DM415	150	2.0	3.75 x 4.56 x 8.75	46	4.6
320DM417	175	2.0	3.75 x 4.56 x 10.5	53	5.4
325DM550	50	2.5	3.75 x 4.56 x 5.00	21	1.9
325DM410	100	2.5	3.75 x 4.56 x 8.75	37	3.8
325DM411	115	2.5	3.75 x 4.56 x 10.5	43	4.4
330DM525	25	3.0	2.86 x 4.56 x 4.00	13	1.2
330DM550	50	3.0	3.75 x 4.56 x 7.25	24	2.3
330DM575	75	3.0	3.75 x 4.56 x 10.5	35	3.5

- Design Life of 1 x 10^9 Charge/Discharge Cycles or 25,000 hours of DC Life.
- Heavy duty 1/4" -20 terminals. Metric (M6) also available.
- Standard capacitance tolerance of ±10%
- Performance ratings are at 20% voltage reversal.
- Operating temperature range of -20 to +65°C.
- Contact Maxwell with your applications requirements that are not listed.

Metuchen Capacitors, Inc.

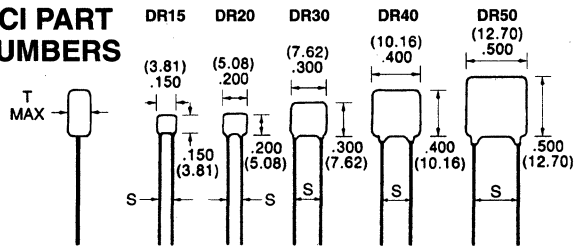
"We Offer Quick Solutions to Noise Pollution"

Epoxy Coated Sub-Miniature Radial-Leaded Ceramic Capacitors

1-800-679-0515 • 732-679-3366 • FAX: 1-800-679-9959

METUCHEN CAPACITORS, INC. • 135 White Oak Lane • P.O. Box 499 • Old Bridge, NJ 08857

MCI PART NUMBERS



MAXIMUM PHYSICAL DIMENSIONS

MCI PART NO.	DR15	DR20	DR30	DR40	DR50
S ±.030	.100 (2.54)	.100 (2.54)	.200 (5.08)	.200 (5.08)	.400 (10.16)
+.004 D -.001	.016 (.406)	.020 (.508)	.020 (.508)	.020 (.508)	.025 (.635)
T MAX	.100 (2.54)	.125 (3.18)	.150 (3.81)	.150 (3.81)	.200 (5.08)
AWG #	26	24	24	24	22

S = Lead spacing D = Lead size T = Body thickness mm are in parentheses

MECHANICAL SPECIFICATIONS

BODY CONSTRUCTION: Dipped epoxy

LEAD MATERIAL: Solderable tinned copper

MARKING:

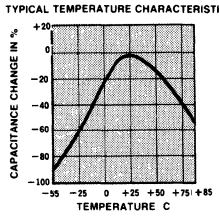
Parts will be marked with the following:

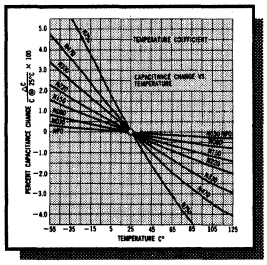
Trademark — Capacitance — Tolerance Letter Designation Voltage (size permitting)

EIA specifications apply regarding Q. TC tol and CAP tol on all units 10 pF or less.

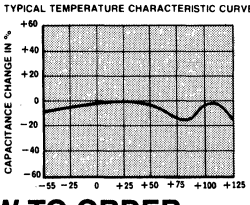
TYPICAL TEMPERATURE CHARACTERISTIC CURVES

Z5U

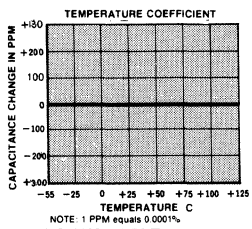




X7R



NPO



HOW TO ORDER

DR15 B CG 101 J

SIZE:

WVDC: (B = 50V)(1) (D = 100V)

CHARACTERISTIC: (CG = NPO; BM = X7R; BN = Z5U)

CAPACITANCE CODE: (2)

TOLERANCE: (3)

1. **WVDC AVAILABLE:** 50 VDC, 100 VDC, 200 VDC
2. 101 = 100 pF i.e., the third digit signifies number of zeroes
3. **MINIMUM AVAILABLE CAPACITANCE TOLERANCES:**
   B = ±.1 pF (10 pF and below)
   C = ±.25 pF (10 pF and below)
   D = ±.5 pF (10 pF and below)
   F = ±1% (10 pF and above)
   G = 2% (10 pF and above)
   J = ±5% (10 pF and above)
   K = 10% (5.6 pF and above)
   M = 20% (2.7 pF and above)
   Z = +80%, –20% (all values)
   P = +100%, –0% (GMV — all values)

FOR ADDITIONAL INFORMATION SEE OUR DATA PAGES IN THE CONNECTOR SECTION, VOLUME C PAGES C•1296 - C•1304, THE FERRITE SECTION, VOLUME A PAGE A•1595, AND THE FILTERS, RF SECTION VOLUME A PAGE A•1594.

Z5U CHARACTERISTICS

CAPACITANCE RANGE: .001 MFD to 4.7 MFD

WORKING VOLTAGE: 50/100/200 VDC
Higher voltages available on request

TEMPERATURE COEFFICIENT: +22%, -56% from +10°C to +85°C (EIA Characteristic Z5U)

DISSIPATION FACTOR: 3% maximum at 1 kHz, 25°C

INSULATION RESISTANCE: 100 K megohms or 500 megohm-microfarad, whichever is less at 25°C, at rated voltage

DIELECTRIC STRENGTH: 250% rated voltage with 50 mA maximum charging current

CAPACITANCE TOLERANCES AVAILABLE: ±20%, +80% -20%, or +100% -0%

MCI OFFERS A COMPLETE RANGE OF TEMPERATURE COEFFICIENTS. CONTACT FACTORY FOR SIZES AND ORDERING INFORMATION.

MCI Part No.	DR15		DR20		DR30		DR40		DR50		Capacitance Characteristic
Capacitance in pF	WVDC 50	100	WVDC 50	100	WVDC 50	100	WVDC 50	100	WVDC 50	100	EIA
1000											102
1200											122
1500											152
1800											182
2200											222
2700											272
3300											332
3900											392
4700											472
5600											562
6800											682
8200											822
10,000											103
12,000											123
15,000											153
18,000											183
22,000											223
27,000											273
33,000											333
39,000											393
47,000											473
56,000											563
68,000											683
82,000											823
100,000											104
120,000											124
150,000											154
180,000											184
220,000											224
270,000											274
330,000											334
390,000											394
470,000											474
560,000											564
680,000											684
820,000											824
1,000,000											105
1,200,000											125
1,500,000											155
1,800,000											185
2,200,000											225
2,700,000											275
3,300,000											335
3,900,000											395
4,700,000											475

For your convenience we welcome credit card purchases

VISA MasterCard

For additional information please see our data pages in **Section 2100** (EMI Connectors), **Section 2700** (Low Pass filters).

Metuchen Capacitors, Inc.

"We Offer Quick Solutions to Noise Pollution"

Epoxy Coated Sub-Miniature Radial-Leaded Ceramic Capacitors

1-800-679-0515 • 732-679-3366 • FAX: 1-800-679-9959

METUCHEN CAPACITORS, INC. • 135 White Oak Lane • P.O. Box 499 • Old Bridge, NJ 08857

NPO (COG) CHARACTERISTICS

WORKING VOLTAGE: 50/100/200 VDC. Higher voltages available on request

TEMPERATURE COEFFICIENT: 0 ±30 PPM/°C, -55° to 125°C (EIA Characteristic COG)

DISSIPATION FACTOR: Min. Q of 1000 at 1 MHz. Meets provisions of EIA standard for capacitance less than 30 pF and greater than 1000 pF.

INSULATION RESISTANCE: 100 K megohms or 1000 megohm-microfarad, whichever is less at 25°C, at rated voltage

DIELECTRIC STRENGTH: 250% rated voltage with 50 mA maximum charging current

CAPACITANCE TOLERANCES AVAILABLE: ±1%, ±2%, -±5%, ±10%, ±20

Meets or exceeds requirements of MIL-C-20

MCI offers a complete range of temperature coefficients.

Part No.	DR15			DR20			DR30			DR40			DR50			Cap.
Cap in pF	WVDC 50	100	200	WVDC 50	100	200	WVDC 50	100	200	WVDC 50	100	200	WVDC 50	100	200	Char. EIA
1.0	■	■	■													109
1.2	■	■	■													129
1.5	■	■	■													159
1.8	■	■	■													189
2.2	■	■	■													229
2.7	■	■	■													279
3.3	■	■	■													339
3.9	■	■	■													399
4.7	■	■	■													479
5.6	■	■	■													569
6.8	■	■	■													689
8.2	■	■	■													829
10	■	■	■	■	■	■										100
12	■	■	■	■	■	■										120
15	■	■	■	■	■	■										150
18	■	■	■	■	■	■										180
22	■	■	■	■	■	■										220
27	■	■	■	■	■	■										270
33	■	■	■	■	■	■										330
39	■	■	■	■	■	■										390
47	■	■	■	■	■	■										470
56	■	■	■	■	■	■										560
68	■	■	■	■	■	■										680
82	■	■	■	■	■	■										820
100	■	■	■	■	■	■										101
120	■	■	■	■	■	■										121
150	■	■	■	■	■	■										151
180	■	■	■	■	■	■										181
220	■	■	■	■	■	■										221
270	■	■		■	■	■										271
330	■	■		■	■	■										331
390	■	■		■	■	■										391
470	■	■		■	■	■										471
560	■	■		■	■	■										561
680				■	■	■										681
820				■	■	■										821
1,000				■	■	■										102
1,200				■	■	■	■	■	■							122
1,500				■	■	■	■	■	■							152
1,800				■	■	■	■	■	■							182
2,200				■	■	■	■	■	■							222
2,700				■	■		■	■	■							272
3,300				■	■		■	■	■	■	■	■				332
3,900				■	■		■	■	■	■	■	■				392
4,700				■	■		■	■	■	■	■	■				472
5,600				■	■		■	■	■	■	■	■				562
6,800							■	■	■	■	■	■				682
8,200							■	■	■	■	■	■				822
10,000							■	■	■	■	■	■	■	■	■	103
12,000							■	■		■	■	■	■	■	■	123
15,000							■	■		■	■	■	■	■	■	153
18,000							■	■		■	■	■	■	■	■	183
22,000							■	■		■	■	■	■	■	■	223
27,000										■	■	■	■	■	■	273
33,000										■	■	■	■	■	■	333
39,000										■	■		■	■	■	393
47,000										■	■		■	■	■	473
56,000													■	■	■	563
68,000													■	■		683
82,000													■	■		823
100,000													■	■		104

FOR ADDITIONAL INFORMATION SEE OUR DATA PAGES IN THE CONNECTOR SECTION, VOLUME C PAGES C•1296 - C•1304, THE FERRITE SECTION, VOLUME A PAGE A•1595, AND THE FILTERS, RF SECTION VOLUME A PAGE A•1594.

X7R CHARACTERISTICS

TEMPERATURE COEFFICIENT: ±15% from -55°C to 125°C (EIA Characteristic X7R)

DISSIPATION FACTOR: 2.5% maximum at 1 kHz, 25°C.

CAPACITANCE TOLERANCES AVAILABLE: ±5%, ±10%, ±20%, +80% -20%, or +100% -0%

Meets or exceeds requirements of MIL-C-39014

Working Voltage, Insulation Resistance & Dielectric Strength same as NPO Radial.

MCI offers a complete range of temperature coefficients.

Part No.	DR15			DR20			DR30			DR40			DR50			Cap.
Cap in pF	WVDC 50	100	200	WVDC 50	100	200	WVDC 50	100	200	WVDC 50	100	200	WVDC 50	100	200	Char. EIA
10	■	■	■													100
12	■	■	■													120
15	■	■	■													150
18	■	■	■													180
22	■	■	■													220
27	■	■	■													270
33	■	■	■													330
39	■	■	■													390
47	■	■	■													470
56	■	■	■													560
68	■	■	■													680
82	■	■	■													820
100	■	■	■	■	■	■										101
120	■	■	■	■	■	■										121
150	■	■	■	■	■	■										151
180	■	■	■	■	■	■										181
220	■	■	■	■	■	■										221
270	■	■	■	■	■	■										271
330	■	■	■	■	■	■										331
390	■	■	■	■	■	■										391
470	■	■	■	■	■	■										471
560	■	■	■	■	■	■										561
680	■	■	■	■	■	■										681
820	■	■	■	■	■	■										821
1,000	■	■	■	■	■	■	■	■	■							102
1,200	■	■	■	■	■	■	■	■	■							122
1,500	■	■	■	■	■	■	■	■	■							152
1,800	■	■		■	■	■	■	■	■							182
2,200	■	■		■	■	■	■	■	■							222
2,700	■	■		■	■	■	■	■	■							272
3,300	■	■		■	■	■	■	■	■							332
3,900	■	■		■	■	■	■	■	■							392
4,700	■	■		■	■	■	■	■	■							472
5,600	■	■		■	■	■	■	■	■							562
6,800	■			■	■	■	■	■	■							682
8,200	■			■	■	■	■	■	■							822
10,000	■			■	■	■	■	■	■	■	■	■	■	■	■	103
12,000	■			■	■	■	■	■	■	■	■	■	■	■	■	123
15,000				■	■		■	■	■	■	■	■	■	■	■	153
18,000				■	■		■	■	■	■	■	■	■	■	■	183
22,000				■	■		■	■	■	■	■	■	■	■	■	223
27,000				■	■		■	■	■	■	■	■	■	■	■	273
33,000				■	■		■	■	■	■	■	■	■	■	■	333
39,000				■	■		■	■	■	■	■	■	■	■	■	393
47,000				■	■		■	■	■	■	■	■	■	■	■	473
56,000							■	■	■	■	■	■	■	■	■	563
68,000							■	■	■	■	■	■	■	■	■	683
82,000							■	■	■	■	■	■	■	■	■	823
100,000							■	■	■	■	■	■	■	■	■	104
120,000							■	■	■	■	■	■	■	■	■	124
150,000							■	■	■	■	■	■	■	■	■	154
180,000							■	■	■	■	■	■	■	■	■	184
220,000							■	■	■	■	■	■	■	■		224
270,000							■	■	■	■	■	■	■	■		274
330,000							■	■	■	■	■	■	■	■	■	334
390,000							■	■	■	■	■	■	■	■		394
470,000							■	■	■	■	■	■	■	■		474
560,000							■	■		■	■	■	■	■		564
680,000							■	■		■	■	■	■	■		684
820,000							■	■		■	■	■	■	■		824
1,000,000							■	■		■	■		■	■		105
1,200,000							■	■		■	■		■	■		125
1,500,000							■	■		■	■		■	■		155
1,800,000							■	■		■	■		■			185
2,200,000							■	■		■	■		■			225
2,700,000							■	■		■	■		■			275
3,300,000							■	■		■	■		■			335
3,900,000							■	■		■	■		■			395
4,700,000							■	■		■	■		■			475

For your convenience we welcome credit card purchases

VISA MasterCard

For additional information please see our data pages in **Section 2100** (EMI Connectors), **Section 2700** (Low Pass filters).

Metuchen Capacitors, Inc.

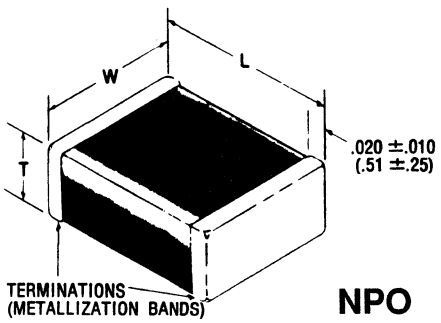
"We Offer Quick Solutions to Noise Pollution"

1-800-679-0515 • 732-679-3366 • FAX: 1-800-679-9959

METUCHEN CAPACITORS, INC. • 135 White Oak Lane • P.O. Box 499 • Old Bridge, NJ 08857

High Voltage Ceramic Chip Capacitors

MCI OFFERS A COMPLETE LINE OF LEADED & EPOXY COATED UNITS



NPO

FOR ADDITIONAL INFORMATION SEE OUR DATA PAGES IN THE CONNECTOR SECTION, VOLUME C PAGES C•1296 - C•1304, THE FERRITE SECTION, VOLUME A PAGE A•1595, AND THE FILTERS, RF SECTION VOLUME A PAGE A•1594.

Size	1515	1812	1825	2020	2225	3333	3530	4540	5550	6560
Length "L"	.150 (3.81)	.180 (4.57)	.180 (4.57)	.200 (5.08)	.220 (5.59)	.330 (8.38)	.350 (8.89)	.450 (11.4)	.550 (11.4)	.650 (16.5)
Width "W"	.150 (3.81)	.125 (3.18)	.250 (6.35)	.200 (5.08)	.250 (6.35)	.330 (8.38)	.300 (7.62)	.400 (10.2)	.500 (12.7)	.600 (15.2)
T Max	.130 (3.30)	.065 (1.65)	.070 (1.78)	.150 (3.81)	.070 (1.78)	.180 (4.57)	.180 (4.57)	.180 (4.57)	.180 (4.57)	.200 (5.08)
MB	.040 (1.02)	.020 (.508)	.020 (.508)	.040 (1.02)	.020 (.508)	.050 (1.27)	.050 (1.27)	.060 (1.52)	.060 (1.52)	.060 (1.52)
WVDC	Max Capacitance (pF) Values. 3 Digit Code									
500	332	272	822	682	103	223	223	393	638	104
1000	272	152	472	472	562	183	183	333	563	823
2000	222	122	392	392	472	123	123	223	393	563
3000	102	471	152	222	182	682	682	123	223	393
4000	561	271	102	122	102	392	392	822	123	223
5000				331	331	122	122	222	392	562
6000						681	681	122	222	332
7000						391	391	821	122	222
8000								681	821	182
9000								471		122
10000								391		102

NOTES: 1. Dimensions are in inches (mm)
2. Capacitance value in picofarads: two significant digits, followed by number of zeros. 102 = 1000 pF.

GENERAL SPECIFICATIONS:

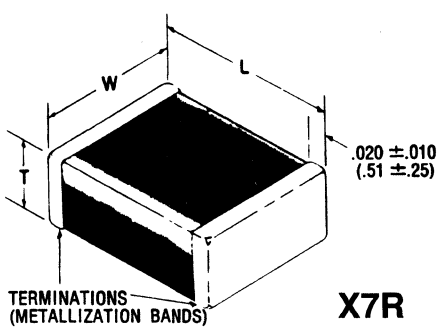
Capacitance Range: 10pF to .1mF
Dissipation Factor: .15% max.
(measured @ 25°C, @ 1.0 VRMS @ 1mHz for values through 100 pF and 1 kHz for all higher values)
Operating Temp. Range: -55°C to +125°C
Temperature Coefficient: 0 ± 30ppm/°C over Temp. Range
Dielectric Withstanding Voltage: 500V: 1.5 x Rated Voltage
1kV & over: 1.2 x Rated Voltage
Insulation Resistance: 1,000 Ohm-Farad or 100,000 megOhms min., whichever is less.
Terminations: P = Silver Palladium
N = Nickel Barrier
(available on sizes 1515 to 4540 only)

HOW TO ORDER

202 C 1825 A 122 J

VOLTAGE: (3rd digit is No.of zeros)
MFG DESIGNATION:
SIZE:
DIELECTRIC TYPE: (A = NPO; B = X7R)
CAP. IN pF: (3rd digit is No.of zeros)
CAPACITANCE TOLERANCE: (F = ± 1%; G = ±2%; J = ± 5%; K = +±10%; M = ±20%)

Other sizes and configurations are available on request.



X7R

Size	1515	1812	1825	2020	2225	3333	3530	4540	5550	6560
Length "L"	.150 (3.81)	.180 (4.57)	.180 (4.57)	.200 (5.08)	.220 (5.59)	.330 (8.38)	.350 (8.89)	.450 (11.4)	.550 (11.4)	.650 (16.5)
Width "W"	.150 (3.81)	.125 (3.18)	.250 (6.35)	.200 (5.08)	.250 (6.35)	.330 (8.38)	.300 (7.62)	.400 (10.2)	.500 (12.7)	.600 (15.2)
T Max	.130 (3.30)	.065 (1.65)	.070 (1.78)	.150 (3.81)	.070 (1.78)	.180 (4.57)	.180 (4.57)	.180 (4.57)	.180 (4.57)	.200 (5.08)
MB	.040 (1.02)	.020 (.508)	.020 (.508)	.040 (1.02)	.020 (.508)	.050 (1.27)	.050 (1.27)	.060 (1.52)	.060 (1.52)	.060 (1.52)
WVDC	Max Capacitance (pF) Values. 3 Digit Code									
500	473	273	823	104	104	334	334	564	105	125
1000	223	123	333	473	393	154	124	224	394	684
2000	392	182	562	822	682	273	273	473	823	124
3000	182	821	272	332	332	103	103	183	333	563
4000	821	471	152	182	182	682	562	123	183	333
5000				122	102	472	392	822	123	223
6000						222	222	562	682	153
7000						182	182	392	562	103
8000								272	332	822
9000								222		682
10000								182		472

NOTES: 1. Dimensions are in inches (mm)
2. Capacitance value in picofarads: two significant digits, followed by number of zeros. 102 = 1000 pF.

GENERAL SPECIFICATIONS:

Capacitance Range: 10pF to 1.2mF
Dissipation Factor: 2.5% max.
(measured @ 25°C, @ 1kHz @ 1.0 VRMS)
Operating Temp. Range: -55°C to +125°C
Temperature Coefficient: ± 15% from -55°C to +125°C
Dielectric Withstanding Voltage: 500V: 1.5 x Rated Voltage
1kV & over: 1.2 x Rated Voltage
Insulation Resistance: 1,000 Ohm-Farad or 100,000 megOhms min., whichever is less.
Terminations: P = Silver Palladium
N = Nickel Barrier
(available on sizes 1515 to 4540 only)

For your convenience we welcome credit card purchases

For additional information please see our data pages in **Section 2100** (EMI Connectors), **Section 2700** (Low Pass filters).

Metuchen Capacitors, Inc.

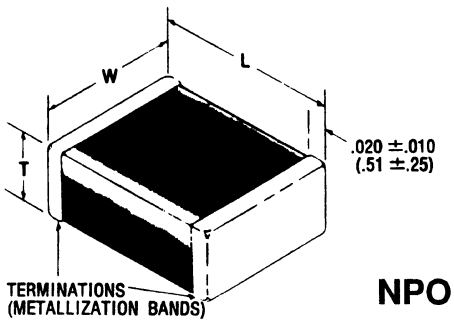
"We Offer Quick Solutions to Noise Pollution"

1-800-679-0515 • 732-679-3366 • FAX: 1-800-679-9959

METUCHEN CAPACITORS, INC. • 135 White Oak Lane • P.O. Box 499 • Old Bridge, NJ 08857

High Voltage Ceramic Chip Capacitors

MEET OR EXCEED FCC PART 68 1000 VAC SURGE



NPO

MCI offers chip capacitors in four sizes specially designed to meet the FCC Part 68 1000 VAC surge voltage test. Units are available with standard solderable terminations of nickel barrier or silver-palladium.

Size	AC1005	AC1206	AC1505	AC1808
Length "L"	.100 (2.54)	.125 (3.18)	.150 (3.81)	.180 (4.57)
Width "W"	.050 (1.27)	.060 (1.52)	.050 (1.27)	.080 (2.03)
T Max	.050 (1.27)	.060 (1.52)	.050 (1.27)	
MB	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)
Volts AC Rating	1000	1000	1000	1000
pf 0.5 10				
56 220				
270 330				
390 470				
560 1000				
1200 1800				
2200 2700				
3300 3900				

NOTES: Dimensions are in inches; bracketed dimensions are in millimeters.
Tolerances are ± .005" (0.12 mm)

GENERAL SPECIFICATIONS:

Capacitance Range: .5pF to 1200pF
Dissipation Factor: .1% max.
(measured @ 25°C, @ 1.0 VRMS @ 1mHz for values through 100 pF and 1 kHz for all higher values)
Operating Temp. Range: -55°C to +125°C
Temperature Coefficient: 0 ± 30ppm/°C over Temp. Range
Dielectric Withstanding Voltage: 1kV & over: 1.2 x Rated Voltage
Insulation Resistance: 1,000 Ohm-Farad or 100,000 megOhms min., whichever is less.
Terminations: N = Nickel Barrier; P = Silver Palladium

HOW TO ORDER

102AC 1206 A 101 K N

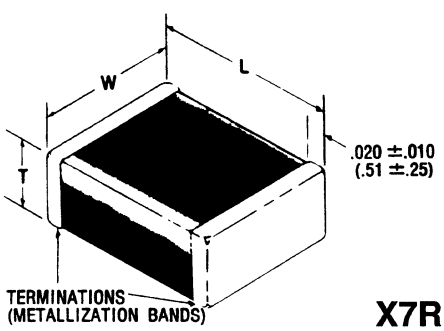
FCC PART 68 1000 VAC

DIELECTRIC TYPE:
(A = NPO; B = X7R)

CAPACITANCE IN pF:
(3rd digit is No.of zeros

CAPACITANCE TOLERANCE:
(J = ± 5%; K = ±10%; M = ± 20%;
Z = +80% -20%; P = +100% -0%)

TERMINATION S:



X7R

MCI offers chip capacitors in four sizes specially designed to meet the FCC Part 68 1000 VAC surge voltage test. Units are available with standard solderable terminations of nickel barrier or silver-palladium.

Size	AC1005	AC1206	AC1505	AC1808
Length "L"	.100 (2.54)	.125 (3.18)	.150 (3.81)	.180 (4.57)
Width "W"	.050 (1.27)	.060 (1.52)	.050 (1.27)	.080 (2.03)
T Max	.050 (1.27)	.060 (1.52)	.050 (1.27)	
MB	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)
Volts AC Rating	1000	1000	1000	1000
pf 0.5 10				
56 220				
270 330				
390 470				
560 1000				
1200 1800				
2200 2700				
3300 3900				

NOTES: Dimensions are in inches; bracketed dimensions are in millimeters.
Tolerances are ± .005" (0.12 mm)

GENERAL SPECIFICATIONS:

Capacitance Range: .5pF to 3300pF
Dissipation Factor: 2.5% max.
(measured @ 25°C, @ 1.0 VRMS @ 1mHz for values through 100 pF and 1 kHz for all higher values)
Operating Temp. Range: -55°C to +125°C
Temperature Coefficient: ±15% over Temp. Range
Dielectric Withstanding Voltage: 1kV & over: 1.2 x Rated Voltage
Insulation Resistance: 1,000 Ohm-Farad or 100,000 megOhms min., whichever is less.
Terminations: N = Nickel Barrier; P = Silver Palladium

For your convenience we welcome credit card purchases

VISA MasterCard

For additional information please see our data pages in **Section 2100** (EMI Connectors), **Section 2700** (Low Pass filters).

Metuchen Capacitors, Inc.

"We Offer Quick Solutions to Noise Pollution"

Chip Capacitors for Ultra High Q RF/Microwave Applications

1-800-679-0515 • 732-679-3366 • FAX: 1-800-679-9959

METUCHEN CAPACITORS, INC. • 135 White Oak Lane • P.O. Box 499 • Old Bridge, NJ 08857

MECHANICAL CONFIGURATIONS

MCI SERIES	Case Size & Type	MCI Term. Code	QPL MIL-C-11272C	QPL MIL-C-55681	Outlines	Body Dimensions Length	Width	Thickness	Lead & Termination Dimensions & Materials
200	A Solder Plate	W	—	CDR12BG	W/T is a Termination Surface	.055 ±.015 (1.4±.38)		.057 (1.45) max.	For low cost, high volume, tape & reel applications. Nickel barrier, solder plated
800	A Solder Plate	W	—	CDR12BP	W/T is a Termination Surface	.055 ±.015 (1.4±.38)		.057 (1.45) max.	For low cost, high volume, tape & reel applications. Nickel barrier, solder plated
200	B Solder Plate	W	—	CDR14BG	W/T is a Termination Surface	.110±.020 (2.79±.51)		.102 (2.6) max.	For low cost, high volume, tape & reel applications. Nickel barrier, solder plated
800	B Solder Plate	W	—	CDR14BP	W/T is a Termination Surface	.110±.020 (2.79±.51)		.102 (2.6) max.	For low cost, high volume, tape & reel applications. Nickel barrier, solder plated
275	B Solder Plate	W	—	—	W/T is a Termination Surface	.110±.020 (2.79±.51)		.102 (2.6) max.	For low cost, high volume, tape & reel applications. Nickel barrier, solder plated
200	A Pellet	P	CY82	CDR12BG	W/T is a Termination Surface	.055 ±.025 (1.4±.64)	.055 ±.015 (1.4±.38)	.057 (1.45) max.	Pellets are solder-coated chips with nickel barrier over the termination. Solder melting temperature is 372°F, 179°C.
800	A Pellet	P	—	CDR12BP	W/T is a Termination Surface	.055 ±.025 (1.4±.64)	.055 ±.015 (1.4±.38)	.057 (1.45) max.	Pellets are solder-coated chips with nickel barrier over the termination. Solder melting temperature is 372°F, 179°C.
200	B Pellet	P	CY84	CDR14BG	W/T is a Termination Surface	.110 +.035 -.020 (2.79 +.89 -.51)	.110 ±.020 (2.79 ±.51)	.102 (2.6) max.	Pellets are solder-coated chips with nickel barrier over the termination. Solder melting temperature is 372°F, 179°C.
800	B Pellet	P	—	CDR14BP	W/T is a Termination Surface	.110 +.035 -.020 (2.79 +.89 -.51)	.110 ±.020 (2.79 ±.51)	.102 (2.6) max.	Pellets are solder-coated chips with nickel barrier over the termination. Solder melting temperature is 372°F, 179°C.
275	B Pellet	P	—	—	W/T is a Termination Surface	.110 +.035 -.020 (2.79 +.89 -.51)	.110 ±.020 (2.79 ±.51)	.102 (2.6) max.	Pellets are solder-coated chips with nickel barrier over the termination. Solder melting temperature is 372°F, 179°C.
200	A Chip	C	CY81**	CDR11BG	W/T is a Termination Surface	.055 ±.015 (1.4±.38)		.057 (1.45) max.	PALLADIUM SILVER TERMINATIONS
800	A Chip	C	—	CDR11BP	W/T is a Termination Surface	.055 ±.015 (1.4±.38)		.057 (1.45) max.	PALLADIUM SILVER TERMINATIONS
200	B Chip	C	CY83**	CDR13BG	W/T is a Termination Surface	.110±.020 (2.79±.51)		.102 (2.6) max.	PALLADIUM SILVER TERMINATIONS
800	B Chip	C	—	CDR13BP	W/T is a Termination Surface	.110±.020 (2.79±.51)		.102 (2.6) max.	PALLADIUM SILVER TERMINATIONS
275	B Chip	C	—	—	W/T is a Termination Surface	.110±.020 (2.79±.51)		.102 (2.6) max.	PALLADIUM SILVER TERMINATIONS
200	A Chip	CA	CY81**	CDR11BG	W/T is a Termination Surface	.055 ±.015 (1.4±.38)		.057 (1.45) max.	GOLD OVER NICKEL OVER SILVER (CA)
800	A Chip	CA	—	CDR11BP	W/T is a Termination Surface	.055 ±.015 (1.4±.38)		.057 (1.45) max.	GOLD OVER NICKEL OVER SILVER (CA)
200	B Chip	*CA	CY83**	CDR13BG	W/T is a Termination Surface	.110±.020 (2.79±.51)		.102 (2.6) max.	GOLD OVER NICKEL OVER SILVER (CA)
800	B Chip	*CA	—	CDR13BP	W/T is a Termination Surface	.110±.020 (2.79±.51)		.102 (2.6) max.	GOLD OVER NICKEL OVER SILVER (CA)
275	B Chip	*CA	—	—	W/T is a Termination Surface	.110±.020 (2.79±.51)		.102 (2.6) max.	GOLD OVER NICKEL OVER SILVER (CA)
									Length / Width / Thickness
200	B Microstrip	MS	CY85	CDR21BG		.120 (3.05) min. .150 (3.81) max.	.100 ±.015 (2.79 ±.38)	.100 (2.54) max.	.250 (6.35) min. / .093 ±.005 (2.36 ±.13) / .004 ±.001 (.102 ±.025)
800	B Microstrip	MS	—	CDR21BP		.120 (3.05) min. .150 (3.81) max.	.100 ±.015 (2.79 ±.38)	.100 (2.54) max.	.250 (6.35) min. / .093 ±.005 (2.36 ±.13) / .004 ±.001 (.102 ±.025)
275	B Microstrip	MS	—	—		.120 (3.05) min. .150 (3.81) max.	.100 ±.015 (2.79 ±.38)	.100 (2.54) max.	.250 (6.35) min. / .093 ±.005 (2.36 ±.13) / .004 ±.001 (.102 ±.025)
200	B Axial Ribbon	AR	CY86	CDR22BG					
800	B Axial Ribbon	AR	—	CDR22BP					
200	B Radial Ribbon	RR	CY88	CDR24BG					
800	B Radial Ribbon	RR	—	CDR24BP					
200	B Radial Wire	RW	CY87	CDR23BG		.120 (3.05) min. .165 (4.19) max.	.100 ±.015 (2.79 ±.38)	.100 (2.54) max.	.500 (12.7) min. / #26 AWG., .016 (.375) dia. nominal
800	B Radial Wire	RW	—	CDR23BP		.120 (3.05) min. .165 (4.19) max.	.100 ±.015 (2.79 ±.38)	.100 (2.54) max.	.500 (12.7) min. / #26 AWG., .016 (.375) dia. nominal
200	B Axial Wire	AW	CY89	CDR25BG					
800	B Axial Wire	AW	—	CDR25BP					

HOW TO ORDER

MCI 200 B 91 0 J P 500 X

- **SERIES:** MCI 200
- **CASE SIZE:** B
- **CAPACITANCE CODE:** 91 — First 2 significant digits for capacity. R = Decimal Point
- **Indicates number of zeros following digits of capacitance in picofarads:** 0
- **CAPACITANCE TOLERANCE:** J
- **TERMINATION CODE:** P
- **WVDC:** 500
- **LASER MARKING:** X

*CA Termination includes Nickel Barrier.

**CY81 and CY83 are Palladium Silver terminated Chips per MIL-C-11272 requirements. MIL-C-11272 IS FOR REFERENCE ONLY! ADDITIONAL LEAD STYLES AVAILABLE. CONSULT FACTORY. Radial wire and axial wire are silver plated copper. All other leads are high purity silver and are attached with high temperature solder.

ALL DIMENSIONS ARE IN INCHES EXCEPT THOSE IN PARENTHESES WHICH ARE IN MILLIMETERS.

TAPE AND REEL PACKAGING for automated surface mounting available upon request. W Termination is Recommended.

For your convenience we welcome credit card purchases

VISA MasterCard

For additional information please see our data pages in **Section 2100** (EMI Connectors), **Section 2700** (Low Pass filters).

Metuchen Capacitors, Inc.

"We Offer Quick Solutions to Noise Pollution"

Resin Sealed Bolt-In Filters

1-800-679-0515 • 732-679-3366 • FAX: 1-800-679-9959

METUCHEN CAPACITORS, INC. • 135 White Oak Lane • P.O. Box 499 • Old Bridge, NJ 08857

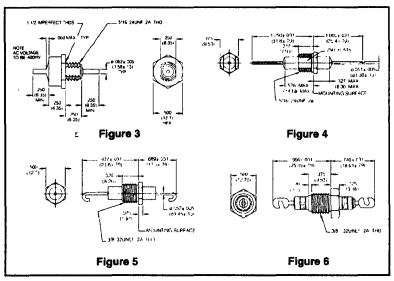


Figure 3 Figure 4 Figure 5 Figure 6

HIGH CURRENT HIGH VOLTAGE FEED-THRU

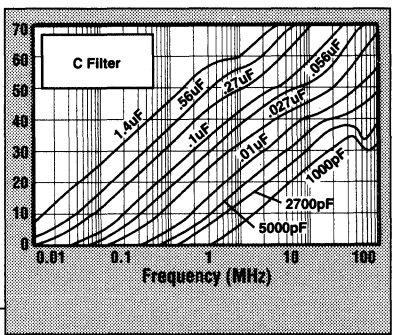
Part Number	Fig. #	Rated Voltage 125°C DC	Rated Voltage 125°C AC	I Amp	CKT	Min. Cap.	Minimum Insertion Loss (dB) 1 MHz	3 MHz	10 MHz	30 MHz	100 MHz	300 MHz	1 GHz	10 GHz
54-844-001**	3	600	240	25	C	4700 pF+\-20%	—	—	12	20	30	33	50	50
54-763-008*	4	750		25	C	1000 pF	—	—	—	10	20	28	28	28
54-763-009*	4	750		25	C	5000 pF	—	—	10	22	32	35	35	40
54-789-003*	5	1250		25	C	4000 pF	—	—	6	20	30	35	35	35
1280-060	6	2000		25	Pi	1500 pF	—	—	5	15	50	50	50	50

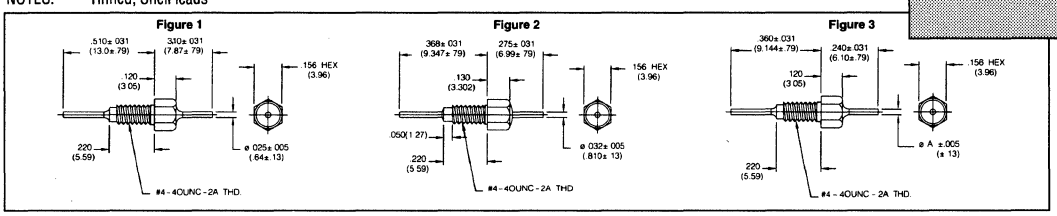
NOTES: * Denotes parts that are UL recognized to UL 1459 & certified to CSA C22.2
** Denotes parts that meet 1500 VAC Dielectric Withstanding Voltage per UL 1283 & CSA C22.2

4-40 C CIRCUIT

Part Number	Fig. #	Rated Voltage 125°C DC	Rated Voltage 125°C AC	I Amp	Min. Cap.	A In	A (mm)	Minimum Insertion Loss (dB) 1 MHz	3 MHz	10 MHz	30 MHz	100 MHz	300 MHz	1 GHz	10 GHz
MCI-9110-100	3	50		10	10 pF	0.32	(0.81)	—	—	—	—	—	—	10	10
9900-381-6004	2	50		10	5000 pF	—	—	—	—	15	22	30	35	45	55
9900-381-6026	2	50		10	0.031 µF	—	—	12	20	25	35	40	45	55	60
54-790-023**	1	50		10	0.056 µF	—	—	15	24	34	41	45	50	60	60
54790001X5F101M	1	100		10	100 pF+\-20%	—	—	—	—	—	—	—	10	20	25
54-790-020	1	100		10	5600 pF	—	—	—	—	15	24	33	37	40	40
MCI-9112-503*	3	100		3	0.05 µF	0.016	(0.41)*	15	24	35	41	45	50	60	60
54-790-018**	1	300		10	1000 pF	—	—	—	—	—	9	20	28	28	28

NOTES: * Tinned, Shell leads

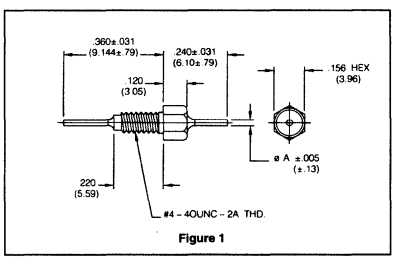




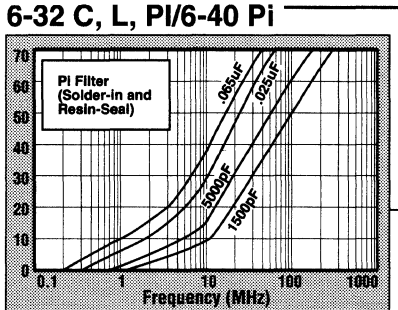
4-40 L & Pi CIRCUIT

Part Number	Fig. #	Rated Voltage 125°C DC	Rated Voltage 125°C AC	I Amp	CKT	Min. Cap.	A In	A (mm)	Minimum Insertion Loss (dB) 1 MHz	3 MHz	10 MHz	30 MHz	100 MHz	300 MHz	1 GHz	10 GHz
51-729-305	1	50		3	Pi	5500 pF	0.018	(0.46)	—	7	14	40	60	70	70	70
51-729-312	1	50		3	Pi	7000 pF	0.018	(0.46)	—	8	15	40	65	70	70	70
51-729-304	1	100		3	LB	0.022 µF	0.018	(0.46)	7	17	27	34	43	47	55	55
51-729-303	1	200		3	Pi	1500 pF	0.018	(0.46)	—	—	5	15	42	65	70	70

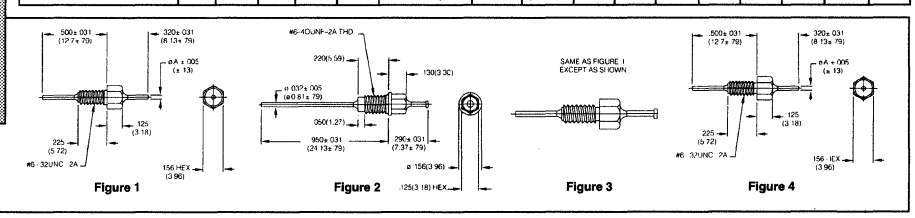
NOTES: * Tinned, Shell leads



6-32 C, L, PI/6-40 Pi



Part Number	Fig. #	Rated Voltage 125°C DC	Rated Voltage 125°C AC	I Amp	CKT	Min. Cap.	A In	A (mm)	Minimum Insertion Loss (dB) 1 MHz	3 MHz	10 MHz	30 MHz	100 MHz	300 MHz	1 GHz	10 GHz
54779001X5F100M	4	100		10	C	10 pF+\-20%	0.032	(0.81)	—	—	—	—	—	—	10	10
54779001X5U102P	4	100		10	C	1000 pF	0.032	(0.81)	—	—	—	10	21	28	28	28
51-726-002	3	100		10	LB	0.022 µF	0.032	(0.81)	7	17	27	34	43	50	60	60



For your convenience we welcome credit card purchases

VISA MasterCard

For additional information please see our data pages in **Section 2100** (EMI Connectors), **Section 2700** (Low Pass filters)

Metuchen Capacitors, Inc.

"We Offer Quick Solutions to Noise Pollution"

Ceramic Chip Capacitors for Surface Mounted Technology

1-800-679-0515 • 732-679-3366 • FAX: 1-800-679-9959

METUCHEN CAPACITORS, INC. • 135 White Oak Lane • P.O. Box 499 • Old Bridge, NJ 08857

Temperature Compensating Ceramic Chips

NEW

CHIP PACKAGING INFORMATION — CERAMIC

CoPS (Component Pacement System) Reeling

MCI is offering CoPS (Component Placement System), Multilayer Ceramic Chip Capacitors in carrier tape form for automatic placement on printed circuit boards. They are available in eight sizes.

MCI CoPS capacitors conform to the Electronic Industries Association specification RS-481A for Automated Component Processing and insertion.

Figure 1

MCI CoPS Capacitors are wound on a standard 178.0 mm (7.00") or 330.0 mm (13.0") diameter 8 mm reel. Seven-inch diameter reels contain 4,000 chips and for 13.0" diameter reels, 12,500 chips.

Figure 2

Figure 2 shows carrier leader and ending amounts of MCI Multilayer Ceramic Chips on CoPS reels.

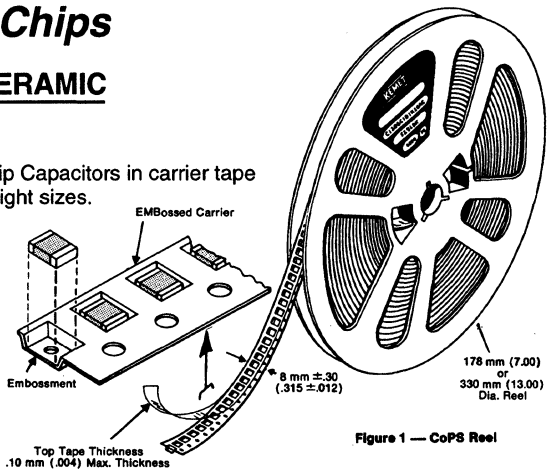


Figure 1 — CoPS Reel

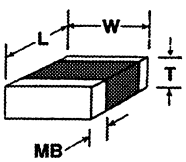
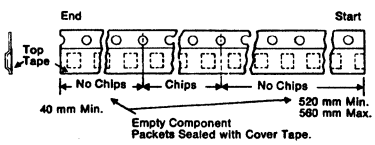


Figure 2 — CoPS Carrier Chips



DIMENSIONS

MCI stocks the following chip sizes and values on reel for immediate shipping. Additional sizes and values will be made available on reels — Consult MCI for delivery.

SIZE	0402	0603	0805	1206	1210	1812	1825	2225
Length L	.040(1.02)	.060(1.52)	.080(2.03)	.125(3.18)	.125(3.18)	.180(4.57)	.180(4.57)	.220(5.59)
Width W	.020(.508)	.030(.760)	.050(1.27)	.060(1.52)	.100(2.54)	.125(3.18)	.250(6.35)	.250(6.35)
T Max	.024(.610)	.030(.760)	.055(1.40)	.060(1.52)	.065(1.65)	.065(1.65)	.080(2.03)	.080(2.03)
MB	.010(.254)	.014(.355)	.020(.508)	.020(.508)	.020(.508)	.024(.610)	.024(.610)	.030(.760)

COMMERCIAL STANDARD REELING DESCRIPTION

Tape and Reeling in Accordance with EIA 481-1 — Minimum Shipping Quantity: 1 Full Reel

Ceramic Chip Case Size/ All Dielectrics	Tape Type	Tape Width	Qty. per 7"	Qty. Per 13" Reel (2)
0402	Punched Paper	8 mm	4,000	50,000
0603	Punched Paper	8 mm	4,000	10,000
0805, 1005, 1206, 1210	Embossed Plastic	8 mm	4,000	10,000
1805, 1808	Embossed Plastic	12 mm	2,500	10,000
1812, 1825, 2220, 2225	Embossed Plastic	12 mm	1,100	4,000

HOW TO ORDER

SIZE CODE: MC 0805 C 102 J 500 N T

DIELECTRIC:
C = NPO X = X7R Z=Z5U
P = N150 R = N220 S = N330
T = N470 U = N750

CAPACITANCE:
Value in picofarads: Two significant figures followed by number of zeros. 102 = 1000pf

CAPACITANCE TOLERANCE: (1)
B = ±0.10pF J = ±5.0%
C = ±0.25pF K = ±10%
D = ±0.50pF M = ±20%
F = ±1.0% Z = ±80% - 20%
G = ±2.0%

VOLTAGE:
500 = 50

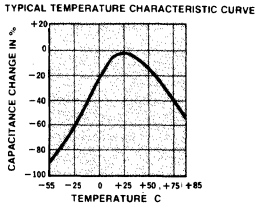
TERMINATION:
N = Nickel barrier, 90% tin, 10% lead overcoat

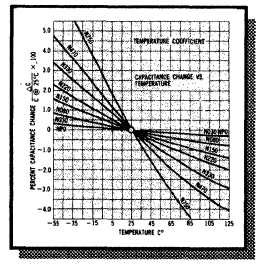
PACKING CODE:
B = Bulk T = Reeled

(1) Tolerance Closer than 5% not available in X7R
Tolerance Closer than 20% not available in Z5U

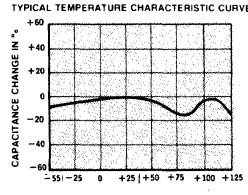
TYPICAL TEMPERATURE CHARACTERISTIC CURVES

Z5U

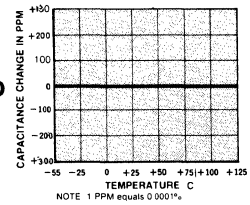




X7R



NPO



NOTE 1 PPM equals 0.001%

TEMPERATURE COEFFICIENTS AVAILABLE

Size	NPO (50V)	X7R (50V)	Z5U (50V)	N150, N220, (50V) N330, N470, N750	N150, N220, (100V) N330, N470, N750
MC0402	0.5pF - 180pF	100pF - 3,300pF	1,000pF - .010µF	.5pF - 150pF	.5pF- 100pF
MC0603	0.1pF - 680pF	100pF - .022µF	4,700pF - .047µF	.5pF - 680pF	.5pF - 390pF
MC0805	1.0pF - 2,700pF	100pF - .082µF	.010pF - .150µF	.5pF - 1,800pF	.5pF - 1,200pF
MC1206	1.0pF - .01µF	1,000pF - .18µF	2,700pF - .47µF	.5pF - 3,300pF	.5pF - 2,200pF
MC1210	1,000pF - .018µF	1,000pF - .47µF	.010µF - 1.0µF	2,200pF - 7,500pF	
MC1812	470pF - .039µF	1,000pF - .82µF	.0180µF - 1.5µF		
MC1825	120pF - .082µF	1,800pF- 1.5µF	.027µF - 4.7µF		
MC2225	330pF - 0.1µF	5,600pF - 1.8µF	.027µF - 5.6µF		

All Capacitors listed are rated at 50VDC

For your convenience we welcome credit card purchases

VISA MasterCard

For additional information please see our data pages in **Section 2100** (EMI Connectors), **Section 2700** (Low Pass filters).

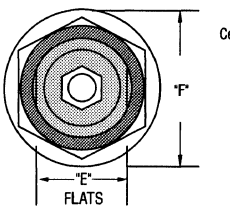
Your most reliable source for...

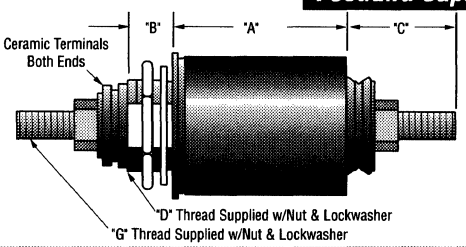
EMI/RFI Feed-Through Filter Capacitors

MTK ELECTRONICS, INC.

BULKHEAD
Feedthru Capacitors

Call About CUSTOM DESIGNS

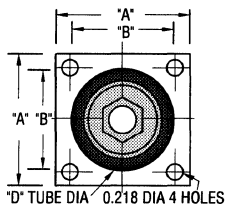


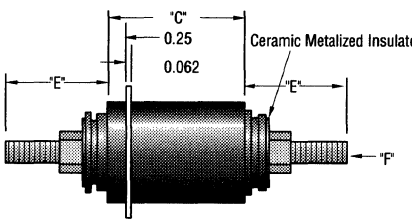


FEED-THROUGH CAPACITORS

1. Rating: 400 VDC / 125 VAC
2. Capacitance:1.0 Micro-Farad ±10% (other values available)
3. Temperature Range: -55°C to ÷85°C

Part Number	Amps	"A"	"B"	"C"	"D"	"E"	"F"	"G"
MTK1.0TH400D30	30	1.75	0.38	0.63	1/2-28	0.45	1.25	10-32
MTK1.0TH400D60	60	1.75	0.50	0.88	3/4-20	0.656	1.25	1/4-20
MTK1.0TH400D100	100	2.00	0.56	1.25	1 1/8-18	1.062	1.75	3/8-16
MTK1.0TH400D200	200	2.00	0.56	1.25	1 1/8-18	1.062	1.75	3/8-16
MTK1.0TH400D300	300	2.00	0.56	1.50	1 1/8-18	1.062	1.75	1/2-13

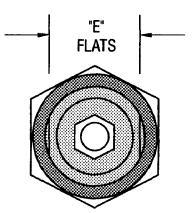


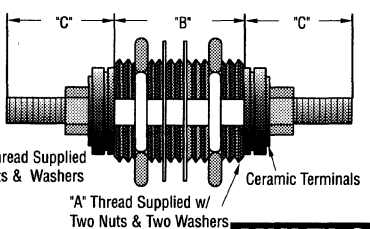


FEED-THROUGH CAPACITORS

1. Rated: 200 VDC 1.0 Micro-Farad ± 10% (other values available)
2. Temperature Range: -55°C to + 85°C
3. Insulation Resistance: 500 Megohms Min. at 100 VDC

Part Number	Amps	"A"	"B"	"C"	"D"	"E"	"F"
MTK1.0FT200D30	30	1.50	1.00	1.50	1.00	0.75	10-32
MTK1.0FT200D60	60	1.50	1.00	1.50	1.00	1.00	1/4-20
MTK1.0FT200D100	100	1.75	1.25	1.75	1.25	1.25	3/8-16
MTK1.0FT200D200	200	1.75	1.25	1.75	1.25	1.25	3/8-16
MTK1.0FT200D300	300	1.75	1.25	2.00	1.25	1.50	1/2-13
MTK1.0FT200D400	400	2.00	1.50	2.00	1.50	2.00	5/8-18
MTK1.0FT200D500	500	2.25	1.75	2.00	1.75	2.25	3/4-10





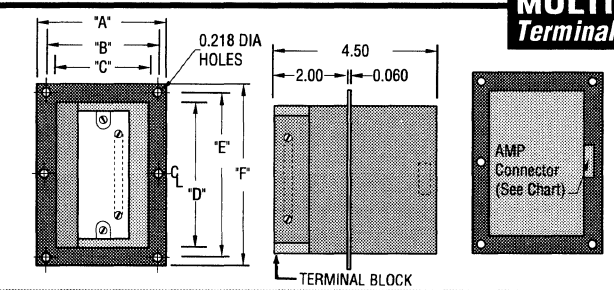
FEED-THROUGH CAPACITORS

1. Capacitance: 0.22 Micro-Farads GMV (other values available)
2. Voltage Rating: 300 VDC / 125 VAC
3. Current Rating: 30-200 AMPS

Part Number	Amps	"A"	"B"	"C"	"D"	"E"
MTK0.22TB300D30	30	5/8-24	1.00	0.75	10-32	0.570
MTK0.22TB300D60	60	3/4-20	1.00	0.75	1/4-20	0.656
MTK0.22TB300D100	100	1 1/8-18	1.12	0.88	5/16-24	1.062
MTK0.22TB300D200	200	1 1/8-18	1.38	1.25	3/8-16	1.062

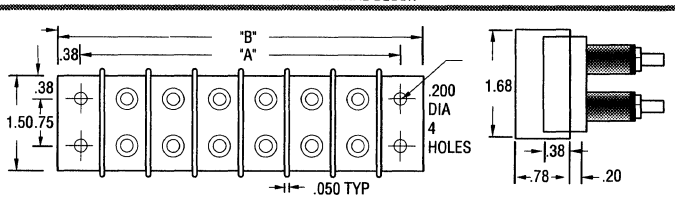
MULTI-CIRCUIT CONFIGURATIONS:
Terminal Block & Enclosed Assemblies

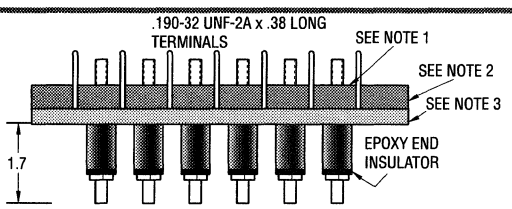
Call About CUSTOM ASSEMBLIES



1. Rating: 400 VDC / 125 VAC
2. Capacitance: 1.0 Micro-Farad Per Circuit (other values available)
3. 25 Amperes Per Circuit

Part Number	Number/ Circuits	Marathon Block No.	AMP Connector	"A"	"B"	"C"	"D"	"E"	"F"
MTK1.0FA400D-2	2	1102	770024-1	3.25	2.75	2.25	2.25	2.75	3.25
MTK1.0FA400D-4	4	1104	770026-1	3.25	2.75	2.25	3.00	3.50	4.00
MTK1.0FA400D-6	6	1106	770027-1	3.25	2.75	2.25	4.00	4.50	5.00
MTK1.0FA400D-8	8	1108	2 x 770026-1	3.25	2.75	2.25	6.00	6.50	7.00
MTK1.0FA400D-12	12	1112	770029-1	3.50	3.00	2.50	8.00	8.50	9.00





1. Lug Mounting Surface: 0.350 Dia.
2. Insulator Block Material: G.E. Valox 310 Black
3. Bottom Wrap Around Plate Material: 0.050
4. Capacitance: 1.0 MFD ± 20%
5. Rating: 50 Amps 300 VDC / 125 VAC
6. Max Torque: 25 Inch Pounds
7. Temperature Range: -55°C to + 85°C

Part Number	"A"	"B"
M1907-2	1.50	2.25
M1907-4	2.25	3.00
M1907-6	3.00	3.75
M1907-8	3.75	4.50
M1907-10	4.50	5.25
M1907-12	5.25	6.00

Competitive Pricing - Call or Fax for an Accurate Quote!

TELECOMMUNICATIONS • COMMERCIAL MEDICAL & MILITARY REQUIREMENTS

Current Ratings from MA to 100's of Amps
Voltage Ratings from MV to 480 VAC
Hermetic Potted & Molded Assemblies
Film & Non-Film Dielectrics

MTK also manufactures a full line of Standard & Custom EMI/RFI Filters in Discrete & Multi-Circuit Configurations.

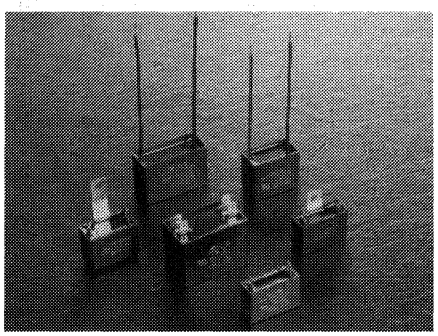
1-800-360-1407

Tel: (516) 567-4666 • Fax: (516) 567-4654

1696 Church Street · Holbrook, NY 11741

THESE CAPACITORS FEATURE METALIZED FILM DIELECTRICS WHICH ARE SMALLER AND LIGHTER THAN FILM AND FOIL VERSIONS. METALIZED FILM CAPACITORS ALSO FEATURE SELF-HEALING PROPERTIES WHICH PREVENT MOMENTARY VOLTAGE SURGES FROM CAUSING PERMANENT CAPACITOR BREAKDOWN.

TYPE AD METALLIZED POLYESTER / METALLIZED POLYPROPYLENE CAPACITORS



• Motor Run •
• Fans •
• Lighting •
• Power Supplies •
• Appliances •
• Pumps •
• Tools •

motor CAPACITORS
A CAPACITOR INDUSTRIES COMPANY

Motor Capacitors, Inc. was founded in 1990 to service the capacitor requirements of the electric motor industry. We offer our customers access to specialty and standard capacitor products manufactured in Taiwan, Korea, Japan ,Italy and Britain.

General Description

Dielectric: Metallized Polypropylene (AD-P) or Metalized Polyester (AD-M) Film. Metalized Film is self-healing in the event of a momentary over-voltage.

Winding: Non-inductive using a zinc alloy spray to contact the edges of the metalized film.

Enclosure: Molded rectangular case of black polyester-glass which is flame retardant per UL94V-0. The integral mounting ear allows mounting of the capacitor to the chassis by a single screw.

Encapsulant: The epoxy compound used to fill the enclosure and protect the capacitor is flame retardant per UL94V-0.

Marking: Each unit is stamped with the Capacitance, Tolerance, Voltage Rating and Series Code.

Terminals: .187 or .250. Brass Terminals may be selected from several style combinations. Solderable Lugs and UL 1015 Stranded Wire Leads are also available.

Electrical Characteristics

	AD-M	AD-P
Capacitance: Values are available in 5% and 10% tolerances when measured at 1000 Hz. (25°C).	0.5-20µF.	0.5-16µF.
Voltage: The standard available operating AC Voltages	250,330,370,440,500	250,330,370,440
Temperature: Unit will operate continuously over this temperature range without derating.	-25 to +60°C	-26 to +85°C
Dissipation Factor: Max. percentage when measured at 60 Hz and 25°C.	less than 0.35%	less than 0.10%
Insulation Resistance: Min. measurement at 135 VDC (25°C)		
Across the terminals.	1,000 MOhm X µF	1,000 MOhm X µF
Terminal to Case.	2,000 MOhm	2,000 MOhm

Test Specifications

Dielectric Strength: Capacitors shall withstand 175% of the rated AC voltage for a period of 60 seconds.

Case Test: Terminal to case shall withstand 200% of the rated AC voltage plus 1500 VAC for a period of 60 seconds.

Humidity Resistance: Units shall exceed the requirements of MIL-Std-202, Method 106.

Life Test: After 1000 hours at the maximum rated temperature with 120% of the rated voltage applied between the terminals:

	AD-M	AD-P
Max. Capacitance Shift:	+/-7.0%	+/-4.0%
Max. Dissipation Factor:	0.45%	0.10%
Min. Insulation Res.:	100 Mohm X µF	100 Mohm X µF

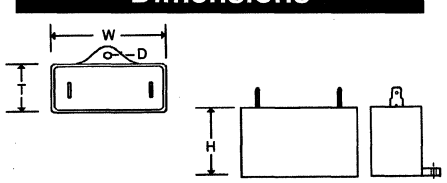
Case Size Required for a Given Capacitor

µF	250 VAC ADM	250 VAC ADP	330 VAC ADM	330 VAC ADP	370 VAC ADM	370 VAC ADP	440 VAC ADM	440 VAC ADP	500 VAC ADM	500 VAC ADP
0.5	A	A	A	E	A	E	C	E	E	J
1.0	A	A	A	E	A	E	E	J	G	
1.5	A	A	C	E	C	J	J	J	J	
2.0	A	A	E	J	C	J	J	L	J	
2.5	A	E	E	J	J	J	J	N	L	
3.0	E	E	J	J	J	J	J	N	L	
4.0	E	E	J	L	J	L	L	P		
5.0	J	L	L	N	L	N	N	R		
6.0	J	N	L	N	L	N	P			
7.0	J	N	N	P	N	P	R			
7.5	J	N	N	P	N	P	R			
8.0	J	P	N	R	N	R				
10.0	L	P	R	R	R	R				
12.0	N	R	CONSULT FACTORY							
12.5	N	R								
15.0	P	R								
17.5	P									
20.0	R									
25.0	R									

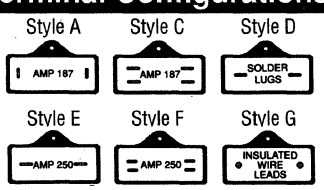
Case Size Required for a Given Capacitor

Case	Width (W) In.	Width (W) mm	Thickness (T) In.	Thickness (T) mm	Height (H) In.	Height (H) mm	Hole Dia (D) In.	Hole Dia (D) mm
A	1.28	32.5	0.51	13.0	0.87	22.0	.170	4.3
C	1.28	32.5	0.55	14.0	1.00	25.5	.170	4.3
D	1.46	37.0	0.51	13.0	0.94	24.0	.170	4.3
E	1.48	37.5	0.61	15.5	1.04	26.5	.170	4.3
G	1.52	38.5	0.61	15.5	1.18	30.0	.170	4.3
J	1.56	39.5	0.77	19.5	1.14	29.0	.170	4.3
L	1.54	39.0	0.87	22.0	1.30	33.0	.170	4.3
N	1.97	50.0	0.81	20.5	1.20	30.5	.170	4.3
P	2.05	52.0	0.89	22.5	1.40	35.5	.170	4.3
R	2.01	51.0	1.18	30.0	1.57	40.0	.170	4.3

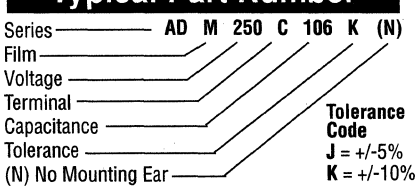
Dimensions



Terminal Configurations



Typical Part Number



Motor Capacitors, Inc. • 6455 N. Avondale Ave., Chicago, IL 60631 • Phone: 773-774-6666 • Fax: 773-774-6690
Toll-Free Phone: 1-888-227-2248 • E-Mail: info@capacitorindustries.com • Web address: www.capacitorindustries.com

THESE CAPACITORS FEATURE METALIZED FILM DIELECTRICS WHICH ARE SMALLER AND LIGHTER THAN FILM AND FOIL VERSIONS. METALIZED FILM CAPACITORS ALSO FEATURE SELF-HEALING PROPERTIES WHICH PREVENT MOMENTARY VOLTAGE SURGES FROM CAUSING PERMANENT CAPACITOR BREAKDOWN.

TYPE BPS (ROUND) AND BPO (OVAL) CAPACITORS

General Description

Low-loss Metallixed Polypropylene Capacitors suitable for a wide variety of electrical applications including Motor-Run, HID Lighting, Ferroresonant Power Supplies, and Power Factor Correction.

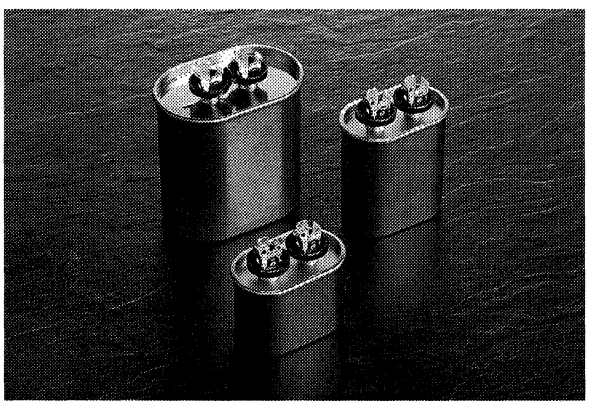
These capacitors utilize a UL approved protective device which will prevent case rupture if gasses are generated or the unit is overheated.

Type BPO and BPS capacitors are self-healing in the event of a momentary over-voltage.

Oils used are non-PCB, non-toxic, and biodegradable.

motor CAPACITORS

A CAPACITOR INDUSTRIES COMPANY



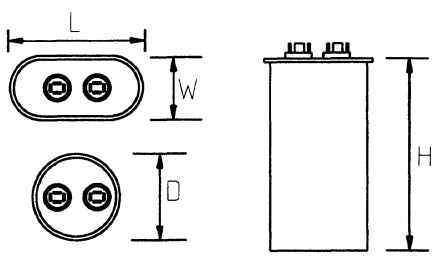
Electrical Characteristics

Capacitance:	3 µF. - 100 µF.
AC Voltage Ratings:	220,240,370,440 & 660 VAC
Temperature Rating:	-25°C to +90°C
Dissipation Factor:	0.1% maximum at 25°C and 60 Hz
Protected to 10,000 AFC	

Case Dimensions

Case	Type	L	W	D
A	Oval	2.16	1.31	
B	Oval	2.69	1.56	
C	Oval	2.91	1.91	
D	Oval	3.66	1.97	
K	Round			1.88
L	Round			2.13
M	Round			1.63

Dimensions



BPO (Oval) Mfd.	Case	Height	AC (60 Hz.) Voltage	BPS (ROUND) Mfg.	Case	Height
7.5	A	2.13	220	15	K	2.13
10	A	2.13	220	17.5	K	2.13
12.5	A	2.38	220	20	K	2.13
15	A	2.88	220	25	K	2.38
17.5	A	2.88	220	30	K	2.88
20	A	2.88	220	35	K	2.88
25	A	3.5	220	40	L	2.88
30	A	3.88	220	45	L	2.88
35	C	2.88	220	50	L	2.88
40	C	2.88	220	60	L	3.5
45	C	2.88	220	70	L	3.5
50	C	2.88	220	80	L	3.88
60	C	3.5	220	90	L	4.25
70	C	3.88	220	100	L	4.75
7.5	A	2.13	240	15	K	2.13
10	A	2.38	240	17.5	K	2.38
12.5	A	2.88	240	20	K	2.88
15	A	2.88	240	25	K	2.88
17.5	A	3.5	240	30	K	2.88
20	A	3.75	240	35	K	3.5
25	A	4.25	240	40	L	2.88
30	A	4.75	240	45	L	3.5
35	C	2.88	240	50	L	3.88
40	C	3.5	240	60	L	4.25
45	C	3.88	240	70	L	4.75
50	C	3.88	240	80	M	3.5
60	C	4.75	240	90	M	3.88
70	C	5.75	240	100	M	4.25
4	A	2.13	370	6	K	2.13
5	A	2.13	370	7.5	K	2.13
6	A	2.38	370	10	K	2.13
7.5	A	2.88	370	12.5	K	2.38
10	A	2.88	370	15	K	2.88
12.5	A	3.5	370	17.5	K	2.88
15	A	3.75	370	20	K	2.88
17.5	A	4.25	370	25	K	3.5
20	C	2.88	370	30	L	2.88
25	C	2.88	370	35	L	3.5
30	C	3.5	370	40	L	3.88
35	C	3.88	370	45	L	4.25
40	C	4.25	370	50	L	4.75
45	C	4.75	370	60	M	3.5
50	C	4.75	370	70	M	4.25
60	D	3.5	370			
4	A	2.38	440	6	K	2.13
5	A	2.88	440	7.5	K	2.38
6	A	2.88	440	10	K	2.88
7.5	A	3.5	440	12.5	K	2.88
10	A	4.25	440	15	K	3.5
12.5	A	4.75	440	17.5	K	3.88
15	C	2.88	440	20	K	4.25
17.5	C	3.5	440	25	K	4.75
20	C	3.5	440	30	L	4.25
25	C	4.25	440	35	L	4.75
30	C	4.75	440	40	M	3.88
35	D	3.5	440	45	M	4.25
40	D	3.88	440	50	M	4.75
45	D	4.25	440	60	M	5.75
50	D	4.75	440	70	M	5.75
60	D	4.75	440			

Motor Capacitors, Inc. • 6455 N. Avondale Ave., Chicago, IL 60631 • Phone: 773-774-6666 • Fax: 773-774-6690
Toll-Free Phone: 1-888-227-2248 • E-Mail: info@capacitorindustries.com • Web address: www.capacitorindustries.com

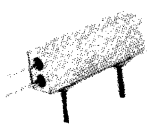
SINCE 1961, SEI HAS BEEN MANUFACTURING PREMIUM QUALITY CAPACITORS FOR:
DC Filtering • Computing • Bypass • Feed-Thru • Timing

THESE PRODUCTS ARE USED EXTENSIVELY IN THE FOLLOWING INDUSTRIES:
Avionics • Military • Aerospace • Scientific Apparatus • Power Supplies • Automotive

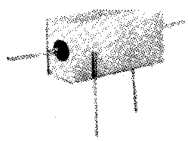
Custom Configurations

AVAILABLE IN ADDITION TO OUR STANDARD PACKAGES

14 Pin Dip Package



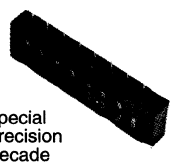
Rectangular Hermetic



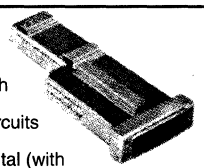
Rectangular Hermetic

Special End Mounting

Special Shape Conforming For Limited Area



Special Precision Decade



Capacitor Network with Additional Co-Axial Circuits For Rugged Environmental (with External Plug)

sei CAPACITORS

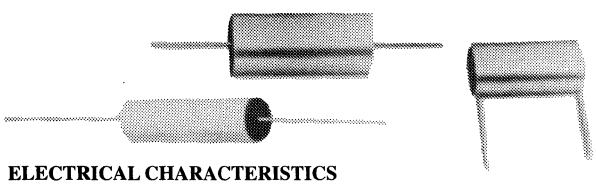
A CAPACITOR INDUSTRIES COMPANY

FOR THE AVIONICS AND AEROSPACE INDUSTRIES

Since 1963, SEI has been manufacturing metalized film capacitors that meet and exceed the stringent quality requirements of the Avionics and Aerospace Industries. Our capacitors also find widespread application in Telecommunications, Medical, Computer, Instrumentation, and other applications that demand the ultimate in reliability at a reasonable cost.

In addition to standard catalog types, we offer special design capabilities. Please contact us for more detailed information on the SEI capacitor which will meet your specific requirements.

Metalized Polyester Capacitors



ELECTRICAL CHARACTERISTICS

Insulation Resistance: Measured at rated voltage for 2 minutes electrification, the insulation resistance will equal or exceed the following values:

Temp	Meg. X Mfd.	Need not Exceed
25°C	50,000	100,000 Megohm
85°C	5,000	10,000 Megohm
105°C	500	1,000 Megohm
125°C	100	200 Megohm

Dissipation Factor: Measured at 25°C and 1,000 cycles will be less than 1.0%. See dissipation factor curve variance for other temperature levels.

Dielectric Strength: Will withstand up to 200% of rated voltage not to exceed 1 minute.

ENVIRONMENTAL CAPABILITIES

Operating Temperature and Voltage Derating: Units will operate from –55°C to +105°C at full rated voltage and to +125°C with 50% voltage derating.

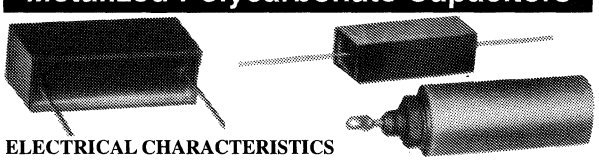
Moisture Resistance: 17E series will meet or exceed the humidity immersion temperature cycling requirements of MIL-STD-202, Method 106, and are 100% leak tested as standard procedure.

Vibration and Shock: When tested in accordance with the methods set forth in MIL-STD-202B, will meet the requirements of method 204, Condition D for vibration and method 213, Condition 1 for shock.

Life Characteristics: Will withstand a life test of 1,000 hrs. at 125°C and rated voltage.

Production and Quality Control Test: Consists of 100% production and final testing for dielectric withstanding voltage, insulation resistance, capacitance and dissipation factor, in accordance with methods 301, 302, 305 and 306 of MIL-STD-202B.

Metalized Polycarbonate Capacitors



ELECTRICAL CHARACTERISTICS

Insulation Resistance: Measured at rated voltage not to exceed 2 minutes, the insulation resistance will equal or exceed the following values:

Temp	Meg. X Mfd.	Need not Exceed
25°C	100,000	200,000 Megohm
85°C	10,000	20,000 Megohm
105°C	1,000	2,000 Megohm
125°C	500	1,000 Megohm

Dissipation Factor: When measured at 25°C and 1KHZ, units will measure .3% or less.

Dielectric Strength: Will withstand up to and including 200% of rated voltage not to exceed 1 minute.

ENVIRONMENTAL CAPABILITIES

Operating Temperature: From –55°C to 105°C without derating. When properly encapsulated, units may be operated to 125°C with 50% deration.

Moisture Resistance: The wrap and fill encasements will withstand up to 70 hours at 85% humidity. Applications that are exposed to longer periods of relative humidity above 85% should provide suitable protection, such as ample potting or a hermetic seal encased circuit, and/or S&EI hermetic encased capacitor series 22E.

Vibration and Shock: When tested in accordance with the methods set forth in MIL-STD-202E, will meet the requirements of method 204, Condition D for vibration and method 213, Condition A for shock.

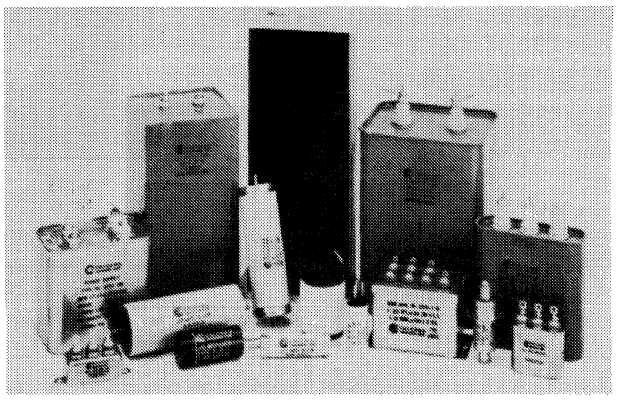
Life Characteristics: Will withstand a life test of 1,000 hrs. at 125°C and rated voltage.

Production and Quality Control Test: Consists of 100% production and final testing for dielectric withstanding voltage, insulation resistance, capacitance and dissipation factor, in accordance with methods 301, 302, 305 and 306 of MIL-STD-202E.

SEI CAPACITORS, INC. • 6455 N. Avondale Ave., Chicago, IL 60631 • Phone: 773-774-6666 • Fax: 773-774-6690
Toll-Free Phone: 1-888-227-2248 • E-Mail: info@capacitorindustries.com • Web address: www.capacitorindustries.com

SINCE 1944, WE HAVE BEEN MANUFACTURING PREMIUM GRADE CAPACITORS FOR:
DC Filtering • Computing • Bypass • Feed-Thru • Discharge • Communications • Power Factor Correction
THESE PRODUCTS ARE USED EXTENSIVELY IN THE FOLLOWING INDUSTRIES:
Medical • Military • Communication • Scientific Apparatus • Power Supplies • Utilities

HIGH VOLTAGE CAPACITORS



chicago CONDENSER

A CAPACITOR INDUSTRIES COMPANY

Fifty Years of Manufacturing Quality Capacitors and Related Products

MIL SPEC • Commercial • Custom • Capacitor Bypass Feedthrough

MIL-SPEC:
CQ72, CP70, CP53, CP54, CP55 • MIL-C-25, MIL-C-19978

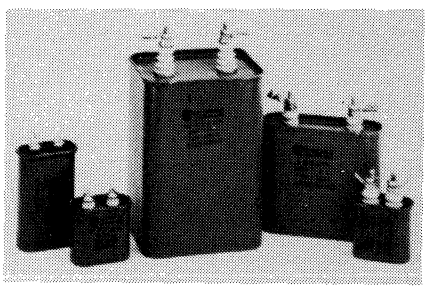
Type CMP / CPP Capacitors

TYPE CMP / CPP
MYLAR-PAPER FILTER CAPACITOR

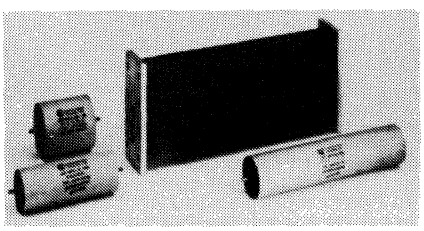
Case: Metal with terminals
Temperature Range: -55°C to 85°C
Capacity Range: .01 to 50 MFD
Capacity Tolerance: ±20% Std.
2%, 5% and 10% available
Voltage Range: 600 to 50000 volts DC
Meets MIL spec: MIL-C-19978/3

APPLICATIONS

Power Factor Correction
Tuned Filter
Energy Storage
Low & High Pass Filters
Pulse Forming Networks
RF Bypass
Audio Coupling
Integrating Circuits
Oscillator Circuits
Arc & Spark Suppression



Type BMV / BPV Capacitors



TYPE BMV / BPV
MYLAR-PAPER FILTER CAPACITORS

Case: Fabricated phenolic
Temperature Range: -30°C to 65°C
Other ranges available
Capacity Range: .005 to .05 MFD
Capacity Tolerance: ±10% Std.
Voltage Range: 600 to 200 KV DC

APPLICATIONS

Energy Storage
Coupling Circuits
High Voltage Power Supplies
Impulse Generators
X-ray Equipment
Test Equipment

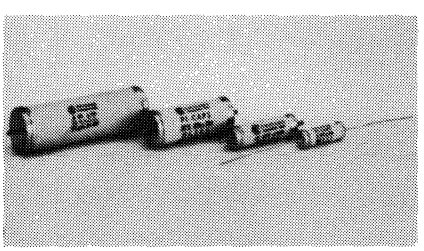
Type GMV / GPV Capacitors

TYPE GMV / GPV
PLASTIC FILM CAPACITOR

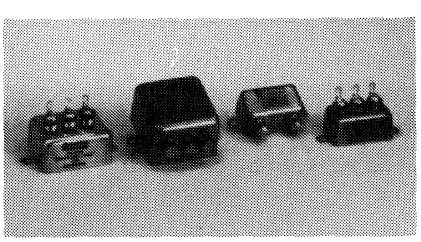
Case: Ceramic with Metal Caps
Temperature Range: -60°C to 85°C
-60°C to +125°C Extended
Capacity Range: .001 to .5 MFD
Capacity Tolerance: ±10% Std.
Other tolerances available
Voltage Range: 400 to 20000 volts DC

APPLICATIONS

Pulse Forming Networks
Buffer Stages
Tank Circuits
R.F. Filters Circuits
High Frequency Circuitry
Blocking Capacitors
Power Supply Filters
De-spiking Network



Type DLS / DNS Capacitors



TYPE BMV / BPV
METALLIZED FILM CAPACITORS

Case: Metal
Temperature Range: -90°C to 85°C
Other ranges available
Capacity Range: 0.1 to 20 MFD
Capacity Tolerance: ±20% Std.
Other ranges available
Voltage Range: 100 to 600 volts DC

APPLICATIONS

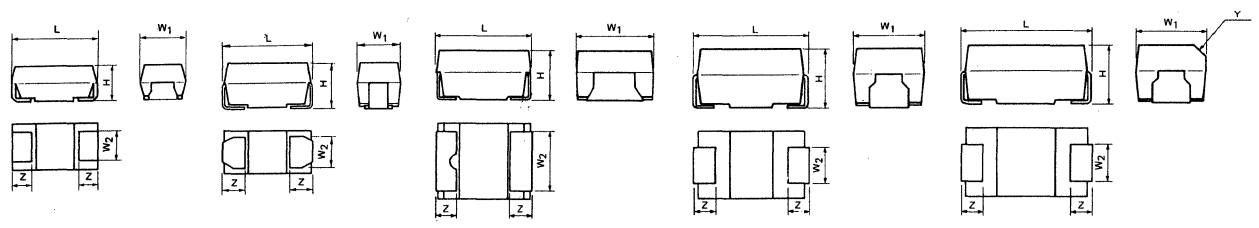
Computer Circuits
Audio Coupling
Tuned Filters
Pulse Forming Networks
Energy Storage
Oscillator Circuits
Power Supply Filters
Power Factor Correction
Arc & Spark Suppression
Integrating Circuits
Audio & RF Bypass
Analog Computers
Low & High Pass Filters
Radio Frequency Coupling

Chicago Condenser • 6455 N. Avondale Ave., Chicago, IL 60631 • Phone: 773-774-6666 • Fax: 773-774-6690
Toll-Free Phone: 1-888-227-2248 • E-Mail: info@capacitorindustries.com • Web address: www.capacitorindustries.com

NEC Electronics Inc.
2880 Scott Blvd., Santa Clara, CA 95050-2554
Telephone: 1-800-366-9782 FAX #: 1-800-729-9288
www.nec.com

R-SERIES SOLID TANTALUM CAPACITORS

DIMENSIONS [mm]



(A2 - Case) (A - Case) (B2 - Case) (D2 - Case) (B, C & D - Case)

Case Code	L	W_1	W_2	H	Z	Y
A	3.2±0.2	1.6±0.2	1.2±0.1	1.6±0.2	0.8±0.3	
A2	3.2±0.2	1.6±0.2	1.2±0.1	1.2 Max.	0.8±0.3	
B2	3.5±0.2	2.8±0.2	2.3±0.1	1.9±0.2	0.8±0.3	
B3	3.5±0.2	2.8±0.2	2.2±0.1	1.2 Max.	0.8±0.3	
B	4.7±0.3	2.6±.03	1.4±0.1	2.1±0.3	0.8±0.3	0.4C
C	6.0±0.3	3.2±.03	1.8±0.1	2.5±0.3	1.3±0.3	0.4C
D2	5.8±0.3	4.6±0.3	2.4±0.1	3.2±0.3	1.3±0.3	
D	7.3±0.3	4.3±0.3	2.4±0.1	2.8±0.3	1.3±0.3	0.5C

PERFORMANCE CHARACTERISTICS

- Operating temperature range –55 to +125°C with proper voltage rating as shown in following table.
- DC working voltage and surge voltage

Working	@ 85°C	2.5	4	6.3	10	16	20	25	35	V
	@ 125°C	1.6	2.5	4	6.3	10	13	16	22	V
Surge	@ 85°C	3.3	5.2	8	13	20	26	33	46	V

- Capacitance (at 25°C, 120 Hz)
  Range 0.01 μF to 100 μF
  Tolerance ±20%, ±10%
- Capacitance change with temperature
  –12% at –55°C,
  +12% at 85°C and +15% at 125°C.
- Dissipation factor (at 25°C, 120Hz)
  0.01 μF to 4.7 μF 4% max
  6.8 μF to 68 μF 6% max
  100 μF 8% max
- DC leakage current (at 25°C)
  0.01CVμA or 0.5μA, whichever is greater
- Humidity (90 ~ 95% RH at 40°C, 500 h)
  Capacitance change ±5% (±12% at 2.5V)
  Dissipation factor 150% of initial requirements
  DC Leakage current initial requirements
- Load life (at 125°C, DC W.V., 1000 h)
  Capacitance change ±10% (±12% at 2.5V)
  Dissipation factor initial requirements
  DC Leakage current initial requirements
- Resistance to soldering heat
  (solder reflow at 260°C, 10 sec.
  or solder dip at 260°C, 5 sec.
  Capacitance change ±5% (±12% at 2.5V)
  Leakage current initial requirements
  Dissipation factor initial requirements

NEC obtained IEC Qualification Approval on R-series tantalum capacitors, JP154-9, JP154-10 and JP154-11 on Sept. 29, 1987

VDC / μF	2.5	4	6.3	10	16	20	25	35	50
0.047								A	
0.068								A	
0.10						A2		A	A
0.15						A2		A	A
0.22						A2		A	B2
0.33						A2		A	B2
0.47						A2	A	A, B2, B	B2
0.68					A2	A, A2	A	A, B2, B	C
1.0				A2	A2	A2, A	A	A, B2, B	C
1.5			A2	A, A2	A, A2	A, A2	A, B2, B	A, B2, B, C	C
2.2		A2	A, A2	A, A2	A, A2	A, B2, B	A, B2	B2, B, C	D
3.3		A, A2	A, A2	A, A2	A, B2, B	A, B2	B2, B, C	B2, C, D	D,D2
4.7	A2	A, A2	A, A2	A, A2, B2, B	A, B2	A, B, B2, C	B2, C	C, D2, D	D
6.8	A2	A, A2	A, A2, B2, B	A, B2	A, B, B2, B3, C	B2, C	C, D2, D	C, D2, D	
10	A2	A, A2, B2, B	A, A2, B2	A, B, B2, B3, C	B2, C	B2, C, D2, D	C, D2, D	D, D2	
15	A, A2	A, A2, B2	A, B, B2, B3, C	B2, C	C, B2, D2, D	C, D2, D	D, D2	D	
22	A, A2	A, B, B2, B3, C	A, B2, B3, C	B2, C, D2, D	B2, C, D2, D	C, D2, D	D		
33	A, B2, B3	A, B2, B3, C	B2, C, D2, D	B2, C, D2, D	C, D2, D	D, D2			
47	A, B2, B3	B2, C, D2, D	B2, C, D2, D	C, D2, D	C, D, D2	D			
68	B2	B2, C, D2, D	C, D2, D	C, D, D2	D				
100	B2	B2, C, D2, D	C, D, D2	D, D2	D				
150	B2	C, D, D2	D, D2	D					
220	C	D	D						
330	D2	D, D2							
470	D								

See NECEL's other products in Section 4500.

These specifications are subject to change without notice.

NEC Electronics Inc.
2880 Scott Blvd., Santa Clara, CA 95050-2554
Telephone: 1-800-366-9782 FAX #: 1-800-729-9288
www.nec.com

SVS SERIES SOLID TANTALUM CAPACITORS (Ultra-Miniaturized)

The SVS Series is a line-up of high-performance ultra-miniaturized tantalum chip capacitors. The case dimensions are 2.0 mm x 1.25 mm x 1.2 mm as shown below.

PERFORMANCE CHARACTERISTICS

- Operating temperature range –55 to +125°C with proper voltage rating as shown in following table.
- DC working voltage and surge voltage

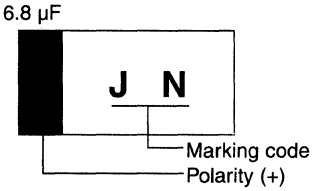
R.V.		2.5	4	6.3	10	16	V
Working	at 85°C	2.5	4	6.3	10	16	V
	at 125°C	1.6	2.5	4	6.3	10	V
Surge	at 85°C	3.3	5.2	8	13	20	V

- Capacitance (at 25°C, 120 Hz)
  Range 0.33 µF to 4.7µF
  Tolerance ±20%
- Capacitance change with temperature
  Not to exceed –12% at –55°C, +12% at 85°C and +15% at 125°C.
- Dissipation factor (at 25°C, 120 Hz)
  0.1 max. (0.2 max.)*
- DC leakage current (at 25°C)
  0.5 µA max.
- Humidity (90 to 95% RH at 40°C, 500 h)
  Capacitance change ±20%
  Dissipation factor 150% of initial requirements
  DC Leakage current initial requirement
- Load life (at 85°C, DC R.V., 1000 h)
  Capacitance change ±20%
  Dissipation factor initial requirements
  DC Leakage current initial requirements
- Resistance to soldering heat
- Fully immersion to solder, 260°C for 5 sec
  Capacitance change ±20%
  Leakage current initial requirements
  Dissipation factor initial requirements

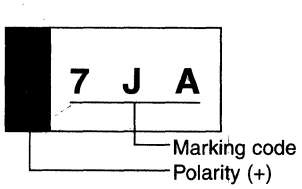
* Dissipation factor of the following items are 0.2 max.
2.5V/4.7µF, 4V/3.3µF, 6.3V/2.2µF

MARKING DETAIL

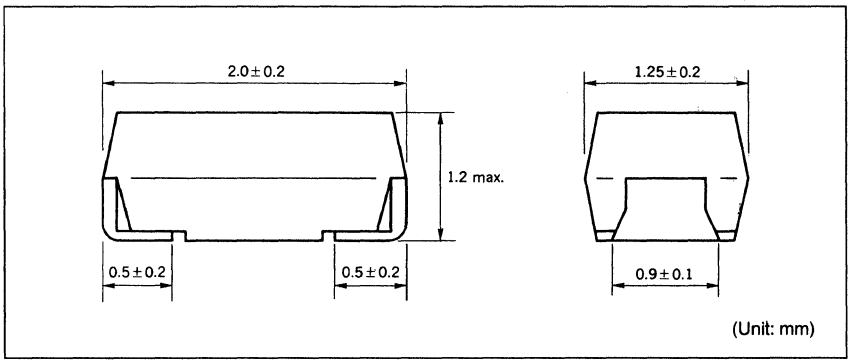
up to 6.8 µF



10 µF



DIMENSIONS (mm)



PRODUCT LINE-UP AND MARKING CODE

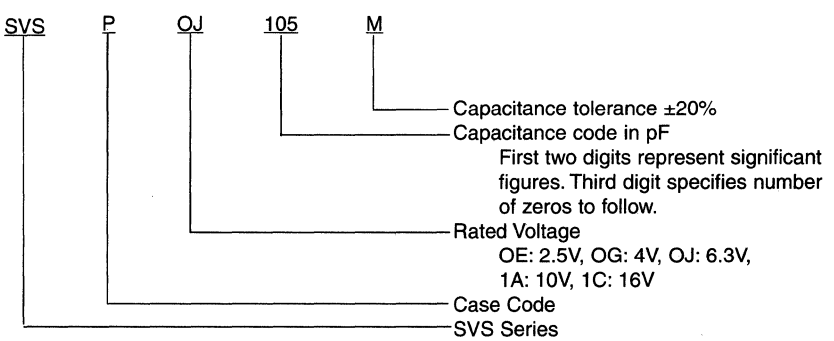
New products

UR/µF	2.5	4	6.3	10	16
0.33					CN
0.47					CS
0.68				AW	CW
1			JA	AA	CA
1.5		GE	JE	AE	
2.2	eJ	GJ	JJ	AJ	
3.3	eN	GN	JN	AN	
4.7	eS	GS	JS		
6.8	eW	GW	JW		
10	7eA	7GA	7JA		

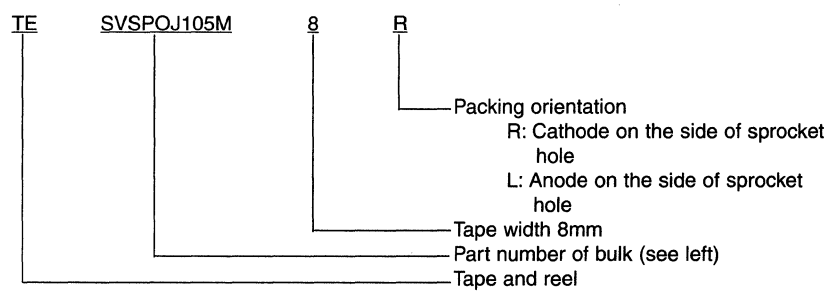
UR: Rated voltage

PART NUMBERING SYSTEM

[BULK]



[TAPE & REEL]

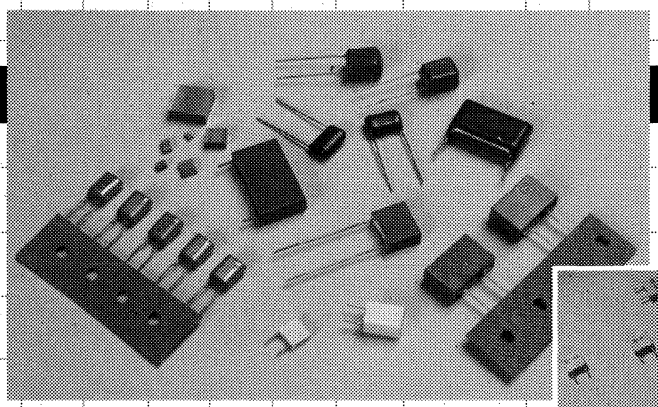


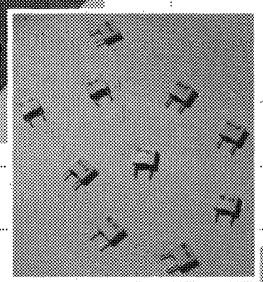
See NECEL's other products in Sections 4500.

7873 S.W. Nimbus Avenue
Beaverton, OR 97008-6404
Phone: 503-646-1434
Fax: 503-641-9594
www.nissei-arco.com

NISSEI ARCOTRONICS

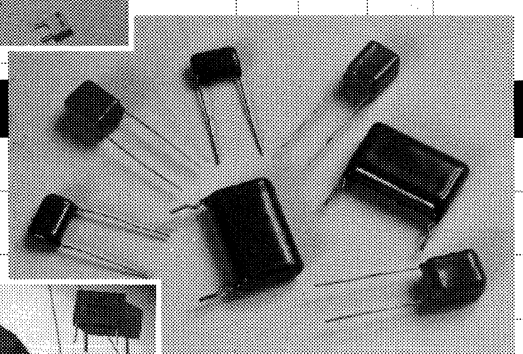
FILM CAPACITORS





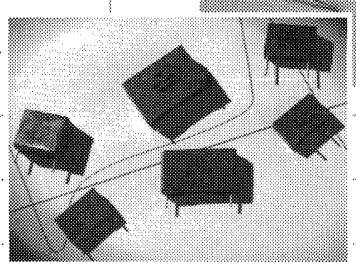
POLYESTER

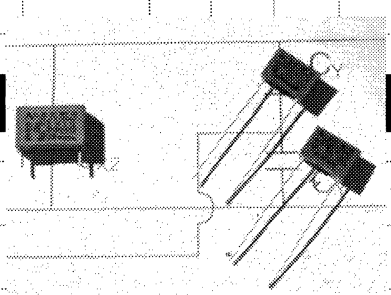
- 100 pF to 22 µF •
- 50VDC to 1,250VDC •
- Axial and Radial •
- Stacked and Wound •
- Metallized and Extended Foil •



POLYPROPYLENE

- 100 pF to 30 µF •
- 63VDC to 3,000VDC •
- 250VAC to 900VAC •
- Axial and Radial •
- Close Tolerance •
- Single and Double Metallized •
- Series Construction •





X2-Y2 EMI/RFI SUPPRESSORS

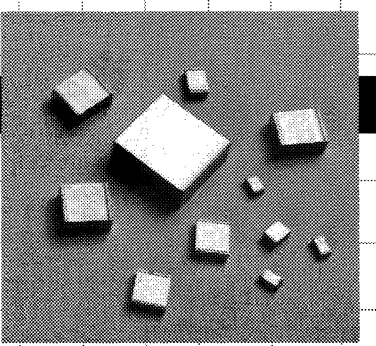
- 1,000 pF to 2.2 µF •
- 250/275VAC •
- Across-The-Line, Line-To-Ground •
- UL, CSA, SEV, VDE etc. Approvals •

FILM CAPACITORS ISO 9001 REGISTERED

7873 S.W. Nimbus Avenue
Beaverton, OR 97008-6404
Phone: 503-646-1434
Fax: 503-641-9594
www.nissei-arco.com

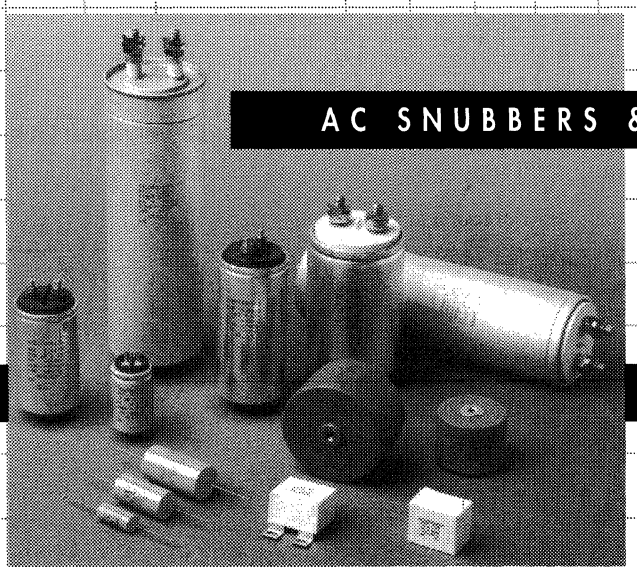
NISSEI ARCOTRONICS

FILM CAPACITORS



PEN/PPS CHIPS

• 1,000 pF to 4.7 µF •
• 25VDC to 250VDC •
• 1206 to 6054 EIA Sizes •



AC SNUBBERS & AC FILTER CAPACITORS

• 6,800 pF to 60 µF •
• 250VDC to 3,000VDC •
• 160VAC to 750VAC •

IGBT SNUBBERS

• 4,700 pF to 60 µF •
• 250VDC to 3,000VDC •
• 450VAC to 750VAC •

GTO PROTECTION & IGBT CLAMPING

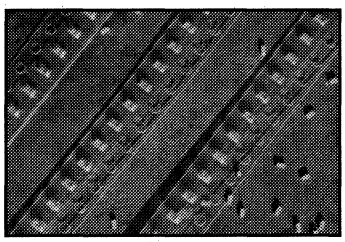
• .5 µF to 220 µF • 400VDC to 1,500VDC • 160VAC to 700VAC •
• ESR<2mΩ - I_{RMS} up to 70A - I_{PK} up to 3,600 A •

GENERAL PURPOSE POWER & COMMUTATION CAPACITORS

• 1 µF to 500µF • 400VDC to 1,500VDC • 250VAC to 630 VAC •
• ESR<3mΩ - I_{PK} up to 4,500 A - I_{RMS} up to 50A •

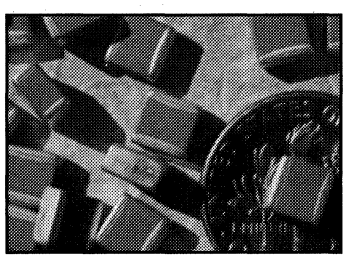
FILM CAPACITORS ISO 9001 REGISTERED

NOVACAP
A DOVER TECHNOLOGIES COMPANY
25111 Anza Drive, Valencia, California 91355
Tel: (805) 295-5920 • FAX: (805) 295-5928



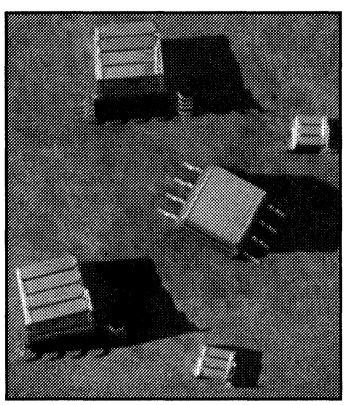
Surface Mounts MLC's

Surface mount MLC's are available in COG (NPO), X7R, BX, Z5U and Y5V dielectrics. Sizes range from 0402-2225 with voltages ranging from 16-800 VDC. Cap values up to 15 µF are attainable. Terminations include nickel barrier, silver palladium and gold. Packaging options are bulk, waffle, or taped on 7" or 13" reels. Marking and high reliability ranges are available.



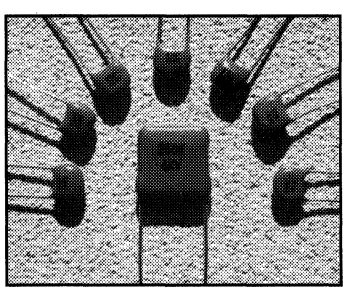
High Voltage Chip Capacitors

These capacitors offer the highest capacitance available per kilovolt rating, in COG and X7R characteristics and are appropriate for commercial/industrial applications to 10 KV. Applications include power supply and voltage multiplier circuits. Available in commercial and high reliability versions. Sizes range from 1515 to 7565.



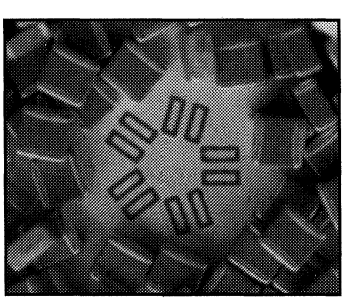
Capacitor Assemblies

High Capacitance assemblies with low equivalent series resistance (ESR) and low equivalent series inductance (ESL) are available for use in high power or high frequency applications as replacements for tantalums and aluminum electrolytics. Uses include input and output filters in switch mode power supplies, high capacitance discharge circuits and high temperature filtering/decoupling. The leaded configurations safeguard the devices against thermal and mechanical stresses and include thru-hole and surface mount J and L style leads bonded with high temperature solder. Assembly onto a gull-wing leaded carrier designed to withstand 150°C is available.



Radial Lead High Voltage

High Voltage Leaded Multilayer Capacitors are available in COG and X7R dielectric characteristics. Conformal coating and lead mounting provide a rugged configuration for optimum performance. Ranges offered provide highest capacitance efficiency per KV rating and are appropriate for commercial/industrial use to 10KV. Applications include power supply and voltage multiplier circuits. High reliability versions are also offered.



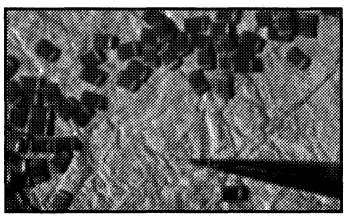
Ring Detect Capacitors

Novacap offers a line of low ESR surface mount capacitors ideally suited for "TIP & RING" applications. These units are designed with 250 VDC rating to withstand the 52 VDC bias and 150 volt RMS signal during ring cadence. Chips are offered in X7R dielectric from 0.39µF to 1.00µF in sizes 1812, 1825 and 2225. Product is also available in Z5U and Y5V dielectrics from .47µF to 1.30µF to provide higher volumetric efficiency for other ring detection circuits.

E-mail: info@novacap.com
Web Site: http://www.novacap.com

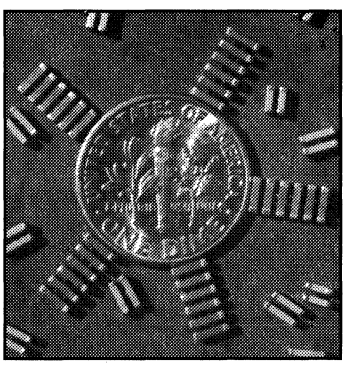
NOVACAP
A DOVER TECHNOLOGIES COMPANY

Thin Profile Capacitors



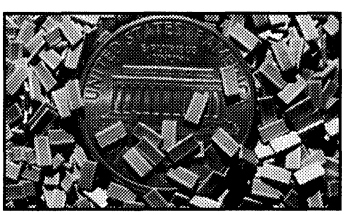
Popular EIA size chips are offered in very thin profile configuration with COG, X7R, Z5U and Y5V dielectric characteristics rated at 25V and 50V for use as decoupling capacitors under other circuit elements, or for low profile RFID and "Smart Card" circuitry.

Capacitor Arrays



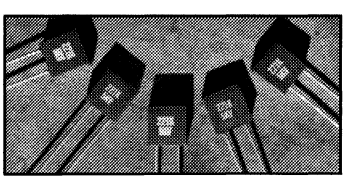
The Cap-Rack (Pat.Pend.) is an assembly of individual chip capacitors, bonded with high temperature epoxy. This construction permits the assembly of dissimilar capacitance values or dielectrics into one single component, providing extended freedom for board space utilization. The design reduces harmful thermal stress during assembly, behaving as individual components, not as a single large ceramic mass. Arrays are available as groupings of chip sizes1206, 1210, 1808 and 1812, from pairs to as many as eight chips. Custom sizes, particularly for high voltage applications, are also available.

Low ESR-ESL Chip Capacitors



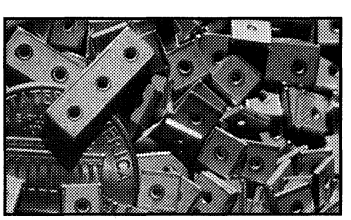
Chip capacitors terminated along the long electrode axis, to effectively reduce current paths and resistance to charging current flow between electrodes, qualities which lower ESR and ESL for improved performance in high speed decoupling.

High Temperature



Chip capacitors designed to operate to 200°C in both COG and X7R dielectrics for use in very harsh environments, where isolation and protection of the device is required for optimum reliability.

Feed-Thru Components



Feed-thru units are used to provide signal conduits through openings while suppressing EMI and RFI interference. Capacitors are constructed with ground plane electrodes completely surrounding the signal feed-thru contact, to provide very low ESR and ESL for most effective filtering.

High Reliability Testing

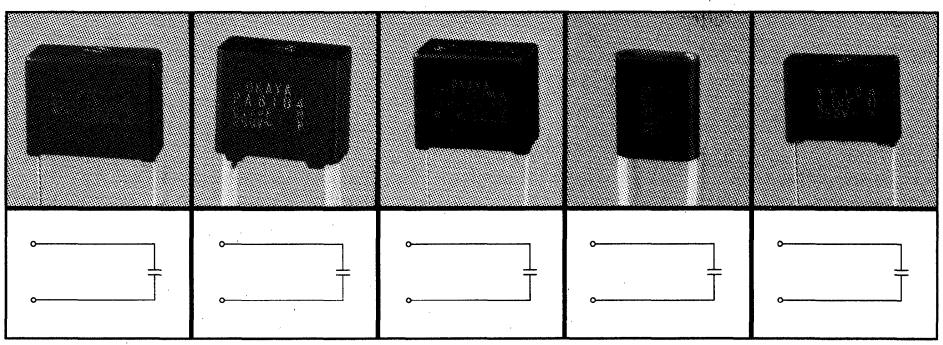
Novacap manufactures and tests COG, BX and X7R chips in accordance with MIL-C-55681, MIL-C-123, MIL-C-49467, HALT, or customer S.C.D. Product is designed for optimum reliability, burned in at elevated voltage and temperature, and 100% physically and electrically inspected to ascertain conformance to strict performance criteria. Applications for High Reliability products include medical implanted devices, aerospace, airborne and various military applications, and consumer uses requiring safety margins not attainable with conventional product. High voltage conditioning up to 20KV for specialty High Voltage devices is also available.

ISO 9001
Certified 1992
RCJ-92M-05

Okaya Electric America, Inc.
503 Wall Street
Valparaiso, IN 46383
Ph: (219) 477-4488
Fx: (219) 477-4856

OKAYA

AC NOISE SUPPRESSION CAPACITORS



Series	PA	PAB	XE	XEB	YE
Category △	X2, Y3	X2, Y3	X1, X2 or Y2	X1, X2 or Y2	Y2
Climatic Category	40/100/21	40/100/21	40/100/85	40/100/85	40/085/21
Voltage Rating	275VAC	275VAC	250VAC	250VAC	250VAC
MFD	Dimension L x H x T x F (mm)				
0.001	13/12/5/11	–	17/12.5/5.5/15	16/18/8/12.5	13/10/4/11
0.0015		–			
0.0022		–			13/12/5/11
0.0033		–			
0.0047		–			17/12/5/15
0.0068		–		18/21.5/8.5/15	17/12.5/5.5/15
0.01	17/12/5/15	17/12/5/15	17/12/5/15	16/18/8/12.5	
0.022					17/15/8/15
0.033			17/12.5/5.5/15		25/16/6.5/22.5
0.047	17/12.5/5.5/15	17/12.5/5.5/15	17/13.5/6.5/15	19/23/8.5/15	25/17.5/8/22.5
0.068	17/13.5/6.5/15	17/13.5/6.5/15	17/15/8/15		25/19.5/10/22.5
0.1	17/15/8/15	17/15/8/15	25/16/6.5/22.5		30/22/11/27.5
0.22	25/17.5/8/22.5	25/17.5/8/22.5	25/19.5/10/22.5	21.5/28/11/17.5	–
0.33	25/19.5/10/22.5	–	30/22/11/27.5	30/39/16/26	–
0.47	30/22/11/27.5	–	30/24.5/13.5/27.5		–
0.68	30/24.5/13.5/27.5	–	30.5/28/16.5/27.5	37/48/22/33	–
1.0	30.5/28/16/27.5	–	36/30.5/20/32.5		–
1.5	41/28/15.5/37.5	–	–	–	–
2.2	41/32.5/17.5/37.5	–	–	–	–
Fax Back Document #	1101		1103	1104	1105
Approvals	UL SP VDE S FI D N SEMKO	UL SP VDE S FI D N SEMKO	UL SP VDE S OVE FI D N SEMKO Y	UL SP VDE S FI D N SEMKO	UL SP VDE S BS FI D N SEMKO

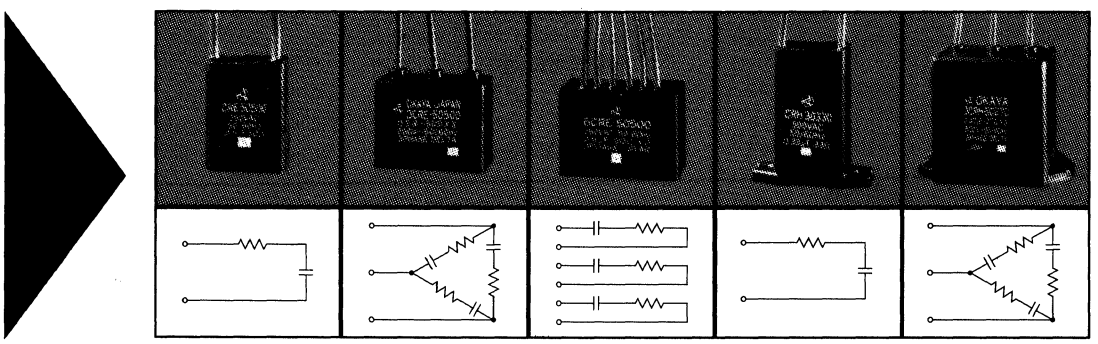
△ IEC 384-14 2nd Edition 1993

For complete data call our FAXBACK #:1-800-755-8561
or
Visit our Website at: http://www.okaya.com

ISO 9001
Certified 1992
RCJ-92M-05

Okaya Electric America, Inc.
503 Wall Street
Valparaiso, IN 46383
Ph: (219) 477-4488
Fx: (219) 477-4856

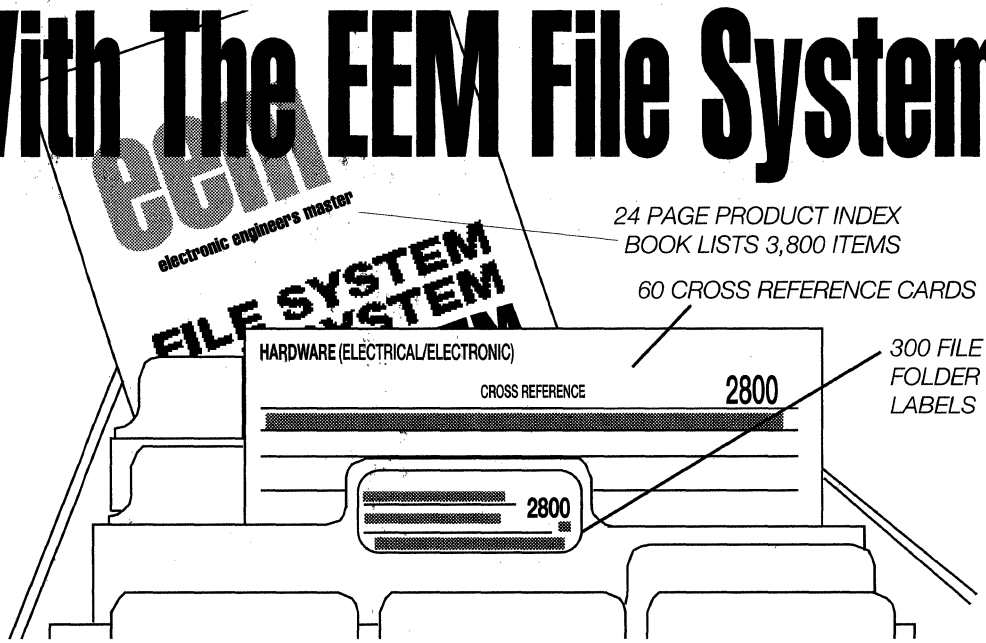
Series		AU	XA	XAB	XE	XEB
0.5	10	–	–	–	40/28/16/36.5	30/39/16/26
	47	–	–	–		
1.0	10	–	–	–	47/33.5/22/43.5	37/48/22/33
Fax Back Document #		1201	1202	1202	1203	1204
Approvals						



Series		CRE	3CRE	6CRE	CRH	3CRH
Peak Pulse Voltage		800V	800V	800V	1500V	1500V
Climatic Category		-40 ~ 85°C	-40 ~ 85°C	-40 ~ 85°C	-40 ~ 70°C	-40 ~ 70°C
Rated Voltage		250VAC	250VAC	250VAC	500VAC	500VAC
MFD	Ohms	Dimension L x H x T x F (mm)				
0.1	68	–	–	–	30/57/15/18	–
0.1	200	23/26/14/13	–	–	–	–
0.2	150	23/26/14/13	–	–	–	–
0.22	47	–	–	–	30/57/15/18	–
0.3	68	25/32/16/15	44/35/26/15	–	–	–
0.33	33	–	–	–	30/57/20/18	46/62/32/13
0.47	27	–	–	–	40/57/20/28	56/62/40/18
0.5	50	25/32/16/15	44/35/26/15	48/35/26/15	–	–
Comments		–	3-Phase	3-Phase	–	3-Phase
Fax Back Document #		1205	1205	1205	1206	1206
Approvals						

For complete data call our FAXBACK #:1-800-755-8561
or
Visit our Website at: http://www.okaya.com

Organize Your Files... With The EEM File System!



The EEM File System was developed 36 years ago to help you organize your catalog files the EEM way. The EEM File System follows the EEM cataloging system that organizes all electronic product information by the four-digit EEM Product Section Number. It puts an end to catalog clutter and filing frustration.

The EEM File System comes in one neat package:

Product Index Book - Tells you where to file information on each and every type of electronic product by generic product name and EEM Product Section Number.

300 File Folder Labels - Pressure sensitive labels are pre-printed with product names and EEM Product Section Number. You apply the labels to as many, or as few, file folders as you choose.

60 Cross Reference Cards - You'll never lose track of where you filed a catalog from a multi-product manufacturer.

With the EEM File System you can get organized and stay organized. You'll save countless hours of searching for elusive catalogs and data sheets. You'll be able to quickly find the catalog you need when you need it. The EEM File System is in everyday use in thousands of engineering and purchasing departments around the world. This proven, time-saving system belongs in your department!

The EEM File System is very affordable and easy to order...

- **Charge it to your VISA, AMEX or MasterCard by calling toll-free 1-800-833-7138.**
- **Or, mail your purchase order and check for US $30.00 plus local sales tax* to:**

EEM/Hearst Business Communications, Inc.
645 Stewart Avenue
Garden City, NY 11530
Att: Marie Botta
(516) 227-1314 • FAX (516) 227-1453

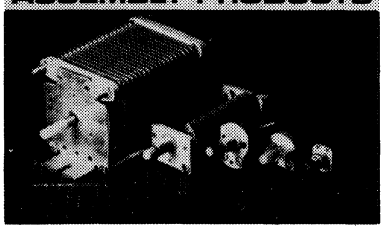
*Add sales tax in CA,FL,IL,MA,NJ,NY,PA,VA and GST tax in Canada.

Pre-payment in U.S. dollars required for orders shipped outside the USA. Add $10 per set for foreign delivery.

OREN ELLIOTT PRODUCTS, INC.

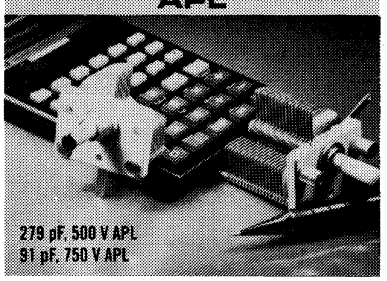
Oren Elliott Products, Inc. is the largest domestic manufacturer of air-dielectric variable capacitors. We also manufacture variable gas capacitors, screw machine products, CNC machine products, custom sub-assemblies, variable inductors, and vernier drives.

ASSEMBLY PRODUCTS

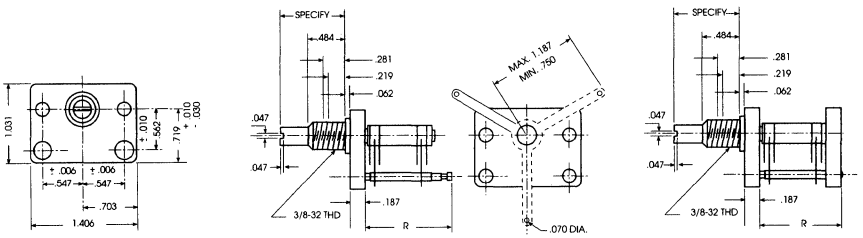


Our assembly products can be divided into three major categories: Air variable capacitors, variable inductors, and vernier reduction drives. Most of our capacitors can be put into one of three general types: Air trimmers, condensers, and M-73's. The distinguishing feature of an air trimmer is its ceramic frame, which holds the stationary bank of blades (or stator), as well as the bearing in which the rotating bank of blades (or rotor) rides.
Condensers are built into a U-shaped wraparound plated steel frame: insulation between oppositely charged banks of blades is accomplished through phenolic stator supports. Condensers are used in applications that require an economical price, high capacitance in confined spaces, rugged durability under inertial shock and vibrations, and special mounting requirements.

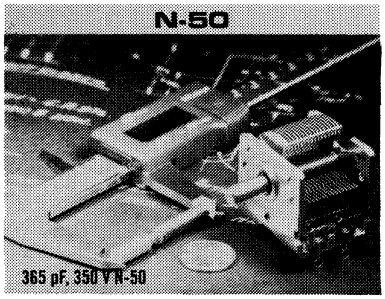
APL



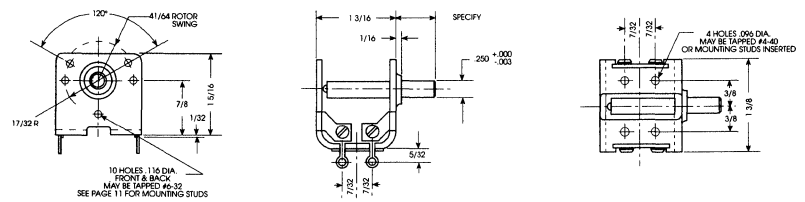
The APL is usually installed by single-hole mounting, but mounting posts are available, as are lock-bearings and 180° rotor-stop bearings. Most APL's have solder lugs for electrical connection to the stator, and most of the APL's that we currently sell have an insulated shaft.



N-50



The N-50 is a compact, rugged, economical unit used in a myriad of low-voltage applications, and is our most popular condenser configuration. Although it is slightly larger than NS-51, the N-50's almost cubical shape makes more efficient use of the space that it occupies, and it delivers a remarkable amount of capacitance for its volume.



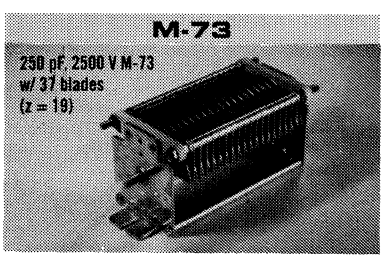
Max. and min. capacitances, NS-51 and N-50, standard blades, .010" air gap (350 V max.)

No. Of Blades	Min. Cap. (pF)	Max. Cap. (pF)
5	5.0	54.2
7	5.5	79.4
9	6.0	104.5
11	6.8	129.9
13	7.5	155.2

No. Of Blades	Min. Cap. (pF)	Max. Cap. (pF)
15	7.9	180.3
17	8.2	205.2
29	8.8	230.4
21	9.5	255.7
23*	10.3	281.1

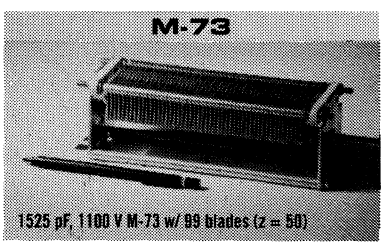
No. Of Blades	Min. Cap. (pF)	Max. Cap. (pF)
25	11.1	306.5
27	12.0	332.0
29	13.9	358.6
31	14.9	384.2
33	15.9	409.9

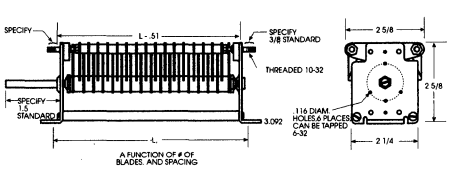
M-73



The M-73 is a high-voltage, heavy-wattage, continuous duty capacitor. Insulation between the rotor and stator is achieved through 1/4" thick, high quality, military spec ceramics riveted to the plated steel end plates. These end plates are tied together by solid aluminum and brass bars, forming a rigid structure. The rotor rides on ball bearings housed between the front end plate and the stainless steel shaft, and the blades are heavy .032" thick aluminum. Totally non-magnetic M-73's are also available.

M-73





Air Gap	Max. Voltage	Min. Capacitance	Max. Capacitance	Mounting Distance, L
.030	950	.537z + 5.0	37.36z - 8.1	.113z + 1.5
.032	1100	.616z + 5.4	30.735z - 7.8	.125z + 1.5
.037*	1325	.564z + 5.8	25.88z - 5.4	.112z + 1.5
.045	1550	.637z + 7.3	22.015z - 1.7	.152z + 1.4
.075	2500	.854z + 6.2	13.80z - 1.6	.211z + 1.3
.080	2700	.888z + 6.0	12.92z - 2.2	.222z + 1.3
.100	3100	.977z + 5.7	10.77z - 6.3	.264z + 1.2
.120	3500	1.096z + 4.5	9.455z - 6.8	.302z + 1.1
.140	3700	1.262z + 3.7	8.41z - 7.1	.342z + 1.1

* .037 spacing uses thin blades
z = # of rotor blades.

OREN ELLIOTT PRODUCTS, INC.
128 West Vine - P.O. Box 638 - Edgerton, Ohio 43517 - Phone: (419)298-2306 - Fax: (419)298-3545

©1998 Paccom Electronics

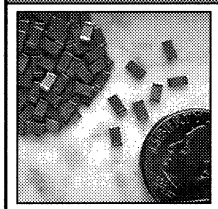
PACCOM ELECTRONICS

Tel (800) 848-6983
www.paccom.com

Ceramic Capacitors
Plastic Film Capacitors

Paccom Electronics reserves the right to make changes without notice in the construction and design from the specifications. No warranties are expressed or implied.

Ceramic Chips



MT Series
Monolithic
Multilayer
Surface Mount Chip

Capacitance Range:
0.5pF to 10µF

Rated Working Voltage:
16Vdc to 100Vdc

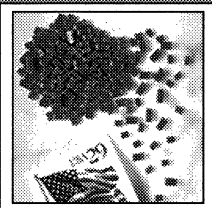
Operating Temp Range:
-55°C to +125°C

Capacitance Tolerance:
±5%, ±10%, ±20%, +80%/-20%

Temp Characteristic:
C0G, X7R, Y5V, Z5U

EIA Case Sizes:
0402, 0603, 0805, 1206, 1210

Packaging:
Tape/Reel, Bulk Cassette



ML Series
Data Guard Mono
Multilayer Low Profile
Surface Mount Chip

Capacitance Range:
0.1µF, 0.18µF, 0.22µF, 0.33µF

Rated Working Voltage:
25Vdc and 50Vdc

Operating Temp Range:
-25°C to +85°C

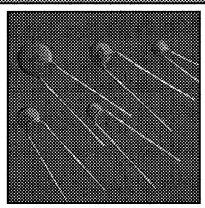
Capacitance Tolerance:
+80%/-20%

Temp Characteristic:
Y5V

EIA Case Sizes:
0805, 1206, 1210

Packaging:
Tape/Reel

Ceramic Discs



PC Series
Temp Compensating
Class I Disc
Radial Lead

Capacitance Range:
0.5pF to 820pF

Rated Working Voltage:
50Vdc to 1KVdc

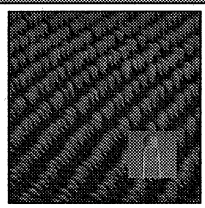
Operating Temp Range:
-25°C to +85°C

Capacitance Tolerance:
±0.25pF, ±0.5pF, ±5%, ±10%

Temp Characteristic:
NP0, N750, SL

Encapsulation:
Durez Phenolic

Packaging:
Tape/Box, Bulk



PK Series
High Dielectric Constant
Class II Disc
Radial Lead

Capacitance Range:
100pF to 0.047µF

Rated Working Voltage:
50dc to 1KVdc

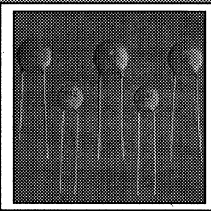
Operating Temp Range:
-25°C to +85°C

Capacitance Tolerance:
±10%, ±20%, +80%/-20%

Temp Characteristic:
Y5P, Z5V, Z5U

Encapsulation:
Durez Phenolic

Packaging:
Tape/Box, Bulk



PS Series
Semi-Conductive
Class III Disc
Radial Lead

Capacitance Range:
6,800pF to 0.22µF

Rated Working Voltage:
16Vdc to 50Vdc

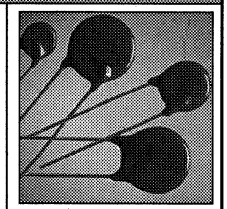
Operating Temp Range:
-25°C to +85°C

Capacitance Tolerance:
±20%, +80%/-20%

Temp Characteristic:
Y5R, Y5V

Encapsulation:
Durez Phenolic

Packaging:
Tape/Box, Bulk



PY Series
Across-The-Line
Safety Recognized Disc
Radial Lead

Capacitance Range:
100pF to 0.01µF

Rated Working Voltage:
125Vac and 250Vac

Operating Temp Range:
-25°C to +85°C

Capacitance Tolerance:
±10%, ±20%

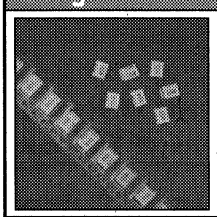
Temp Characteristic:
Y5P, Y5V

Coating:
Epoxy Resin

Packaging:
Bulk

UL Listed / CSA Approved

Poly-Film Chips



CHE Series
Metallized PPS
Non-Inductive
Surface Mount Chip

Capacitance Range:
0.0022µF to 0.1µF

Rated Working Voltage:
25Vdc

Operating Temp Range:
-40°C to +125°C

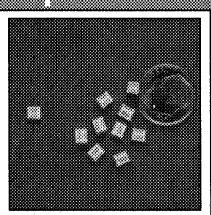
Capacitance Tolerance:
±5%, ±10%

Dissipation Factor:
0.06% max @ 1KHz

Case Sizes:
4835, 6040, 6545

Construction:
Stacked Film

Packaging:
Tape/Reel



CPE Series
PolyEthyleneNaphtalate
Inductive
Surface Mount Chip

Capacitance Range:
0.001µF to 4.7µF

Rated Working Voltage:
50Vdc to 250Vdc

Operating Temp Range:
-40°C to +125°C

Capacitance Tolerance:
±5%, ±10%, ±20%

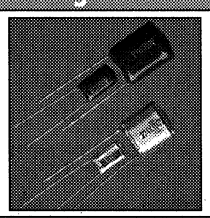
Dissipation Factor:
0.06% max @ 1KHz

EIA Case Sizes:
1206 to 5460

Construction:
Stacked Film

Packaging:
Tape/Reel

Polyester Film Capacitors



PQ92 Series
Polyester Film/Foil
Inductive
Radial Lead

Capacitance Range:
0.001µF to .47µF

Rated Working Voltage:
100Vdc

Operating Temp Range:
-40°C to +85°C

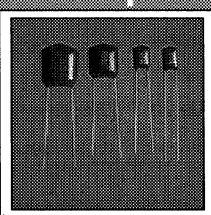
Capacitance Tolerance:
±5%, ±10%, ±20%

Dissipation Factor:
1% max @ 1KHz

Coating:
Epoxy Resin Dipped

Construction:
Wound Film

Packaging:
Tape/Box, Bulk



PEI Series
Polyester Film/Foil
Inductive
Radial Lead

Capacitance Range:
0.001µF to .22µF

Rated Working Voltage:
100Vdc

Operating Temp Range:
-40°C to +85°C

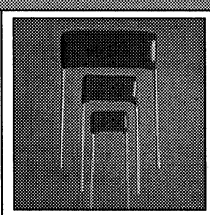
Capacitance Tolerance:
±5%, ±10%, 20%

Dissipation Factor:
1% max @ 1KHz

Coating:
Epoxy Resin Dipped

Construction:
Wound Film

Packaging:
Tape/Box, Bulk



MEF Series
Metallized Polyester
Non-Inductive
Radial Lead

Capacitance Range:
0.01µF to 6.8µF

Rated Working Voltage:
100Vdc to 630Vdc

Operating Temp Range:
-40°C to +85°C

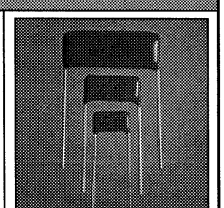
Capacitance Tolerance:
±5%, ±10%, ±20%

Dissipation Factor:
1% max @ 1KHz-25°C

Coating:
Epoxy Resin Dipped

Construction:
Wound Film

Packaging:
Tape/Reel, Bulk



MES Series
Metallized Polyester
Non-Inductive Mini
Radial Lead

Capacitance Range:
0.01µF to 10µF

Rated Working Voltage:
100Vdc to 630Vdc

Operating Temp Range:
-40°C to +85°C

Capacitance Tolerance:
±5%, ±10%, ±20%

Dissipation Factor:
1% max @ 1KHz-25°C

Coating:
Epoxy Resin Dipped

Construction:
Wound Film

Packaging:
Tape/Reel, Bulk

©1998 Paccom Electronics

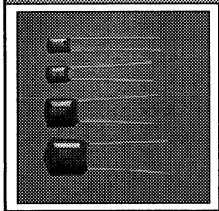
PACCOM ELECTRONICS

Tel (800) 848-6983
www.paccom.com

Plastic Film Capacitors

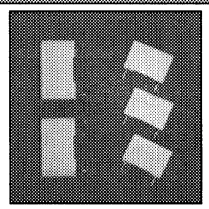
Paccom Electronics reserves the right to make changes without notice in the construction and design from the specifications. No warranties are expressed or implied.

Polyester Film Capacitors



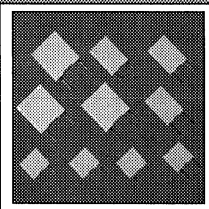
MMT Series
Metallized Polyester
Non-Inductive
Radial Lead

Capacitance Range: 0.01µF to 3.3µF
Rated Working Voltage: 50Vdc, 63Vdc
Operating Temp Range: -40°C to +85°C
Capacitance Tolerance: ±5%
Dissipation Factor: 1% max @ 1KHz
Coating: Epoxy Resin Dipped
Construction: Stacked Film
Packaging: Tape/Reel, Tape/Box, Bulk



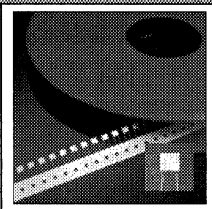
60 Series
Metallized Polyester
Non-Inductive
Radial Lead

Capacitance Range: 0.001µF to 22µF
Rated Working Voltage: 63Vdc to 1000Vdc
Operating Temp Range: -55°C to +105°C
Capacitance Tolerance: ±5%, ±10%, ±20%
Dissipation Factor: 0.1% max @ 1KHz
Coating: Plastic Case
Construction: Epoxy Resin Filled Box
Packaging: Bulk



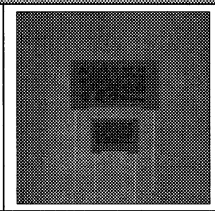
67/84 Series
Metallized Polyester
Non-Inductive
Radial Lead

Capacitance Range: 0.001µF to 1µF
Rated Working Voltage: 63Vdc to 630Vdc
Operating Temp Range: -55°C to +105°C
Capacitance Tolerance: ±5%, ±10%, ±20%
Dissipation Factor: 0.1% max @ 1KHz
Coating: Plastic Case
Construction: Epoxy Resin Filled Box
Packaging: Tape/Box, Bulk



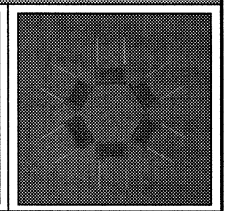
68/85 Series
Metallized Polyester
Non-Inductive
Radial Lead

Capacitance Range: 0.001µF to 2.2µF
Rated Working Voltage: 50Vdc to 400Vdc
Operating Temp Range: -55°C to +105°C
Capacitance Tolerance: ±5%, ±10%, ±20%
Dissipation Factor: 0.1% max @ 1KHz
Coating: Plastic Case
Construction: Epoxy Resin Filled Box
Packaging: Tape/Box, Bulk



R40 Series
Metallized Polyester
X2-Class Non-Inductive
Radial Lead

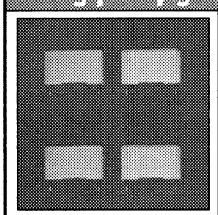
Capacitance Range: 0.01µF to 2.2µF
Rated Working Voltage: 275Vac; 50/60Hz
Operating Temp Range: -40°C to +100°C
Capacitance Tolerance: ±10%, ±20%
Dissipation Factor: 0.1% max @ 1KHz
Coating: Plastic Case
Construction: Polyurethane Resin Filled Box
Packaging: Bulk



R41 Series
Metallized Polyester
Y2-Class Non-Inductive
Radial Lead

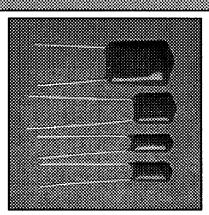
Capacitance Range: 0.001µF to 0.1µF
Rated Working Voltage: 250Vac; 50/60Hz
Operating Temp Range: -40°C to +100°C
Capacitance Tolerance: ±10%, ±20%
Dissipation Factor: 0.1% max @ 1KHz
Coating: Plastic Case
Construction: Epoxy Resin Filled Box
Packaging: Bulk

Polypropylene Film Capacitors



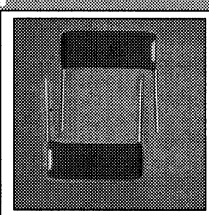
76 Series
Polypropylene Film
Non-Inductive
Radial Lead

Capacitance Range: 0.001µF to 2.2µF
Rated Working Voltage: 250Vdc to 2000Vdc
Operating Temp Range: -55°C to +105°C
Capacitance Tolerance: ±5%, ±10%
Dissipation Factor: 0.1% max @ 1KHz
Coating: Plastic Case
Construction: Epoxy Resin Filled Box
Packaging: Tape/Box, Bulk



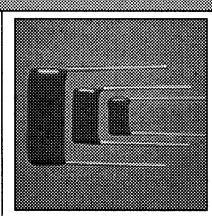
PPI Series
Polypropylene Film
Non-Inductive
Radial Lead

Capacitance Range: 0.001µF to 0.12µF
Rated Working Voltage: 100Vdc
Operating Temp Range: -55°C to +105°C
Capacitance Tolerance: ±1% , 2%, 5%
Dissipation Factor: 0.1% max @ 1KHz
Coating: Epoxy Resin Dipped
Construction: Wound Film
Packaging: Tape/Box, Bulk



PPH Series
Ext'd Polypropylene Film
Non-Inductive
Radial Lead

Capacitance Range: 0.001µF to 0.047µF
Rated Working Voltage: 1KVdc to 1.5KVdc
Operating Temp Range: -40°C to +85°C
Capacitance Tolerance: ±3%, ±5%, ±10%
Dissipation Factor: 0.1% max @ 1KHz
Coating: Epoxy Resin Dipped
Construction: Wound Film
Packaging: Bulk



PPM Series
Metallized Polypropylene
Non-Inductive
Radial Lead

Capacitance Range: 0.01µF to 2.2µF
Rated Working Voltage: 250Vdc to 630Vdc
Operating Temp Range: -40°C to +85°C
Capacitance Tolerance: ±5%, ±10%, ±20%
Dissipation Factor: 0.1% max @ 1KHz
Coating: Epoxy Resin Dipped
Construction: Wound Film
Packaging: Bulk

This space intentionally left blank. Please use it for notes.

This space intentionally left blank. Please use it for notes.

©1998 Paccom Electronics

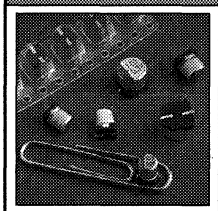
PACCOM ELECTRONICS

Tel (800) 848-6983
www.paccom.com

Aluminum & Tantalum Electrolytic Capacitors

Paccom Electronics reserves the right to make changes without notice in the construction and design from the specifications. No warranties are expressed or implied.

Aluminum Chips



ECR Series
General Purpose
Vertical Chip
Surface Mount

Capacitance Range:
0.1µF to 1,000µF

Rated Working Voltage:
4Vdc to 50Vdc

Operating Temp Range:
-40°C to +85°C

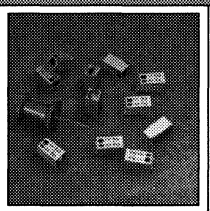
Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.01CV or 3µA

Load Life:
1,000~2,000 Hrs @ 85°C

Cleaning:
Solvent Proof - 5 mins HCFC

Packaging:
Tape/Reel



ECHR Series
General Purpose
Horizontal Chip
Surface Mount

Capacitance Range:
0.1µF to 150µF

Rated Working Voltage:
4Vdc to 50Vdc

Operating Temp Range:
-40°C to +85°C

Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.01CV or 3µA

Load Life:
2,000 Hrs @ 85°C

Cleaning:
Solvent Proof - 5 mins HCFC

Packaging:
Tape/Reel

ECU Series
High Temperature
Vertical Chip
Surface Mount

Capacitance Range:
0.1µF to 1,000µF

Rated Working Voltage:
6.3Vdc to 50Vdc

Operating Temp Range:
-40°C to +105°C

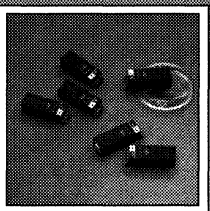
Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.01CV or 3µA

Load Life:
1,000~2,000 Hrs @ 105°C

Cleaning:
Solvent Proof - 5 mins HCFC

Packaging:
Tape/Reel



ECHU Series
High Temperature
Horizontal Chip
Surface Mount

Capacitance Range:
0.1µF to 1,000µF

Rated Working Voltage:
6.3Vdc to 50Vdc

Operating Temp Range:
-55°C / -40°C to +105°C

Capacitance Tolerance:
±20%

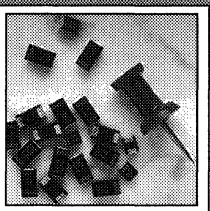
Max. Leakage Current:
≤0.01CV or 3µA

Load Life:
1,000~2,000 Hrs @ 105°C

Cleaning:
Solvent Proof - 5 mins HCFC

Packaging:
Tape/Reel

Tantalum Chips



TC Series
General Purpose
Resin Molded
Surface Mount

Capacitance Range:
0.01µF to 68µF

Rated Working Voltage:
4Vdc to 35Vdc

Operating Temp Range:
-55°C to +125°C

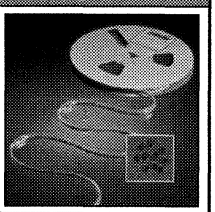
Capacitance Tolerance:
±10%, ±20%

Max. Leakage Current:
≤0.01CV or 0.5µA

Load Life:
2,000 Hrs @ 125°C

Case Sizes:
A, B, C, D

Packaging:
Tape/Reel



TS Series
High CV
Resin Molded
Surface Mount

Capacitance Range:
0.47µF to 100µF

Rated Working Voltage:
4Vdc to 35Vdc

Operating Temp Range:
-55°C to +125°C

Capacitance Tolerance:
±10%, ±20%

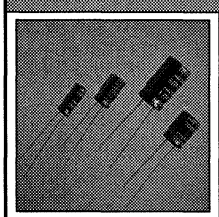
Max. Leakage Current:
≤0.01CV or 0.5µA

Load Life:
2,000 Hrs @ 125°C

Case Sizes:
A, B, C, D

Packaging:
Tape/Reel

Aluminum Electrolytic Capacitors



EVR Series
General Purpose
Standard
Radial Lead

Capacitance Range:
0.1µF to 15,000µF

Rated Working Voltage:
6.3Vdc to 450Vdc

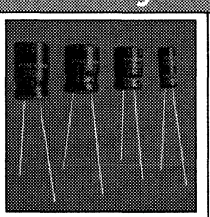
Operating Temp Range:
-40°C to +85°C

Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.01CV + 3µA ≤100VDC
≤0.03CV + 10µA ≥160VDC

Load Life:
2,000 Hrs @ 85°C

Packaging:
Tape/Box, Tape/Reel Bulk



EVSP Series
General Purpose
Low Profile
Radial Lead

Capacitance Range:
33µF to 10,000µF

Rated Working Voltage:
6.3Vdc to 100Vdc

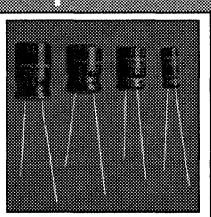
Operating Temp Range:
-40°C to +85°C

Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.02CV + 3µA

Load Life:
1,000 Hrs @ 85°C

Packaging:
Tape/Box, Tape/Reel Bulk



EVS Series
General Purpose
7mm Height
Radial Lead

Capacitance Range:
0.1µF to 220µF

Rated Working Voltage:
4Vdc to 63Vdc

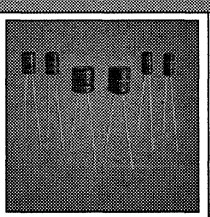
Operating Temp Range:
-40°C to +85°C

Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.01CV or 3µA

Load Life:
1,000 Hrs @ 85°C

Packaging:
Tape/Box, Tape/Reel Bulk



EVSM Series
General Purpose
5mm Height
Radial Lead

Capacitance Range:
0.1µF to 220µF

Rated Working Voltage:
4.0Vdc to 50Vdc

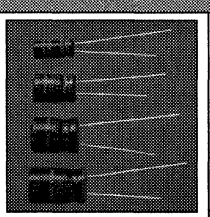
Operating Temp Range:
-40°C to +85°C

Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.01CV or 3µA

Load Life:
1,000 Hrs @ 85°C

Packaging:
Tape/Box, Tape/Reel Bulk



EVUS Series
High Temperature
Standard
Radial Lead

Capacitance Range:
0.1µF to 15,000µF

Rated Working Voltage:
6.3Vdc to 450Vdc

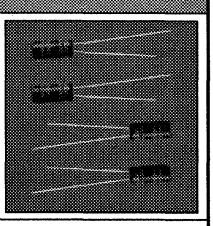
Operating Temp Range:
-25°C / -40°C to +105°C

Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.01CV + 3µA ≤100VDC
≤0.03CV + 10µA ≥160VDC

Load Life:
2,000 Hrs @ 105°C

Packaging:
Tape/Box, Tape/Reel Bulk



EVUM Series
High Temperature
7mm Height
Radial Lead

Capacitance Range:
0.1µF to 220µF

Rated Working Voltage:
4.0Vdc to 63Vdc

Operating Temp Range:
-40°C to +105°C

Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.01CV or 3µA

Load Life:
1,000 Hrs @ 105°C

Packaging:
Tape/Box, Tape/Reel Bulk

©1998 Paccom Electronics

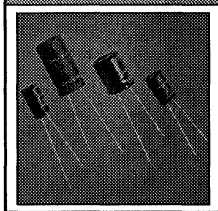
PACCOM ELECTRONICS

Tel (800) 848-6983
www.paccom.com

Aluminum Electrolytic Capacitors

Paccom Electronics reserves the right to make changes without notice in the construction and design from the specifications. No warranties are expressed or implied.

Aluminum Electrolytic Capacitors



EVX Series
Long Life
High Temperature
Radial Lead

Capacitance Range:
0.47µF to 4,700µF

Rated Working Voltage:
10Vdc to 250Vdc

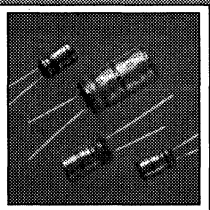
Operating Temp Range:
-55°C to +105°C

Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.01CV

Load Life:
5,000 Hrs @ 105°C

Packaging:
Tape/Box, Tape/Reel Bulk



RXMS Series
Low Impedence
Hi Reliability/Low ESR
Radial Lead

Capacitance Range:
3.3µF to 6,800µF

Rated Working Voltage:
6.3Vdc to 450Vdc

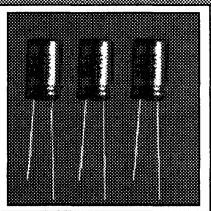
Operating Temp Range:
-55°C /- 25°C to +105°C

Capacit ance Tolerance:
±20%

Max. Leakage Current:
≤0.002CV or 3µA ≤100VDC
≤0.03CV + 10µA ≥160VDC

Load Life:
2,000 Hrs @ 105°C

Packaging:
Tape/Box, Tape/Reel Bulk



EVLM Series
Low Leakage Current
Standard
Radial Lead

Capacitance Range:
0.1µF to 15,000µF

Rated Working Voltage:
6.3Vdc to 100Vdc

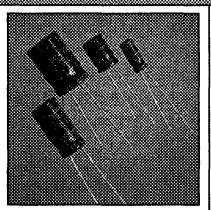
Operating Temp Range:
-40°C to +85°C

Capacitance Tolerance:
±10%, ±20%

Max. Leakage Current:
≤0.002CV or 0.4µA

Load Life:
1,000 Hrs @ 85°C

Packaging:
Tape/Box, Tape/Reel Bulk



EVSL Series
Low Leakage Current
7mm Height
Radial Lead

Capacitance Range:
0.1µF to 100µF

Rated Working Voltage:
6.3Vdc to 50Vdc

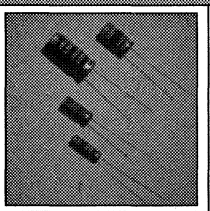
Operating Temp Range:
-40°C to +85°C

Capacitance Tolerance:
±10%, ±20%

Max. Leakage Current:
≤0.002CV or 0.4µA

Load Life:
1,000 Hrs @ 85°C

Packaging:
Tape/Box, Tape/Reel Bulk



EVLU Series
Low Leakage Current
High Temperature
Radial Lead

Capacitance Range:
0.1µF to 15,000µF

Rated Working Voltage:
6.3Vdc to 100Vdc

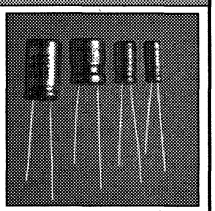
Operating Temp Range:
-40°C to +105°C

Capacitance Tolerance:
±10%, ±20%

Max. Leakage Current:
≤0.002CV or 0.4µA

Load Life:
1,000 Hrs @ 105°C

Packaging:
Tape/Box, Tape/Reel Bulk



EVLN Series
Low Leakage Current
Low Noise
Radial Lead

Capacitance Range:
0.1µF to 470µF

Rated Working Voltage:
6.3Vdc to 50Vdc

Operating Temp Range:
-40°C to +85°C

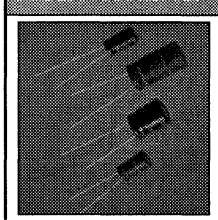
Capacitance Tolerance:
±10%, ±20%

Max. Leakage Current:
≤0.002CV or 0.4µA

Load Life:
1,000 Hrs @ 85°C

Packaging:
Tape/Box, Tape/Reel Bulk

Aluminum Electrolytic Capacitors



EVN Series
Bi-Polar
Standard
Radial Lead

Capacitance Range:
0.1µF to 1,000µF

Rated Working Voltage:
10Vdc to 50Vdc

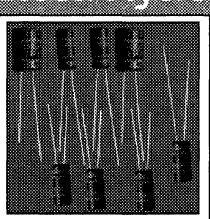
Operating Temp Range:
-40°C to +85°C

Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.03CV or 3µA

Load Life:
1,000 Hrs @ 85°C

Packaging:
Tape/Box, Tape/Reel Bulk



EVNS Series
Bi-Polar
Reduced Size
Radial Lead

Capacitance Range:
0.47µF to 6,800µF

Rated Working Voltage:
6.3Vdc to 250Vdc

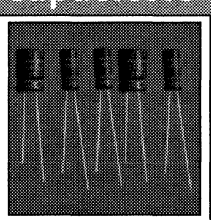
Operating Temp Range:
-40°C to +85°C

Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.06CV + 10µA

Load Life:
1,000 Hrs @ 85°C

Packaging:
Tape/Box, Tape/Reel Bulk



EVNM Series
Bi-Polar
7mm Height
Radial Lead

Capacitance Range:
0.1µF to 100µF

Rated Working Voltage:
4.0Vdc to 63Vdc

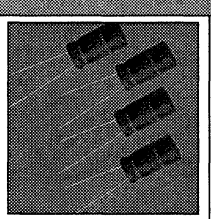
Operating Temp Range:
-40°C to +85°C

Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.06CV + 10µA

Load Life:
1,000 Hrs @ 85°C

Packaging:
Tape/Box, Tape/Reel Bulk



EVNC Series
Bi-Polar
Frequency Crossover
Radial Lead

Capacitance Range:
1.0µF to 100µF

Rated Working Voltage:
25Vdc to 100Vdc

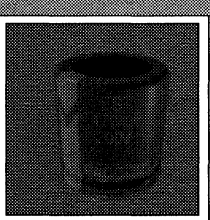
Operating Temp Range:
-40°C to +85°C

Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.03CV or 3µA

Load Life:
1,000 Hrs @ 85°C

Packaging:
Tape/Box, Tape/Reel Bulk



ES Series
General Purpose
High Ripple Current
Snap-In Radial Lead

Capacitance Range:
56µF to 56,000µF

Rated Working Voltage:
10Vdc to 450Vdc

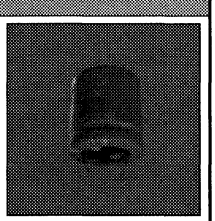
Operating Temp Range:
6.3~100VDC -40°C to +85°C
160~450VDC -25°C to +85°C

Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.02CV or 3mA

Load Life:
2,000 Hrs @ 85°C

Packaging:
Bulk



ESU Series
High Temperature
High Ripple Current
Snap-In Radial Lead

Capacitance Range:
68µF to 68,000µF

Rated Working Voltage:
10Vdc to 400Vdc

Operating Temp Range:
6.3~100VDC -40°C to +105°C
160~450VDC -25°C to +105°C

Capacitance Tolerance:
±20%

Max. Leakage Current:
≤0.02CV or 3mA

Load Life:
2,000 Hrs @ 105°C

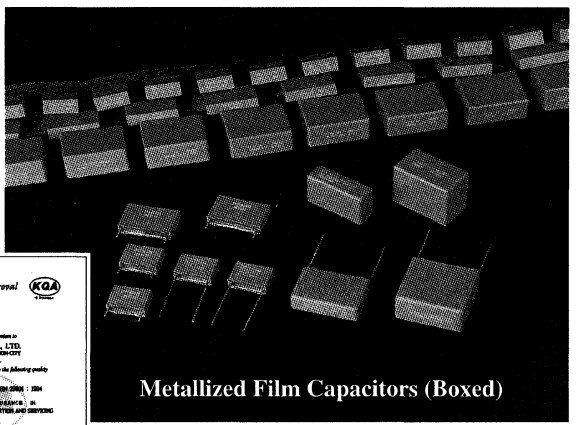
Packaging:
Bulk

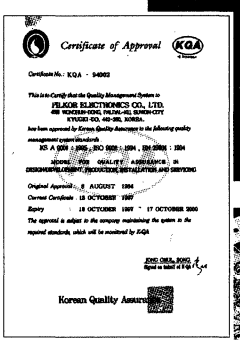
Quality Products & Quality Service from PILKOR!

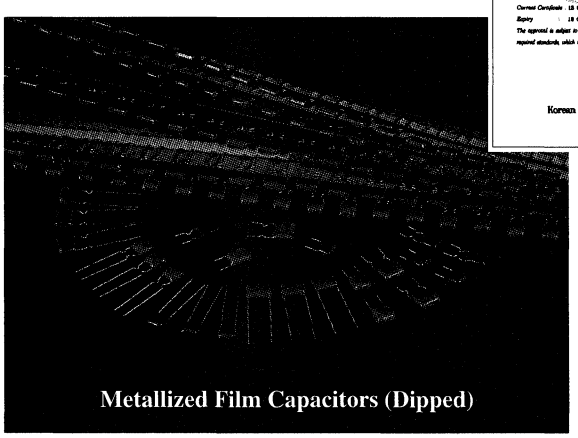
ISO 9001 Certified Company

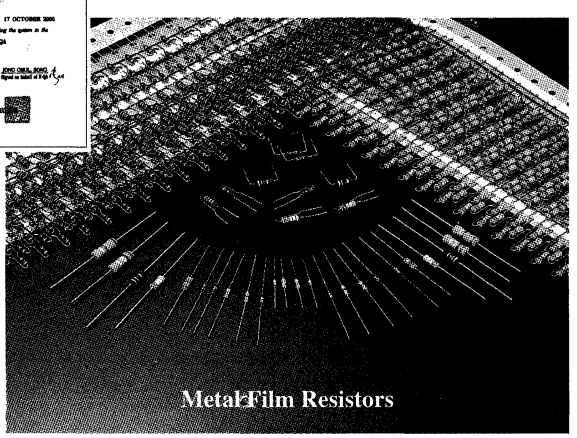
♣ Main Products ♣

- ◆Metallized Polypropylene & Polyester Film Capacitors
  - ☞ Interference Suppression Capacitor (Class X2) (335 / 335 Miniature Series)
  - ☞ AC + Pulse capacitors for High Frequency & High Voltage (376 / 378 / 379 Series)
  - ☞ General Purpose under Dipped Type (365 / 366 / 367 / 368 Series)
  - ☞ Spark Quenching R-C Networks
- ◆Metal Film Resistors
  - ☞ Standard Resistor : 1/8, 1/4, 1/2 Wattage
  - ☞ Fusible (Non-flammable) Resistor : 1/4, 1/2, 1, 2 Wattage
  - ☞ Power Resistor : 1. 2. 3.Wattage
  - ☞ Customized Products (Forming and R-Shaping) are available.


Metallized Film Capacitors (Boxed)


Certificate of Approval


Metallized Film Capacitors (Dipped)


Metal Film Resistors

◆Safety Approval for X2 (10 Countries Safety Approvals acc. to IEC 384-14, 2nd Editions)

UL 1414

PILKOR, previously a multinational company' s Korean facility for Metal Film Capacitors & Resistors, is the largest and leading ma.. ufacturer of these products in Korea (Sales US$ 50Mil.). Established in 1974 by a European multinational company, it was divested in 1994 and PILKOR was created. Pilkor has gone significantly beyond competitive quality performance. PPM performance has consistently come in at 1% for many years. PILKOR is able to offer You globally leading performance on all key performance criteria as one of your best suppliers.

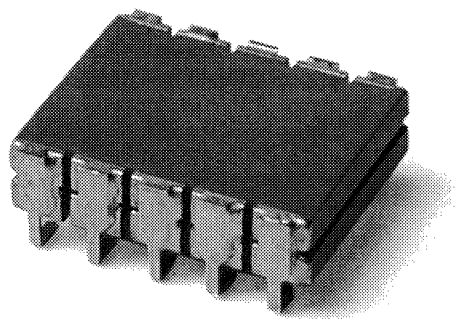
♣ Factory & Head Office

PILKOR ELECTRONICS LTD.
381. Wonchun-Dong, Paldal-Ku, Suwon City, Kyung Ki-Do, Republic of Korea
For complete data, Please call, Fax, visit our Hompage at :
http://users.unitel.co.kr/~pilkor
Tel. 82-331-213-2961/4 (Ext. 370/2) / 82-331-213-2966 (Direct) / Fax.213-2968 / 9

PILKOR Distributors in U.S.A
- ☞ TAURUS Electronics, Tel) 0213 233 1009
- ☞ Compuxpress Inc. Tel) (310) 453 2726

Ceramic Multilayer Capacitors

Presidio Components, Inc. is a leader in high-quality ceramic capacitor products because of our uncompromising dedication to the highest standards of manufacturing, quality control and service. Our state-of-the-art manufacturing technology utilizes the latest designs in machine automation. All manufacturing takes place in our modern facility in San Diego, California. This extensive manufacturing capability, combined with our broad experience in ceramic materials, insures the highest quality products for your application.



DIVERSE MARKETS

Presidio Components' markets include high-reliability commercial, military and medical electronics. Presidio Components is qualified to R level of Mil-C-55681 and currently provides quality ceramic capacitors to hundreds of corporations.

CUSTOMER SERVICE

Presidio's business is built on establishing long-term relationships with our customers. We are committed to providing quality products and superior service. You can depend on Presidio Components to always go the extra mile for you.

Products

- CHIP CAPACITORS (0402-2225)
- CDR CHIP CAPACITORS
- STACKED CAPACITORS (87106 STYLE)
- HIGH-VOLTAGE CAPACITORS (500-5000V)
- EXTENDED RANGE CAPACITORS
- CRYOGENIC CAPACITORS
- HIGH TEMP APPLICATIONS
- CAPACITOR ARRAYS
- RADIAL LEADED/EPOXY COATED CAPACITORS

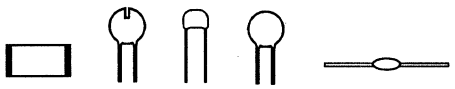
For more information, visit our website at
www.presidiocomponents.com

PRESIDIO COMPONENTS, INC.
7169 Construction Court
San Diego, CA 92121
Tele. (619) 578-9390
Fax: 1-800-538-3880

RFE INTERNATIONAL

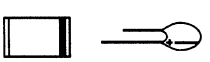
CAPACITOR PRODUCTS

Ceramic Capacitors



RFE Type	Char Code	wVdc	Capacitance Range	Operating Temp. Range	Temp. Coef. PPM/C	DF@ +25°C	Comment
MA	**Multilayer Chip 0603, 0805, 1206, 1210, 1812, 2225**						
	NPO	25 ~ 2000	0.5 ~ 10000pF	-55 to +125°C	0% ±30	<0.001@1KHz	For surface mount
	X7R	25 ~ 2000	180 ~ 470000µF	-55 to +125°C	0±15%	<0.025@1KHz	For surface mount
	Z5U	16 ~ 50	0.01µF-1µF	+10 to +85°C	△C%+22 to-56%	<0.025@1KHz	For surface mount
	Y5V	16 ~ 200	10nF~1µF	-30 to +85°C	△C%+22 to 82%	0.025@1KHz	For surface mount
RD	**Multilayer, Radial Leads, Epoxy Dipped, RD2, RD3, RD4**						
	NPO	50 & 100	1 ~ 22000pF	-55 to +125°C	0% ±30	<0.001@1KHz	Tape & Reel or Bulk Pack
	X7R	50 & 100	470pF-1.0µF	-55 to +125°C	0±15%	<0.025@1KHz	Tape & Reel or Bulk Pack
	Z5U	50 & 100	0.01-0.47µF	-10 to +85°C	+22 to -56%	<0.025@1KHz	Tape & Reel or Bulk Pack
AD	**Multilayer Axial Leads, Epoxy Coated, AD10**						
	NPO	50 & 100	1-3300pF	+55 to +125°C	0% ±30	<0.001@1KHz	Tape & Reel or Bulk Pack
	X7R	50 & 100	560pF-0.047µF	+55 to +125°C	0±15%	<0.025@1KHz	Tape & Reel or Bulk Pack
	Z5U	50 & 100	0.01µF-0.22µF	+10 to +85°C	+22 to -56%	<0.025@1KHz	Tape & Reel or Bulk Pack
1	**Disc, Temperature Compensating Resin Coated to 1KV and Epoxy Coated above 1KV**						
	NPO	50 to 5k	1 ~ 150pF	+55 to +85°C	0% ±30	See Specs.	High Q, High Stability
	S2L	50 to 5k	5.1 ~ 560pF	+55 to +85°C	+170-830	See Specs.	High Q, High Stability
2	**Disc, High-K, Resin Coated to 1KV and Epoxy Coated above 1KV**						
	Z5F	50 to 5k	100 ~ 33kpF	+10 to +85°C	±7.5%	2.5%	By-pass & Coupling Applications
	Y5P	50 to 5k	100 ~ 33kpF	"+30°C ~ +85°C	±10%	2.5%	Filtering, Blocking & Timing Applications
	Z5U	50 to 5k	100pF ~ 33kpF	+10 to +85°C	+22 ~ -56%	2.5%	By-pass & Coupling Applications
	Y5U	50 to 5k	750pF ~ 0.1µF	-30 to +85°C	+22 ~ -56%	2.5%	Filtering, Blocking & Timing Applications
	Z5V	50 to 5k	2500pF ~ 0.1µF	+10 to +85°C	+22 ~ 82%	5.0%	By-pass & Coupling Applications
3	**Disc, Semi-Conducting, Resin Coated (Epoxy Coating Optional)**						
	Y5P,U,V	12 to 50	0.01 ~ 0.47µF	-30 to +85°C	See Specs.	8% max	Low volt By-pass and coupling
4	**Disc, Spark Gap, Resin Coated with cut at top for static/stray transient discharge**						
	Z5U,F	1k to 2.5k	0.001pF ~ .75pF	+10 to 85°C	+7.5% to -56%	2.5%	Static/stray voltage protection
	Y5P	1k to 2.5k	0.75pF ~ 0.02µF	-30 to 85°C	±10%	2.5%	Static/stray voltage protection
5	**Disc, Across the line, Epoxy Coated X & Y Class**						
	Y5P	125 to 400VAC	100pF-0.01µF	-30 to +85°C	±10%	See Specs.	UL, CSA & VDE Recognized
	Y5V	125 to 400VAC	0.001-0.01µF	-30 to +85°C	+22-82%	See Specs.	UL, CSA & VDE Recognized International Agency Approved

Tantalum Solid Electrolytic Capacitors



RFE Type	Cap Range uF	Cap Tol ±%	Op Voltage wVdc	Oper. Temp. °C	DCL uA	Comments
Industrial Grade/General Purpose/Radial Leads/Epoxy Dipped						
CB	.10 ~ 330	10 & 20	6.3 ~ 50	-55 to +125	<0.01CV	Derate wVdc above +85°C
Very Low Leakage/Radial Leads/Epoxy Dipped						
CL-A,B,C	.10 ~ 330	5, 10 & 20	6.3 ~ 50	-55 to +125	<0.01CV	3 Leakage Ranges Available
Sub Miniature/Radial Leads/Epoxy Dipped						
CM	0.47 ~ 10	10 & 20	6.3 ~ 50	-55 to +125	<0.01CV	Small size, Low DCL
Surface Mount						
SMT	.10 ~ 330	10 & 20	6.3 ~ 50	-55 to +125	<0.01CV	Surface Mount

RFE INTERNATIONAL
RFE International Inc. • 20432 Barents Sea Circle, Lake Forest, CA 92630
Tel:(949)583-0808 • Fax:(949)583-9898 • E-Mail:rfeint@Compuserve.com

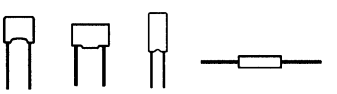
RFE INTERNATIONAL

CAPACITOR PRODUCTS

Aluminum Electrolytic Capacitors

RFE Type	Cap Range	Oper Volts wVdc	Oper Life Hrs@X°C	Ripple Current mA@ X°C	Ripple Temp. Multiplier	Comment
Polarized, Radial Leads						
RE/RC	0.1 ~ 22K	6.3 ~ 100	2000 @ 85	1.5 ~ 3066	1.78 ~ 1.0	Low impedance, general purpose
RG	0.1 ~ 4700	6.3 ~ 100	2000 @105	2 ~ 1859	1.95 ~ 1.0	Higher temperature, general purpose
RH	0.47 ~ 330	160 ~ 450	1000 @ 85	5 ~ 550	See Specs.	Higher Voltage
RHG	1 ~ 470	160 ~ 450	1000 @ 85	13 ~ 826	See Specs.	Higher voltage/High temp.
RL	0.1 ~ 4700	6.3 ~ 100	2000 @ 85	1.5 ~ 3185	1.75 ~ 1.0	Low leakage, general purpose
SE	0.1 ~ 470	4 ~ 63	2000 @ 85	2 ~ 154	See Specs.	Super-miniature, general purpose
SS	0.1 ~ 220	4 ~ 50	2000 @ 85	1 ~ 74	See Specs.	Micro-miniature, straight leads
SSX	0.1 ~ 220	4 ~ 50	2000 @ 85	1 ~ 74	See Specs.	Micro-miniature, formed leads
Polarized, Axial Leads						
TE	0.1 ~ 22K	6.3 ~ 100	2000 @ 85	1.5 ~ 3097	1.78 ~ 1.0	Low impedance, general purpose
TG	0.1 ~ 4700	6.3 ~ 100	2000 @ 85	2.0 ~ 1878	1.78 ~ 1.0	High temperature, general purpose
TH	1 ~ 330	160 ~ 450	1000 @ 85	7 ~ 632	2.2 ~ 1.0	High voltage
TL	0.1 ~ 4700	6.3 ~ 100	2000 @ 85	1.5 ~ 3190	1.75 ~ 1.0	Low DCL, Low impedance
Non-Polarized, Radial Leads						
RN	0.1 ~ 2200	6.3 ~ 100	1000 @ 85	4 ~ 1347	See Specs.	For audio circuits (Bi-polar available)
Non-Polarized, Axial Leads						
TN	0.1 ~ 2200	6.3 ~ 100	1000 @ 85	5 ~ 1393	See Specs.	Single end seal, Audio circuit use
TNR	0.1 ~ 2200	6.3 ~ 100	1000 @ 85	5 ~ 1393	See Specs.	Double end seal, Audio circuit use
Surface Mount						
SME	0.1µF~330µF	4 ~ 50	2000 @ 85	1.0 ~ 150	See Specs.	Micro-miniature Surface Mount
Snap-In						
LP	47 ~ 68K	10 ~ 450	5000 @ 85	2.0 ~ 5.9	See Specs.	Low profile, long life
HP	33 ~ 68K	10 ~ 400	3000 @ 105	.23 ~ 5.27	See Specs.	High temp., long life
LT	330 ~ 82K	16 ~ 450	5000 @ 85	.99 ~ 6.8	See Specs.	4 terminal, long life
HT	39 ~ 1200	160 ~ 400	3000@ 105	.39 ~ 2.28	See Specs.	4 terminal, High temp. 75,000 hrs @ 65°C

Film/Foil & Metalized Film Capacitors



RFE Type	Material	Construction	Leads	wVdc	Cap Range µF	Cap Tol. ±%	Comment
L/LM	Polyester	Film/Foil	Radial	50 ~ 400	.001 ~ .47	5 ~ 20	General purpose, Min. ESR
N	Polyester	Film/Foil	Radial	50 ~ 200	.001 ~ .47	5 ~ 20	Non-Inductive
T	Polyester	Film/Foil	Axial	50 ~ 630	.001 ~ .47	5 ~ 20	Non-Inductive, Decoupling & Timing
MME	Polyester	Metalized	Radial	63 ~ 100	.001 ~ 1.5	5 ~ 20	Auto-Insertion, Box
MMD	Polyester	Metalized	Radial	63 ~ 400	0.033 ~1.0	5 ~ 20	Replaces Stacked Film
MD	Polyester	Metalized	Radial	63 ~ 630	.01 ~ 10.0	5 ~ 20	Non-Inductive
MT	Polyester	Metalized	Axial	100 ~ 630	.01 ~ 12.0	5 ~ 20	Non-Inductive, Round Body
MF	Polyester	Metalized	Axial	100 ~ 630	.01 ~ 12.0	5 ~ 20	Non-Inductive, Flattened Body
PMT	Polypropylene	Metalized	Axial	250 ~ 630	0.01~ 4.7	5 ~ 20	High Rel, Round Body
PMF	Polypropylene	Metalized	Axial	250 ~ 630	0.01~ 4.7	2 ~ 20	High Rel, Flattened Body
PPL	Polypropylene	Film/Foil	Radial	50 ~ 250	0.001 ~ .39	2 ~ 20	Low DF & High IR For RF Circuits
PND	Polypropylene	Film/Foil	Radial	50 ~ 630	.001 ~ .47	5 ~ 20	Low DF & High IR For General Purpose
PMD	Polypropylene	Metalized	Radial	100 ~ 630	.001 ~ 3.3	5 ~ 20	High Temp., Dipped or Box
PMF	Polypropylene	Metalized	Axial	250 ~ 630	.001 ~ .47	5 ~ 20	High Rel, Flattened Body
MPPS	Polypropylene	Metalized	Radial	1k ~ 2k	.001 ~ .033	5 ~ 10	High Freq., Pulse, High Current
PPS	Polypropylene	Film/Foil	Radial	1k ~ 2k	.001 ~ 3.3	5 ~ 10	High DV/DT
MEX	Class X-2	Metalized	Radial	250Vac	.001 ~ .47	5 ~ 20	UL, CSA, VDE, NEMKO, DENKO, etc
MPA	Polyester	Metalized	Radial	160~250Vac	0.1 ~ 5.6	5 ~ 20	Across-the-line, AC applications
PMA	Polypropylene	Metalized	Radial	250~400Vac	.01 ~ 1.0	5 ~ 20	Across-the-line, AC applications
MEY	Class Y	Metalized	Radial	120~250Vac	0.001 ~ 0.47	5 ~ 20	UL

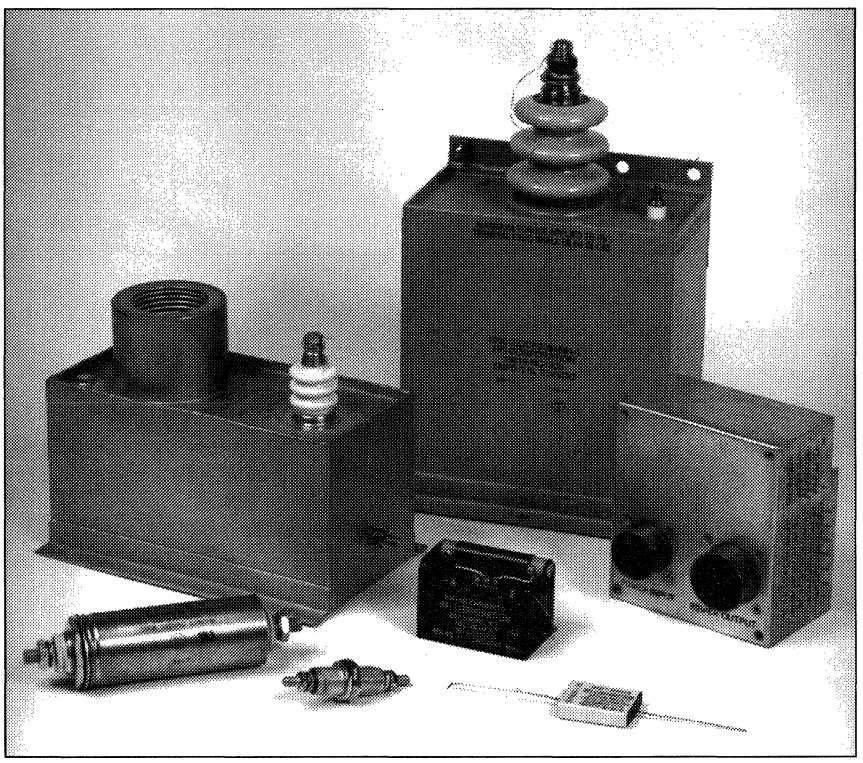
RFE INTERNATIONAL

RFE International Inc. • 20432 Barents Sea Circle, Lake Forest, CA 92630

Tel (949)583-0808 • Fax (949)583-9898 • E-Mail: rfeint@Compuserve.com

RFI Corporation

CAPACITORS



- Reconstituted mica capacitors
- Film-Foil capacitors
- Metalized capacitors
- Communication, high current capacitors
- Feed-Through EMI/EMC/RFI Capacitors

RFI's High Voltage Magnetics and Capacitors has earned a quality reputation in the market. RFI offers components such as high voltage capacitors, pulse modulators, transformers and reactors, and a variety of other products designed for industrial, medical, military and other commercial applications. RFI's design and engineering work in high-voltage magnetics have won various recognition awards from the nation's leading major Fortune 500 corporations!

RFI Corporation also owns the sole manufacturing rights to the STANLEY line of High-Voltage and Reconstituted Mica Capacitors.

RFI is a company with great engineering and manufacturing resources. RFI offers more products, designs and technical solutions than any of our competitors. RFI has more filters on the QPL list than anyone!

Our sales and engineering personnel are available to help you solve your unique technical needs with either an existing or custom design.

RFI Corporation

A DEL GLOBAL TECHNOLOGIES CORPORATION

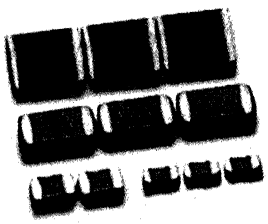
100 Pine Aire Drive, Bay Shore, Long Island, New York 11706 • Phone 516-231-6400 • FAX: 516-231-6465
Visit our Website at http://www.rficorp.com E-Mail us at info@rficorp.com

A Partner You Can Trust
SAMSUNG ELECTRO-MECHANICS

HEAD OFFICE & FACTORY
314,MAETAN 3DONG, PALDAL-KU, SUWON, KYUNGKI-DO, KOREA 442-743
TEL:(82-331)210-6120, 6791 FAX:(82-331)210-5999, 6109

SAMSUNG ELECTRO-MECHANICS AMERICA, INC.
85 TASMAN DRIVE, SAN JOSE, CA, 95134 U.S.A
TEL:(1-408)544-5200~9, 5211~5. 5217~8 FAX:(1-408)544-4967~8

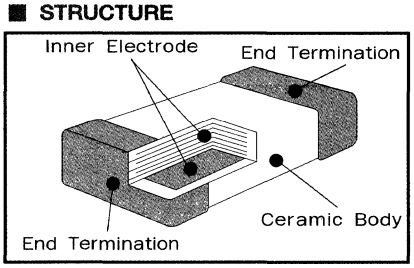
MULTI-LAYER CERAMIC CHIP CAPACITOR



■ FEATURE

- Miniature Size
- Wide Capacitance, TC and Voltage Range

■ STRUCTURE



■ THICKNESS OPTION

DESCRIPTION
Standard thickness
Thinner than standard thickness
Thicker than standard thickness
standard thickness high Q (Low DF)

■ PACKAGING OPTION

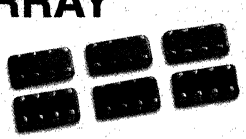
PACKAGING	MARKING	PACKAGING	MARKING
Bulk (Vinyl Bag)	No	Paper Tape, 13" reel	No
Bulk (Vinyl Bag)	Yes	Paper Tape, 13" reel	Yes
CASSETTE	No	Embossed Tape, 7" reel	No
CASSETTE	Yes	Embossed Tape, 7" reel	Yes
Paper Tape, 7" reel	No	Embossed Tape, 13" reel	No
Paper Tape, 7" reel	Yes	Embossed Tape, 13" reel	Yes

■ STANDARD THICKNESS BY CAPACITANCE RANGE

SIZE			05 TYPE (0402)	10 TYPE (0603)	21 TYPE (0805)			31 TYPE (1206)				32 TYPE (1210)		
DIMENSION (mm)		L	1.0 ±0.05	1.6 ±0.1	2.0 ±0.1			3.2 ±0.15				3.2 ±0.3		
		W	0.5 ±0.05	0.8 ±0.1	1.25 ±0.1			1.6 ±0.15				2.5 ±0.2		
		T	0.5 ±0.05	0.8 ±0.1	0.65 +0.05 -0.10	0.85 ±0.1	1.25 ±0.1	0.65 ±0.1	0.85 ±0.1	1.15 ±0.1	1.25 ±0.1	1.0 ±0.2	1.25 ±0.2	1.4 ±0.2
CAPACITANCE RANGE	C & TC	50V	0.5~ 120	0.5~ 680	0.5~ 560	620~ 1000	1100~ 1800	0.5~ 1500	1600~ 2200	2400~ 2700	3000~ 3300	4700	5600	7500
		100V	-	0.5~ 390	0.5~ 470	510~ 1000	1100~ 1200	0.5~ 1500	1600~ 1800	2000~ 2200	2400~ 2700	-	-	-
	SL	50V	0.5~ 240	0.5~ 1000	0.5~ 1000	1100~ 1500	1600~ 2700	0.5~ 2200	2400~ 2700	3000~ 3300	3600~ 5600	-	-	-
		100V	-	0.5~ 680	0.5~ 560	620~ 1000	-	0.5~ 1000	1100~ 1500	1600~ 2200	2400~ 3300	-	-	-
	B (X7R)	16V	6800~ 10000	33000~ 100000	100000~ 180000	220000~ 330000	390000~ 560000	330000~ 560000	680000~ 820000	1000000~ 1200000	1500000	1000000~ 1800000	2200000	2700000
		25V	1000~ 8200	10000~ 39000	47000~ 68000	82000~ 120000	150000~ 220000	100000~ 220000	270000~ 390000	470000	560000	330000~ 820000	1000000	1200000
		50V	220~ 2700	220~ 15000	330~ 39000	47000~ 56000	68000~ 100000	330~ 82000	100000~ 150000	180000~ 220000	-	100000~ 270000	330000~ 390000	470000
	F (Y5V)	16V	33000~ 56000	100000~ 330000	330000~ 680000	820000~ 1000000	1200000~ 2200000	1000000~ 1500000	1800000~ 2220000	2700000~ 3300000	3900000~ 4700000	3300000~ 5600000	6800000~ 8200000	10000000
		25V	10000~ 39000	47000~ 120000	100000~ 270000	330000~ 470000	560000~ 820000	470000~ 680000	820000~ 1000000	1200000~ 1500000	1800000~ 2200000	1200000~ 2700000	3300000~ 3900000	-
		50V	2200~ 10000	10000~ 56000	10000~ 82000	100000~ 150000	180000~ 330000	10000~ 330000	390000~ 470000	560000~ 680000	820000	820000	100000~ 1200000	-
	E (Z5U)	25V	-	-	100000~ 220000	270000~ 330000	390000~ 560000	330000~ 470000	560000~ 680000	820000~ 1200000	-	1000000~ 1500000	1800000	2200000
		50V	-	-	10000~ 82000	100000~ 120000	150000~ 220000	10000~ 270000	330000~ 390000	470000~ 560000	-	100000~ 680000	820000~ 1000000	1200000

(CAPACITANCE UNIT:pF)

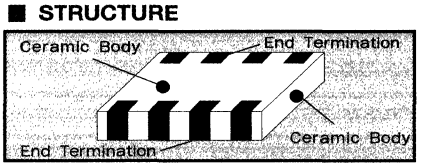
MULTI-LAYER CERAMIC CHIP CAPACITOR ARRAY



■ FEATURE

- Reduction in required real estate (more than 50%)
- Reduced Cost, Space and Time for placement on PCB
- Reduction in number of solder joints
- Easier PCB design
- Reduced waste from tape and reel packaging process
- It protect EMI bypassing digital signal line nose

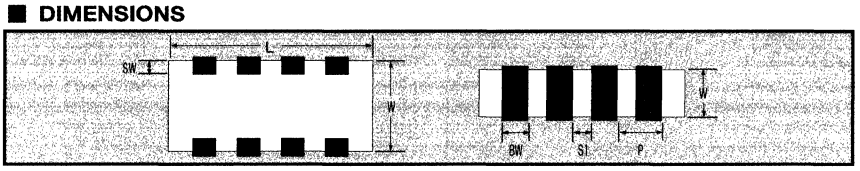
■ STRUCTURE



(Unit:mm)

Type	Size(inch)	Element	L	W
04	0612	4	3.2±0.15	1.6±0.15
	T	BW	SW	S1	P
	1.35 MAX	0.4±0.2	0.3±0.15	0.4±0.2	0.8±0.2

■ DIMENSIONS



■ C-ARRAY

※ Thickness 0.85±0.1mm

Temperature Characteristics	Size	Voltage	Capacitance Range: 10pF – 100pF – 1000pF – 10000pF – 0.1μF – 1μF – 10μF
CH	0612	50V	10 – 47
X7R	"	16V	47 – 0.1
	"	25V	47 – 22000
	"	50V	47 – 10000
Y5V	"	16V	10000 – 0.15
	"	25V	10000 – 0.1
	"	50V	10000 – 47000

Please contact us for special capacitance and high voltage(100V)

A Partner You Can Trust

SAMSUNG ELECTRO-MECHANICS

SAMSUNG ELECTRO-MECHANICS GmbH.
SAMSUNG HAUS AM KRONBERGER HANG 6, 65824 SCHWALBACH/TS, GERMANY
TEL:(49-6196)66-7700, 7000, 7200 FAX:(49-6196)66-7766

SAMSUNG ASIA PTE., LTD.(ELECTRO-MECHANICS DIVISION)
83 CLEMENCEAU AVENUE, #08-05 UE SQUARE, SINGAPORE 239920
TEL:(65)8333-215~233 FAX:(65)8333-243, 244

SOLID TANTALUM CAPACITOR

FEATURE

- Epoxy molded tantalum chip capacitors
- Designed for SMD
- Wide temperature range, low leakage current
- Long-term capacitance stability
- Capacitance and ESR have minor temperature dependence
- High resistance to vibration and shock, as it is important,for example in automotive electronic
- Suitable for wave, reflow and vapor soldering

PRODUCT IDENTIFICATION

TC	SCN	1A	225	M	B	A	R
①	②	③	④	⑤	⑥	⑦	⑧

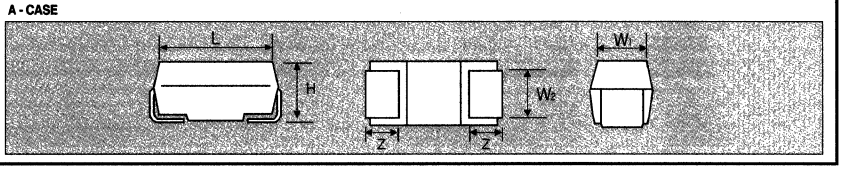
① Tantalum Capacitors
② Series Name (SCN,SCS)
③ Rated Voltage Code
④ Capacitance Code
⑤ Cap. Tolerance (K:±10%, M:±20%)
⑥ Case Code (A,B,C,D)
⑦ Division
⑧ Packaging Code

RATED VOLTAGE CODE

Code	R. Voltage
0G	4
0J	6.3
1A	10
1C	16
1D	20
1E	25
1V	35
1H	50

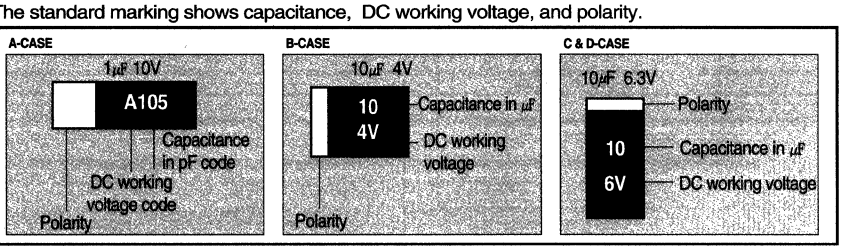
DIMENSIONS

A - CASE



MARKING SPECIFICATION

The standard marking shows capacitance, DC working voltage, and polarity.



CASE CODE

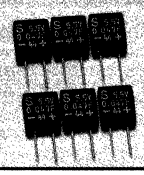
(Unit : mm)

Case Code	L	W1	W2	H	Z
A	3.2 ± 0.2	1.6 ± 0.2	1.2 ± 0.1	1.6 ± 0.2	0.8 ± 0.3
B	3.5 ± 0.2	2.8 ± 0.2	2.2 ± 0.1	1.9 ± 0.2	0.8 ± 0.3
C	6.0 ± 0.3	3.2 ± 0.3	2.2 ± 0.1	2.5 ± 0.3	1.3 ± 0.3
D	7.3 ± 0.3	4.3 ± 0.3	2.4 ± 0.1	2.8 ± 0.3	1.3 ± 0.3

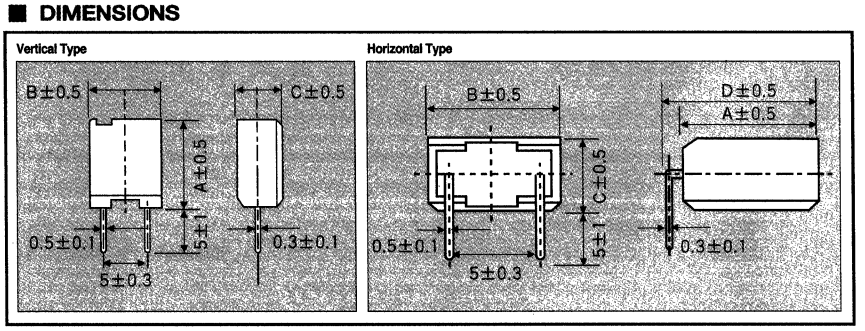
CASE CODES ACCORDING TO CAPACITANCE & RATED VOLTAGE

Capacitance Code \ Voltage Series	4V		6.3V		10V		16V		20V		25V		35V		50V	
	SCN	SCS	SCN	SCS	SCN	SCS	SCN	SCS	SCN	SCS	SCN	SCS	SCN	SCS	SCN	SCS
0.01 (103)													A			A
0.015 (153)													A			
0.022 (223)													A			
0.033 (333)													A			
0.047 (473)													A			B
0.068 (683)													A			
0.1 (104)													A			C
0.15 (154)													A			
0.22 (224)											A		A			
0.33 (334)											A		A			
0.47 (474)									A		A		B	A		
0.68 (684)							A		A		B	A	B	A		
1.0 (105)					A		A		B	A	B	A	B	A		
1.5 (155)			A		A		B	A	B	A	B	A	C	A,B		
2.2 (225)	A		A		B	A	B	A	B	A	C	A,B	C	B		
3.3 (335)	A		B	A	B	A	B	A	C	A,B	C	B	C	B		
4.7 (475)	B	A	B	A	B	A	C	A,B	C	B	C	B	D	C		
6.8 (685)	B	A	B	A	C	A,B	C	A,B	C	B	D	B,C	D	C		
10 (106)	B	A	C	A,B	C	A,B	C	B	D	B,C	D	C		D		
15 (156)	C	A,B	C	B	C	B	D	B,C	D	C		D		D		
22 (226)	C	A,B	C	B	D	B,C	D	C		D		D				
33 (336)	C	B	D	B,C	D	C		C,D		D						
47 (476)	D	C	D	B,C		C,D		C,D								
68 (686)	D	C		D		D										
100 (107)		D		D		D										
150 (157)																
220(227)																

STARCAP® (ELECTRIC DOUBLE LAYER CAPACITOR)



DIMENSIONS



FEATURE

- Tape packaging available
- Longer life than secondary battery
- Unrestricted lengthwise and crosswise mounting
- Compact resin case further helps miniaturize and conserve space
- Waterproof structure facilitates washing

Capacitance (F)	Equivalent Series Resistance (Ω)	Leakage Current (μA)	Dimension A	B	C	D
0.022 (223)	150 MAX.	50 MAX.	10.5	9.5	5.0	12.0
0.047 (473)	60 MAX.	70 MAX.	10.5	9.5	5.0	12.0
0.1 (104)	60 MAX.	150 MAX.	12.5	11.5	5.0	14.0

LEAD & TAPING TYPE

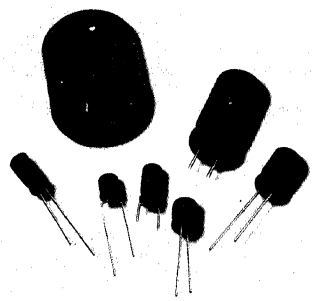
TYPE	CODE
VERTICAL BULK	V
HORIZONTAL BULK	H
AMMO TAPING	A

A Partner You Can Trust
SAMSUNG ELECTRO-MECHANICS

SAMSUNG ELECTORO-MECHANICS(H.K.) LTD.
65/F, CENTRAL PLAZA, 18 HARBOUR ROAD, WANCHAI, HONGKONG, CHINA
TEL:(852)2862-6331~2 FAX:(852)2528-5920

SAMSUNG JAPAN CO., LTD.
16~18F, HAMACHO CENTER BLDG. 2-31-1, NIHONBASHI-HAMACHO, CHUO-KU, TOKYO 103, JAPAN
TEL:(81-3)5641-9870, 9875 FAX:(81-3)5641-9881

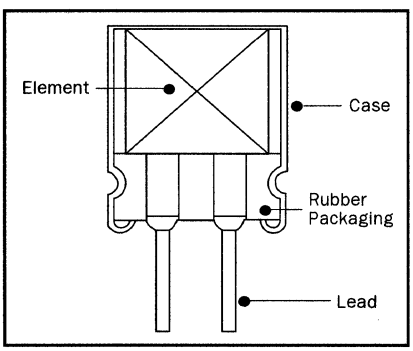
ALUMINUM ELECTROLYTIC CAPACITOR



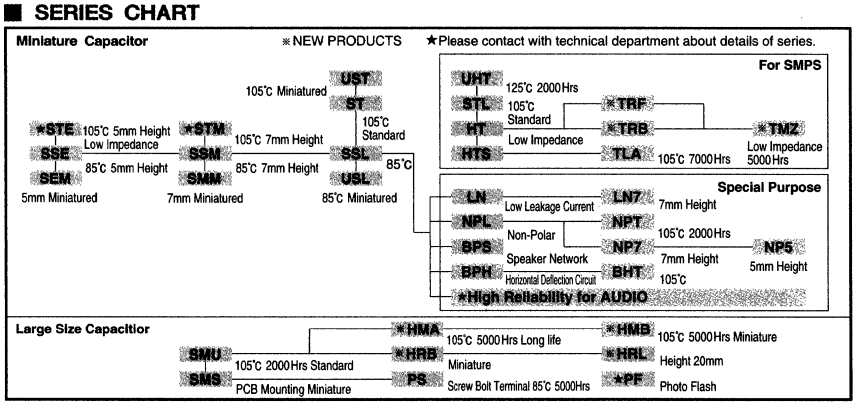
■ FEATURE

- Miniature size
- Wide Capacitance
- Lead taping capacitors for Automatic Insertion

■ STRUCTURE



■ SERIES CHART



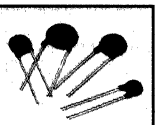
■ LIST OF PRODUCT

04: Radial lead type, 69: PCB terminal, 33: Screw terminal

		Series	Feature	W.V(V) Range	Capacitance (μF)	Temperature (℃)
Radial	Small Size	SSL	Standard Size, General	6.3 ~ 450	0.1 ~ 15000	-40(-25) ~ +85
		USL	Miniatured Size, General	6.3 ~ 450	10 ~ 22000	-40(-25) ~ +85
		ST	Standard Size, High-Temp	6.3 ~ 450	0.1 ~ 15000	-40(-25) ~ +105
		UST	Miniatured Size, High-Temp	6.3 ~ 450	10 ~ 22000	-55(-25) ~ +105
		SSM	Height 7mm, Standard	6.3 ~ 63	0.1 ~ 220	-40 ~ +85
		SMM	Height 7mm, Miniatured Size	6.3 ~ 63	0.1 ~ 330	-40 ~ +85
		STM	Height 7mm, High Temperature	6.3 ~ 50	0.1 ~ 100	-55 ~ +105
		SSE	Height 5mm, Standard	6.3 ~ 50	0.1 ~ 100	-40 ~ +85
		SEM	Height 5mm, Miniatured Size	6.3 ~ 50	0.1 ~ 100	-40 ~ +85
		STE	Height 5mm, High -Temp	6.3 ~ 50	0.1 ~ 100	-55 ~ +105
	Special	LN	Low Leakage Current	6.3 ~ 50	0.1 ~ 470	-40 ~ +85
		LN7	Height 7mm, Low Leakage Current	6.3 ~ 50	0.1 ~ 470	-40 ~ +85
		NPL	Non-Polar, Standard	6.3 ~ 100	0.47 ~ 6800	-40 ~ +85
		NPT	Non-Polar, High Temperature	6.3 ~ 100	0.47 ~ 6800	-55 ~ +105
		NP7	Height 7mm, Non-Polar	6.3 ~ 50	0.1 ~ 47	-40 ~ +85
		NP5	Height 5mm, Non-Polar	6.3 ~ 50	0.1 ~ 47	-40 ~ +85
		BPS	Cross Over Network	6.3 ~ 50	1.0 ~ 22	-40 ~ +85
		BPH	Horizontal Deflection Circuit	25, 50	2.2 ~ 10	-40 ~ +85
		BHT	Horizontal Deflection Circuit, High Temperature	25, 50	2.2 ~ 10	-55 ~ +105
	Low-Impedance	HT	Low ESR, Low Impedance	6.3 ~ 100	100 ~ 1000	-55 ~ +105
		HTS	Low Impedance	6.3 ~ 63	22 ~ 2200	-55 ~ +105
		STL	Standard, For SMPS	6.3 ~ 100	1.5 ~ 12000	-55 ~ +105
		※ TRF	Low Impedance Miniatured(TRZ)	6.3 ~ 50	1.5 ~ 12000	-55 ~ +105
		※ TRB	Low Impedance Miniatured	160 ~ 450	0.47 ~220	-40 ~ +105
		※ TMZ	Low Impedance Miniatured(105℃ 5000HRS)	6.3 ~ 50	1.5 ~ 12000	-55 ~ +105
		TLA	Long Life Miniatured Size (105℃ 7000HRS)	6.3 ~ 50	1.5 ~ 12000	-55 ~ +105
		UHT	For High Temperature +125℃(125℃ 2000HRS)	10 ~ 50	0.47 ~ 1000	-55 ~ +125
			High Reliability For AUDIO	6.3 ~ 100	0.1 ~ 10000	-40 ~ +85
Terminal	Large Capacitor	SMS	P.C board mounting, Standard	10 ~ 450	56 ~ 33000	-40(-25) ~ +85
		SMU	P.C board mounting, Standard	10 ~ 450	56 ~ 33000	-40(-25) ~ +105
		※ HRB	P.C board mounting Miniatured	10 ~ 450	56 ~ 33000	-40(-25) ~ +105
		※ HRL	Low Profile Hi-Temp 20mm	160 ~ 400	47 ~ 560	-40(-25) ~ +105
		※ HMA	P.C board mounting Long Life (105℃ 5000HRS)	160 ~ 400	82 ~ 1000	-25 ~ +105
		※ HMB	Long Life Miniature (105℃ 5000HRS)	160 ~ 400	56 ~ 1200	-40(-25) ~ +105
		PS	Screw Terminal, Standard	10 ~ 400	220 ~ 680000	-40(-25) ~ +85
		PF	For Photo Flash	330,360	150 ~ 1500	-20 ~ +55

※NEW PRODUCTS

CERAMIC CAPACITORS



High Voltage Ceramic Disc Capacitors Rated Voltage 1KV. to 10KV DC

■ FEATURE

1KV DC to 3KV DC
- High temperature stability
- Low loss at pulse voltage

■ SPECIFICATIONS

- **Operating temperature range**: -25℃~+85℃
- **Rated working voltage**: 1KV DC ~ 10KV DC
- **Test voltage**: 2 times rated working voltage
- **Insulation resistance**: 10,000MΩ MIN.
- **Capacitance measuring**: at 1MHz 1~5V rms and 20℃ for SL, 1KHz 1~5V rms and 20℃ for BDE
- **Dissipation factor**:
  tan δ≦2.5% (at 1KHz 1~5V rms, and 20℃ for BDE)
  Q≧1000 (at 1MHz 1~5V rms, and 20℃ for SL)

Safety Standard Recognized Ceramic Disc Capacitors Rated Voltage 125V, 250V, 400V AC

TYPE	SPECIFICATIONS
AA	● Operating temperature range: E,B:-25℃ ~ +85℃, F:-10℃ ~ +85℃ ● Rated working voltage: 125V, 250V, 400V AC ● Capacitance: Within the tolerance, when measured at 1KHz and 20℃ ● Dissipation factor: Measured at 1±0.1 KHz, 3Vrms MAX. and 20℃, E, B : tanδ ≤2.5% F : tanδ ≤5.0% ● Insulation resistance: 10,000 MΩ MIN. (at DC 500V for 1 MIN.) ● Test voltage : Between both leads : AC 2600V for 1 MIN.Body insulation: AC 2600V for 1 MIN.
AD	● Rated working voltage: 400V AC ● Test Voltage : Between both leads : AC 4000V for 1MIN. Body insulation : AC 4000V for 1 MIN.

■ CAPACITANCE TEMPERATURE CHARACTERISTICS

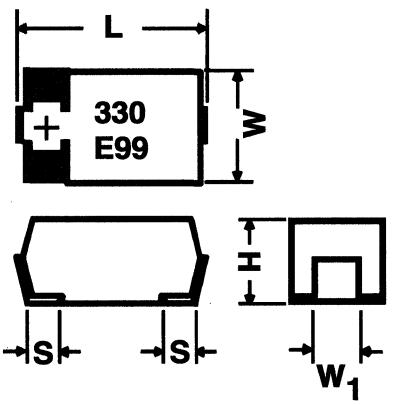
	Standard	Rated Voltage (Vac)		Approval No.		Capacitance Range (pF)	
		AA	AD	AA	AD	AA	AD
UL	UL1414	125 / 250	250	E87113	E87113	100 ~ 10,000	100 ~ 4,700
CSA	CSA C22, 2 NO1, 2	125	250	LR52861-12	LR52861-61	100 ~ 10,000	100 ~ 4,700
		250		LR52861-60			
VDE	VDE(0560-2)	400	400	62005	47724	100 ~ 10,000	100 ~ 4,700
	EN 132 400 : 1994 IEC384-14 SECOND EDITION (1993)	250 (Y2) and 400 (X1)	250 (Y1) and 400 (X1)	89788	89753	100 ~ 1,000	100 ~ 1,000
				89754	89751	1000 ~ 4,700	1000 ~ 4,700
				89752	9526177	10,000	100 ~ 4,700
SEMKO				9526177		100 ~ 10,000	
SEV	SEV(1016)	400	250	91.1 10711.01	94.1 00506.02	100 ~ 10,000	100 ~ 4,700
	EN 132 400:1994 IEC 384-14 SECOND EDITION (1993)	250 (Y2) and 400 (X1)	400	94.1 00506.01	91.5 51992.01	100 ~ 10,000	100 ~ 4,700
FIMKO			250 (Y1) and 400 (X1)	185717-01	185718-01	100 ~ 10,000	100 ~ 4,700
NEMKO				P95103321	P95103318	100 ~ 10,000	100 ~ 4,700
DEMKO				304527	304508	100 ~ 10,000	100 ~ 4,700
BSI	BS 415	400	250	163462	163461	100 ~ 10,000	100 ~ 4,700

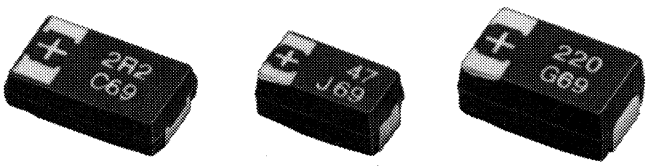
POSCAP
CAPACITORS

SANYO

POSCAP is a solid electrolytic chip capacitor. The anode is sintered Tantalum and the cathode is a highly conductive polymerized organic semiconductor formed on SANYO original method. POSCAP has a Low Profile, Large Capacitance, Low ESR and is high in safety. Therefore, POSCAP is suitable for high technology and low profile electronic equipment such as notebook personal computers, personal digital assistants and digital still cameras. etc..

Measurements & Size Table





TPA • TPB • TPC Series

Unit of measure: mm

Size Code	L (±0.2)	W (±0.2)	H*	S (±0.2)	W_1 (±0.1)
C	6.0	3.2	2.8	1.3	1.8
D2	7.3	4.3	1.9	1.3	2.4
D3	7.3	4.3	3.1	1.3	2.4

* C, D3 Size (±0.2) : D2 Size (±0.1)

TPA Series

μF \ WV	4	6.3	10
33			C
47		C	
100			D3
150		D3	
220	D3		

TPB Series

μF \ WV	2.5	4	6.3	10
100				D3
150			D3	
220		D3		
330	D3			

TPC Series

μF \ WV	2.5	4	6.3	10
68				D2
100			D2	
150		D2		
220	D2			

Characteristics Table

Series	Size Code	Sanyo Part Number	Rated Voltage (V)	Nominal Cap. (μF)	Tangent δ	Leakage Current (μA Max/5 min.)	E.S.R. (mΩ Max)	Maximum Allowable Ripple Current (mA rms)
TPA	C	10TPA33M	10.0	33	0.08	33.0	100	1000
	C	6TPA47M	6.3	47	0.08	29.6	100	1000
	D3	10TPA100M	10.0	100	0.08	100.0	80	1200
	D3	6TPA150M	6.3	150	0.08	94.5	80	1200
	D3	4TPA220M	4.0	220	0.08	88.0	80	1200
TPB	D3	10TPB100M	10.0	100	0.08	100.0	55	1900
	D3	6TPB150M	6.3	150	0.08	94.5	55	1900
	D3	4TPB220M	4.0	220	0.08	88.0	65	1500
	D3	2R5TPB330M	2.5	330	0.08	82.5	65	1500
TPC	D2	10TPC68M	10.0	68	0.10	68.0	45	1700
	D2	6TPC100M	6.3	100	0.10	63.0	45	1700
	D2	4TPC150M	4.0	150	0.10	60.0	45	1700
	D2	2R5TPC220M	2.5	220	0.10	55.0	45	1700

* ESR at 100 KHz, +20°C
* Maximum allowable ripple current at 100KHz - 500KHz, 45°C

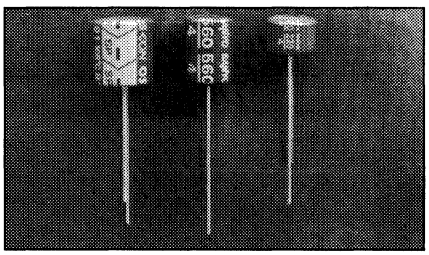
Please visit our website at: ***www.sanyovideo.com***

Or contact: ***SANYO VIDEO COMPONENTS (USA) CORP.***
San Diego, CA: 619-661-6835, San Jose, CA: 408-892-2789
Forrest City, AR: 870-633-5030, Rochelle Park, NJ: 201-843-8100

OS-CON

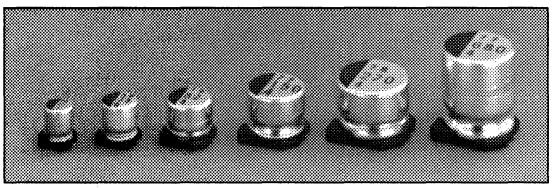
SANYO

aluminum solid capacitors with
Organic Semiconductive electrolyte



OS-CON Features:

- **OS-CON** is a Large Capacitance and Low ESR capacitor.
- ESR of **OS-CON** in NOT dependent on temperature.
- **OS-CON** has long life.



SP Series Radial Type

Size Code	Rated Voltage (V)	Nominal Capacitance (µF)	ESR (100kHz~300kHz) (mΩ) (max.)	Allowable Ripple Current (mA rms)+
C'	★25	6.8	55	1510
	20	22	50	1580
	16	33	50	1580
	10	56	45	1710
	6.3	68	40	1850
	4	100	40	1850
	★2	120	40	1850
E'	20	47	36	2210
	16	68	34	2280
	10	100	32	2350
	6.3	150	30	2420
	4	220	28	2510
F'	20	68	34	2800
	16	100	32	2890
	10	180	29	2990
	6.3	220	28	3100
	4	330	24	3230
	★2	390	24	3230
C	20	33	45	1710
	16	47	45	1710
	10	82	40	1850
	6.3	120	35	1930
	4	150	35	1930
D	★20	68	30	2580
	★16	100	25	2820
	★10	150	25	2820
	6.3	220	20	3160
	4	270	20	3160
E	★25	33	30	2780
	20	120	24	3110
	16	180	20	3410
	10	270	18	3600
	6.3	390	16	3810
	4	560	14	4080
F	★25	56	25	3260
	20	180	20	4280
	16	270	18	4400
	10	470	15	4510
	6.3	680	13	4840
	4	820	12	5040
	★2	1000	11	5260
F_0	4	1500	10	6500
	★2	1800	10	6500
G	4	2200	10	7100

SV Series Vertical Surface Mounting Type

Size Code	Rated Voltage (V)	Nominal Capacitance (µF)	ESR (100kHz~300kHz) (mΩ) (max.)	Allowable Ripple Current (mA rms)*
A5	16	3.3	400	500
	10	4.7	400	540
	10	6.8	400	540
	10	10	350	560
	6.3	15	350	560
	4	22	350	560
B6	20	10	220	600
	16	15	200	650
	10	22	180	700
	6.3	33	140	750
	4	39	120	780
C6	20	22	80	1050
	16	27	80	1100
	10	47	70	1150
	6.3	56	70	1200
	4	82	65	1250
E7	25	10	60	1400
	20	47	60	1450
	16	56	60	1500
	10	82	55	1550
	6.3	120	50	1600
	4	150	50	1700
F8	25	22	50	1800
	20	68	45	2000
	16	100	45	2200
	10	150	40	2400
	6.3	220	40	2700
	4	270	40	2800
F12	25	47	22	3500
	20	150	20	3600
	16	220	18	3700
	10	330	15	3800
	6.3	470	13	4000
	4	680	12	4200
	★2	820	11	4400

★ Under Development

* 100kHz at 45°C

SP Series Dimensions

Size Code	ø XL	Size Code	ø XL
C'	6.3 x 6.0	E	8.0 x 11.5
E'	8.0 x 6.0	F	10.0 x 11.5
F'	10.0 x 6.0	F_0	10.0 x 21.0
C	6.3 x 7.8	G	12.5 x 23.0
D	6.3 x 10.8		

SV Series Dimensions

Size Code	ø XL
A5	4.0 x 5.5
B6	5.0 x 6.0
C6	6.3 x 6.0
E7	8.0 x 7.0
F8	10.0 x 8.0
F12	10.0 x 12.7

Please visit our website at: ***www.sanyovideo.com***

Or contact: ***SANYO VIDEO COMPONENTS (USA) CORP.***
San Diego, CA: 619-661-6835, San Jose, CA: 408-892-2789
Forrest City, AR: 870-633-5030, Rochelle Park, NJ: 201-843-8100

SB Electronics, Inc.
131 South Main Street
Barre, Vermont 05641-4854 USA

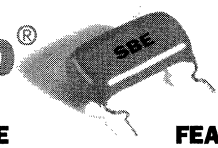
SBE

T 802-476-4146
F 802-476-4149
web site: www.sbelectronics.com
e-mail: Info@SBElectronics.com

Specialists in Film/Foil Capacitor Design and Manufacturing since 1959!

The Most Reliable Film/Foil Capacitors For Your Application!

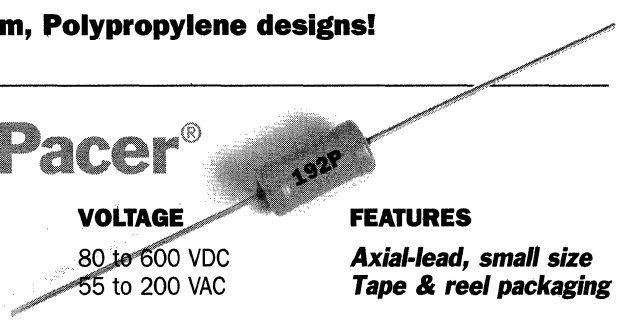
Orange Drop®



TYPE	DIELECTRIC	CAPACITANCE	VOLTAGE	FEATURES
715P	Polypropylene	.001 to .47 µF	100 to 2000 VDC 155 to 500 VAC	***Tolerance to ±1%*** ***Proven Reliability***
716P	Polypropylene	.00022 to 1.0 µF	100 to 2000 VDC 155 to 500 VAC	***Copper leads*** ***Compact size***
715P, 717P High A-C Voltage	Polypropylene	.00047 to .015 µF	800 to 900 VAC 1800 to 2000 VDC	***dV/dt ratings up to 104,000 Volts/µsec***
New! 778P, 779P	Polypropylene	.00039 to .1 µF	400 VAC/630 VDC	***Small size, low D.F.***
225P, 418P	Polyester	.001 to 1.0 µF	100 to 1000 VDC 70 to 200 VAC	***Operating temperature up to +125°C***
288P	Metallized Polyester & Resistor	.1/.22/.47 µF	400 VDC/250 VAC	***R-C Network*** ***Arc suppression***
New! 298P	Polyester Film/Foil & Resistor	.047/.1 µF	330 VAC/500 VDC	***R-C Network*** ***for AC line applications***

New! Contact us today for information on our 772P/ 773P, 700 VAC, 15 mm, Polypropylene designs!

192P Pacer®



TYPE	DIELECTRIC	CAPACITANCE	VOLTAGE	FEATURES
192P	Polyester	.0001 to .39 µF	80 to 600 VDC 55 to 200 VAC	***Axial-lead, small size*** ***Tape & reel packaging***

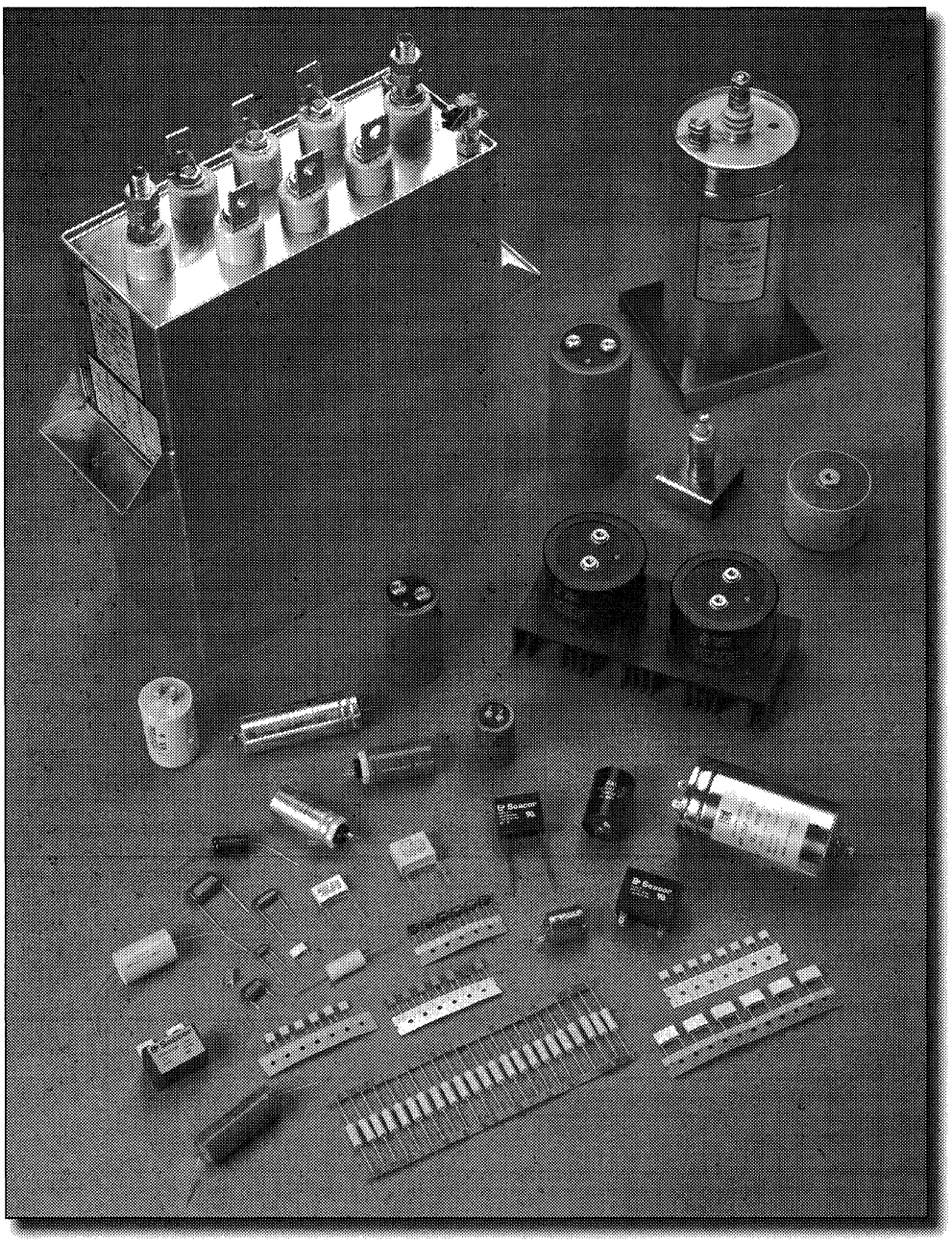
Performance.

F R O M D E S I G N T O D E L I V E R Y™

Contact us today for details on our New! line of Metallized Film Capacitors!

ORANGE DROP® and PACER® are registered trademarks of SB Electronics, Inc.

SEACOR INC



Seacor Film and Electrolytic Capacitors

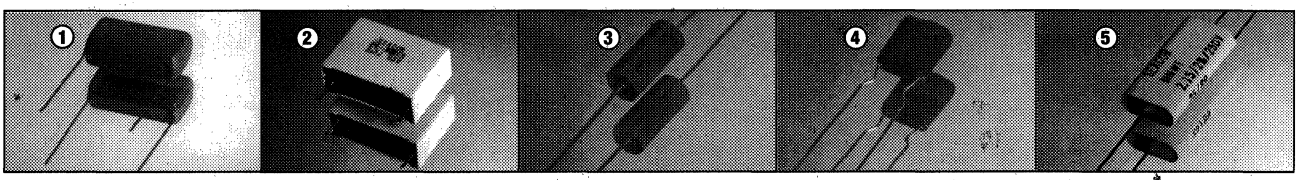
Discover the quality, performance and real economies of Seacor's broad selection of standard capacitor designs. Seacor capacitors are engineered to meet numerous requirements. The following pages contain basic product characteristics which can serve as a guide to meet your needs. Call for complete specifications on these and other capacitors. Ask about special shapes, sizes, leads, encapsulations, voltages, tolerances or matched sets, call 1-800-662-7322; or you can e-mail us at: upsales@seacorinc.com.

A Key Source for Industry Since 1959

SEACOR INC.™

Seacor Inc. 123 Woodland Avenue, Westwood, N.J. 07675
Tel: 201-666-5600 • FAX: 201-664-8544
Toll Free: 1-800-662-7322
E-mail: upsales@seacorinc.com
Web: http://eemonline.com/seacor

SEACOR Film & Electrolytic Capacitors



General Purpose Capacitors

Type	Units	PFDR	PFKR	PFWA	PVDS	PMDR
Dielectric		Polypropylene film foil	Polypropylene film foil	Polypropylene film foil	Polypropylene film foil	Polypropylene film metallized
Capacity Range	uF	0.001 to 0.47	0.001 to 0.47	0.001 to 0.47	0.001 to 0.22	0.001 to 2.2
Rated DC	Vdc	100 to 1000	63 to 1000	100 to 1000	50 to 200	250 to 630
Voltage AC	Vac	63 to 220	40 to 220	63 to 220	30 to 120	160 to 250
Temperature range	deg C	-40 to +85 (to +100 derated)	-40 to +85 (to +100 derated)	-40 to +85 (to +100 derated)	-40 to +85 (to +100 derated)	-40 to +85 (to +100 derated)
Tolerance ±	%	1, 2, 5, 10, 20	1, 2, 5, 10, 20	1, 2, 5, 10, 20	5, 10, 20	5, 10, 20
Dissipation Factor max.	%	0.2	0.2	0.2	0.2	0.2
Insulation Resistance min	MΩ	50000	50000	50000	50000	30000
Construction (**)		Epoxy Resin Dipped ①	Rectangular Plastic Box ②	Wrap & Fill ③	Epoxy Resin Inductive ④	Epxoy Resin Dipped ①
Lead Spacing	mm inch	10 to 30 0.394 to 1.180	7.5 to 22.5 0.295 to 0.886	Axial	3.5 to 10.0 0.138 to 0.394	10 to 27.5 0.394 to 1.083

Type	Units	PMKR	PMWA	PMWF	MMWA	MMWF
Dielectric		Polypropylene metallized	Polypropylene metallized	Polypropylene metallized	Polyester metallized	Polyester metallized
Capacity Range	uF	0.01 to 2.2	0.01 to 4.7	0.1 to 6.8	0.001 to 15.0	0.01 to 15.0
Rated DC	Vdc	250 to 630	160 to 630	250 to 630	63 to 1000	100 to 630
Voltage AC	Vac	160 to 250	90 to 250	160 to 250	40 to 220	63 to 220
Temperature range	deg C	-40 to +85 (to +100 derated)	-40 to +85 (to +100 derated)	-40 to +85 (to +100 derated)	-40 to +85 (to +100 derated)	-40 to +85 (to +100 derated)
Tolerance ±	%	5, 10, 20	1, 2, 5, 10, 20	1, 2, 5, 10, 20	5, 10, 20	5, 10, 20
Dissipation Factor max.	%	0.2	0.2	0.2	0.75	0.75
Insulation Resistance min	MΩ	30000	30000	30000	15000	15000
Construction (**)		Rectangular Plastic Box ②	Wrap & Fill ③	Wrap & Fill ⑤	Wrap & Fill ③	Wrap & Fill ⑤
Lead Spacing	mm inch	7.5 to 27.5 0.295 to 1.083	Axial	Axial Flat	Axial	Axial Flat

Type	Units	MFDR	MFWA	MVDS	MMDR, M	MMKR, S, T & MSKT
Dielectric		Polyester film foil	Polyester film foil	Polyester film foil	Polyester metallized	Polyester metallized
Capacity Range	uF	0.001 to 0.47	0.0001 to 1.0	0.001 to 0.47	0.001 to 10.0	0.001 to 15.0
Rated DC	Vdc	100 to 600	100 to 630	50 to 400	100 to 630	50 to 1000
Voltage AC	Vac	63 to 220	63 to 220	30 to 160	63 to 220	30 to 220
Temperature range	deg C	-40 to +85 (to +100 derated)	-40 to +85 (to +100 derated)	-40 to +85 (to +100 derated)	-40 to +85 (to +100 derated)	-55 to +85 (to +100 derated)
Tolerance ±	%	5, 10, 20	5, 10, 20	5, 10, 20	5, 10, 20	5, 10, 20
Dissipation Factor max.	%	0.75	0.75	0.6	0.75	0.75
Insulation Resistance min	MΩ	50000	50000	50000	15000	15000
Construction (**)		Epoxy Resin Dipped ①	Wrap & Fill ③	Epoxy Resin Inductive ④	Epoxy Resin Dipped ①	Rectangular Plastic Box ②
Lead Spacing	mm inch	10.0 to 22.0 0.394 to 0.866	Axial	3.5 to 11.5 0.138 to 0.453	5 to 27.5 0.197 to 1.083	5 to 27.5 0.197 to 1.083

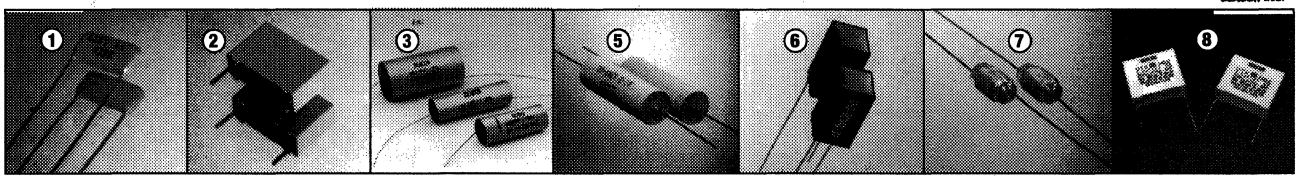
Note (**) ②, ②, ③, ④, ⑤ indicates appropriate photo.

123 Woodland Avenue
Westwood, N.J. 07675
Tel: 201-666-5600
FAX: 201-664-8544
E-mail: upsales@seacorinc.com
Web: http://eemonline.com/seacor

SEACOR Inc.

SPECIALS AVAILABLE
For matched sets, different shapes, sizes, encapsulations, values, tolerances, voltages, please call, toll-free **SEACOR 1-800-662-7322**

SEACOR Film & Electrolytic Capacitors



High Current Capacitors				High Voltage Capacitors			X2 Suppression Capacitors
Type	**Units**	**KT70**	**KT71**	**MKT66**	**MKT68.5**	**MVDO, F**	**HQX**
Dielectric		Polyester	Polyester	Polyester metallized	Polyester metallized	Polyester metallized	Polypropylene metallized
Capacity Range	**uF**	0.0001 to 0.1	0.001 to 0.047	0.00047 to 0.047	0.00047 to 0.022	0.00022 to .047	0.01 to 2.2
Rated DC	**Vdc**	160, to 630	160, to 630	2000 to 6300	2000 to 15000	10,000 to 55,000	250/275
Voltage AC	**Vac**	90 to 250	90 to 250	600	600 to 1200		
Temperature range	**deg C**	-55 to +100	-55 to +100	-40 to +85	-40 to +85	-40 to +100	-40 to +85
Tolerance ±	**%**	5, 10, 20	5, 10, 20	10, 20	10, 20	5, 10, 20	5, 10, 20
Dissipation Factor max.	**%**	0.8	0.8	0.8	0.8	6	0.1
Insulation Resistance min	**MΩ**	50000	30000	30000	30000	100000	30000
Construction (**)		Wrap & Fill ⑤	Rectangular Plastic Box ②	Rectangular Plastic Box ②	Wrap & Fill ⑤	Inductive Wrap & Fill ③	Rectangular Plastic Box ⑧
Lead Spacing	**mm** **inch**	Axial	7.5 to 10 0.295 to 0.394	15 to 27.5 0.591 to 1.083	Axial	Axial offset leads	10 to 37.5 0.394 to 1.48

Precision Capacitors				Stability Capacitors		
Type	**Units**	**KP44**	**KP51**	**CMDR**	**CMKR**	**CMWA**
Dielectric		Polypropylene	Polypropylene	Polycarbonate metallized	Polycarbonate metallized	Polycarbonate metallized
Capacity Range	**uF**	0.000047 to 0.22	0.0001 to 0.068	0.01 to 10.0	0.001 to 10.0	0.01 to 10.0
Rated DC	**Vdc**	100 to 1000	63	63 to 630	63 to 630	63 to 630
Voltage AC	**Vac**	63 to 250	25	40 to 220	40 to 220	40 to 220
Temperature range	**deg C**	-40 to +85	-55 to +85	-40 to +85 (to +125 derated)	-40 to +85 (to +125 derated)	-40 to +85 (to +125 derated)
Tolerance ±	**%**	1, 2, 5, 10, 20	1, 2, 5	5, 10, 20	1, 2, 5, 10, 20	1, 2, 5, 10, 20
Dissipation Factor max.	**%**	0.5	0.04	0.4	0.4	0.4
Insulation Resistance min	**MΩ**	30000	100000	15000	30000	30000
Construction (**)		Wrap & Fill ③	Square Plastic Box ⑥	Epoxy Resin Dipped ①	Rectangular Plastic Box ②	Wrap & Fill ⑤
Lead Spacing	**mm** **inch**	Axial	7.2, 10.75, 14.35 0.283, 0.394, 0.565	10 to 27.5 0.394 to 1.083	7.5 to 27.5 0.295 to 1.083	Axial

Precision Capacitors						
Type	**Units**	**KSP43**	**KS46**	**KS50**	**SFWA**	**SVVO**
Dielectric		Polystyrene & Polypropylene	Polystyrene	Polystyrene	Polystyrene	Polystyrene
Capacity Range	**uF**	0.000047 to 0.01	0.0001 to 0.068	0.0001 to 0.056	0.001 to 0.603	0.000056 to 0.022
Rated DC	**Vdc**	160 to 1600	63 to 160	63	63 to 1000	63 to 630
Voltage AC	**Vac**	63 to 400	25 to 63	25	40 to 220	25 to 125
Temperature range	**deg C**	-40 to +85	-40 to +85	-40 to +85	-40 to +70	-40 to +70
Tolerance ±	**%**	1, 2, 5, 10, 20	1, 2, 5	1, 2, 5	1, 2, 5	1, 2, 5, 10, 20
Dissipation Factor max.	**%**	0.04	0.04	0.03	0.05	0.05
Insulation Resistance min	**MΩ**	100000	200000	200000	100000	100000
Construction (**)		Wrap & Fill ⑤	Rectangular Plastic Box ②	Square Plastic Box ⑥	Wrap & Fill ⑤	Wrap & Fill ⑦ (offset leads)
Lead Spacing	**mm** **inch**	Axial	10 to 20 0.394 to 0.787	7.2, 10.75, 14.35 0.283, 0.394, 0.565	Axial	Axial

SPECIALS AVAILABLE
For more information please contact Seacor Inc.
* Other values are available.

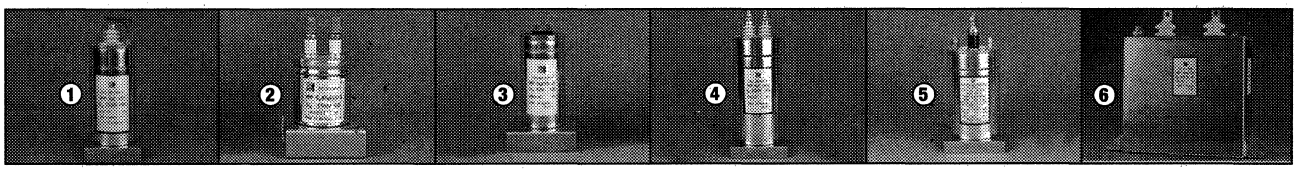
Note (**) ②, ②, ③, ④, ⑤ indicates appropriate photo.

123 Woodland Avenue
Westwood, N.J. 07675
Tel: 201-666-5600
FAX: 201-664-8544
E-mail: upsales@seacorinc.com
Web: http://eemonline.com/seacor

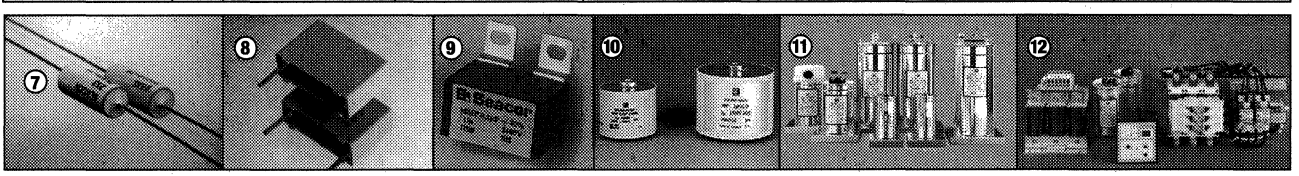
SEACOR Inc.

SPECIALS AVAILABLE
For matched sets, different shapes, sizes, encapsulations, values, tolerances, voltages, please call, toll-free **SEACOR 1-800-662-7322**

SEACOR Film & Electrolytic Capacitors



Power Electronics Capacitors							
Type Ordering code	**Units**	**MPP Design A 253.51...**	**MPP/MKP Design D/E 253.6.../263.6...**	**MPP Solder Slug 252.4...**	**SMKP**	**Water cooled**	**Water and air cooled**
Application		Radar, General use	Frequency converter	General use	Filtering and smoothing	Filtering and smoothing	Inductive heating equipment
Dielectric		Polypropylene	Polypropylene	Polypropylene	Polypropylene	Polypropylene	Polypropylene
Capacity Range	µF µF	0.068 to 1	MPP: 0.1 to 50 MKP: 4.0 to 150	0.5µF to 32µF	130 to 10,230	1 x 0.2 to 6 x 155	0.5 to 64
Tolerance Standard ±*		10	10	10	10	10	10
Rated Voltage AC DC	Vac Vdc	930V to 3000V	600V to 1400V 450V to 900V	630 to 850	750 to 4000	500 to 1500	600 to 1500
Rated Current	A	4.4 to 6.9	MPP: 4.0 to 20 MKP: 1.0 to 14	0.1 to 5.3	50 to 250	1 x 5 to 6 x 278	20 to 200
dV/dt (max)	V/µs	150 to 1000	MPP: 30 to 500 MKP: 10 to 18	15 to 80	10 to 60	—	—
Construction (**)		Aluminum can oil filled ①	Aluminum can oil filled ③	Aluminum can oil filled	Rectangular metal case ⑥	Rectangular metal case ⑧	Cylindrical metal case ⑤
Safety Features		Pressure Interrupter	Pressure Interrupter	Pressure Interrupter	Overpressure switch	Overpressure switch	Overpressure switch



Power Factor Correction Capacitors				High Pulse Capacitors		
Type	**Units**	**Power factor correction capacitors**	**Power factor correction assemblies**	**MPP Design GTO-ax**	**MPP Design B**	**MPP Design C**
Application		Power factor correction	Power factor correction	Thyristors and thiristor switch gear, Damping snuber circuits	Power supplies, UPS Filtering, Smoothing Damping	Electric locomotives, Electric vehicles, current converters, Damping, commutation, supporting
Dielectric		Polypropylene	Polypropylene	Polypropylene	Polypropylene oil-filled	Polypropylene oil-filled
Capacity Range* Three phase	uF µF	11.5 to 750 3 x 1.1 to 3 x 250	3 x 45 to 3 x 400	0.5 to 7.5	0.1 to 3.3	1.0 to 220
Tolerance Standard ±*	%	-5+15, ±5	-5+15, ±5	10	10	10
Rated voltage* AC	Vcc	230 to 600	230 to 690	800 to 2100	1100 to 3500	600 to 3000
Rated Current Three phase	A A	2.1 to 75 3 x 1.2 to 3 x 43.3	3 x 17 to 3 x 87	15 to 60	8.0 to 18	19 to 100
Temperature range	deg C	-40 to +70	-40 to +70	-25 to +70	-25 to +70	-25 to +70
dV/dt (max)	V/µs			150 to 800	150 to 2200	50 to 500
Dissipation Factor Max.	%			0.04	0.02	0.02
Construction (**)		Aluminum can oil filled ⑪	Aluminum can oil filled ⑫	Plastic can with epoxy filled ⑩	Aluminum can oil filled ②	Aluminum can oil filled ④
Safety Features		Pressure Interrupter	Pressure Interrupter		Pressure Interrupter	Pressure Interrupter

High Pulse Capacitors						
Type	**Units**	**KP21**	**KP25**	**MKP22**	**MKP27**	**IGBT Snubber**
Application		limiting dI/dt or -dV/dt, reduce or eliminate or current spikes, reduce total loss due to switching. Reduce EMI by damping voltage and current rising.				Damping, high pulse operation, commutation
Dielectric		Polypropylene	Polypropylene	Polypropylene	Polypropylene	Polypropylene
Capacity Range	uF	0.00047 to 0.47	0.0001 to 0.33	0.001 to 2.2	0.00047 to 1.5	0.10 to 2.2
Rated DC Voltage AC	Vdc Vac	250 to 2000 160 to 600	400 to 2000 220 to 600	250 to 2000 160 to 600	250 to 2000 160 to 600	500 to 2000
Temperature range	deg C	-55 to +100	-55 to +100	-55 to +100	-55 to +100	-25 to +70
Tolerance ±	%	5, 10, 20	5, 10, 20	5, 10, 20	5, 10, 20	10
dV/dt (max)	V/µs	12000	12000	6400	6400	60 to 960
Rated current	A					8 to 13
Dissipation Factor max.	%	0.04	0.04	0.04	0.04	0.05
Insulation Resistance min.	MΩ	100000	100000	100000	100000	
Construction (**)		Wrap & Fill ⑦	Rectangular Plastic box ⑧	Wrap & Fill ⑦	Rectangular Plastic box ⑧	Plastic Box with epoxy filled ⑨
Lead Spacing	mm inch	Axial	15 to 27.5 0.591 to 1.083	Axial	7.5 to 27.5 0.295 to 1.083	

SPECIALS AVAILABLE
Reactors and assemblies for detuned modules are also available at Seacor. For more information please contact Seacor Inc.
* Other values are available.

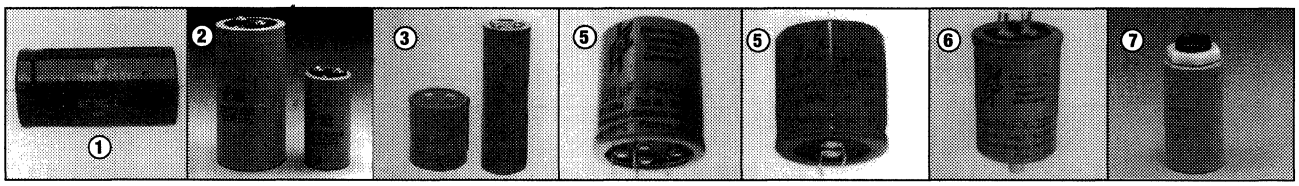
Note (**) ①, ②, ③, ④, ⑤, ⑥, ⑦, ⑧, ⑨, ⑩, ⑪, ⑫ indicates appropriate photo.

123 Woodland Avenue
Westwood, N.J. 07675
Tel: 201-666-5600
FAX: 201-664-8544
E-mail: upsales@seacorinc.com
Web: http://eemonline.com/seacor

SEACOR Inc.

SPECIALS AVAILABLE
For matched sets, different shapes, sizes, encapsulations, values, tolerances, voltages, please call, toll-free **SEACOR 1-800-662-7322**

SEACOR Film & Electrolytic Capacitors



Aluminum Electrolytic Capacitors For Power Electronics						
Type	**Units**	**Axial Type A**	**Power Caps, Type G**	**High Capacity Type GM**	**Long Life Type GH**	**Photoflash Capacitors**
Application		Standard and switch mode power supply, telecommunication, consumer electronics	Uninterruptable, standard switch mode power supply and Cap. Banks in current converters. welding machines	Audio HiFi systems standard and switched power supplies telecommunication	Standard and switch mode power supplies.	X Ray Generators, photoflash devices welding equipment, defibrillators
Capacity Range	**µF**	4.7 to 10,000	100 to 1,000,000	220 to 470,000	220 to 220,000	12 to 3900
Tolerance Standard *		+30 -10	+30 -10	+30 -10	+30 -10	+30 -10
Rated Voltage	**V**	16 to 500	16 to 500	40 to 500	16 to 450	250 to 550
Temperature Range	**Deg. C**	-40 to +85... -40 to 105	-40 to +85... -40 to 105	-40 to +85	-40 to +85... -40 to 105	-10 to +60
Ripple current @ 100Hz @ 85 deg.C	**A**	0.1 to 8.4	1.1 to 60	1.7 to 33.3	1.9 to 32.8	**Stored Energy** 0.7 Ws to 499.1 Ws
Tan @ 100Hz@ 20 deg C max. in [%]	**%**	6 to 38	2 to 283	4 to 133	——	——
Typical ESR @ 100Hz @ 20 deg. C	**mΩ**	30 to 10000	2 to 250	3 to 240	6 to 220	**Anode Type** Single or double
Impedance [Z] @10KHz @20deg. C	**mΩ**	30 to 10000	3 to 200	4 to 600	5 to 286	
Construction (**)		Insulated aluminum can ①	Insulated aluminum can ②	Insulated aluminum can ②	Insulated aluminum can ②	Insulated aluminum can ①②or⑥

Type	**Units**	**Capacitor for PCB mounting Type GS**	**High Performance Cap. Type GW**	**Soldering lug cap. Type LF**	**Central mounted cap. Type S**	**Snap in Capacitors Type SI**
Application		Telecommunication, control systems, industrial application, switch mode power supplies	Frequency converter, welding machines, uninterruptable, standard and switch mode power sup.	Standard and switch mode power supplies, telecommunication, industrial applications	Tube amplifier industrial application	Standard and switch mode power supplies, telecommunication
Capacity Range	**µF**	47 to 33,000	1000 to 100,000	47 to 47,000	22 to 22,000	22 to 33,000
Tolerance Standard *	**%**	+30 -10	+30 -10	+30 -10	+30 -10	
Rated Voltage	**V**	16 to 450	40 to 500	16 to 500	16 to 450	16 to 500
Temperature Range	**Deg. C**	-40 to +85... -40 to 105	-40 to +85... -40 to 105	-40 to +85... -40 to 105	-40 to +85... -40 to 105	-40 to +85
Ripple current @ 100Hz @ 85 deg.C	**A**	0.4 to 8.5	4.8 to 33.9	0.5 to 14.5	0.2 to 5.3	0.5 to 15.2
Tan @ 100Hz@ 20degC max. in [%]	**%**	7 to 38	4 to 38	5 to 45	7 to 36	5 to 62
Typical ESR@ 100Hz @ 20 deg. C	**mΩ**	13 to 1333	4 to 100	11 to 1333	17 to 1600	11 to 3900
Impedance [Z] @10KHz @20deg. C	**mΩ**	——	5 to 130	20 to 1790	—	14 to 5070
Construction (**)		insulated aluminum can ④	insulated aluminum can ③	insulated aluminum can ⑥	insulated aluminum can ⑦	insulated aluminum can ⑤

Motor Capacitors					
Type	**Units**	**PNM**	**PNP**	**PUK**	**Motor-starting capacitors Type MDK & MEK**
Application		Motor Run	Motor Run	Motor Run	Starting Capacitors for single-phase, motors with auxiliary-phase.
Dielectric		Polypropylene oil-filled	Polypropylene Dry	Polypropylene Dry	
Capacity Range*	**µF**	1.0 to 120	1.0 to 100.0	1.0 to 25.0	10 to 850
Tolerance Standard *±	**%**	5, 10	5, 10	5, 10	10
Rated Voltage	**Vac**	250 to 500	250 to 450	200 to 500	160 to 320
Temperature Range	**Deg. C**	-25 to +85	-25 to +85	-25 to +70	-10 to +60
Percent Duty Cycles					0.55% to 1.7%
Construction (**)		Aluminum can oil-filled ⑩	Plastic case filled with epoxy ⑪	Plastic box filled with epoxy ⑨ 10,000 AFC rated	double-potted design ⑧ insulated aluminum can
Safety Features		Pressure interrupter			
Approvals		UL;VDE; CSA; SEV; IMQ	VDE; SEV; IMQ	UL; CSA	VDE

Note (**) ①, ②, ③, ④, ⑤, ⑥, ⑦, ⑧, ⑨, ⑩, ⑪, ⑫ indicates appropriate photo.

SPECIALS AVAILABLE
For more information please contact Seacor Inc.
* Other values are available.

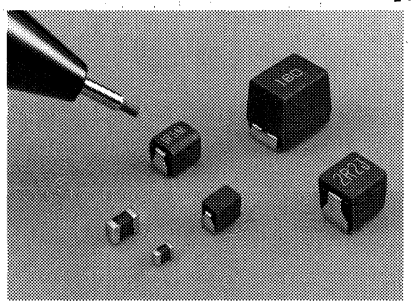
123 Woodland Avenue
Westwood, N.J. 07675
Tel: 201-666-5600
FAX: 201-664-8544
E-mail: upsales@seacorinc.com
Web: http://eemonline.com/seacor

SEACOR Inc.

SPECIALS AVAILABLE
For matched sets, different shapes, sizes, encapsulations, values, tolerances, voltages, please call, toll-free **SEACOR 1-800-662-7322**

SPRAGUE GOODMAN

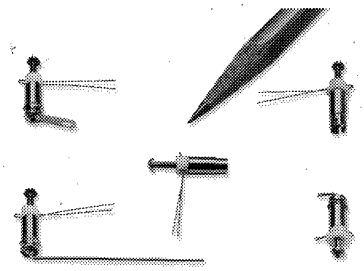
TRIMMER CAPACITORS, INDUCTORS AND MICROWAVE TUNING ELEMENTS



SURFCOIL® SMT INDUCTORS

- Inductance from 2.2 nH to 1 mH
- 13 model series in 6 sizes:
  1.0 x 0.5 x 0.5 mm (0402)
  1.6 x 0.8 x 0.8 mm (0603)
  2.00 x 1.25 x 1.25 mm (0805)
  2.5 x 2.0 x 1.6 mm (1008)
  3.2 x 2.5 x 2.2 mm (1210)
  4.5 x 3.2 x 3.2 mm (1812)
- Shielded, unshielded, ferrite core and nonmagnetic models
- Operating temp: -20° to +85°C
- Carrier and reel standard

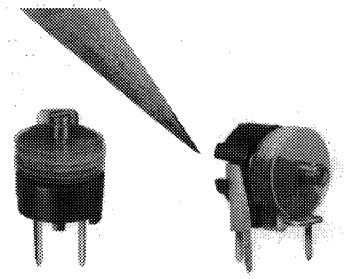
For more information, ask for Bulletin SG-800.



MULTITURN PLASTIC

- Cap range: 0.25-1.5 pF
- 5 models
- Rated working voltage to 1700V
- Multiturn resolution at low cost
- Q typically > 2000 to VHF
- Temp coefficient of capacitance: 50 ± 50 ppm/°C
- Operating temp: -55° to +125°C

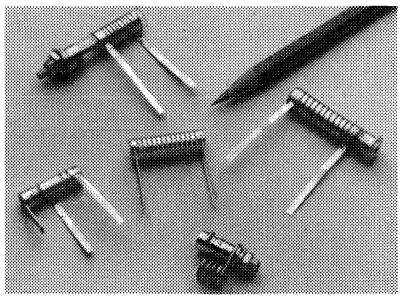
For more information, ask for Bulletin SG-401.



FILMTRIM® SINGLE TURN PLASTIC

- Cap ranges: 1.0-3.5 pF to 25-600 pF
- Q to 5000 at 1 MHz
- Operating temp:
  PTFE, Polycarbonate, Polyimide: -40° to +85°C
  Polypropylene: -40° to +70°C
  High temp PTFE: -40° to +125°C
- 6 sizes from 5 mm to 16 mm
- More stable with temperature than other single turn trimmers

For more information, ask for Bulletin SG-402.



METALIZED INDUCTORS & LC TUNERS

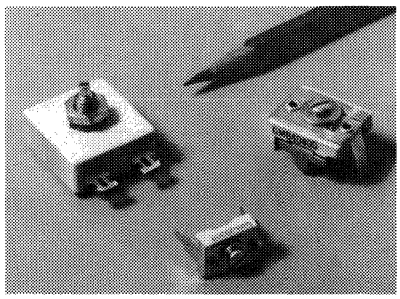
Metalized Inductors

- Variables (±10%): overlapping ranges from 0.029 to 1.5 µH
- Fixed: 0.05 to 2.00 µH
- Min SRF to 900 MHz, Min. Q to 200
- Temperature coefficient only ±10 ppm/°C over -55° to +125°C

LC Tuners

- Series resonant with SRF from 150 to 725 MHz in 4 ranges
- Parallel resonant with SRF from 170 to 1000 MHz in 5 ranges
- Temperature coefficient less than 40 ± 30 ppm/°C over -55° to +125°C

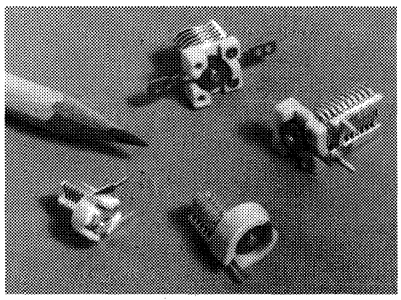
For more information, ask for Bulletin SG-700.



MICA COMPRESSION

- Cap ranges: 2.5-7.0 pF to 1400-3055 pF
- Q to 600 at 1 MHz
- Rated working voltage to 2000 V
- Can handle higher RF currents
- Operating temp: -35° to +85°C
- 8 mounting styles for PC, panel, and bracket mounting

For more information, ask for Bulletin SG-500.



AIRTRIM® SINGLE TURN AIR DIELECTRIC

- Cap Ranges: 1.1-3.3 pF to 2.9-24.0 pF
- Q typically 8000 at 1 MHz; 4000 at 100 MHz; 1500 at 200 MHz
- Operating temp: -55° to +85°C
- Temp coefficient as low as 10 ±10 ppm/°C
- 2 sizes and 10 mounting configurations for printed circuit and panel mounting
- Machined from solid brass

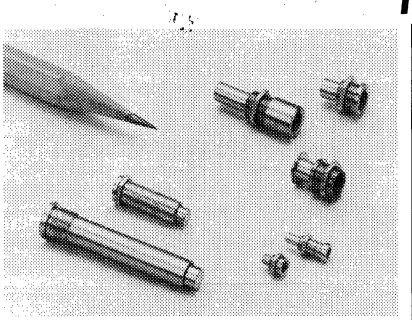
For more information, ask for Bulletin SG-600.

Tuning tools are available for all models. Ask for Bulletin SG-206.

Sprague-Goodman Electronics, Inc.
1700 Shames Drive, Westbury, N.Y. 11590
Tel: 516-334-8700 • Fax: 516-334-8771 • E-mail: info@spraguegoodman.com • www.spraguegoodman.com

SPRAGUE GOODMAN

TRIMMER CAPACITORS, INDUCTORS AND MICROWAVE TUNING ELEMENTS



MICROWAVE TUNERS

Metallic tuning elements
- 4 to 33 GHz
- For waveguide filters, attenuators

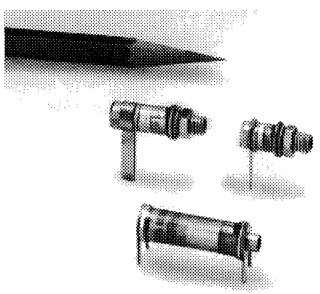
Dielectric tuning elements
- Alumina, quartz, sapphire
- 8 to 100 GHz
- For IMPATT, Gunn devices

Dielectric resonator tuners
- 2 to 18 GHz
- For filters, oscillators

LC tuning elements
- 2 to 60 GHz
- High Q wideband tuning

Resistive tuning elements
- 1 to 18 GHz
- Trim amplifier, oscillator power

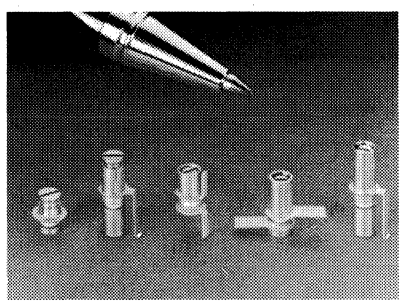
For more information, ask for Bulletin SG-670.



GLASS AND QUARTZ PISTONCAP®

- Designed to meet MIL-C-14409D
- QPL models
- Extremely stable over temperature, frequency, voltage, etc.
- Cap ranges: 0.5-3.0 pF to 1.0-120 pF
- Zero backlash multiturn adjust mechanism
- Operating temp: -55° to +125°C (models to +200°C)
- Q to 1500 at 20 MHz
- Wide variety of configurations for PC, panel and surface mounting
- Voltage ratings from 500 to 5000 V

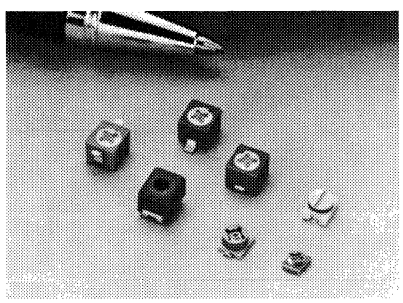
For more information, ask for Bulletin SG-205.



SAPPHIRE PISTONCAP®

- Q to 4000 at 250 MHz
- 2 configurations and 6 mounting styles suitable for all RF structures
- Designed to meet MIL-C-14409D
- Operating temp: -55° to +125°C
- Cap ranges: 0.3-1.2 pF to 0.8-8.0 pF
- Subminiature size
- Multiturn resolution
- Extremely stable over temperature, frequency, voltage, etc.

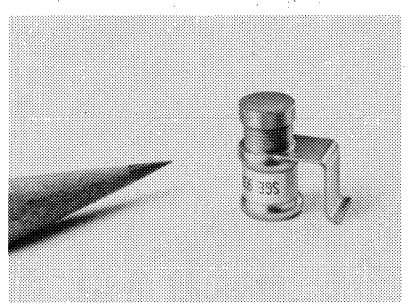
For more information, ask for Bulletin SG-207.



SURFTRIM® SURFACE MOUNT

- 5 sizes:
  - 2.2 x 3.1 x 1.2 mm
  - 3.2 x 4.5 x 1.8 mm
  - 3.2 x 3.8 x 1.5 mm
  - 4.0 x 4.5 x 2.7 mm (sealed)
  - 5.2 x 4.3 x 3.2 mm (sealed split stator)
- 7 mounting configurations
- Carrier and reel or bulk pack
- 0.4-2.0 pF to 8.5-50.0 pF in 21 cap ranges
- Operates to 85°C
- Q to 450 at 100 MHz

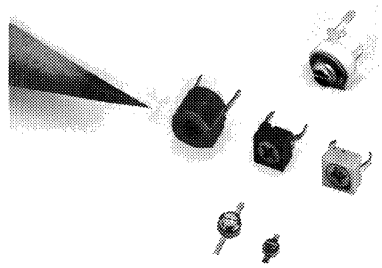
For more information, ask for Bulletins SG-305 and SG-310.



AIRTRIM® MULTITURN AIR DIELECTRIC

- Q: > 5000 at 100 MHz
- 14 mounting styles including surface mount
- Designed to meet MIL-C-14409D
- Operating temp: -65° to +125°C
- Standard cap ranges: 0.35 to 3.5 pF; 0.6 to 6 pF; 0.8 to 10 pF; 1.0 to 14 pF
- Multiturn resolution
- Extremely stable over temperature, frequency, voltage, etc.
- Rated voltage: 250 VDC
- Self-resonant frequency: > 6 GHz
- Insulation resistance: $>10^6$ MΩ

For more information, ask for Bulletin SG-660.



CERAMIC DIELECTRIC

5 mm Rugged:
- Operating temp: -55° to +125°C
- Cap ranges: 1.5-5.5 pF to 15.0-90.0 pF

5 mm Economy:
- Operating temp: -25° to +85°C
- Cap ranges: 1.0-3.0 pF to 14.0-70.0 pF

7 mm Economy:
- Operating temp: -25° to +85°C
- Cap ranges: 2.0-5.0 pF to 14.0-108.0 pF

Miniature types suitable for hybrids
- Operating temp: -25° to +85°C
- 2 series: 2.0 x 1.2 mm; 3.0 x 1.5 mm
- Cap ranges: 1.0-3.0 pF to 6.0-40.0 pF

Plastic encased 4x4.5mm and 6mm types
- Designed for volume applications
- SMT and printed-thru-hole models
- Cap ranges: 1.4-3.0 pF to 20.0-90.0 pF

For more information, ask for Bulletin SG-305.

Tuning tools are available for all models. Ask for Bulletin SG-206.

Sprague-Goodman Electronics, Inc.
1700 Shames Drive, Westbury, N.Y. 11590
Tel: 516-334-8700 • Fax: 516-334-8771 • E-mail: info@spraguegoodman.com • www.spraguegoodman.com

TUSONIX

A World Leader in Ceramic EMI/RFI Components

...and a broad range of fixed and variable ceramic capacitors

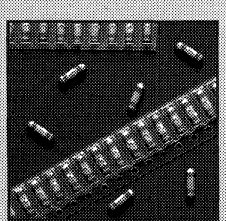
- **Technology**...EMI/RFI Components based on extensive Ceramic Dielectric Technology.
- **Innovation**...Surface Mount Filters reduce board count by replacing multiple components.
- **Delivery**...We meet customer needs with proven on-time performance.
- **Quality**...Quality Management System registered by UL to ISO 9001.
- **Value**...Cost Effective Solutions.

www.tusonix.com

TUSONIX

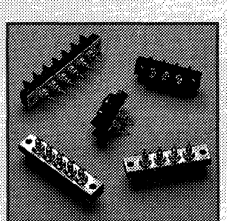
- 7741 N. Business Park Drive
  Tucson, Arizona 85743
- 520-744-0400 FAX: 520-744-6155
- email: sales@tusonix.com

New Products Showcase



Surface Mount EMI Filters

- Square Design For Easy Handling
- Small Size (8X2.1mm)
- Reduces Component Count
- Capacitance Up To 8200pF
- Insertion Loss Of 70dB At 1GHz
- Attractively Priced



Filtered Terminal Blocks

- Industry Standard Terminal Blocks
- Capacitance Up To 5000pF
- Eliminates EMI Using An Existing Design Element
- Custom Design Options

A5924 UL REGISTERED FIRM ISO9001

TUSONIX, INC.

Authorized Stocking Distributors:

- PALtronics 1-800-387-7969
- **Penstock 1-800-736-7862**
- Resco 1-800-638-1242
- RS Electronics 1-313-525-1155
- **TTI 1-800-225-5884**

Ceramic Capacitors

High Capacitance Multilayer Ceramic Capacitors (Nickel based Electrodes)

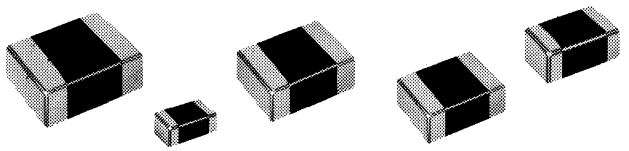
Taiyo Yuden's state-of-the-art ceramic material technology, high precision multilayering techniques and firing technology has made it possible to produce some of the world's highest capacitance values relative to case size in Multilayer Ceramic Capacitors (MLCCs).

- Capacitance values up to 22µF in Y5V (10V, 1206, +80/-20%) and up to 10µF in X5R (6.3V, 1210, 20%).
- Excellent for circuit downsizing and replacement of Tantalum & Aluminum Electrolytic capacitors.
- No polarity.
- Low ESR provides excellent noise absorption.
- The use of Nickel (Ni) as material for both internal and external electrodes improves solderability and heat resistance characteristics.

Part Numbering System [Example]

EMK 325 BJ 475 M N □ T

- 8 Packaging
- 7 Internal code ("–" for standard products)
- 6 Thickness code
- 5 Capacitance tolerance
- 4 Capacitance
- 3 Temperature characteristics
- 2 Case size
- 1 Rated voltage



PART NUMBERING SYSTEM

1 : Rated voltage: U=DC50V, T=DC25V, G=DC35V, E=DC16V, L=DC10V, J=DC6.3V

2 : Case size (LxW)
107=EIA 0603
212=EIA 0805
316=EIA 1206
325=EIA 1210
432=EIA 1812

3 : Temperature characteristics
F=Y5V (-30~+85°C; +22/-82%)
BJ=X7R (-55~+125°C; ±15%) or
BJ=X5R (-55~+85°C; ±15%)

4 : Capacitance (3-digit figure)
473=0.047µF
105=1µF

5 : Capacitance tolerance

6 : Thickness code

7 : Taiyo Yuden internal code

8 : Packaging B=Bulk (1,000 pcs./bag) T=Tape & Reel

Case Size	Thickness in./(mm)	Tape Material	Quantity (pcs./reel)
0603	.031 (0.80)	Paper	4,000
0805	.033 (0.85)	Paper	4,000
	.049 (1.25)	Plastic	3,000
1206	.033 (0.85)	Paper	4,000
	.045 (1.15)	Plastic	3,000
	.049 (1.25)		
	.063 (1.60)		2,000
1210	.059 (1.50)	Plastic	2,000
	.075 (1.90)		
1812	.051 (1.30)	Plastic	1,000

Thickness code		
Case Size	Thickness in./(mm)	Code
0603	.031 (0.80)	A
0805	.033 (0.85)	D
	.049 (1.25)	G
1206	.033 (0.85)	D
	.045 (1.15)	F
	.049 (1.25)	G
	.063 (1.60)	L
1210	.059 (1.50)	H
	.075 (1.90)	N
1812	.051 (1.30)	G

AVAILABLE CAPITANCE RANGE

Type	107					212							316										325						432
Temp. char	BJ/X7R		BJ/X5R		F/Y5V	BJ/X7R			BJ/X5R	F/Y5V			BJ/X7R		BJ/X5R		F/Y5V						BJ/X5R	F/Y5V					F/Y5V
Cap \ VDC	25	16	10	16	10	50	25	16	10	50	16	10	50	25	16	25	16	10	35	25	10	6.3	16	6.3	35	25	16	10	50
[µF]	[pF:3digits]																												
0.022	223	A					D																						
0.033	333						D	D																					
0.047	473		A																										
0.068	683		A				G																						
0.10	104																												
0.15	154			A									F	D															
0.22	224			A					G		D		L	F															
0.33	334								G					L															
0.47	474				A						G																		
0.68	684									G						L	L	F											
1.0	105					A				G	G	G						L		G	G								
2.2	225																		L										G
3.3	335																	L		G	G								
4.7	475											G											N						
10.0	106																				L			N	H	H	H		
22.0	226																					L						N	

Letters inside the shaded boxes indicate thickness codes.

Surface Mount Multilayer Ceramic Capacitors (Pd/Ag electrode)

- Case Sizes: 0402, 0603, 0805, 1206
- Rated voltage: 50V, 25V, 16V
- Capacitance range: 0.5 pF~1.0µF
- Tolerances: .25pF, .5pF, 1pF, 5%, 10%, +80/-20%
- Dielectrics: NPO, X7R, Y5V

UP050 series – Axial Lead Ceramic Capacitors

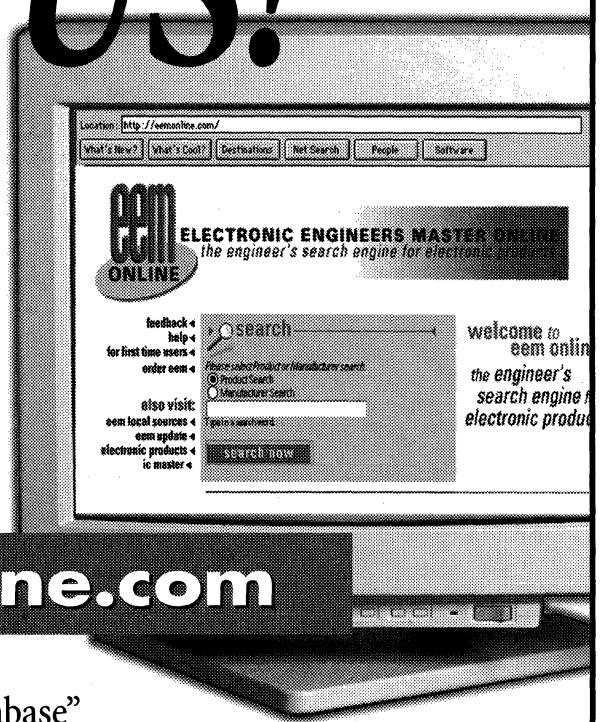
- Available in both tubular monolithic and multilayer construction.
- Rated voltage: 50V, 25V, 16V
- Capacitance range: 1.0pF~1.0µF
- Tolerances: 5%, 10%, 20%, 30%, +80%/-20%
- Dielectrics: NPO, Y5P, Y5R, Y5S, Y5V

TAIYO YUDEN *(USA), INC.*
E-mail: TYUSA@T-Yuden.com
http://www.T-YUDEN.com

Midwestern/Eastern (Chicago) 800-348-2496
Southwestern (San Diego) 800-258-2496
Northwestern (Silicon Valley) 800-368-2496

When you're looking for electronic products

. . . *TRY US!*



The Engineer's search engine for electronic products!

http://eemonline.com

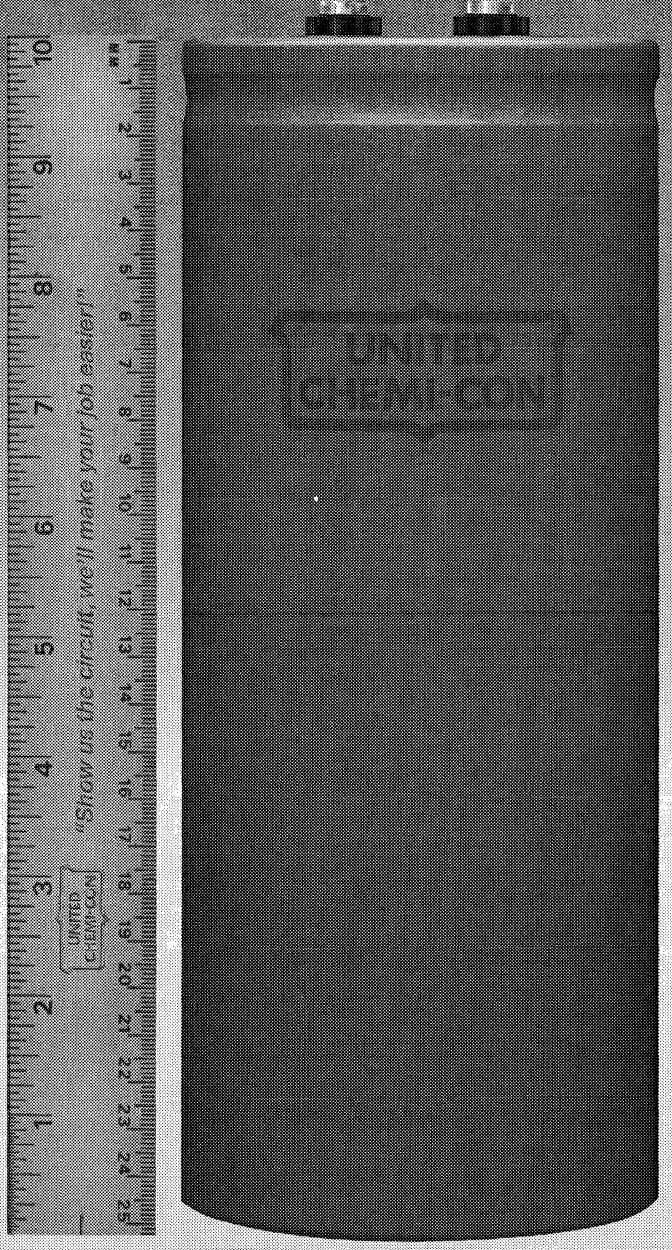
- "Easy, well-organized index of the EEM database"
  means... **Easy search of multiple products & companies**
- "New, improved interface and faster database now available"
  means... **Faster search times and less time online**
- "EEM Online is available 24 hours a day, 7 days a week"
  means... **Round-the-clock solutions to your design needs**
- Gives detailed company information & links to a manufacturer's website & email
  means... **You can retrieve more detailed information, if necessary.**

EEM Online—your search engine for electronic products.

Hearst Business Communications, Inc./UTP Division
645 Stewart Avenue, Garden City, NY 11530 • Tel: 516.227.1300 • FAX: 516.227.1901

WE ARE UNITED CHEMI-CON.

From the largest capacitor...



to the smallest capacitor...

and everything in between!

Aluminum Electrolytic Capacitors

Surface Mount – 15 Series
Voltage: 4V-50V Capacitance: 0.1µF-1,000µF

Miniature – 32 Series
Voltage: 4V-450V Capacitance: 0.1µF-39,000µF

OS-CON – 2 Series
Voltage: 4V-25V Capacitance: 4.7µF-2,200µF

Large Tubular Wire Leads – 4 Series
Voltage: 6.3V-450V Capacitance: 15µF-220,000µF

Snap Mount – 4 Series
Voltage: 6.3V-450V Capacitance: 39µF-270,000µF

Large Can Screw Terminals – 9 Series
Voltage: 6.3V-550V Capacitance: 68µF-2,200,000µF

Solid Products

Multilayer Ceramic Chip – 4 Series
Voltage: 25V-250V Capacitance: 0.01µF-100µF

Tantalum Chip – 6 Series
Voltage: 4V-50V Capacitance: 0.047µF-220µF

Film – 7 Series
Voltage: 50V-1,250V
Capacitance: 0.0015µF-29µF

Metal Oxide Varistors – 9 Series
Varistor Voltage: 12V-12,000V
Voltage Range: 8.5VDC-8,100VDC

UNITED CHEMI-CON, INC.

9801 West Higgins Road, Rosemont, IL 60018 Tel: 847-696-2000 Fax: 847-696-9278
www.chemi-con.com E-mail: info@chemi-con.com

ISO9001 Certified Manufacturing Facilities
in the United States, Japan, Malaysia, Taiwan, Singapore, Indonesia and Korea.

UNITED CHEMI-CON Selection Guide for Aluminum Electrolytic Capacitors

Application	Product Type	Max. Temp.	Terminal Type	Series	Highlights
Surface Mount	General Purpose	+85°C	SMD	**MF**	General, Low Profile, For Reflow
			SMD	**MV**	General, Vertical Mounting, For Reflow
		+105°C	SMD	**MFK**	General, Low Profile, For Reflow
			SMD	**MVK**	General, Vertical Mounting, For Reflow
			SMD	**MVJ**	Longer Life than MVK
		+125°C	SMD	**MVH**	General, High Temperature, For Reflow
	Low Impedance	+105°C	SMD	**MFY**	Low Impedance, Low Profile, For Reflow
			SMD	**MVY**	Low Impedance, Vertical Mounting, For Reflow
	Large Capacitance	+105°C	SMD	**MFK Large**	Large Capacitance, For Reflow
	Bi-Polar	+85°C	SMD	**MF-BP**	Bi-Polar, Low Profile, For Reflow
			SMD	**MV-BP**	Bi-Polar, Vertical Mounting, For Reflow
		+105°C	SMD	**MFK-BP**	Bi-Polar, Low Profile, For Reflow
			SMD	**MVK-BP**	Bi-Polar, Vertical Mounting, For Reflow
	Solid	+105°C	SMD	**MFX**	Ultra Low Impedance, Low Profile, Solid Electrolyte
			SMD	**MFZ**	Higher CV than MFX
Solid Electrolyte Low Impedance	OS-CON (Organic Semiconductor)	+105°C	Radial	**FA**	Ultra Low Impedance, OS-CON
			Radial	**FF**	Ultra Low Impedance, 5mm Height, OS-CON
	MnO_2	+105°C	SMD	**MFX**	Ultra Low Impedance, Low Profile, Solid Electrolyte
			SMD	**MFZ**	Higher CV than MFX
General Purpose	Miniature	+85°C	Radial	**SME**	General Purpose
			Radial	**SMG**	General Purpose, High CV
		+105°C	Radial	**KME**	General Purpose
			Radial	**KMG**	General Purpose, High CV
	Low Profile	+85°C	Radial	**SREC**	Low Profile, 5mm Height
			Radial	**SRG**	Low Profile, 7-25mm Height
		+105°C	Radial	**KRE**	Low Profile, 5mm Height
			Radial	**KMA**	Low Profile, 7mm Height
			Radial	**KRG**	Low Profile, 7-25mm Height
	Large Tubular	+85°C	Axial	**53D**	General Purpose, Large Diameter Wire Lead
	Snap Mount	+85°C	Snap-In	**SMH**	General Purpose, Large Capacitance
		+105°C	Snap-In	**KMH**	General Purpose, Large Capacitance
			Snap-In	**KMM**	General Purpose, Smaller Size than KMH
	Large Can	+85°C	Screw	**U36D**	General, High CV, Extended Voltage, Inch Size
			Screw	**RWE**	General, High CV, Extended Voltage, Metric Size
		+105°C	Screw	**U32D**	General, High CV, Extended Temp., Inch Size
			Screw	**KMH-LG**	General, High CV, Extended Temp., Metric Size
Output Power Supply	Low Impedance High Reliability	+105°C	Radial	**KMF**	Small Size, Long Life
			Radial	**SXE**	General Purpose, Low Impedance
			Radial	**LXV**	Long Life, Low Impedance
			Radial	**LXY**	Long Life, Low Impedance, High Ripple
			Radial	**LXZ**	Long Life, Lowest Impedance, Highest Ripple
			Wire Lead	**URZA**	19-25mm Diameter, Long Life, Low Impedance
			Screw	**747D**	Low Impedance, 6.3-35 Volts
		+105°C Solid	SMD	**MFX**	Ultra Low Impedance, Low Profile, Solid Electrolyte
			SMD	**MFZ**	Higher CV than MFX
			Radial	**FA**	Ultra Low Impedance, OS-CON
			Radial	**FF**	Ultra Low Impedance, 5mm Height, OS-CON
		+105°C (+125°C)	Radial	**EX**	High Reliability, High Frequency
		+125°C	Wire Lead	**U767D**	3/4"-1" Diameter, Long Life, Low Impedance
Input Power Supply	General Purpose	+85°C	Axial	**53D**	General Purpose, Large Diameter Wire Lead
			Snap-In	**SMH**	General Purpose, Large Capacitance
			Screw	**U36D**	General, High CV, Extended Voltage, Inch Size
			Screw	**RWE**	General, High CV, Extended Voltage, Metric Size
		+105°C	Radial	**KMF**	Small Size, Long Life
			Snap-In	**KMH**	General Purpose, Large Capacitance
			Snap-In	**KMM**	General Purpose, Smaller Size than KMH
			Screw	**U32D**	General, High CV, Extended Temp., Inch Size
			Screw	**KMH-LG**	General, High CV, Extended Temp., Metric Size
	High Reliability	+105°C	Radial	**KMX**	High Reliability, High CV, Long Life
			Snap-In	**LXG**	High Reliability, Large Capacitance
			Screw	**LXA/LX-LG**	High Reliability, High CV, Long Life

Recommended Products

UNITED CHEMI-CON, INC.

9801 W. Higgins Rd., Rosemont, IL 60018 Tel: 847-696-2000 Fax: 847-696-9278 E-mail: info@chemi-con.com Web: http://www.chemi-con.com

UNITED CHEMI-CON Selection Guide for Aluminum Electrolytic Capacitors

Application	Product Type	Max. Temp.	Terminal Type	Series	Highlights
Inverter Circuit	Inverter Use	+85°C	Screw	**RWF**	Inverter Use, High Ripple
			Screw	**RWL**	High Reliability, Long Life
		+105°C	Screw	**LXA/LX-LG**	High Reliability, High CV, Long Life
			Screw	**LXR**	High Reliability, High Ripple, Long Life
			Screw	**U32D**	General, High CV, Extended Temp., Inch Size
Strobe	Photoflash	+55°C	Radial	**PH**	High CV, Charge/Discharge
Timer Circuit Low Leakage	Low Leakage	+85°C	Radial	**LLA**	Low Leakage
	Low Profile	+105°C	Radial	**KRL**	Low Leakage, Low Profile
Wide Temperature Range	−55°C to +125°C	+125°C	Radial	**EX**	High Reliability, High Frequency
			Radial	**GXD**	High Reliability, High CV
			Axial	**600D**	High Reliability
			Wire Lead	**U767D**	3/4"-1" Diameter, Long Life, Low Impedance
Bi-Polar	Surface Mount	+85°C	SMD	**MF-BP**	Bi-Polar, Low Profile, For Reflow
			SMD	**MV-BP**	Bi-Polar, Vertical Mounting, For Reflow
		+105°C	SMD	**MFK-BP**	Bi-Polar, Low Profile, For Reflow
			SMD	**MVK-BP**	Bi-Polar, Vertical Mounting, For Reflow
	Miniature	+85°C	Radial	**SME-BP**	Bi-Polar, General Purpose
		+105°C	Radial	**KME-BP**	Bi-Polar, General Purpose
	Low Profile	+85°C	Radial	**SRE-BP**	Bi-Polar, General Purpose, 5mm Height
			Radial	**SRA-BP**	Bi-Polar, General Purpose, 7mm Height
		+105°C	Radial	**KRE-BP**	Bi-Polar, General Purpose, 5mm Height
			Radial	**KMA-BP**	Bi-Polar, General Purpose, 7mm Height
	Horizontal Deflection	+105°C	Radial	**KSA-BP**	Special Bi-Polar, Horizontal Deflection
Long Life	2,000 Hours	+125°C	Radial	**U767D**	3/4"-1" Diameter, Long Life, Low Impedance
	2,000-5,000 Hours	+105°C	Radial	**KMF**	Small Size, Long Life
			Radial	**LXV**	Long Life, Low Impedance
			Radial	**LXY**	Long Life, Low Impedance, High Ripple
			Radial	**LXZ**	Long Life, Lowest Impedance, Highest Ripple
		+105°C (+125°C)	Radial	**EX**	High Reliability, High Frequency
	5,000 Hours	+85°C	Screw	**RWF**	Inverter Use, High Ripple
		+105°C	Radial	**LXA/LX**	High Reliability, High CV, Long Life
			Radial	**KMX**	High Reliability, High CV, Long Life
			Snap-In	**LXG**	High Reliability, Large Capacitance
			Wire Lead	**URZA**	19-25mm Diameter, Long Life, Low Impedance
			Screw	**LXA/LX-LG**	High Reliability, High CV, Long Life
			Screw	**LXR**	High Reliability, High Ripple, Long Life
	20,000 Hours	+85°C	Screw	**RWL**	High Reliability, Long Life
Large Tubulars	General Purpose	+85°C	Radial	**SMG Large**	General, High CV, 20-25mm Diameter
			Axial	**53D**	General Purpose, Large Diameter Wire Lead
	Low Impedance	+105°C	Wire Lead	**URZA**	19-25mm Diameter, Long Life, Low Impedance
		+125°C	Wire Lead	**U767D**	3/4"-1" Diameter, Long Life, Low Impedance
Snap Mount	Standard	+85°C	Snap-In	**SMH**	General Purpose, Large Capacitance
		+105°C	Snap-In	**KMH**	General Purpose, Large Capacitance
			Snap-In	**KMM**	General Purpose, Smaller Size than KMH
	High Reliability	+105°C	Snap-In	**LXG**	High Reliability, Large Capacitance
Large Can	General Purpose	+85°C	Screw	**U36D**	General, High CV, Extended Voltage, Inch Size
			Screw	**RWE**	General, High CV, Extended Voltage, Metric Size
		+105°C	Screw	**U32D**	General, High CV, Extended Temp., Inch Size
			Screw	**KMH-LG**	General, High CV, Extended Temp., Metric Size
	Inverter Use	+85°C	Screw	**RWF**	Inverter Use, High Ripple
			Screw	**RWL**	High Reliability, Long Life
		+105°C	Screw	**LXA/LX-LG**	High Reliability, High CV, Long Life
			Screw	**LXR**	High Reliability, High Ripple, Long Life
	Low Impedance	+105°C	Screw	**747D**	Low Impedance, 6.3-35 Volts

Recommended Products

United Chemi-Con's Solid Products Selection Guide is on the following page.

UNITED CHEMI-CON, INC.

9801 W. Higgins Rd., Rosemont, IL 60018 Tel: 847-696-2000 Fax: 847-696-9278 E-mail: info@chemi-con.com Web: http://www.chemi-con.com

UNITED CHEMI-CON SOLID PRODUCTS Selection Guide

Capacitors

Series	Product Description	Capacitance (μF)	Tolerance (%)	Voltage Range (V)	Temperature Range (°C)
Multilayer Ceramic Capacitors					
THC	Y5U Ceramic, SMD Chip, High CV	0.01 ~ 33	−20 ~ +80	25 ~ 100	−55 ~ +125
TCC	Y5U Ceramic, SMD Chip, High Voltage	0.01 ~ 18	±20	20 ~ 200	−55 ~ +125
TCD	Y5U Ceramic, Radial, High CV, Dipped Resin Coating	0.01 ~ 100	−20 ~ +80 or ±20	25 ~ 250	−55 ~ +125
TCP	Y5U Ceramic, SMD Stacked Chip, High CV	1.0 ~ 47	−20 ~ +80 or ±20	25 ~ 200	−55 ~ +125
Film Capacitors					
DTD	Stacked Polyester, Radial Lead, General Purpose	0.0015 ~ 15	±10	50 ~ 400	−40 ~ +105
DTDZ	Stacked Polyester, Radial Lead, General Purpose	0.01 ~ 22	±10	50 ~ 250	−40 ~ +105
DFDA	Wrapped Polyester, Radial Lead, High Voltage	0.01 ~ 4.7	±10	250 ~ 1,000	−40 ~ +100
DADA	Polypropylene, Radial Lead, High Voltage, General	0.0022 ~ 4.7	±10	160 ~ 1,250	−25 ~ +85
DFWA	Wrapped Polyester, Axial Lead, General Purpose	0.033 ~ 10	±10	250 ~ 630	−40 ~ +85
FAN	Large Sized Polypropylene, Lug Terminals, VAC Rated	0.4 ~ 20	±5 or ±10	200 ~ 450	−25 ~ +70
TAP	Large Sized Polypropylene, Lug Terminals, VAC Rated	0.7 ~ 29	±5 or ±10	100 ~ 400	−25 ~ +75
Tantalum Chip Capacitors					
MC	SMD Tantalum Chip, General Purpose	0.047 ~ 68	±10 or ±20	4 ~ 50	−55 ~ +125
MCS	SMD Tantalum Chip, Small Size, General Purpose	0.1 ~ 150	±20	4 ~ 35	−55 ~ +125
MCM	SMD Tantalum Chip, Smallest Size, General Purpose	0.68 ~ 220	±20	4 ~ 35	−55 ~ +125
MCR	SMD Tantalum Chip, Low Impedance	4.7 ~ 150	±20	4 ~ 35	−55 ~ +125
MCH	SMD Tantalum Chip, Automotive Use	0.1 ~ 22	±10 or ±20	4 ~ 35	−55 ~ +125
MCF	SMD Tantalum Chip, Built-in Fuse, General Purpose	1.5 ~ 33	±20	10 ~ 35	−55 ~ +125

Metal Oxide Varistors

Series	Product Description	Varistor Voltage (V)	Varistor Voltage Tol. (%)	Voltage Range (VDC)	Temperature Range (°C)
G	MOV, Radial Lead, General, UL and CSA Approved	15 ~ 1,000	±10	12 ~ 825	−40 ~ +85
V	MOV, Radial Lead, General Purpose, UL Approved	15 ~ 1,800	±10	12 ~ 1,465	−40 ~ +85
H	MOV, Radial Lead, Low Voltage, High Energy	22 ~ 47	±10	14 ~ 34	−40 ~ +125
HP	MOV, Radial Lug, Heat Sink Terminals, High Energy	22 ~ 47	±10	16 ~ 34	−40 ~ +150
A	MOV, Axial Lead, High Voltage	1,200 ~ 12,000	±10	880 ~ 8,100	−40 ~ +85
GF	MOV, Radial Lead, Built-in Thermal Fuse, General	270 ~ 820	±10	225 ~ 2,670	−40 ~ +85
E	MOV, Lug Terminals, High Surge Current, General	220 ~ 1,100	±10	180 ~ 895	−40 ~ +85
MG	MOV, SMD Chip, Small Size, General Purpose	12 ~ 33	±10	8.5 ~ 26	−40 ~ +125
MH	MOV, SMD Chip, Small Size, Automotive Use	27	±10	16	−40 ~ +125

UNITED CHEMI-CON, INC.

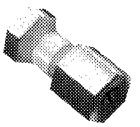
9801 W. Higgins Rd., Rosemont, IL 60018 Tel: 847-696-2000 Fax: 847-696-9278 E-mail: info@chemi-con.com Web: http://www.chemi-con.com

VOLTRONICS
Precision Trimmer Capacitors

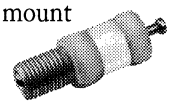
More than 34 years of fine tuning

Since 1963, Voltronics precision trimmer capacitors have solved the most critical tuning problems in military, commercial, and medical applications. Patented Voltronics designs deliver performance, stability, and reliability conventional trimmers can't match, and our fast-turnaround of custom tuning solutions will precisely match your needs.

Low Cost, Miniature-Designed in High Reliability

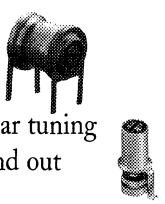


- Capacitance ranges from 0.3-1pF to 0.5-12pF
- Sizes: 0.09" dia. X 0.225" long
  0.16" dia. X 0.4" long
  0.16" dia. X 0.225" long
- Useable up to 3GHz
- Tape and reel available for surface mount
- Up to 2KV withstanding voltage
- Patented solid dielectric design



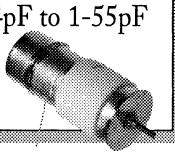
Wide Variety of Dielectric, Application Specific Choices

- Air, glass, quartz and sapphire dielectric
- Capacitance ranges from 0.6-2.5pF to 2-250pF
- Most capacitance in smallest size
- Sealed to 40 p.s.i.
- Qualified to MIL-C-14409D
- Non-rotating piston provides linear tuning and shaft which does not go in and out
- Useable up to 10 GHz

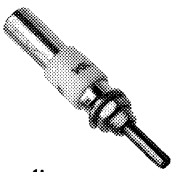


High Voltage

- Up to 25 KV DC withstanding voltage
- Maximum capacitance values up to 1,000pF
- Small, .16" and .31" dia. parts up to 2,000 VDC with capacitance ranges from 0.5-4pF to 1-55pF
- Sealed to 40 p.s.i.
- Patented solid dielectric design



Non-Magnetic Parts for NMR and MRI Applications

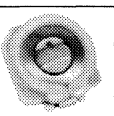


- All styles are available in non-magnetic versions
- Cryogenic designs
- Extended shafts for tuning rod coupling
- Custom designs for specific applications
- Industry Standard for over 20 years

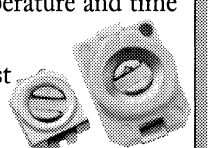
Microwave Tuners

- Wide variety of sizes and materials
- Stable multi-turn tuning
- Rotating and non-rotating styles
- Diameters from 0.03" to 1"

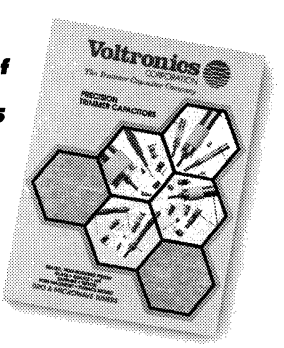
Low Cost 1/2 Turn Ceramic Surface Mount



- Capacitance ranges from 0.43-1.0pF to 5-40pF
- Low temperature coefficient
- Most stable of its type over temperature and time
- Tape and reel standard
- Three sizes including the smallest of its type available anywhere



For a free copy of our catalog, call (973) 586-8585



Voltronics CORPORATION

The Trimmer Capacitor Company

100 Ford Road • Denville, NJ 07834
973.586.8585 • FAX : 973.586.3404
e-mail: info@voltronicscorp.com
Our complete catalog can be found at:
http://www.voltronicscorp.com

VISHAY
Roederstein

FILM, SUPPRESSION and CERAMIC DISC CAPACITORS

- **Surface Mount**
- **Thru-Hole**
- **Radial and Axial**

EEM DESCRIPTIONS

CAPACITORS:

- Chip
- AC and DC
- Film, Metallized and Non-Metallized
- Feed-Thru and High Voltage
- Ceramic, Disk and Tubular

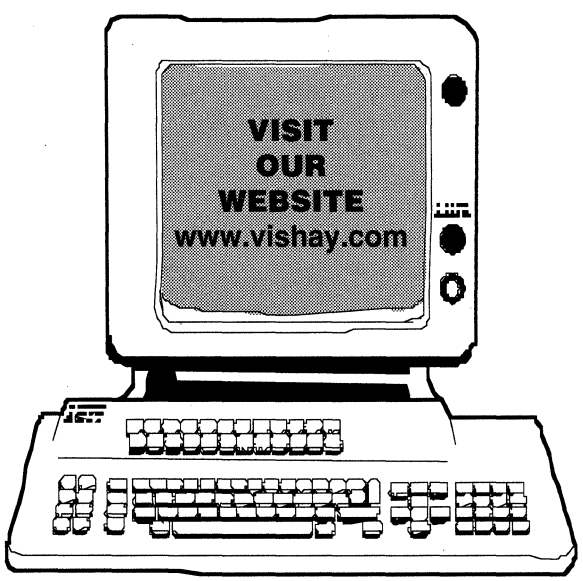
FLASHFAX℠

Fax 1-800-835-4272 for literature.

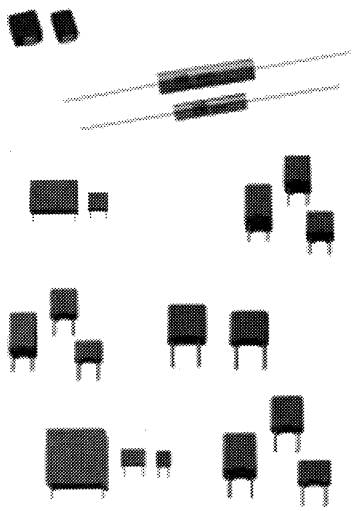
Or call Vishay's FlashFax℠ Service
at 1-800-487-9437.
Request document 9999.
This is a listing of data sheets you can
order by fax in a flash!

11 Capacitor data sheets
for Roederstein products are available.

INTERNET



FILM CAPACITORS



SERIES

MKT 1824 (SMD)

MKT 1813, 1816 (Axial)

MKT 1817, 1818, 1820, 1822, 1823, 1826 (Radial)

KP 1830, 1836 (Radial)

MKP 1837, 1840 (5mm lead spacing), 1841, 1846 (Radial)

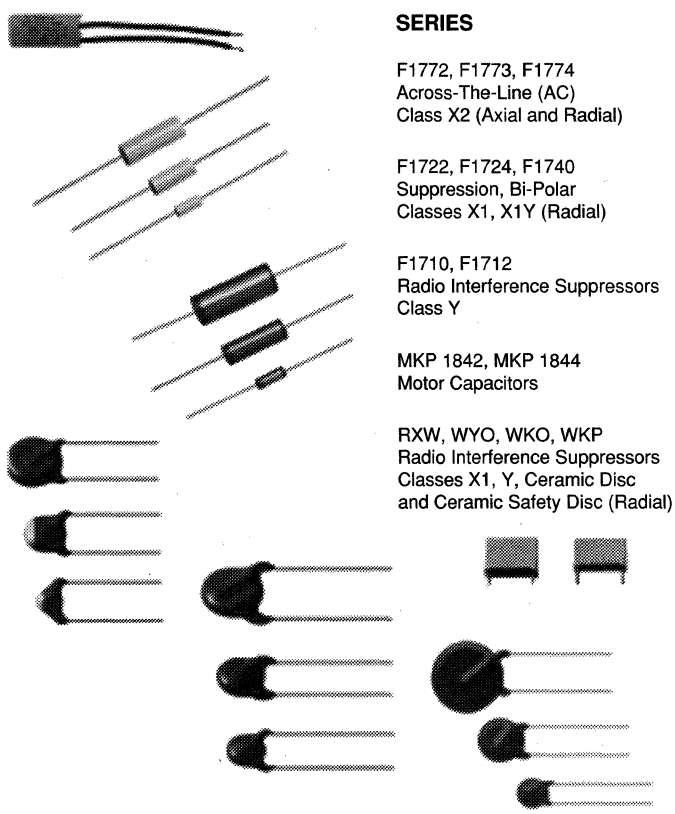
MKP 1839, 1845 (Axial)

KC 1850 (Radial)

MKC 1858, 1862 (Radial)

MKC 1860 (Axial)

SUPPRESSION and CERAMIC DISC CAPACITORS



SERIES

F1772, F1773, F1774
Across-The-Line (AC)
Class X2 (Axial and Radial)

F1722, F1724, F1740
Suppression, Bi-Polar
Classes X1, X1Y (Radial)

F1710, F1712
Radio Interference Suppressors
Class Y

MKP 1842, MKP 1844
Motor Capacitors

RXW, WYO, WKO, WKP
Radio Interference Suppressors
Classes X1, Y, Ceramic Disc
and Ceramic Safety Disc (Radial)

VISHAY
SPRAGUE

TANTALUM CAPACITORS

- **Surface Mount**
- **Thru-Hole**
- **Solid Tantalum**
- **Wet and Foil**

EEM DESCRIPTIONS

CAPACITORS:

- Military
- Commercial
- Conformal Surface Mount Chip
- Molded Surface Mount Chip
- Molded Axial Leaded
- Hermetic Axial Leaded
- Dipped Radial Leaded
- Capacitor Packages
- Filters

FLASHFAX℠

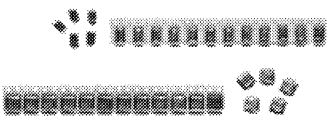
Fax 1-800-835-4272 for literature.

Or call Vishay's FlashFax℠ Service
at 1-800-487-9437.
Request document 9999.
This is a listing of data sheets
you can order by fax in a flash!

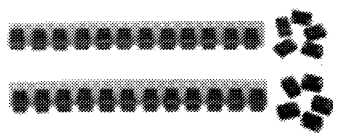
13 Capacitor data sheets
for Vishay Sprague products are available.

INTERNET

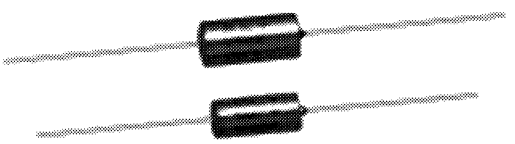
Solid Tantalum, Surface Mount, Conformal
Types 49BC, 49EC, 591D, 592D, 594D, 595D, CWR06



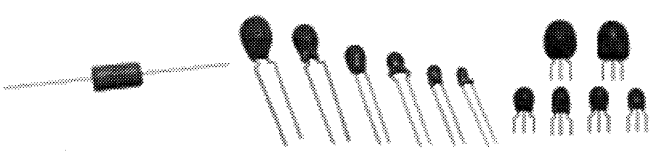
Solid Tantalum, Surface Mount, Molded
Types 293D, 296D, 593D, 893D, CWR09, CWR11



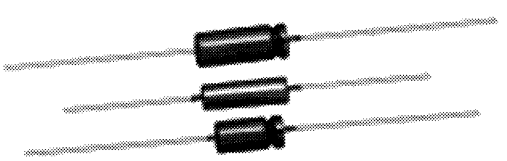
Solid Tantalum, Thru-Hole, Hermetic Seal, Axial Leads
Types 150D, 152D, 550D, MIL-C-39003



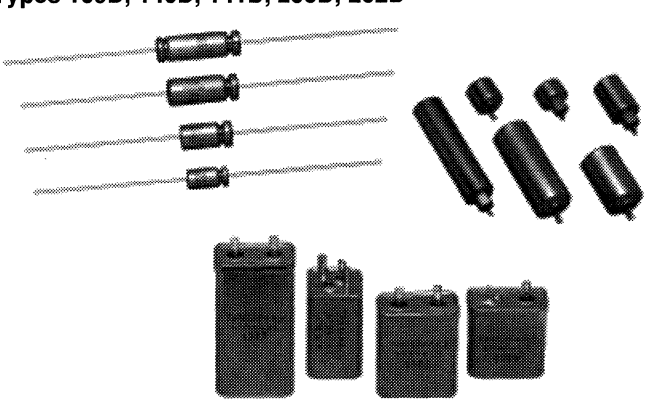
Solid Tantalum, Thru-Hole, Molded or Resin Coated
Types 173D, 199D, 299D



Wet, Hermetic Seal, Metal Case, Axial Leads
Types 135D, 138D, MIL-C-39006



Wet, Non-Hermetic, Axial Leads, Wet Sintered Anode
Types 109D, 140D, 141D, 200D, 202D



Vishay Sprague 678 Main Street, Sanford, ME 04073 • **Phone** (207) 324-4140 • **Fax** 207-324-7223 • **Internet Address**: www.vishay.com
Vishay Sprague 5900 Australian Avenue, West Palm Beach, FL 33407 • **Phone** (561) 863-1800 • **Fax** 561-863-1811 • **Internet Address**: www.vishay.com
Major Vishay Brands Dale • Draloric • Foil Resistors • Measurements Group • Roederstein • Sfernice • Sprague • Thin Film • Vitramon

CERAMIC CHIP CAPACITORS

- **Monolithic**
- **Military**

EEM DESCRIPTIONS

CAPACITORS:

- Chip
- Energy Storage
- Fixed: AC
- Fixed: Ceramic, Disk and Tubular
- Fixed: Ceramic, Monolithic
- Military, Fixed

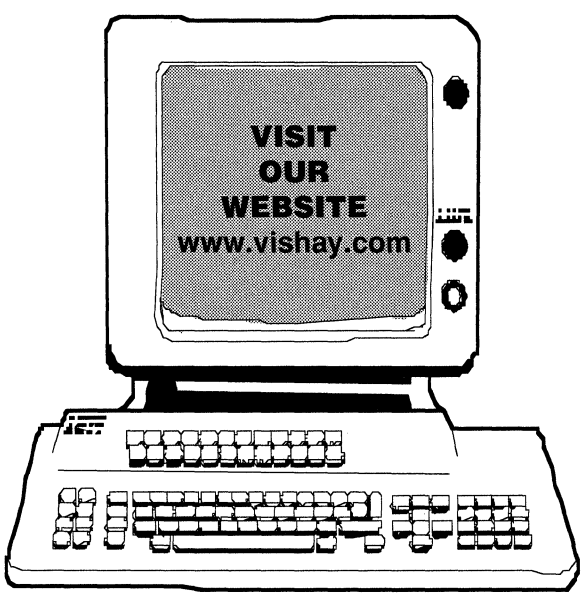
FLASHFAX^{SM}

Fax 1-800-835-4272 for literature.

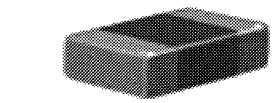
Or call Vishay's FlashFax^{SM} Service at 1-800-487-9437. Request document 9999. This is a listing of data sheets you can order by fax in a flash!

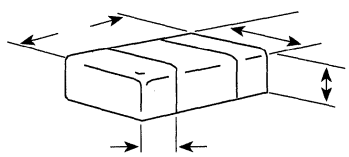
18 Monolithic Ceramic Chip data sheets for Vitramon® products are available.

INTERNET



Military, MIL-C-55681, Style CDR, Surface Mount





STYLE CDR01
STYLE CDR02
STYLE CDR03
STYLE CDR04
STYLE CDR06
STYLE CDR31
STYLE CDR32
STYLE CDR33
STYLE CDR34
STYLE CDR35

General Specifications

STYLE	CDR01	CDR02	CDR03	CDR04	CDR06
MIL-C-55681	/1	/1	/1	/1	/3
Length (L)	.080 [2.03]	.180 [4.57]	.180 [4.57]	.180 [4.57]	.225 [5.72]
Width (W)	.050 [1.27]	.050 [1.27]	.080 [2.03]	.125 [3.18]	.250 [6.35]
Thickness (F) Max.	.055 [1.40]	.055 [1.40]	.080 [2.03]	.080 [2.03]	.080 [2.03]
Term. (P) Min.	.010 [.25]	.010 [.25]	.010 [.25]	.010 [.25]	.010 [.25]
Max.	.030 [.76]	.030 [.76]	.030 [.76]	.030 [.76]	.030 [.76]
STYLE	**CDR31**	**CDR32**	**CDR33**	**CDR34**	**CDR35**
MIL-C-55681	/7	/8	/9	/10	/11
Length (L)	.078 [2.00]	.125 [3.18]	.125 [3.18]	.176 [4.50]	.176 [4.50]
Width (W)	.049 [1.25]	.062 [1.60]	.098 [2.50]	.125 [3.18]	.250 [6.35]
Thickness (F) Max.	.051 [1.30]	.051 [1.30]	.059 [1.50]	.059 [1.50]	.059 [1.50]
Term. (P) Min.	.012 [.30]	.012 [.30]	.010 [.25]	.010 [.25]	.008 [.20]
Max.	.028 [.70]	.028 [.70]	.030 [.76]	.030 [.76]	.032 [.80]

- **Voltage Ratings:** 50Vdc and 100Vdc
- **Insulation Resistance @ + 25°C and Rated Vdc:** 100,000 Megohms or 1,000 ohm-farad (minimum) whichever is less
- **Insulation Resistance @ + 125°C and Rated Vdc:** 10,000 Megohms or 100 ohm-farad (minimum) whichever is less
- **Dissipation Factor (maximum) @ + 25°C:** BX (2.5%); BP (0.15%)
- **Dielectric Withstanding Voltage:** 250% rated Vdc for 5 ± 1 second, 50 mA (max.)
- **Capacitance Measuring Frequency:** Values > 1,000pF measured @ 1.0 Vrms, 1 kHz. Values ≤ 1,000pF measured @ 1.0 Vrms, 1 MHz.
- **Signal Measuring Voltage:** 1.0 ± 0.2 Vrms

CERAMIC CHIP CAPACITORS

- **Monolithic**
- **Commercial**

EEM DESCRIPTIONS

CAPACITORS:

- Chip
- Energy Storage
- Fixed: AC
- Fixed: Ceramic, Disk and Tubular
- Fixed: Ceramic, Monolithic

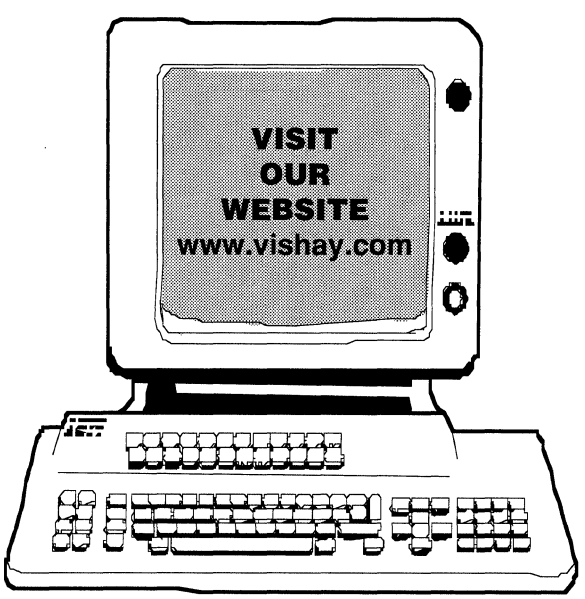
FLASHFAX℠

Fax 1-800-835-4272 for literature.

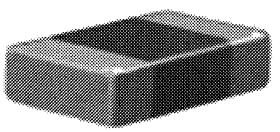
Or call Vishay's FlashFax℠ Service at 1-800-487-9437. Request document 9999. This is a listing of data sheets you can order by fax in a flash!

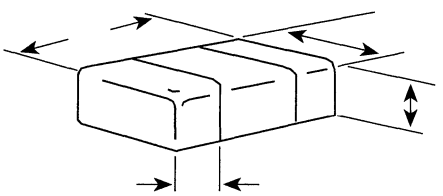
18 Monolithic Ceramic Chip data sheets for Vitramon® products are available.

INTERNET



Surface Mount





STYLE VJ0402

STYLE VJ0603

STYLE VJ0805

STYLE VJ1206

STYLE VJ1210

STYLE VJ1812

STYLE VJ1825

STYLE VJ2225

STYLE VJ3640

STYLE VJ0612*

TIP 'N RING™

*** STYLE VJ0612, Low Inductance Chip, 82pF - .22µF, Maximum Inductance: .5nH.**

General Specifications

STYLE	NPO	X7R	Z5U	X8R	Y5V
0402	—	120pF to 10nF	—	—	—
0603	1pF to 470pF	470pF to 33nF	10nF to 68nF	—	—
0805	1pF to 1.8nF	470pF to 100nF	10nF to 220nF	470pF to 33nF	.15µF to 1.0µF
1206	1pF to 4.7nF	1nF to 220nF	22nF to 470nF	2.2nF to 120nF	.33µF to 2.7µF
1210	220pF to 10nF	10nF to 470nF	33nF to 1µF	10nF to 220nF	.47µF to 4.7µF
1812	470pF to 18nF	22nF to 1µF	150nF to 2.2µF	22nF to 470nF	1.0µF to 8.2µF
1825	1.0nF to 39nF	22nF to 1µF	470nF to 2.7µF	—	—
2225	1.2nF to 56nF	33nF to 2.2µF	1µF to 4.7µF	33nF to 1µF	—
3640	—	220nF to 6.8µF	1µF to 15µF	—	—

WESCO METALLIZED POLYESTER CAPACITORS

SPECIFICATIONS

DIELECTRIC WITHSTANDING VOLTAGE

200% of rated voltage applied through a minimum limiting resistance of 100 Ohms/Volt. Duration of voltage stress shall be 15 seconds minimum and 1 minute maximum at 25°C.

TEMPERATURE RANGE

−55°C to +85°C with full rated voltage applied. To +125°C with 50% of rated voltage.

INSULATION RESISTANCE

At 25°C after 2 minutes of electrification at rated voltage of 500 VDC, whichever is less, the minimum product of Insulation Resistance and Capacitance shall be 30,000 megohms-microfarads, but need not exceed 30,000 megohms.

DISSIPATION FACTOR

Shall not exceed 1.0% when measured at 25°C and 1000 Hz, ±20 Hz. See characteristic curves for D.F. ratings at other temperatures.

CAPACITANCE AND TOLERANCE

Shall be measured within the tolerance limits specified. Measurements will be made at 25°C and 1000 Hz, ±20 Hz.

LIFE TEST

Shall withstand 140% of rated voltage at 85°C for 250 hours. One failure in twelve shall be permitted.

CAPACITANCE STABILITY (DRIFT)

Less than 0.3% when measured in the following manner: three capacitance readings at 25°C, each made prior to and after temperature cycling from room to 85°C, and room to −55°C. The mathemtaical difference between the two extremes, divided by the intermediate value, and then multiplied by 100, yields the stability expressed in percent.

HUMIDITY RESISTANCE

Meets requirements of Mil-C-27287, Para. 3.12 when tested in accordance with Mil-STD-202C, Method 103 B, Condition B.

LEAD PULL AND BEND TEST

Steady pull of 5 pounds applied axially to leads for one minute. Bend test shall consist of one bend from the point of egress, first 90° in one direction, back to the original axial position, and then 90° in the opposite direction with no evidence of breakage.

32MM RATINGS AND DIMENSIONS

Capacity in µF	35 VDC D	35 VDC L	50 VDC D	50 VDC L	100 VDC D	100 VDC L	200 VDC D	200 VDC L	400 VDC D	400 VDC L	600 VDC D	600 VDC L
.0068	—	—	—	—	—	—	—	—	.218	.53	.312	.53
.0082	—	—	—	—	—	—	—	—	.234	.53	.171	.65
.01	—	—	—	—	—	—	—	—	.265	.53	.250	.65
.012	—	—	—	—	—	—	—	—	.203	.65	.265	.65
.015	—	—	—	—	—	—	—	—	.218	.65	.296	.65
.018	—	—	—	—	—	—	.203	.40	.234	.65	.328	.65
.022	—	—	—	—	—	—	.218	.40	.250	.65	.375	.65
.027	—	—	—	—	.171	.40	.234	.40	.265	.65	.390	.65
.033	—	—	—	—	.187	.40	.265	.40	.296	.65	.437	.65
.039	—	—	—	—	.187	.40	.203	.53	.234	.90	.328	.90
.047	—	—	—	—	.203	.40	.218	.53	.265	.90	.375	.90
.056	—	—	—	—	.218	.40	.234	.53	.265	.90	.390	.90
.068	—	—	—	—	.250	.40	.250	.53	.296	.90	.437	.90
.082	—	—	—	—	.187	.53	.265	.53	.328	.90	.468	.90
.1	—	—	—	—	.203	.53	.281	.53	.343	.90	.515	.90
.12	—	—	—	—	.218	.53	.312	.53	.328	1.18	.453	1.18
.15	—	—	—	—	.234	.53	.343	.53	.343	1.18	.515	1.18
.18	—	—	.187	.40	.250	.53	.296	.65	.375	1.18	.562	1.18
.22	—	—	.203	.40	.234	.65	.328	.65	.406	1.18	.625	1.18
.27	.171	.40	.218	.40	.250	.65	.359	.65	.453	1.18	.687	1.18
.33	.187	.40	.234	.40	.265	.65	.406	.65	.437	1.45	.656	1.45
.39	.203	.40	.250	.40	.281	.65	.437	.65	.468	1.45	.703	1.45
.47	.218	.40	.187	.53	.312	.65	.468	.65	.515	1.45	.781	1.45
.56	.250	.40	.203	.53	.343	.65	.406	.90	.546	1.45	.843	1.45
.68	.171	.53	.218	.53	.375	.65	.437	.90	.609	1.45	.921	1.45
.82	.187	.53	.250	.53	.359	.78	.406	1.18	.593	1.70	.906	1.70
1.00	.203	.53	.218	.65	.390	.78	.437	1.18	.656	1.70	1.000	1.70
1.25	.234	.53	.234	.65	.421	.78	.500	1.18	.734	1.70	1.171	1.70
1.50	.250	.53	.265	.65	.421	.90	.531	1.18	.796	1.70	1.265	1.70
1.80	.218	.65	.281	.65	.453	.90	.593	1.18	.875	1.70	1.375	1.70
2.00	.234	.65	.312	.65	.484	.90	.625	1.18	.921	1.70	1.406	1.70
3.00	.281	.65	.312	.78	.484	1.18	.656	1.45	—	—	—	—
4.00	.343	.65	.375	.78	.562	1.18	.750	1.45	—	—	—	—
5.00	.375	.65	.421	.78	.625	1.18	.765	1.70	—	—	—	—
8.00	.390	.78	.453	.90	.703	1.45	.828	2.06	—	—	—	—
10.00	.390	.90	.453	1.03	.781	1.45	.921	2.06	—	—	—	—
15.00	.468	.90	.546	1.03	—	—	—	—	—	—	—	—
20.00	.546	.90	.593	1.18	—	—	—	—	—	—	—	—
25.00	.500	1.18	.656	1.18	—	—	—	—	—	—	—	—
30.00	.562	1.18	.718	1.18	—	—	—	—	—	—	—	—

LEAD MATERIAL: TINNED COPPER SOLID WIRE. **STANDARD LEAD SIZES:** #24 AWG: Up to and including .203" Dia.; #22 AWG: from .204" thru .312" Dia.; #20 AWG: .313" Dia. and over. **CAPACITY TOLERANCE:** STANDARD... ±10% OTHER... from ±20% to ±2%. Other values as well as voltage ratings are available on request. **MARKING:** WESCO Logo, Capacity, Tolerance, VDC Rating and Date Code. (Note: On smaller units, ⑦ trademark will be substituted for WESCO logo.)

METALLIZED POLYCARBONATE CAPACITORS

SPECIFICATIONS

DIELECTRIC WITHSTANDING VOLTAGE

200% of rated voltage applied through a minimum limiting resistance of 100 Ohms/Volt. Duration of voltage stress shall be 15 seconds minimum and 1 minute maximum at 25°C.

TEMPERATURE RANGE

−55°C to +85°C with full rated voltage applied. To +125°C with 50% of rated voltage.

INSULATION RESISTANCE

At 25°C after 2 minutes of electrification at rated voltage or 500 VDC, whichever is less, the minimum product of Insulation Resistance and Capacitance shall be 50,000 megohms-microfarads, but need not exceed 50,000 megohms.

DISSIPATION FACTOR

Shall not exceed 0.3% when measured at 25°C and 1000 Hz, ±20 Hz. See characteristic curves for D.F. ratings at other temperatures.

CAPACITANCE AND TOLERANCE

Shall be measured within the tolerance limits specified. Measurements will be made at 25°C and 1000 Hz, ±20 Hz.

LIFE TEST

Shall withstand 140% of rated voltage at 85°C for 250 hours. One failure in twelve shall be permitted.

CAPACITANCE STABILITY (DRIFT)

Less than 0.3% when measured in the following manner: three capacitance readings at 25°C, each made prior to and after temperature cycling from room to 85°C, and room to −55°C. The mathemtaical difference between the two extremes, divided by the intermediate value, and then multiplied by 100, yields the stability expressed in percent.

HUMIDITY RESISTANCE

Meets requirements of Mil-C-27287, Para. 3.12 when tested in accordance with Mil-STD-202C, Method 103B, Condition B.

LEAD PULL AND BEND TEST

Steady pull of 5 pounds applied axially to leads for one minute. Bend test shall consist of one bend from the point of egress, first 90° in one direction, back to the original axial position, and then 90° in the opposite direction with no evidence of breakage.

TYPE 32MPC RATINGS AND DIMENSIONS

WESCO 32MPC

Capacity in µF	35VDC D	35VDC L	Cat. No. 32MPC —K-03.5	50VDC D	50VDC L	Cat. No. 32MPC —K-05	100VDC D	100VDC L	Cat. No. 32MPC —K-1
.033	—	—	—	—	—	—	.171	.40	3302
.039	—	—	—	—	—	—	.187	.40	3902
.047	—	—	—	—	—	—	.203	.40	4702
.056	—	—	—	—	—	—	.218	.40	5602
.068	—	—	—	—	—	—	.234	.40	6802
.082	—	—	—	.156	.40	8202	.187	.53	8202
.1	—	—	—	.171	.40	1003	.203	.53	1002
.12	—	—	—	.187	.40	1203	.218	.53	1203
.15	—	—	—	.203	.40	1503	.234	.53	1503
.18	.156	.40	1803	.218	.40	1803	.250	.53	1803
.22	.171	.40	2203	.171	.53	2203	.265	.53	2203
.27	.187	.40	2703	.187	.53	2703	.250	.65	2703
.33	.203	.40	3303	.203	.53	3303	.265	.65	3303
.39	.218	.40	3903	.203	.53	3903	.281	.65	3903
.47	.234	.40	4703	.218	.53	4703	.312	.65	4703
.56	.171	.53	5603	.250	.53	5603	.328	.65	5603
.68	.187	.53	6803	.218	.65	6803	.328	.78	6803
.82	.203	.53	8203	.234	.65	8203	.343	.78	8203
1.0	.218	.53	1004	.265	.65	1004	.375	.78	1004
1.25	.250	.53	1254	.296	.65	1254	.421	.78	1254
1.50	.218	.65	1504	.312	.65	1504	.453	.78	1504
1.80	.234	.65	1804	.328	.78	1804	.453	.90	1804
2.0	.250	.65	2004	.343	.78	2004	.468	.90	2004
3.0	.296	.65	3004	.390	.78	3004	.484	1.18	3004
4.0	.296	.78	4004	.437	.78	4004	.546	1.18	4004
5.0	.328	.78	5004	.437	.90	5004	.531	1.45	5004
8.0	.406	.78	8004	.468	1.18	8004	.593	1.78	8004
10.0	.453	.78	1005	.515	1.18	1005	.656	1.78	1005
15.0	.421	1.18	1505	.578	1.18	1505	.718	2.06	1505
20.0	.476	1.18	2005	.578	1.45	2005	.828	2.06	2005
25.0	.546	1.18	2505	.656	1.45	2505	—	—	—
30.0	.593	1.18	3005	—	—	—	—	—	—

LEAD MATERIAL: TINNED COPPER SOLID WIRE. **STANDARD LEAD SIZES:** #24 AWG: Up to and including .203" Dia.; #22 AWG: from .204" thru .312" Dia.; #20 AWG: .313" Dia. and over. **CAPACITY TOLERANCE:** STANDARD... ±10%/OTHER... from ±20% to ±1%. Other values as well as voltage ratings are available on request. **MARKING:** WESCO Logo, Capacity, Tolerance, VDC Rating and Date Code. (Note: On smaller units, ⑦ trademark will be substituted for WESCO logo.)

J.K. ELECTRONICS, INC d/b/a
WESCO ELECTRICAL COMPANY
201 MUNSON ST. • GREENFIELD • MASSACHUSETTS • 01301
TELEPHONE: 413-774-4358 FAX: 413-774-4562
Internet: www.wescocap.com
E-mail: sales@wescocap.com

WESCO METALLIZED POLYPROPLENE CAPACITORS

SPECIFICATIONS

DIELECTRIC WITHSTANDING VOLTAGE
200% of rated voltage applied through a minimum limiting resistance of 100 Ohms/Volt. Duration of voltage stress shall be 15 seconds minimum and 1 minute maximum at 25°C.

INSULATION RESISTANCE
At 25°C after 2 minutes of electrification at rated voltage or 500 VDC, whichever is less, the minimum product of Insulation Resistance and Capacitance shall be 100,000 megohms-microfarads, but need not exceed 100,000 megohms.

DISSIPATION FACTOR
Shall not exceed 0.1% when measured at 25°C and 1000 Hz, ±20 Hz. See characteristic curves for D.F. ratings at other temperatures.

CAPACITANCE AND TOLERANCE
Shall be measured within the tolerance limits specified. Measurements will be made at 25°C and 1000 Hz, ±20 Hz.

LIFE TEST
Shall withstand 140% of rated voltage at 85°C for 250 hours. One failure in twelve shall be permitted.

TEMPERATURE COEFFICIENT
Capacitance shall change linearly over operating temperature range of −55°C to +85°C at rate of −290, ±75 parts per million/°C.

CAPACITANCE STABILITY (DRIFT)
Less than .2% when measured in the following manner: three capacitance readings at 25°C, each made prior to and after temperature cycling from room to 105°C, and room to −55°C. The mathematical difference between the two extremes, divided by the intermediate value, and then multiplied by 100, yields the stability expressed in percent.

HUMIDITY RESISTANCE
Meets requirements of Mil-C-27287, Para. 3.12 when tested in accordance with Mil-STD-202C, Method 103 B, Condition B.

LEAD PULL AND BEND TEST
Steady pull of 5 pounds applied axially to leads for one minute. Bend test shall consist of one bend from the point of egress, first 90° in one direction, back to the original axial position, and then 90° in the opposite direction with no evidence of breakage.

TEMPERATURE RANGE
−55°C to +85°C with full rated voltage applied.

DIELECTRIC ABSORPTION
Shall not exceed .05% when tested in accordance with Mil-C-19978.

Capacity in µF	100 VDC D	100 VDC L	100 VDC Cat. No. 32MPL —K-1	200 VDC D	200 VDC L	200 VDC Cat. No. 32MPL —K-2	400 VDC D	400 VDC L	400 VDC Cat. No. 32MPL —K-4
.01	.171	.406	1002	.171	.406	1002	1.87	.531	1002
.012	.171	.406	1202	.171	.406	1202	.203	.531	1202
.015	.171	.406	1502	.187	.406	1502	.234	.531	1502
.018	.171	.406	1802	.203	.406	1802	.250	.531	1802
.022	.171	.406	2202	.171	.531	2202	.265	.531	2202
.027	.171	.406	2702	.171	.531	2702	.296	.531	2702
.033	.187	.406	3302	.187	.531	3302	.312	.531	3302
.039	.203	.406	3902	.203	.531	3902	.343	.531	3902
.047	.218	.406	4702	.218	.531	4702	.281	.656	4702
.056	.234	.406	5602	.234	.531	5602	.312	.656	5602
.068	.187	.531	6802	.250	.531	6802	.343	.656	6802
.082	.187	.531	8202	.275	.531	8202	.375	.656	8202
.1	.218	.531	1003	.250	.656	1003	.343	.781	1003
.12	.234	.531	1203	.265	.656	1203	.375	.781	1203
.15	.250	.531	1503	.296	.656	1503	.421	.781	1503
.18	.275	.531	1803	.328	.656	1803	.453	.781	1803
.22	.312	.531	2203	.359	.656	2203	.437	.906	2203
.27	.328	.531	2703	.359	.781	2703	.484	.906	2703
.33	.281	.656	3303	.359	.781	3303	.546	.906	3303
.39	.312	.656	3903	.406	.781	3903	.578	.906	3903
.47	.343	.656	4703	.390	.906	4703	.531	1.187	4703
.56	.375	.656	5603	.437	.906	5603	.578	1.187	5603
.68	.375	.781	6803	.484	.906	6803	.625	1.187	6803
.82	.390	.781	8203	.515	.906	8203	.687	1.187	8203
1.0	.421	.781	1004	.484	1.187	1004	.671	1.437	1004
1.25	.421	.906	1254	.531	1.187	1254	.750	1.437	1254
1.50	.453	.906	1504	.578	1.187	1504	.812	1.437	1504
1.80	.500	.906	1804	.640	1.187	1804	.796	1.687	1804
2.00	.515	.906	2004	.671	1.187	2004	.843	1.687	2004
3.00	.531	1.187	3004	.718	1.437	3004	1.03	1.687	3004
4.00	.609	1.187	4004	.828	1.437	4004	—	—	—
5.00	.671	1.187	5004	.828	1.687	5004	—	—	—
8.00	.750	1.437	8004	.937	2.062	8004	—	—	—
10.00	.843	1.437	1005	1.03	2.062	1005	—	—	—
12.00	.828	1.687	1205	—	—	—	—	—	—
15.00	.921	1.687	1505	—	—	—	—	—	—

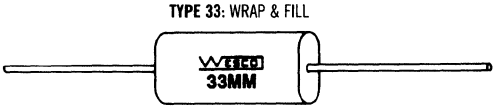
LEAD MATERIAL: TINNED COPPER SOLID WIRE. **STANDARD LEAD SIZES:** #24 AWG: Up to and including .203" Dia.; #22 AWG: from .204" thru .312" Dia.; #20 AWG: .313" Dia. and over. **CAPACITY TOLERANCE:** STANDARD... ±10%/OTHER... from ±20% to ±1%. Other values as well as voltage ratings are available on request. **MARKING:** WESCO Logo, Capacity, Tolerance, VDC Rating and Date Code. (Note: On smaller units, Ⓣ trademark will be substituted for WESCO logo.)

TYPICAL CASE STYLES

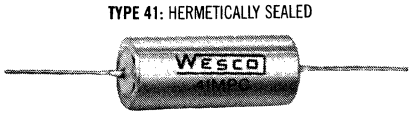
AXIAL LEADS

TYPE 32: WRAP & FILL

TYPE 33: WRAP & FILL



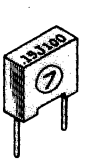
TYPE 41: HERMETICALLY SEALED



RADIAL LEADS

WRAP & FILL

"BOX"



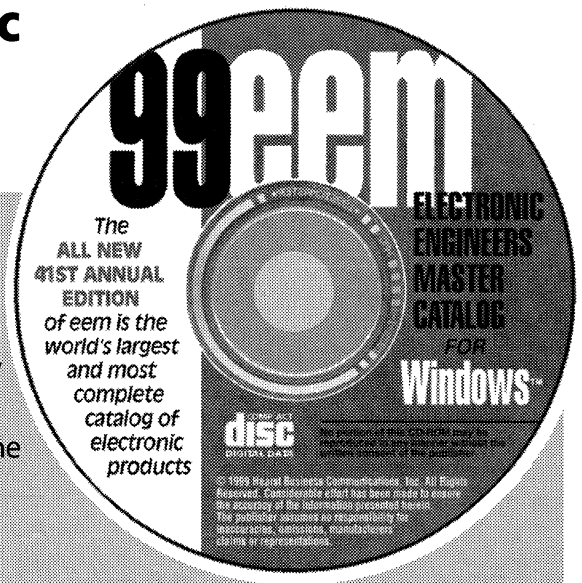
OTHER AVAILABLE PRODUCTS

Data Sheet	Dielectric	Type
101	POLYESTER FILM-FOIL	32M - 33M
201	METALIZED POLYESTER	33MM
"BOX" CAPACITORS	METALIZED POLYESTER (Radial Leads)	60MM - 66MM 67MM - 68MM
402	METALIZED POLYCARBONATE (Hermetically Sealed)	41MPC
501	POLYSTYRENE FILM-FOIL	32P
601	POLYPROPYLENE FILM-FOIL	32PL
602	POLYPROPYLENE FILM-FOIL (Radial Leads)	F32PLRT
604	POLYPROPYLENE FILM-FOIL (AC Rated)	432PL
605	METALIZED POLYPROPYLENE (RFI Suppressors)	63MKP

J K ELECTRONICS, INC d/b/a
WESCO ELECTRICAL COMPANY
201 MUNSON ST. • GREENFIELD • MASSACHUSETTS • 01301
TELEPHONE: 413-774-4358 FAX: 413-774-4562
Internet: www.wescocap.com
E-mail: sales@wescocap.com

1999 EEM CD-ROM *for Windows*

The entire EEM/Electronic Engineers Master on a single compact disk!



With this time-saving search tool on your PC, you have immediate access to all the data that is in the 4-volume 1999 EEM catalog, the world's largest catalog of electronic components, equipment, and services.

The fast and easy-to-use CD-ROM search engine helps you find the Product or Manufacturer you need ... in minutes.

*** Search by Product**
All products are organized by their generic name in 64 main product categories with thousands of sub-categories. Your product search can be as general as "Power Supplies" or as specific as "Power Supplies, Switching, Medical".

*** Search by Manufacturer**
Complete contact information is listed for over 5,300 manufacturers including e-mail and web addresses.

*** Locate, View and Print-Out Product Catalog Data Pages**
Over 4,200 Product Catalog Data Pages supplied by more than 1,000 manufacturers provide you with valuable additional product information.

Save time! Make your job easier!

Order your copy of the

1999 EEM CD-ROM for Windows today!

To order contact Marie Botta at:

Hearst Business Communications, Inc.
645 Stewart Avenue, Garden City, NY 11530
(516) 227-1314 FAX (516) 227-1453
CREDIT CARD HOTLINE: 1-800-833-7138

The EEM CD-ROM for Windows is published annually in October.

See us on the World Wide Web at http://eemonline.com

W O R L D P R O D U C T S

RFI SUPPRESSORS / WXE SERIES - X2 CLASS CAPACITORS (POLYESTER)

PART NUMBER	CAPACITANCE (µF) ±10%	L MAX mm	H MAX mm	W MAX mm	P mm	QUANTITY PER BOX
WXE-103K	0.01	18.0	10.5	5.5	15.0±.5	500
WXE-153K	0.015	18.0	10.5	5.5	15.0±.5	500
WXE-223K	0.022	18.0	10.5	5.5	15.0±.5	500
WXE-333K	0.033	18.0	10.5	5.5	15.0±.5	500
WXE-473K	0.047	18.0	12.5	6.5	15.0±.5	400
WXE-683K	0.068	18.0	13.5	7.5	15.0±.5	400
WXE-104K	0.1	18.0	14.5	8.5	15.0±.5	400
WXE-154K	0.15	26.5	15.5	7.5	22.5±.5	200
WXE-224K	0.22	26.5	16.5	8.5	22.5±.5	200
WXE-334K	0.33	26.5	18.5	10.5	22.5±.5	150
WXE-474K	0.47	31.5	20.5	11.5	27.5±.7	100
WXE-684K	0.68	31.5	23.5	13.5	27.5±.7	100
WXE-105K	1.0	31.5	24.5	15.0	27.5±.7	75
WXE-155K	1.5	41.5	28.5	16.0	37.5±.7	50
WXE-225K	2.2	41.5	33.0	18.0	37.5±.7	50

Note: 275 VAC rated

RFI SUPPRESSORS / WXP SERIES - X2 CLASS CAPACITORS (POLYPROPYLENE)

PART NUMBER	CAPACITANCE (µF) ±10%	L MAX mm	H MAX mm	W MAX mm	P mm	QUANTITY PER BOX
WXP-103K	0.01	18.0	10.5	5.5	15.0±0.5	500
WXP-153K	0.015	18.0	10.5	5.5	15.0±0.5	500
WXP-223K	0.022	18.0	10.5	5.5	15.0±0.5	500
WXP-333K	0.033	18.0	10.5	5.5	15.0±0.5	500
WXP-473K	0.047	18.0	12.5	6.5	15.0±0.5	400
WXP-683K	0.068	18.0	13.5	7.5	15.0±0.5	400
WXP-104K	0.1	18.0	14.5	8.5	15.0±0.5	400
WXP-154K	0.15	26.5	15.5	7.5	22.5±0.5	200
WXP-224K	0.22	26.5	16.5	8.5	22.5±0.5	200
WXP-334K	0.33	26.5	18.5	10.5	22.5±0.5	150
WXP-474K	0.47	31.5	20.5	11.5	27.5±0.7	100
WXP-684K	0.68	31.5	23.5	13.5	27.5±0.7	100
WXP-105K	1.0	31.5	24.5	15.0	27.5±0.7	75
WXP-155K	1.5	41.5	28.5	16.0	37.5±0.7	50
WXP-225K	2.2	41.5	33.0	18.0	37.5±0.7	50

Note: 275 VAC rated

RFI SUPPRESSORS / WYE SERIES - Y2 CLASS CAPACITORS (POLYESTER)

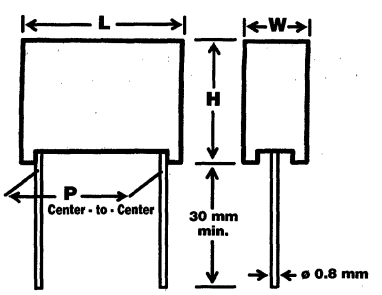
PART NUMBER	CAPACITANCE (µF) ±20%	L MAX mm	H MAX mm	W MAX mm	P mm	QUANTITY PER BOX
WYE-102M	0.001	13.0	10.5	4.5	10.0±0.5	1000
WYE-152M	0.0015	13.0	10.5	4.5	10.0±0.5	1000
WYE-222M	0.0022	13.0	10.5	5.5	10.0±0.5	1000
WYE-252M	0.0025	13.0	10.5	5.5	10.0±0.5	1000
WYE-332M	0.0033	13.0	12.5	5.5	10.0±0.5	800
WYE-392M	0.0039	13.0	12.5	5.5	10.0±0.5	800
WYE-472M	0.0047	13.0	13.5	5.5	10.0±0.5	800
WYE-682M	0.0068	18.0	14.0	5.5	15.0±0.5	500
WYE-103M	0.01	18.0	13.5	7.5	15.0±0.5	400
WYE-153M	0.015	18.0	14.5	8.5	15.0±0.5	400
WYE-223M	0.022	18.0	17.0	8.5	15.0±0.5	300

Note: 250 VAC rated

SAFETY APPROVALS REFERENCES

SYMBOL	COUNTRY
CSA	Canada
D	Denmark
FI	Finland
GOST	Russia
IMQ	Italy
N	Norway
OVE	Austria
S	Sweden
SEV	Switzerland
UL	USA
UL	USA
VDE	Germany

OUTLINE DRAWING



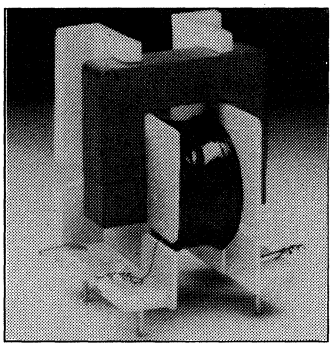
SEE OUR OTHER DATA PAGES IN SECTIONS 1850, 2460, 4300, 4700 AND 4800

WORLD PRODUCTS INC.
19654 8TH ST. EAST, SONOMA, CA 95476 PHONE (707) 996-5201 FAX (707) 996-3380
Internet: www.worldproducts.com • E-Mail: ppgsales@worldproducts.com

AMECON

Serving You Since 1972 With Knowledge & Sensible Products

1900 Chris Lane • Anaheim, CA 92085 • (714) 634-2220 • FAX (714) 634-0905 • **800-394-2234**



"Snap-On" 5-50A Load Detector

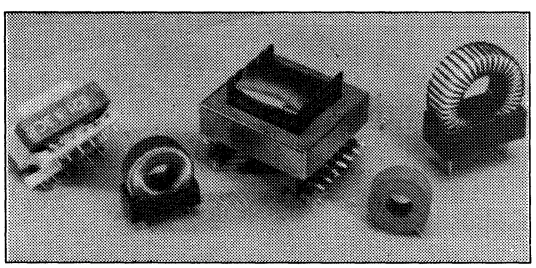
The LD-50 is ±3% accurate from 5A to 50A and can handle short term currents up to 150A! It costs a fraction of sensors with comparable range and accuracy *and* it's designed for pc-mounting and auto-insertion. And the LD-50 features a revolutionary snap-on design that simplifies installation – even in pre-wired systems! **See pages A•2110-A•2111.**

Wide Range Mini and Super-CT's*

Miniature Wide Range Current Transformer

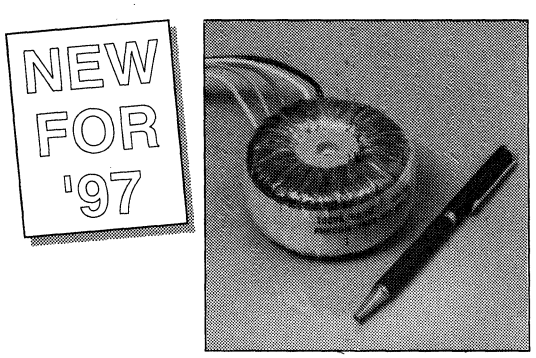
- 50µA to 20A & 100µA to 50A
- 40% smaller than comparable CT's
- Excellent bandwidth, accuracy, linearity and repeatability

The new wide range MINI an d Super-CT's from Amecon offers unparalleled performance over a six-decade input current range-from 50µA to 50A. All this in a package that's 40% smaller than standard CTs! **See pages A•2112-A•2113, Section 5600.**



Switch Mode Power Supply Transformers and Inductors

Current sense transformers, inverter transformers and filter inductors. A large selection of sizes are available, including miniature and low profile; in open winding, encapsulated and semi-encapsulated configurations. Custom designs to 200A. High frequency inverter transformers for power transistors and MOSFETs with power levels from 10VA to 1.0kVA covering frequencies from 5 to 100kHz with low power losses. **See pages A•1170-A•1173, Section 1800.**



Super Toro

The Toro line of toroidal power transformers, available in ratings from 10VA to 3kVA, are claimed to be significantly lighter than comparably rated E-I transformers. For example, a 100VA Toro transformer weighs only 1.9 lbs., which is about 60% lighter than comparable E-I types. Yet, the Toro's efficiency is 86%. A special mounting method incorporated into Toro transformers eliminates the need for external mounting brackets or steel and rubber washers. All Toro transformers are UL1411 listed. (100VA model, $12 ea/large qty—prototypes, 2 weeks ARO; prod qty, 4 to 6 weeks ARO.) **See pages A•2114-A•2115, Section 5600.**

* Note: These features have made these new devices the answer to a myriad of new applications such as monitoring relays and lamps, Hi/Low current limits. instrumentation, solid-state switchgear, motor controls, closed loop feedback, and much more.

COILS, CHOKES, & INDUCTORS

Manufacturer	Starting EEM Page No.	AF	RF	IF	High Q	Shielded	Variable (Adjustable)	Choke/Filter	Chip	Spiral	Toroidal	Power, Switch Mode	Suppression, Common Mode	Other Types
3L Global Electronics	A•1320		√	√	√	√	√	√			√	√	√	
AALTAM/Microtran	A•1158	√§*	√§*		√§*	√§*	√*	√§*			√§*	√§*	√§*	
Abracon Corporation	A•1162		√§			√§	√§	√§	√§		√§	√§	√§	Ferrite beads, Axial and Surface Mount
Amecon Inc.	A•1170	√*			√*	√*	√*	√*		√*	√*	√*	√*	Harmonic Chokes/ Inductors, Power factor correction/chokes
API Delevan	A•1174		√	√	√	√	√	√	√	√	√			
B & L Industries	A•1177							√			√	√	√	Custom
Caddell-Burns	A•1178	√	√	√	√	√	√	√				√		
Classic Coil Winding, Inc.	A•1193	√§*	√§*	√§*	√§*	√§*	√§*	√§*		√§*	√§*	√§*	√§*	Air-Wounds, Baluns
Coilcraft	A•1194		√§	√§	√§	√§	√§	√§	√§		√§	√§	√§	
CoilQ Corp.	A•1210	√*	√*	√*	√*	√*	√*	√*			√*	√*	√*	Custom Design, Pot Cores, Transformers Low TC, Many Others
Communication Coil, Inc.	A•1209	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*		√§*	√§*	√§*	√
EAG Electronics	A•1212	√	√	√		√	√	√			√	√	√	
EWC	A•1213	√*	√*	√*		√*	√*	√*			√*	√*	√*	
Frontier Electronics	A•1214		√§	√	√	√	√	√§	√§	√§	√§	√§	√§	
General Linear Systems	A•1223							√			√	√	√	5600,2700
Gowanda Electronics	A•1224		√		√	√	√	√	√	√	√	√	√	

* MIL Spec. § Surface Mount.

TAMURA Designs OUT Custom Design EMI/RFI IN TAMURA Ripple & Noise.

Low cost filters, common and normal mode coils & power inductors.

Serious designers conquer conducted noise problems with filters, coils and inductors custom-designed by TAMURA to your requirements.

- EMI/RFI line filters feature tab, pin and screw terminal type connectors.
- Common and normal mode coils for AC line and EMI/RFI filtering cover the range from 0.1 to 50 MHz.
- TAMURA offers a wide range of inductors for switch-mode power regulator control and energy storage circuits.

ISO REGISTERED 9001/9002

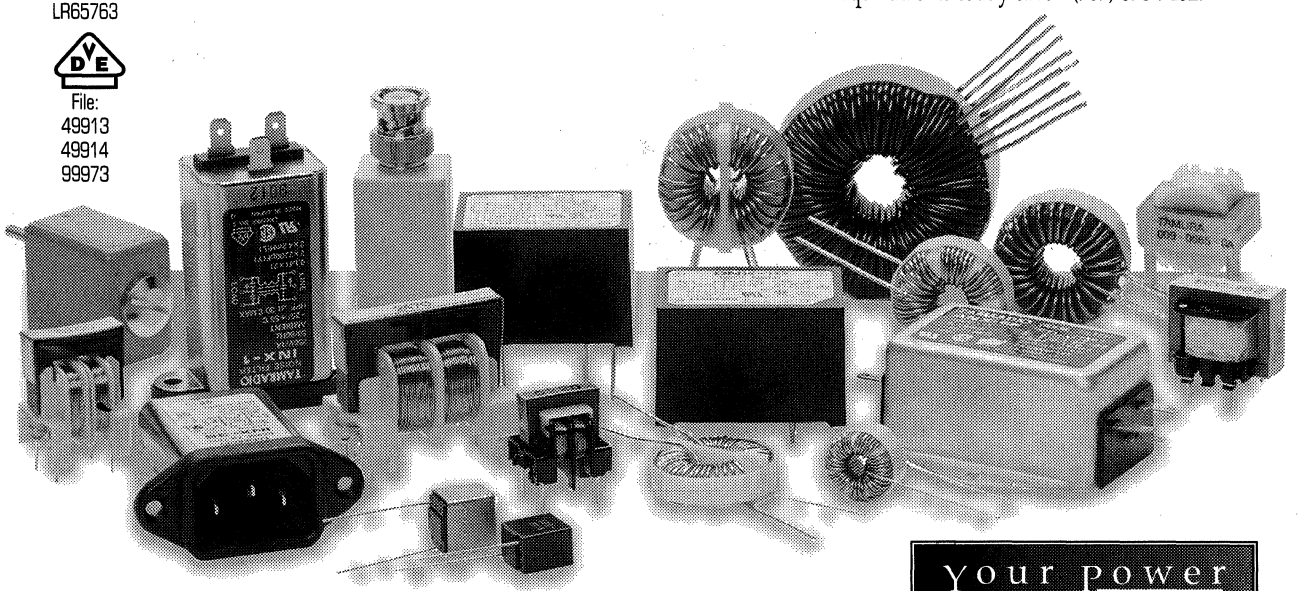
File: E92559 E105042

File: LR65763

File: 49913 49914 99973

TAMURA HAS IT ALL.

For world-class manufacturing, reliability and responsibility, go to the source. Partner with TAMURA and you'll get it all. Send your requirements today or fax (909) 676-9482.



Your Power Partner.

For world-class manufacturing, distribution, reliability, and responsibility, go to the sources...

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

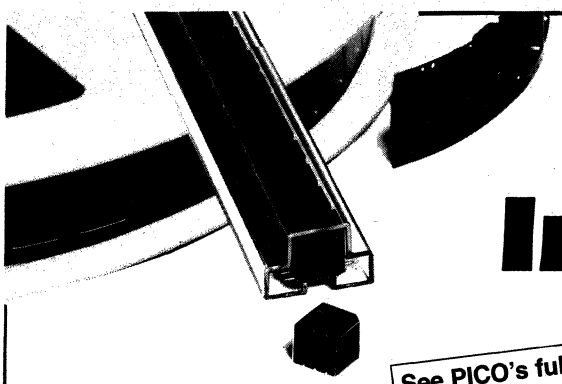
Microtran Division, Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

COILS, CHOKES, & INDUCTORS (cont'd.)

Manufacturer	Starting EEM Page No.	AF	RF	IF	High Q	Shielded	Variable (Adjustable)	Choke/Filter	Chip	Spiral	Toroidal	Power, Switch Mode	Suppression, Common Mode	Other Types
Inductor Supply	A•1226	√*	√§	√§	√§	√§	√*	√§	√§		√§	√§	√*	Ferrite beads leaded and surface mount
Inphase, Inc.	A•1231	√§*	√§*		√§*	√§*		√§*		√	√§*	√§*	√§*	
J.W. Miller	A•1250		√§*		√*	√§*	√	√§*	√§		√§	√§	√	Customer design/wound
KOA Speer Electronics, Inc.	A•1232		√		√			√	√	√	√			
Lodestone Pacific	A•1235		√		√§	√§	√§	√§	√§		√	√	√	√
Magnetic Circuit Elements	A•1240	√§	√§			√§		√§*			√§*	√§*	√§	
Magnetic Component Engineering, Inc.	A•1244		√	√	√	√	√	√			√			
Microtran	A•1158	√§*	√§*		√§*	√§*	√*	√§*			√§*	√§*	√§*	
MTE Corp.	A•1260							√			√		√	√
Newport Components, Inc.	A•1262					√§		√			√	√		
OPT Industries, Inc.	A•1263	√§*			√§*	√§*		√§*			√§*	√§*	√§*	
Pico Electronics, Inc.	A•1265	√§*			√§*	√§*		√§*			√§*	√§*	√§*	
Polara Engineering Inc.	A•1280		√§*		√§*	√§*	√§*	√§*			√§*	√§*	√§*	Custom Magnetics Air Coils,Pot Cores Transformers
Prem Magnetics, Inc.	A•1281	√§	√§				√	√				√	√	
Pulse Engineering	A•1286		√§		√§			√§	√§		√§	√§	√§	
RCD Components, Inc.	A•1290	√§	√§*	√§	√§	√§*	√§	√§	√§	√§	√§	√§	√§	√§
Renco Electronics, Inc.	A•1291	√§	√§*	√§	√§*	√§*	√§	√§*	√§	√§	√§*	√§*	√§*	
RFE International, Inc.	A•1300	√§	√§	√§	√§	√§		√§	√§		√§	√§	√§	√§
SAE Power, Inc.	A•1301							√§		√	√§	√	√	
Standex Electronics	A•1302		√§		√§	√	√	√§			√§	√§	√	

* MIL Spec. § Surface Mount.



PICO Miniature Inductors

(See EEM Pages A•1265-A•1278)

See PICO's full Catalog immediately on the internet http://www.picoelectronics.com

Surface Mount

All PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, IR, and other reflow procedures without degradation of electrical or mechanical characteristics.

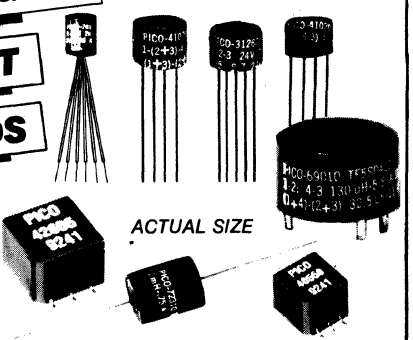
SURFACE MOUNT

INSULATED LEADS

PLUG-IN

TOROIDAL

AXIAL LEADS



ACTUAL SIZE

POWER Inductors

These Inductors are ideal for Noise, Spike and Power Filtering Applications in Power Supplies, DC-DC Converters and Switching Regulators.

- *Low Profile from .19" Ht.*
- *Inductance Values to 20mH with DC Currents to 35 Amps*
- *QPL Standards Available MIL-T-27/356*
- *Shielded Construction*
- *Manufactured to MIL-T-27*
- *Temperature Range –55°C to 130°C*
- *Class V (155°C) Available*
- *Minimum Possible Size*
- *Split Windings*

EMI Common Mode Inductors

These Inductors are well suited for use in Switching Regulators, DC to DC Power Supplies and all types of Electrical Equipment where the elimination of line transmitted Electromagnetic Interference is important.

- *Inductance Values to 20mH with Currents to 9.9 Amps*
- *Winding Balance ± 1%*
- *130°C (Ambient + Temperature Rise)*
- *Class V (155°C) Available*
- *Dielectric Strength 1500 Volts RMS*
- *Manufactured to MIL-T-27*
- *Minimum Possible Size*

HIGH "Q" INDUCTORS

- ± 2% inductance stability vs temperature
- Smallest possible size
- Extreme resistance to thermal shock
- Manufactured to Mil-T-27 (TF5R20ZZ)
- All units are magnetically shielded

VISA MasterCard

QPL Units Available
MIL-T-27/286
MIL-T-27/287
MIL-T-27/286
MIL-T-27/289
MIL-T-27/356

See PICO's full Catalog immediately on the internet http://www.picoelectronics.com

Call Toll Free 1-800-228-9747 or send direct for FREE 152 pg. PICO Catalog featuring Transformers, Inductors, DC-DC Converters, AC-DC Power Supplies

Also see PICO's full line of Transformers EEM pgs. A•2251-A•2301

Call Toll Free 800-228-9747 • FAX: 914-738-8225

PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837

Internet: *http://www.picoelectronics.com* E-mail: *HLSC73A@prodigy.com*

COILS, CHOKES, & INDUCTORS (cont'd.)

Manufacturer	Starting EEM Page No.	AF	RF	IF	High Q	Shielded	Variable (Adjustable)	Choke/Filter	Chip	Spiral	Toroidal	Power, Switch Mode	Suppression, Common Mode	Other Types
Taiyo Yuden (USA), Inc.	A•1309				√§	√§		√§	√§				√§	Ferrite beads; √§
Talema Electronic, Inc.	A•1310							√			√	√	√	
Tamura Corp./ AALTAM	A•1316	√§*	√§*		√§*	√§*	√*	√§*			√§*	√§*	√§*	
Toko America, Inc.	A•1328	√§	√§	√§	√§	√§	√§	√§	√§		√§			
Torotel Products Inc.	A•1332		√§		√§			√§			√§	√§	√§	
Vishay Dale Electronics	A•1341		√§*	√	√§	√§		√§	√§	√§	√§	√§	√§	
Wilco Corporation	A•1342		√§		√	√		√§	√§		√§	√		S-Air Coils, Current Sensors, Pot Cores,Baluns
ZMAN Magnetics	A•1347	√§	√§	√§	√§	√§	√	√§		√	√§	√§	√§	Current Sensor, EMI, Choke

* MIL Spec. § Surface Mount.

tamura
MICROTRAN

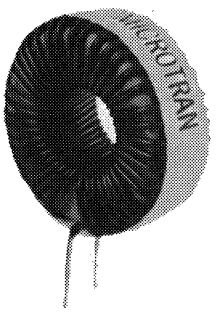
TOROIDAL POWER INDUCTORS

See Opposite Page for Specifications

Swinging Chokes for Switch Mode Power Supplies, Energy Storage, Regulator, and EMI/RFI Filter Applications

- Specially designed for controlled saturation...repeatable specific inductance at a specific current.
- Designed to handle high current spikes typically encountered in high current SMPS applications.
- Application frequencies up to 1 MHz.
- Toroidal construction...closed magnetic field-low EMI.

OPEN FRAME-F

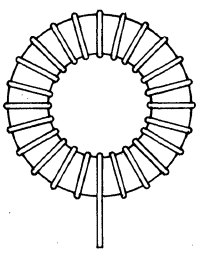


SL-F

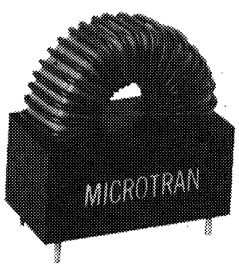
Tinned leads to 1/16" of body for PCB mounting. Additional mechanical mounting recommended for larger units with finer wire. To order add-F to Part No., i.e. SL2-50-F.

SERIES PREFIX	D MAX.	W MAX.	WT OZ.
SL05-*-F	0.56	0.30	0.13
SL06-*-F	0.87	0.40	0.45
SL1-*-F	1.00	0.50	0.64
SL2-*-F	1.30	0.65	1.59
SL3-*-F	1.90	0.90	4.10
SL4-*-F	2.20	1.10	8.00

Dimensions in inches.



BASE MOUNTED-B

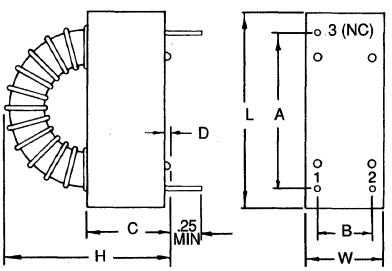


SL-B

Rugged, epoxy base mounted for PCB applications. To order add-B to Part No., i.e. SL2-50-B.

SERIES PREFIX	L MAX.	W MAX.	H MAX.	A	B	C MAX.	D	WT OZ.
SL05-*-B	0.66	0.34	0.62	0.50	0.20	0.22	.025	0.15
SL06-*-B	0.87	0.43	0.94	0.60	0.20	0.22	.025	0.49
SL1-*-B	1.01	0.52	1.08	0.90	0.40	0.26	.025	0.70
SL2-*-B	1.31	0.66	1.33	1.10	0.50	0.36	.030	1.70
SL3-*-B	1.90	0.90	1.98	1.60	0.60	0.41	.030	4.40
SL4-*-B	2.12	1.08	2.30	1.75	0.90	1.00	—	8.80

Dimensions in inches. Tolerances dimension A and B ±.015.



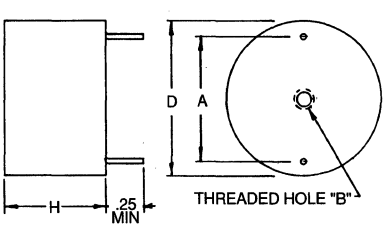
MOLDED-M

SL-M

Epoxy molded with threaded insert for MIL and industrial PCB applications. MIL designation TF5S04ZZ. To order add -M to Part No.,i.e. SL2-50-M.

SERIES PREFIX	D	H	A	B	WT OZ.
SL05-*-M	0.625	0.34	0.50	—	0.18
SL06-*-M	0.937	0.46	0.75	—	0.60
SL1-*-M	1.080	0.52	0.90	4-40x8	0.86
SL2-*-M	1.375	0.70	1.20	6-32x8	2.30
SL3-*-M	2.000	1.00	1.70	8-32x10	6.00
SL4-*-M	2.500	1.25	1.25	10-32x12	10.80

Dimensions in inches. Tolerances ±.015.



For additional inductor information see Tamura in this section.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

See Opposite Page for Dimensions

TOROIDAL POWER INDUCTORS

tamura MICROTRAN

- All SL series toroidal power inductors are available in the Open Frame F, Base Mounted B, and Molded M versions. See notes below the table.
- Non-standard inductance values available. Call the Tamura corporate sales office for assistance.
- For additional inductor offerings see the Tamura inductors in this section.

MICROTRAN PART NO.	"L" @ 0 DC µH	MAX. DCR (OHMS)	RATED CURRENT (AMPS)	5% L DROP (DC AMPS)	10% L DROP (DC AMPS)	20% L DROP (DC AMPS)	30% L DROP (DC AMPS)	40% L DROP (DC AMPS)	50% L DROP (DC AMPS)
SL05-15 (*)	15.0	0.010	4.00	2.50	3.60	5.2	6.6	8.2	9.8
SL05-24 (*)	24.0	0.018	2.50	2.20	3.00	4.2	5.5	6.7	7.9
SL05-35 (*)	35.0	0.037	1.60	1.40	2.00	3.3	4.5	5.5	6.6
SL05-55 (*)	55.0	0.072	1.00	1.40	1.90	2.7	3.5	4.2	5.0
SL05-85 (*)	85.0	0.142	0.65	0.80	1.20	2.0	2.7	3.3	3.9
SL05-158 (*)	158.0	0.271	0.40	0.60	0.90	1.4	1.9	2.3	2.8
SL05-192 (*)	192.0	0.530	0.25	0.53	0.80	1.3	1.7	2.1	2.5
SL05-305 (*)	305.0	1.050	0.16	0.50	0.74	1.1	1.4	1.7	2.0
SL06-26 (*)	26.0	0.011	6.50	5.20	6.80	9.2	11.2	13.4	15.9
SL06-36 (*)	36.0	0.013	6.50	4.50	5.80	7.8	9.6	11.5	13.5
SL06-51 (*)	51.0	0.015	6.50	3.50	4.60	6.2	7.9	9.5	11.2
SL06-80 (*)	80.0	0.027	4.50	2.60	3.50	4.7	6.0	7.3	8.7
SL06-122 (*)	122.0	0.056	3.00	2.30	3.00	4.0	5.0	6.0	7.0
SL06-188 (*)	188.0	0.104	2.00	1.90	2.50	3.4	4.1	4.9	5.7
SL06-300 (*)	300.0	0.215	1.00	1.50	1.90	2.6	3.1	3.8	4.5
SL06-460 (*)	460.0	0.430	0.65	1.10	1.50	2.1	2.6	3.2	3.7
SL1-1.1 (*)	1.1	0.002	5.00	26.30	34.10	50.0	59.8	71.8	83.3
SL1-2.5 (*)	2.5	0.003	5.00	17.00	22.10	32.4	38.8	46.6	54.1
SL1-4.5(*)	4.5	0.004	5.00	10.70	14.30	21.0	25.2	30.2	35.1
SL-8.0 (*)	8.0	0.005	5.00	8.80	11.60	16.0	20.0	24.0	27.8
SL1-15 (*)	15.0	0.007	5.00	5.10	7.50	11.0	14.0	16.9	20.0
SL1-30 (*)	30.0	0.009	5.00	4.20	5.50	8.0	10.2	12.4	14.9
SL1-60 (*)	60.0	0.017	5.00	2.10	3.60	5.4	6.9	8.5	10.2
SL1-120 (*)	120.0	0.027	5.00	1.70	2.60	3.9	5.0	6.1	7.4
SL1-220 (*)	220.0	0.037	5.00	1.50	2.00	3.0	3.8	4.6	5.5
SL1-450 (*)	450.0	0.090	3.20	1.30	1.60	2.2	2.8	3.4	4.0
SL1-900 (*)	900.0	0.230	1.50	0.90	1.20	1.6	1.9	2.4	2.8
SL1-1500 (*)	1500.0	0.470	1.10	0.60	0.80	1.2	1.5	1.8	2.1
SL2-1.4 (*)	1.4	0.003	5.00	28.30	43.60	62.2	82.1	102.5	123.0
SL2-2.5 (*)	2.5	0.003	5.00	23.80	36.80	52.5	69.7	87.0	104.3
SL2-5.5 (*)	5.5	0.005	5.00	16.00	24.80	35.4	47.0	58.7	70.4
SL2-13 (*)	13.0	0.007	5.00	9.50	14.70	21.0	31.5	39.3	47.1
SL2-26 (*)	26.0	0.010	5.00	6.30	10.00	15.0	20.0	25.0	30.0
SL2-50 (*)	50.0	0.013	5.00	4.20	6.90	10.3	13.9	17.4	21.0
SL2-100 (*)	100.0	0.018	5.00	3.30	4.90	7.5	9.8	12.2	14.9
SL2-225 (*)	225.0	0.034	5.00	2.90	3.70	5.1	6.9	8.3	9.9
SL2-475 (*)	475.0	0.055	4.50	1.50	2.00	3.4	4.4	5.5	6.8
SL2-1000 (*)	1000.0	0.130	4.50	1.20	1.60	2.3	3.1	3.9	4.7
SL2-1800 (*)	1800.0	0.340	2.00	1.00	1.30	1.9	2.4	2.9	3.5
SL2-2700 (*)	2700.0	0.520	2.00	0.60	0.90	1.4	1.8	2.3	2.8
SL3-1.3 (*)	1.3	0.003	9.00	51.60	72.20	101.0	128.3	160.3	192.3
SL3-3.0 (*)	3.0	0.004	9.00	40.00	56.00	78.4	99.5	124.3	149.0
SL3-6.5 (*)	6.5	0.005	9.00	31.20	43.60	61.0	77.5	96.8	116.1
SL3-14 (*)	14.0	0.008	9.00	24.40	34.30	48.6	62.1	77.5	92.9
SL3-30 (*)	30.0	0.011	9.00	17.60	24.80	35.2	45.0	56.2	67.4
SL3-55 (*)	55.0	0.015	9.00	12.20	18.50	26.3	33.6	42.0	50.4
SL3-100 (*)	100.0	0.020	9.00	9.40	13.30	19.7	25.2	31.6	37.9
SL3-220 (*)	220.0	0.020	9.00	4.90	6.60	9.4	11.9	14.4	17.1
SL3-470 (*)	470.0	0.034	7.00	2.70	4.10	6.3	8.1	10.0	12.0
SL3-1000 (*)	1000.0	0.120	3.50	2.00	2.70	4.2	5.4	6.8	8.2
SL3-2200 (*)	2200.0	0.220	2.80	1.60	2.10	3.0	3.8	4.6	5.5
SL3-4000 (*)	4000.0	0.300	2.00	1.10	1.50	2.1	2.8	3.3	4.0
SL4-2.2 (*)	2.2	0.003	14.00	49.80	67.20	100.2	130.2	158.8	190.6
SL4-5 (*)	5.0	0.004	14.00	40.00	54.00	80.5	104.6	127.6	153.1
SL4-11 (*)	11.0	0.005	14.00	32.10	43.30	64.5	83.8	102.2	122.6
SL4-23 (*)	23.0	0.007	14.00	24.60	33.20	49.5	64.3	78.4	94.1
SL4-50 (*)	50.0	0.011	14.00	18.30	24.70	36.9	47.8	58.3	70.0
SL4-100 (*)	100.0	0.016	14.00	12.80	17.30	25.9	33.6	41.0	49.2
SL4-230 (*)	230.0	0.023	14.00	7.10	10.40	15.8	20.5	25.0	30.0
SL4-470 (*)	470.0	0.023	14.00	3.50	5.40	8.0	10.4	12.7	15.4
SL4-1000 (*)	1000.0	0.065	9.00	2.40	3.50	5.5	7.2	8.8	10.7
SL4-2200 (*)	2200.0	0.120	7.00	2.00	3.00	4.0	5.0	6.1	7.3
SL4-4000 (*)	4000.0	0.260	4.50	1.10	1.80	2.8	3.5	4.5	5.4
SL4-5600 (*)	5600.0	0.310	4.50	0.90	1.40	2.2	3.0	3.8	4.5

* Add either -F, -B, or -M to Part No. to designate construction.
See photos and outline drawings on adjacent page.

Notes:
1. Non-standard inductance values available upon special order, i.e. specify P/N SL2-75-F for 75 µH.
2. Inductance ±15% measured at 1 kHz. See drive level test condition chart.
3. Current values for percentage inductance drop are typical.
5. Recommended PC board clearance hole .065 dia. min.

DRIVE LEVEL TEST CONDITIONS

INDUCTANCE	DRIVE LEVEL 1 kHz
0-200 µH	100 mA AC
200 µH—2 mH	10 mA AC
2 mH—20 mH	1 mA AC

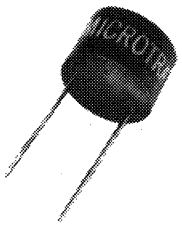
For additional inductor information see Tamura in this section.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

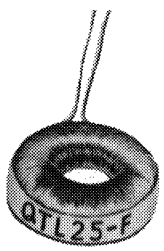
tamura

MICROTRAN.

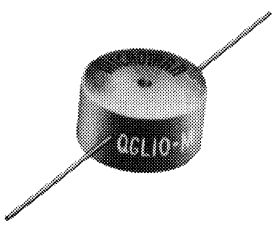
HIGH "Q" TOROIDAL INDUCTORS



QE-M MOLDED

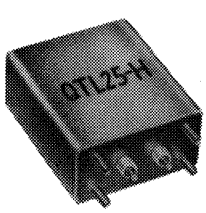


QG-F, QI-F, QK-F, QPL-F, QTL-F
OPEN FRAME



QG-M MOLDED

QI-M, QK-M, QPL-M,
QTL-M MOLDED



QI-H, QK-H 2 STUDS,
QPL-H, QTL-H
4 STUDS HERMETIC

QE Series

Ultra miniaturized with low height design. Exceptionally high "Q" and wide frequency range. Frequency range of QEL Series 1 to 300 kHz: QEM, 3 to 500 kHz. Accuracy, ±2%. Molded in epoxy resin with .020" x 2" tined copperweld leads. size, .450" dia. x .285".

PART NO.	INDUCTANCE	TYP. DCR	TYP. DIST. CAP., pF	PART NO.	INDUCTANCE	TYP. DCR	TYP. DIST CAP., pF
QEL1-M	1mH	2.1	25	QEM05-M	0.5mH	2.1	20
QEL2-M	2	3.6	30	QEM1-M	1.0	3.8	30
QEL5-M	5	7.3	35	QEM2-M	2.0	6.2	35
QEL10-M	10	15.8	45	QEM5-M	5.0	15.9	45
QEL15-M	15	20.0	45	QEM10-M	10.0	19.0	50
QEL25-M	25	32.0	50	QEM15-M	15.0	42.0	55
QEL50-M	50	69.0	50	QEM25-M	25.0	88.0	60
QEL100-M	100	185.0	70	QEM50-M	50.0	193.0	70

QG Series

Frequency range of QGL Series to 20kHz:QGM Series. Accuracy, ±2%. QG-F: Open frame, microcrystalline wax dipped with 4" #28 AWG leads. Size .625" dia x .281". QG-M: Molded in high temperature epoxy resin with .020"x2" tinned copperweld leads. Leads may be bent downward for plug-in printed circuit use. Size .875" dia. x .375".

PART NO.	INDUCTANCE	TYP. DCR	TYP. DIST. CAP., pF	PART NO.	INDUCTANCE	TYP. DCR	TYP. DIST CAP., pF
QGL5- (*)	5.0mH	2.5	30	QGM1- (*)	1mH	1.4	22
QGL10- (*)	10.0	5.0	33	QGM2- (*)	2	2.5	25
QGL15- (*)	15.0	8.0	34	QGM5- (*)	5	6.0	28
QGL30- (*)	30.0	17.0	37	QGM10- (*)	10	12.0	31
QGL50- (*)	50.0	28.0	40	QGM15- (*)	15	18.0	32
QGL100- (*)	100.0	50.0	42	QGM25- (*)	25	30.0	35
QGL250- (*)	250.0	130.0	46	QGM50- (*)	50	52.0	37
QGL500- (*)	500.0	290.0	48	QGM100- (*)	100	115.0	39
QGL1000- (*)	1.0 H	530.0	51				
QGL1500- (*)	1.5	825.0	53				

** Add either -M, -F or -H to designate construction.*

QI Series

Frequency range to 20 kHz accuracy, ±2%. QIL-M: Molded in high temperature epoxy with silver plated turret lugs. Size. 1.87" dia.. x.50". QIL-H: Hermetically sealed in metal case with Teflon terminals. Size, 1.062" x .50" x 1.219". QIL-F: Open frame. Microcrystalline wax dipped with 4" #28 plastic leads. Size. 1" dia x .406".

PART NO.	INDUCTANCE	TYP. DCR	TYP. DIST. CAP., pF	PART NO.	INDUCTANCE	TYP. DCR	TYP. DIST CAP., pF
QIL3- (*)	3mH	.73	36	QIL150- (*)	150.0mH	34	50
QIL5- (*)	5	1.10	38	QIL250- (*)	250.0	55	53
QIL10- (*)	10	2.10	40	QIL500- (*)	500.0	95	55
QIL15- (*)	15	3.30	42	QIL1000- (*)	1.0H	210	57
QIL25- (*)	25	5.30	45	QIL1500- (*)	1.5	335	59
QIL50- (*)	50	11.00	47	QIL2500- (*)	2.5	550	61
QIL100- (*)	100	22.00	49				

** Add either -M, -F or -H to designate construction.*

QK Series

Frequency range of QKL Series to 10 kHz. QKM Series, 5 to 50 kHz. Accuracy, ±2%. QK-F: Open frame, microcrystalline waxdipped, 4" #28AWG leads. Size, 1.25" dia. x .525". QK-H: Hermetically sealed with Teflon terminals, size, 1.469" x .781" x 1.734". QK-M: Molded in high temperature epoxy resin, silver plated turret lugs. Size, 1.375" dia. x .75"; #8 clearance hole.

PART NO.	INDUCTANCE	TYP. DCR	TYP. DIST. CAP., pF	PART NO.	INDUCTANCE	TYP. DCR	TYP. DIST CAP., pF
QKL5- (*)	5mH	.62	60	QKL250- (*)	250.0mH	28	87
QKL10- (*)	10	1.10	66	QKL500- (*)	500.0	63	91
QKL15- (*)	15	1.70	69	QKL1000- (*)	1.0H	110	96
QKL25- (*)	25	2.80	72	QKL1500- (*)	1.5	175	98
QKL50- (*)	50	6.00	76	QKL2500- (*)	2.5	275	103
QKL100- (*)	100	11.00	81	QKL5000- (*)	5.0	645	106
QKL150- (*)	150	17.00	83	QKL10,000- (*)	10.0	1175	112
QKM2- (*)	2mH	.45	52	QKM100- (*)	100.0mH	25	79
QKM5- (*)	5	1.10	58	QKM250- (*)	250.0	65	87
QKM10- (*)	10	2.50	62	QKM500- (*)	500.0	115	92
QKM25- (*)	25	6.50	70	QKM1000- (*)	1.0H	250	97
QKM50- (*)	50	11.00	74				

** Add either -M, -F or -H to designate construction.*

QP Series

Frequency range to 10 kHz: accuracy ±2%. QPL-F: Open frame, microcrystalline wax dipped: 4" #24 leads. Size, 1.938" x .875". QPL-H: Hermetically sealed with Teflon terminals. Size, 1.938" x 1.063" x 2.281". QPL-M: Molded in high temperature epoxy resin; silver plated turret lugs. Size. .2" dia. x 1".

PART NO.	INDUCTANCE	TYP. DCR	TYP. DIST. CAP., pF	PART NO.	INDUCTANCE	TYP. DCR	TYP. DIST CAP., pF
QPL25- (*)	25.0mH	1.5	100	QPL2500- (*)	2.5H	150	133
QPL50- (*)	50.0	2.5	105	QPL5000- (*)	5.0	350	138
QPL100- (*)	100.0	6.0	110	QPL7500- (*)	7.5	525	140
QPL250- (*)	250.0	15.0	115	QPL10,000- (*)	10.0	600	142
QPL500- (*)	500.0	25.0	120	QPL15,000- (*)	15.0	900	146
QPL1000- (*)	1.0 H	60.0	125	QPL25,000- (*)	25.0	1500	150
QPL1500- (*)	1.5	90.0	130				

** Add either -M, -F or -H to designate construction.*

QT Series

Frequency range to 15 kHz: accuracy ±2%. QTL-F: Open frame, microcrystalline wax dipped: 4" #24 leads. Size, 2.438" dia. x .1". QTL-K: Hermetically sealed with Teflon terminals. Size, 2.563" x 1.313"x 2.813". QTL-M: Molded in epoxy resin. Size, 2.875" x 1.375".

PART NO.	INDUCTANCE	TYP. DCR	TYP. DIST. CAP., pF	PART NO.	INDUCTANCE	TYP. DCR	TYP. DIST CAP., pF
QTL25- (*)	25.0 mH	0.85	127	QTL1500- (*)	1.5H	40	177
QTL50- (*)	50.0	1.50	136	QTL2500- (*)	2.5	70	184
QTL100- (*)	100.0	2.80	144	QTL5000- (*)	5.0	140	192
QTL150- (*)	150.0	3.90	149	QTL10,000- (*)	10.0	270	200
QTL250- (*)	250.0	7.00	156	QTL15,000- (*)	15.0	430	205
QTL500- (*)	500.0	15.00	164	QTL25,000- (*)	25.0	850	212
QTL1000- (*)	1.0 H	27.00	173	QTL50,000- (*)	50.0	1500	221

** Add either -M, -F or -H to designate construction.*

For additional inductor information see Tamura in this section.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

COMMON MODE COILS FOR AC LINE & EMI-RFI FILTERING, 0.1 TO 50 MHZ

MICROTRAN.

Common mode suppression inductors minimize AC line-conducted interference from switching power supplies and regulators. Balun winding to within 1% produces opposing magnetic fluxes in the core to effectively cancel differential-mode noise signals. Substantially reduces component count as well as inductor size, as compared to differential filtering. Constructed with spacing between windings to meet international safety requirements.

FEATURES

- 3750V RMS hi-pot.
- VDE, IEC, UL, CSA compatible.
- 130°C insulation system
- Cost effective design.

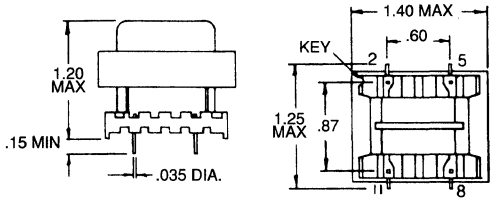


Fig. A
SC1 SERIES
Wt. .42 oz.

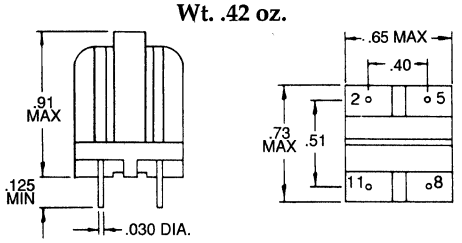
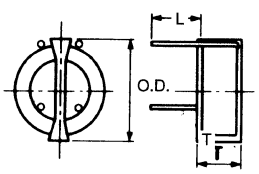


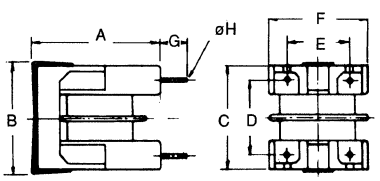
Fig. B
SC2 SERIES
Wt. .30 oz.



CMT SERIES

SERIES PREFIX	O.D.	T	L±3mm
CMT-01	28	12.5	20
CMT-02	28	14.5	20
CMT-03	32	22.0	20

Dimensions in mm



CMF SERIES

SERIES PREFIX	A	B	C±1	D±1	E±1	F±1	G±.8
CMF-0	20.5	17.5	18.0	12.5	10.0	16	4
CMF-6	28.0	22.5	18.0	12.5	10.0	18	4
CMF-8	31.0	24.0	22.0	16.0	10.0	20	4
CMF-2	33.5	38.5	37.0	30.0	12.5	21	4

Dimensions in mm

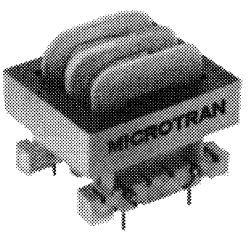
SC SERIES

MICROTRAN PART NO.	"L" MH MIN.	RMS MAX. AMPS	DCR MAX. OHMS	FIG.
SC1-16800	12.60	0.50	1.0000	A
SC1-07900	5.93	0.75	0.4300	A
SC1-04900	3.67	1.00	0.2200	A
SC1-03770	2.77	1.25	0.1560	A
SC1-01960	1.47	1.50	0.1100	A
SC1-01280	0.96	2.00	0.0710	A
SC1-00840	0.63	2.50	0.0460	A
SC1-00490	0.37	3.00	0.0270	A
SC1-00290	0.21	4.00	0.0175	A
SC2-14000	14.00	0.25	2.1000	B
SC2-05250	5.25	0.37	0.8300	B
SC2-03250	3.25	0.50	0.5200	B
SC2-01450	1.45	0.75	0.2200	B
SC2-00750	0.75	1.00	0.1200	B
SC2-00330	0.33	1.50	0.0520	B
SC2-00120	0.12	2.00	0.0240	B

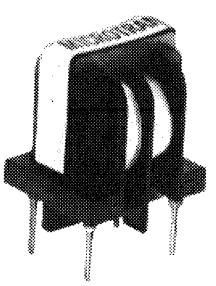
NOTES: Inductance shown is for each winding measured @ 10 kHz, 1V RMS. Inductance with each winding connected series opposing under 100 µH typical @ 10 kHz, 1V RMS. Inter winding capacitance: 5 pF typical @ 10 kHz, 1V RMS.

CM SERIES

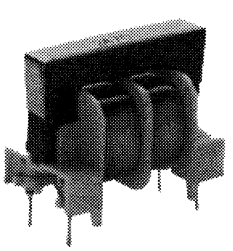
MICROTRAN PART NO.	INDUCTANCE AMPS	INDUCTANCE m H min	DCR (Ω)	DIA mm
CMT-01102	1.00	2.0	0.25	0.40
CMT-01104	1.00	4.0	0.35	0.40
CMT-01202	2.00	2.0	0.15	0.55
CMT-01301	3.00	1.0	0.10	0.70
CMT-02105	1.00	5.0	0.40	0.40
CMT-02107	1.00	7.0	0.50	0.40
CMT-02203	2.00	3.0	0.20	0.55
CMT-02302	3.00	2.0	0.10	0.70
CMT-03110	1.00	10.0	0.55	0.40
CMT-03305	3.00	5.0	0.15	0.70
CMT-03502	5.00	2.0	0.04	0.95
CMT-03801	8.00	1.0	0.02	1.20
CMF-0470	0.15	47.0	7.00	0.70
CMF-0330	0.20	33.0	6.00	0.70
CMF-0220	0.30	22.0	4.50	0.70
CMF-0100	0.45	10.0	3.00	0.70
CMF-0056	0.55	5.6	1.00	0.70
CMF-0033	0.80	3.3	0.70	0.70
CMF-6470	0.45	47.0	3.00	0.70
CMF-6330	0.50	33.0	2.50	0.70
CMF-6220	0.65	22.0	2.00	0.70
CMF-6100	0.90	10.0	0.60	0.70
CMF-6056	1.00	5.6	0.40	0.70
CMF-6033	2.00	3.3	0.30	0.70
CMF-8470	0.50	47.0	4.00	0.80
CMF-8330	0.65	33.0	3.00	0.80
CMF-8220	0.80	22.0	2.00	0.80
CMF-8100	1.00	10.0	0.70	0.80
CMF-8056	1.50	5.6	0.40	0.80
CMF-8033	2.00	3.3	0.30	0.80
CMF-2470	1.00	47.0	2.00	1.00
CMF-2330	1.20	33.0	0.80	1.00
CMF-2220	1.40	22.0	0.60	1.00
CMF-2100	2.20	10.0	0.30	1.00
CMF-2056	2.70	5.6	0.25	1.00
CMF-2033	4.00	3.3	0.08	1.00



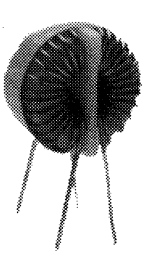
SC1 SERIES



SC2 SERIES



CMF SERIES



CMT SERIES

For additional inductor information see Tamura in this section.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

INDUCTORS

ACML Series SURFACE MOUNT MULTI-LAYER CHIP BEADS

0603-0805

Features:

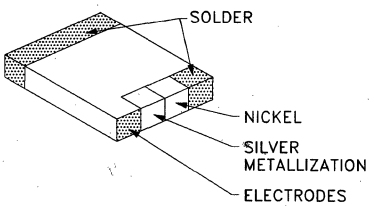
- Multilayer construction
- Closed magnetic circuit
- Avoids crosstalk
- Excellent magnetic shield
- Excellent solderability
- High reliability
- EMI/RFI suppression
- 20% impedance tolerance

Options:

- Packaging Tape & Reel is standard (Qty: 4000pcs.) Bulk packaging available for smaller quantities
- Impedance: Optional values available

Technical Information

- Testing: Impedance vs. Frequency: HP 4195A
- Solderability: 90% of the terminal electrode shall be covered Preheat: @260°C ±5°C for 60 seconds. Flux: Rosin, Dip, for 10 seconds ±1 second
- Thermal Shock: Impedance shall be within ±20% of initial value when temperature is -25°C and +85°C for 30 minutes for each 50 cycles.
- Operating Temperature: -25°C to +85°C
- Storage Temperature: -25°C to +85°C



Electrical Specifications

Part Number	Impedance at 100 MHZ	RDC Ω Max	IDC Max mA	Part Number	Impedance at 100 MHZ	RDC Ω Max	IDC Max mA
ACML-0603-30	30	.30	400	ACML-0805-07	7	.10	600
ACML-0603-60	60	.40	300	ACML-0805-10	10	.10	600
ACML-0603-80	80	.50	300	ACML-0805-17	17	.10	600
ACML-0603-120	120	.80	200	ACML-0805-30	30	.10	600
ACML-0603-150	150	.90	200	ACML-0805-50	50	.10	500
ACML-0603-300	300	1.2	150	ACML-0805-60	60	.20	400
ACML-0603-600	600	1.8	150	ACML-0805-70	70	.34	250
ACML-0603-1000	1000	.80	150	ACML-0805-90	90	.20	400
				ACML-0805-100	100	.20	400
				ACML-0805-120	120	.30	300
				ACML-0805-300	300	.30	200
				ACML-0805-600	600	.60	200
				ACML-0805-1000	1000	2.0	100

ACML Series SURFACE MOUNT MULTI-LAYER CHIP BEADS

1206,1210, 1806, 1812

Features:

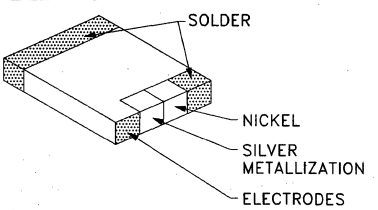
- Multilayer construction
- Closed magnetic circuit
- Avoids crosstalk
- Excellent magnetic shield
- Excellent solderability
- High reliability
- EMI/RFI suppression
- 20% impedance tolerance

Options:

- Packaging Tape & Reel is standard (Qty:1812=1000pcs, 1806,1210=2000pcs, 1206=3000pcs.) Bulk packaging available for smaller quantities
- Impedance: Optional values available

Technical Information

- Testing: Impedance vs. Frequency: HP 4195A
- Solderability: 90% of the terminal electrode shall be covered Preheat: @260°C ±5°C for 60 seconds. Flux: Rosin, Dip, for 10 seconds ±1 second
- Thermal Shock: Impedance shall be within ±20% of initial value when temperature is -25°C and +85°C for 30 minutes for each 50 cycles.
- Operating Temperature: -25°C to +85°C
- Storage Temperature: -25°C to +85°C



Electrical Specifications

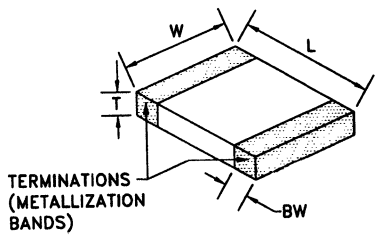
Part Number	Impedance at 100 MHZ	RDC Ω Max	IDC Max mA	Part Number	Impedance at 100 MHZ	RDC Ω Max	IDC Max mA
ACML-1206/11-19	19	.10	500	ACML-1206/11-400	400	.60	100
ACML-1206/11-26	26	.10	500	ACML-1206/11-600	600	.50	200
ACML-1206/11-30	30	.10	600	ACML-1206/11-1200	1200	.60	50
ACML-1206/11-31	31	.10	500	ACML-1206/11-2000	2000	.70	25
ACML-1206/11-42	42	.20	500	ACML-1210-31	31	.20	300
ACML-1206/16-50	50	.10	400	ACML-1210-52	52	.20	400
ACML-1206/11-50H	50	.10	600	ACML-1210-60	60	.20	400
ACML-1206/11-60	60	.10	500	ACML-1806-31	31	.20	400
ACML-1206/16-20	70	.10	400	ACML-1806-52	52	.20	400
ACML-1206/11-80	80	.20	400	ACML-1806-60	60	.20	300
ACML-1206/11-90	90	.20	400	ACML-1806-70	70	.10	700
ACML-1206/11-100	100	.20	400	ACML-1806-80	80	.50	200
ACML-1206/11-120	120	.40	100	ACML-1806-100	100	.10	600
ACML-1206/11-120H	120	.20	300	ACML-1806-150	150	.20	500
ACML-1206/11-150	150	.40	100	ACML-1812-70	70	.25	300
ACML-1206/11-220	220	.50	100	ACML-1812-125	125	.25	300
ACML-1206/11-300	300	.40	300	ACML-1812-120	120	.25	300
				ACML-1812-150	150	.40	300

For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com/ Internet: http://www.abracon.com

ABRACON CORPORATION • 125 Columbia, Aliso Viejo, California 92656 • 949-448-7070 • Fax 949-448-8484

INDUCTORS

ACML Series SURFACE MOUNT MULTI-LAYER CHIP BEADS
1812, 1806, 1210, 1206, 0805, 0603



Size Chart: Inches (mm)

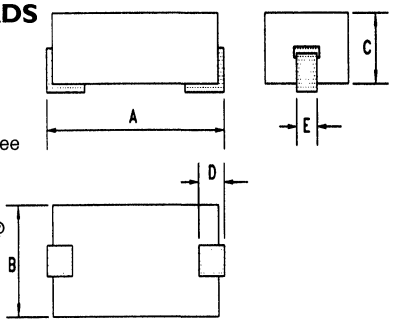
Part Number	Length (L)	Width (W)	Thickness (T)	Termination (BW)
ACML-1812 45315	0.177±0.010 (4.5±0.25)	0.126±0.008 (3.2±0.20)	0.059±0.008 (1.5±0.20)	0.020±.012 (0.5±0.30)
ACML-1806 451616	0.177±0.010 (4.5±0.25)	0.063±0.008 (1.6±0.20)	0.063±0.008 (1.6±0.20)	0.020±0.012 (0.5±0.30)
ACML-1210 322513	0.126±0.008 (3.2±0.20)	0.098±0.008 (2.5±0.20)	0.051±0.008 (1.3±0.20)	0.020±0.012 (0.5±0.30)
ACML-1206/16 321616	0.126±0.008 (3.2±0.20)	0.063±0.008 (1.6±0.20)	0.063±0.008 (1.6±0.20)	0.020±0.012 (0.5±0.30)
ACML1206/11 321611	0.126±0.008 (3.2±0.20)	0.063±0.008 (1.6±0.20)	0.043±0.008 (1.1±0.20)	0.020±0.012 (0.5±0.30)
ACML-0805 201209	0.079±0.008 (2.0±0.20)	0.047±0.008 (1.2±0.20)	0.035±0.008 (0.9±0.20)	0.020±0.012 (0.5±0.30)
ACML-0603 160807	0.063±0.006 (1.60±0.15)	0.031±0.006 (0.80±0.15)	0.029±0.006 (0.74±0.15)	0.014±0.006 (0.36±0.15)

ACSB Series SURFACE MOUNT FERRITE CHIP BEADS
02, 03

Features:
- Rugged construction
- Decreased DC Resistance
- Increases current capacity
- Counter measures for FCC, VDE, CSA, CE and VCCI
- EMI/RFI suppression
- 25% Impedance Tolerance

Options:
- Packaging Tape & Reel is standard (Qty: 500) Bulk packaging available for smaller quantities
- Impedance: Optional values available

Technical Information:
- Testing: Impedance vs. Frequency: HP 4195A Impedance Analyzer: See Impedance curves below
- Impedance vs. DC Bias: See Impedance curves below
- Solderability: EIA-186-10E-Temp @ 260°C for ±5°
- Operating Temperature:-30°C to +130°C to +130°C



Physical/Electrical Specifications

Part Number	A	B	C	D	E	Z 25 MHz Ω Min	Z 100MHz Ω Min	RDC Ω Min
ACSB-02	0.378±0.037 (9.60±0.95)	0.120±0.004 (3.05±0.10)	0.112±0.028 (2.85±0.20)	0.050±0.004 (1.27±0.10)	0.053±0.026 (1.35±0.65)	50	80	0.9 m ohms
ACSB-03	0.201±0.033 (5.10±0.85)	0.120±0.004 (3.05±0.10)	0.112±0.008 (2.85±0.20)	0.050±0.004 (1.27±0.10)	0.053±0.026 (1.35±0.65)	23	38	0.6 m ohms

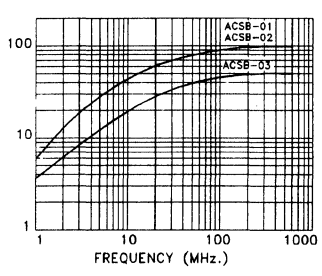


Fig. 1: Impedance vs. Frequency characteristice, no DC bias.

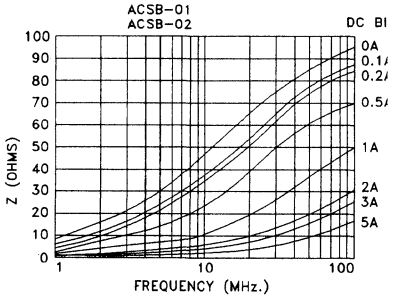


Fig. 2: Impedance vs. Frequency characteristice, at various values of bias.

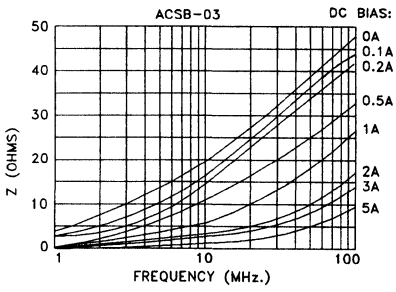


Fig. 3: Impedance vs. Frequency characteristice, at various values of bias.

For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com/ Internet: http://www.abracon.com

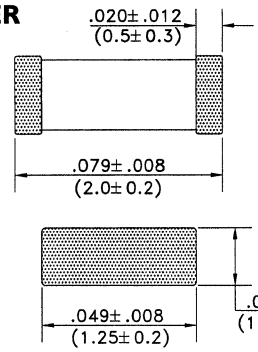
ABRACON CORPORATION • 125 Columbia, Aliso Viejo, California 92656 • 949-448-7070 • Fax 949-448-8484

INDUCTORS

AIML-0805 Series

SURFACE MOUNT MULTI-LAYER CHIP INDUCTORS

0805



Features:

- Multilayer construction
- Closed magnetic circuit
- Avoids crosstalk
- Excellent solderability
- High reliability
- Counter measures for complying with FCC, VDE, CSA, VCCI and CE

Options:

- Packaging Tape & Reel is standard (Qty: 4000pcs.) Bulk packaging available for smaller quantities
- Tolerance: 20% and 10% is standard tighter tolerances available.

Technical Information:

- Testing: Q vs. Freq. - HP4195A Inductance vs. Temp. -HP4285A Impedance vs. Freq. - HP4195A
- Solderability: 90% of the terminal electrode shall be covered. Preheat @ 260°C±5°C for 60 seconds. Solder: H63A Eutectic Solder. flux: Rosin, Dip for 5 seconds ±1 second
- Thermal Shock: Inductance shall be within ±5% of initial value and Q shall be within ±30% of initial value when temperature is -40°C and +85·C for 30 min. for each 100 cycles.
- Operating Temperature: -25°C to +85°C
- Storage Temperature: -40°C to +85°C

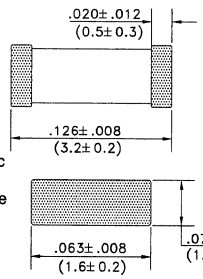
Electrical Specifications

Part Number	L µH	Tol %	Q Min	SRF MHz Min	RDC Ω Max.	IDC Max mA	Test Freq MHz	Part Number	L µH	Tol %	Q Min.	SRF MHz Min	RDC Ω Max	IDC Max mA	Test Freq MHz
AIML-0805-R047M	.047	±20	15	320	0.20	300	50	AIML-0805-1R8K	1.8	±10	45	55	0.60	50	10
AIML-0805-R068M	.068	±20	15	280	0.20	300	50	AIML-0805-2R2K	2.2	±10	45	50	0.65	30	10
AIML-0805-R082M	.082	±20	15	255	0.20	300	50	AIML-0805-2R7K	2.7	±10	45	45	0.75	30	10
AIML-0805-R10K	.10	±10	20	235	0.30	250	25	AIML-0805-3R3K	3.3	±10	45	41	0.80	30	10
AIML-0805-R12K	.12	±10	20	220	0.30	250	25	AIML-0805-3R9K	3.9	±10	45	38	0.90	30	10
AIML-0805-R15K	.15	±10	20	200	0.40	250	25	AIML-0805-4R7K	4.7	±10	45	35	1.00	30	10
AIML-0805-R22K	.22	±10	20	170	0.50	250	25	AIML-0805-5R6K	5.6	±10	40	32	0.90	15	4
AIML-0805-R27K	.27	±10	20	150	0.50	250	25	AIML-0805-6R8K	6.8	±10	40	29	1.00	15	4
AIML-0805-R33K	.33	±10	25	145	0.55	250	25	AIML-0805-8R2K	8.2	±10	40	26	1.10	15	4
AIML-0805-R39K	.39	±10	25	135	0.65	200	25	AIML-0805-100K	10	±10	50	24	1.15	15	2
AIML-0805-R47K	.47	±10	25	125	0.65	200	25	AIML-0805-120K*	12	±10	50	22	1.25	15	2
AIML-0805-R56K	.56	±10	25	115	0.75	150	25	AIML-0805-150K*	15	±10	30	19	0.80	5	1
AIML-0805-R68K	.68	±10	25	105	0.80	150	25	AIML-0805-180K*	18	±10	30	18	0.90	5	1
AIML-0805-R82K	.82	±10	25	100	1.00	150	25	AIML-0805-220K*	22	±10	30	16	1.10	5	1
AIML-0805-1R0K	1.0	±10	45	75	0.40	50	10	AIML-0805-270K*	27	±10	30	14	1.15	5	1
AIML-0805-1R2K	1.2	±10	45	65	0.50	50	10	AIML-0805-330K*	33	±10	30	13	1.25	5	.4
AIML-0805-1R5K	1.5	±10	45	60	0.50	50	10								

* Not Available until 1998

AIML-1206 Series

SURFACE MOUNT MULTI-LAYER CHIP INDUCTORS



Features:

- Multilayer construction
- Closed magnetic circuit
- Avoids crosstalk
- Excellent solderability
- High reliability
- Counter measures for complying with FCC, VDE, CSA, VCCI and CE

Options:

- Packaging Tape & Reel is standard (Qty: 3000pcs.) Bulk packaging available for smaller quantities
- Tolerance: 20% and 10% is standard tighter tolerances available.

Technical Information:

- Testing: Q vs. Freq. - HP4195A Inductance vs. Temp. - HP4285A Impedance vs. Freq. - HP4195A
- Solderability: 90% of the terminal electrode shall be covered. Preheat @ 260°C±5°C for 60 seconds. Solder: H63A Eutectic Solder. flux: Rosin, Dip for 5 seconds ±1 second
- Thermal Shock: Inductance shall be within ±5% of initial value and Q shall be within ±30% of initial value when temperature is -40°C and +85·C for 30 min. for each 100 cycles.
- Operating Temperature: -25°C to +85°C
- Storage Temperature: -40°C to +85°C

Dimensions: Inches (mm)

Electrical Specifications

Part Number	L µH	Tol %	Q Min.	SRF MHz Min	RDC Ω Max.	IDC Max mA	Test Freq MHz	Part Number	L µH	Tol %	Q Min	SRF MHz Min	RDC Ω Max	IDC Max mA	Test Freq MHz
AIML-1206-R047M	.047	±20	20	320	0.15	100	50	AIML-1206-1R8K	1.8	±10	45	55	0.50	50	10
AIML-1206-R068M	.068	±20	20	280	0.25	100	50	AIML-1206-2R2K	2.2	±10	45	50	0.60	50	10
AIML-1206-R10K	.10	±10	20	235	0.25	100	25	AIML-1206-2R7K	2.7	±10	45	45	0.60	50	10
AIML-1206-R12K	.12	±10	20	220	0.30	100	25	AIML-1206-3R3K	3.3	±10	45	41	0.70	50	10
AIML-1206-R15K	.15	±10	20	200	0.30	100	25	AIML-1206-3R9K	3.9	±10	45	38	0.80	50	10
AIML-1206-R18K	.18	±10	20	185	0.40	100	25	AIML-1206-4R7K	4.7	±10	45	35	0.90	50	10
AIML-1206-R22K	.22	±10	20	170	0.40	100	25	AIML-1206-5R6K	5.6	±10	40	32	0.70	25	4
AIML-1206-R33K	.33	±10	25	145	0.60	100	25	AIML-1206-6R8K	6.8	±10	40	29	0.80	25	4
AIML-1206-R39K	.39	±10	25	135	0.50	100	25	AIML-1206-8R2K	8.2	±10	40	26	0.90	25	4
AIML-1206-R47K	.47	±10	25	125	0.60	100	25	AIML-1206-100K	10	±10	50	24	1.00	25	2
AIML-1206-R56K	.56	±10	25	115	0.70	100	25	AIML-1206-120K*	12	±10	50	22	1.05	15	2
AIML-1206-R68K	.68	±10	25	105	0.80	100	25	AIML-1206-150K*	15	±10	35	19	0.70	5	1
AIML-1206-R82K	.82	±10	25	100	0.90	100	25	AIML-1206-180K*	18	±10	35	18	0.70	5	1
AIML-1206-1R0K	1.0	±10	45	75	0.40	100	10	AIML-1206-220K*	22	±10	35	18	0.70	5	1
AIML-1206-1R2K	1.2	±10	45	65	0.50	100	10	AIML-1206-270K*	27	±10	35	14	0.90	5	1
AIML-1206-1R5K	1.5	±10	45	60	0.50	50	10	AIML-1206-330K*	33	±10	35	13	1.05	5	.4

* Not Available until 1998

For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com/ Internet: http://www.abracon.com

ABRACON CORPORATION • 125 Columbia, Aliso Viejo, California 92656 • 949-448-7070 • Fax 949-448-8484

INDUCTORS

AISC-1008 Series SURFACE MOUNT WIRE-WOUND CERAMIC/FERRITE CHIP INDUCTORS

Features:

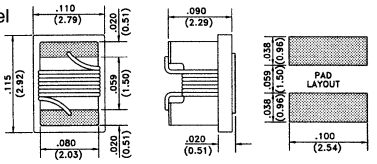
- Construction: Ceramic to 1.2µH Ferrite 1.5 µH to 10µH
- High frequency design
- Excellent Q values
- Excellent SRF
- High reliability
- Excellent thermal stability
- Inductance Values to 100µH

Options:

- Packaging Tape & Reel is standard (Qty: 3000pcs.) Bulk packaging available for smaller quantities
- Tolerance: 20% and 10% is standard tighter tolerances available.

Technical Information:

- Testing: (Equivalent acceptable) Inductance: HP4191A; Q: HPC4291A; SRF: HP8553B; RDC: Measured @ 25°C
- Operating temperature: Ceramic: -55°C to +125°C; Ferrite: -55°C to +85°C
- Pad metalization: Ceramic: Tungsten-nickel with gold flash; Ferrite: Silver-nickel with 9/10 solder Optional gold flash
- Solder methods: Wave, Reflow, Vapor Phase
- Solderability: Max 260°C for 10 seconds
- Marking: EIA color code



Dimensions: Inches (mm)

Electrical Specifications

Part Number	L µH	Tol %	Q Min	Test Freq MHz	SRF MHz Min	RDC Ω Max	IDC Max mA	Part Number	L µH	Tol %	Q Min.	Test Freq MHz	SRF MHz Min	RDC Ω Max	IDC Max mA
AISC-1008-R010M	.010	±20	30	100	1000	0.05	1850	AISC-1008-R56K	0.56	±10	35	35	440	1.20	260
AISC-1008-R022M	.022	±20	40	100	1000	0.06	1450	AISC-1008-R68K	0.68	±10	35	35	390	2.10	200
AISC-1008-R033M	.033	±20	50	100	1000	0.06	1450	AISC-1008-R82K	0.82	±10	35	35	360	2.30	170
AISC-1006-R039K	.039	±10	50	100	1000	0.75	1300	AISC-1008-1R0K	1.00	±10	35	35	330	2.70	170
AISC-1006-R047K	.047	±10	50	100	1000	0.79	1300	AISC-1008-1R2K	1.20	±10	35	35	310	3.00	170
AISC-1008-R056K	.056	±10	50	100	1000	0.09	1260	AISC-1008-1R5K	1.50	±10	25	7.9	240	0.68	370
AISC-1008-R068K	.068	±10	50	100	1000	0.08	1260	AISC-1008-1R8K	1.80	±10	25	7.9	230	0.78	350
AISC-1008-R082K	.082	±10	50	100	1000	0.15	820	AISC-1008-2R2K	2.20	±10	25	7.9	200	1.15	280
AISC-1008-R10K	0.10	±10	50	100	1000	0.15	820	AISC-1008-2R7K	2.70	±10	25	7.9	180	1.34	280
AISC-1006-R12K	0.12	±10	40	100	1000	0.15	820	AISC-1008-3R3K	3.30	±10	25	7.9	170	1.50	250
AISC-1008-R15K	0.15	±10	40	100	825	0.18	820	AISC-1008-3R9K	3.90	±10	25	7.9	150	2.40	200
AISC-1006-R18K	0.18	±10	40	50	770	0.20	770	AISC-1008-4R7K	4.70	±10	25	7.9	140	2.60	180
AISC-1008-R22K	0.22	±10	40	50	690	0.26	660	AISC-1008-5R6K	5.60	±10	25	7.9	130	2.90	180
AISC-1008-R27K	0.27	±10	40	50	650	0.30	610	AISC-1008-6R8K	6.80	±10	25	7.9	120	3.70	180
AISC-1008-R33K	0.33	±10	40	50	570	0.45	500	AISC-1008-8R2K	8.20	±10	25	7.9	110	5.50	130
AISC-1008-R39K	0.39	±10	35	50	520	0.70	360	AISC-1008-100K	10.0	±10	25	7.9	95	8.00	130
AISC-1006-R47K	0.47	±10	35	50	490	0.78	310								

AISC-0805 Series SURFACE MOUNT WIRE-WOUND CERAMIC FERRITE CHIP INDUCTORS

Features:

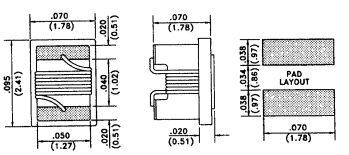
- Construction: Ceramic
- High frequency design
- Excellent Q values
- Excellent SRF
- High reliability
- Excellent thermal stability

Options:

- Packaging Tape & Reel is standard (Qty: 3000pcs.) Bulk packaging available for smaller quantities
- Tolerance: 20% and 10% is standard tighter tolerances available.

Technical Information:

- Testing: (Equivalent acceptable) Inductance: HP4191A; Q: HPC4291A; SRF: HP8553B; RDC: Measured @ 25°C
- Operating temperature: Ceramic: -55°C to +125°C
- Pad metalization: Tungsten-nickel with gold flash
- Solder methods: Wave, Reflow, Vapor Phase
- Solderability: Max 260°C for 10 seconds
- Marking: EIA color code



Dimensions: Inches (mm)

Electrical Specifications

Part Number	L µH	Tol %	Q Min.	Test Freq MHz	SRF MHz Min	RDC Ω Max	IDC Max mA	Part Number	L µH	Tol %	Q Min	Test Freq MHz	SRF MHz Min	RDC Ω Max	IDC Max mA
AISC-0805-0022M	.0022	±20	15	250	>6000	0.05	600	AISC-0805-R068K	0.068	±10	40	150	1700	0.28	500
AISC-0805-0033M	.0033	±20	15	250	>6000	0.08	600	AISC-0805-R082K	0.082	±10	40	150	1600	0.31	400
AISC-0805-0068M	.0068	±20	15	250	5500	0.10	600	AISC-0805-R10K	0.10	±10	40	150	1500	0.35	400
AISC-0805-0082M	.0082	±20	15	250	5000	0.10	600	AISC-0805-R12K	0.12	±10	40	150	1300	0.37	400
AISC-0805-012M	0.012	±20	30	250	4500	0.10	600	AISC-0805-R15K	0.15	±10	40	100	1200	0.40	400
AISC-0805-015M	0.015	±20	30	250	4100	0.10	600	AISC-0805-R18K	0.18	±10	40	100	1100	0.45	400
AISC-0805-018M	0.018	±20	30	250	3500	0.13	600	AISC-0805-R22K	0.22	±10	40	100	1000	0.80	400
AISC-0805-022M	0.022	±20	40	250	3200	0.13	500	AISC-0805-R27K	0.27	±10	40	100	950	1.00	280
AISC-0805-027M	0.027	±20	40	250	2700	0.13	500	AISC-0805-R33K	0.33	±10	40	100	890	1.20	260
AISC-0805-033K	0.033	±10	40	250	2700	0.16	500	AISC-0805-R39K	0.39	±10	40	100	830	1.50	200
AISC-0805-039K	0.039	±10	40	250	2100	0.20	500	AISC-0805-R47K	0.47	±10	40	100	750	2.50	170
AISC-0805-047K	0.047	±10	40	200	2000	0.22	500	AISC-0805-R56K	0.56	±10	40	100	700	3.50	170
AISC-0805-056K	0.056	±10	40	200	1900	0.25	500	AISC-0805-R68K	0.68	±10	30	50	650	4.00	170

For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com/ Internet: http://www.abracon.com

ABRACON CORPORATION • 125 Columbia, Aliso Viejo, California 92656 • 949-448-7070 • Fax 949-448-8484

INDUCTORS

AIUR-03 Series THROUGH-HOLE RADIAL UL TUBE RF CHOKES

Features:

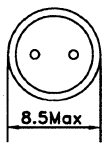
- Wire-wound construction
- UL approved shrink tubing
- Excellent heat resistance
- Excellent environmental characteristics
- High reliability

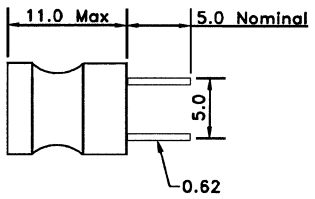
Options:

- Packaging: Bulk is standard Tape and Reel available (Quantity 500 pcs.)
- Tolerance: 10% is standard tighter tolerances available.

Technical Information:

- Testing: (Equivalent acceptable) Inductance: HP43438. Q: HP43438. SRF: HP4195A. RDC: QuadTech 1880 Milliohmmeter
- IDC Max: Lowers inductance by 10% measured @ 1 KHz by HP4284A LCR meter
- Temperature coefficient: 400ppm/°C max
- Marking inductance and tolerance





Dimensions: mm

Electrical Specifications

Part Number	L µH	Tol %	Q Min	Test Freq MHz	RDC Ω Max	IDC Max mA	SRF MHz Min	Part Number	L µH	Tol %	Q Min.	Test Freq MHz	SRF MHz Max	RDC Ω mA	IDC Max mA
AIUR-03-1R0K	1.0	±10	20	7.96	.013	10	150	AIUR-03-560K	56	±10	30	2.52	.180	1.3	5.4
AIUR-03-1R5K	1.5	±10	20	7.96	.016	8.5	130	AIUR-03-680K	68	±10	30	2.52	.210	1.2	4.9
AIUR-03-2R2K	2.2	±10	20	7.96	.021	6.5	100	AIUR-03-820K	82	±10	30	2.52	.230	1.1	4.1
AIUR-03-3R3K	3.3	±10	20	7.96	.025	5.5	79	AIUR-03-101K	100	±10	20	.796	.280	.91	3.7
AIUR-03-4R7K	4.7	±10	20	7.96	.030	4.3	51	AIUR-03-121K	120	±10	20	.796	.320	.84	3.4
AIUR-03-6R8K	6.8	±10	20	2.52	.035	3.7	29	AIUR-03-151K	150	±10	20	.796	.370	.75	3.2
AIUR-03-100K	10	±10	50	2.52	.045	3.0	14	AIUR-03-181K	180	±10	20	.796	.580	.69	2.8
AIUR-03-120K	12	±10	50	2.52	.050	2.7	13	AIUR-03-221K	220	±10	20	.796	.650	.64	2.7
AIUR-03-150K	15	±10	50	2.52	.056	2.3	12	AIUR-03-331K	330	±10	20	.796	.850	.54	2.3
AIUR-03-180K	18	±10	40	2.52	.061	2.2	11	AIUR-03-391K	390	±10	20	.796	1.00	.48	2.1
AIUR-03-220K	22	±10	40	2.52	.070	2.0	9.2	AIUR-03-471K	470	±10	20	.796	1.10	.46	1.9
AIUR-03-270K	27	±10	40	2.52	.080	1.7	8.5	AIUR-03-561K	560	±10	20	.796	1.40	.41	1.8
AIUR-03-330K	33	±10	30	2.52	.090	1.6	7.8	AIUR-03-681K	680	±10	20	.796	1.60	.38	1.6
AIUR-03-390K	39	±10	30	2.52	.100	1.5	6.9	AIUR-03-821K	820	±10	20	.796	1.80	.35	1.5
AIUR-03-470K	47	±10	30	1.51	.160	1.4	6.5	AIUR-03-102K	1000	±10	50	.252	2.90	.29	1.3

AISM-1210 Series SURFACE-MOUNT WOUND MOLDED CHIP INDUCTORS

Features:

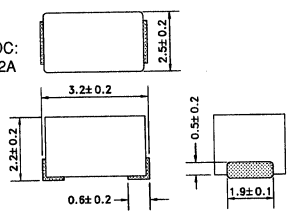
- Molded construction
- Heat resistant molded resin
- Excellent solderability
- High reliability
- Low profile
- Inductance Values to 470 µH

Options:

- Packaging Tape & Reel is standard (Qty: 2000pcs.) Bulk packaging available for smaller quantities
- Tolerance: 10% and 5% is standard tighter tolerances available.
- Inductance Values to 470 µH

Technical Information:

- Testing: (Equivalent acceptable) Inductance: HP4342A RDC: quadTech 1880 Milliohmmeter. Q: HP4342A. SRF: HP4342A
- IDC Max. Determined when superimposed DC current is decreased 10% against its initial value
- Operating temperature: -25°C to +85°C
- Storage temperature: -40°C to +85°C
- Solder Methods: Wave, Vapor Phase, Infrared



Dimensions: mm

Electrical Specifications

Part Number	L µH	Tol %	Q Min	Test Freq MHz	SRF MHz Min	RDC Ω Max	IDC Max mA	Part Number	L µH	Tol %	Q Min	Test Freq MHz	SRF MHz Max	RDC Ω Max	IDC Max mA
AISM-1210-R12M	0.12	±20	30	25.2	500	0.22	450	AISM-1210-3R9K	3.9	±10	30	7.96	55	1.3	250
AISM-1210-R15M	0.15	±20	30	25.2	450	0.25	450	AISM-1210-4R7K	4.7	±10	30	7.96	50	1.5	220
AISM-1210-R18M	0.18	±20	30	25.2	400	0.28	450	AISM-1210-5R6K	5.6	±10	30	7.96	47	1.6	200
AISM-1210-R22M	0.22	±20	30	25.2	350	0.32	450	AISM-1210-6R8K	6.8	±10	30	7.96	43	1.8	180
AISM-1210-R27M	0.27	±20	30	25.2	320	0.36	450	AISM-1210-8R2K	8.2	±10	30	7.96	40	2.0	170
AISM-1210-R33M	0.33	±20	30	25.2	300	0.40	450	AISM-1210-100K	10	±10	30	2.52	36	2.1	150
AISM-1210-R39M	0.39	±20	30	25.2	250	0.45	450	AISM-1210-120K	12	±10	30	2.52	33	2.5	140
AISM-1210-R47M	0.47	±20	30	25.2	220	0.50	450	AISM-1210-150K	15	±10	30	2.52	30	2.8	130
AISM-1210-R56M	0.56	±20	30	25.2	180	0.55	450	AISM-1210-180K	18	±10	30	2.52	27	3.3	120
AISM-1210-R68M	0.68	±20	30	25.2	160	0.60	450	AISM-1210-220K	22	±10	30	2.52	25	3.7	110
AISM-1210-R82M	0.82	±20	30	25.2	140	0.65	450	AISM-1210-270K	27	±10	30	2.52	20	5.0	80
AISM-1210-1R0K	1.0	±10	30	7.96	129	0.70	400	AISM-1210-330K	33	±10	30	2.52	17	5.6	70
AISM-1210-1R2K	1.2	±10	30	7.96	199	0.75	390	AISM-1210-390K	39	±10	30	2.52	16	6.4	65
AISM-1210-1R5K	1.5	±10	30	7.96	85	0.85	370	AISM-1210-470K	47	±10	30	2.52	15	7.0	60
AISM-1210-1R8K	1.8	±10	30	7.96	80	0.90	350	AISM-1210-560K	56	±10	30	2.52	13	8.0	55
AISM-1210-2R2K	2.2	±10	30	7.96	75	1.0	320	AISM-1210-680K	68	±10	30	2.52	12	9.0	50
AISM-1210-2R7K	2.7	±10	30	7.96	70	1.1	290	AISM-1210-820K	82	±10	30	2.52	11	10	45
AISM-1210-3R3K	3.3	±10	30	7.96	60	1.2	270	Inductance Values To 470 µH							

For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com/ Internet: http://www.abracon.com

ABRACON CORPORATION • 125 Columbia, Aliso Viejo, California 92656 • 949-448-7070 • Fax 949-448-8484

INDUCTORS

AIAP-02 Series THROUGH-HOLE AXIAL POWER CHOKES

Features:

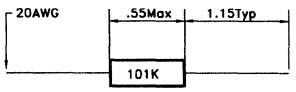
- Wire-wound construction
- Polyolefin shrink tubing
- Excellent environmental characteristics
- High reliability
- High inductance and Low RDC ratios
- Inductance Values to 18,000 µH

Options:

- Packaging: Bulk is standard Tape and Reel available (Quantity 1500 pcs.)
- Tolerance: 10% is standard tighter tolerances available.
- Inductance Values To 18,000 µH

Technical Information:

- Testing: LCR Bridge measured @ 1KHz (Equivalent acceptable). RDC: QuadTech 1880 Milliohmmeter
- IDC Max: Lowers inductance by 10%
- Operating temperature: No load:-55°C to +125°C at full rated current: -55°C +85°C
- Storage temperature: -40°c to +105°C
- Shrink tube: Flame retardant UL type VW-1
- Marking: Inductance and tolerance



Dimensions: Inches

Electrical Specifications

Part Number	L µH	Tol %	RDC Max Ω	IDC Max Amps	Rated AC Amps	Part Number	L µH	Tol %	RDC Max Ω	IDC Max Amps	Rated AC Amps
AIAP-02-3R9K	3.9	±10	.019	7.3	1.28	AIAP-02-121K	120	±10	.283	1.1	.508
AIAP-02-4R7K	4.7	±10	.022	6.3	1.28	AIAP-02-151K	150	±10	.340	1.0	.508
AIAP-02-5R6K	5.6	±10	0.24	5.6	1.28	AIAP-02-181K	180	±10	.362	.95	.508
AIAP-02-6R8K	6.8	±10	.026	5.3	1.28	AIAP-02-221K	220	±10	.430	.86	.508
AIAP-02-8R2K	8.2	±10	.028	4.5	1.28	AIAP-02-271K	270	±10	.557	.77	.400
AIAP-02-100K	10	±10	.033	4.1	1.28	AIAP-02-331K	330	±10	.665	.70	.400
AIAP-02-120K	12	±10	.037	3.6	1.28	AIAP-02-391K	390	±10	.772	.64	.400
AIAP-02-150K	15	±10	.040	3.3	1.28	AIAP-02-471K	470	±10	1.15	.59	.315
AIAP-02-180K	18	±10	.044	3.0	1.28	AIAP-02-561K	560	±10	1.27	.54	.315
AIAP-02-220K	22	±10	.050	2.7	1.28	AIAP-02-681K	680	±10	1.61	.49	.250
AIAP-02-270K	27	±10	.056	2.5	1.28	AIAP-02-821K	820	±10	1.96	.44	.200
AIAP-02-330K	33	±10	.076	2.2	1.00	AIAP-02-102K	1000	±10	2.30	.40	.200
AIAP-02-390K	39	±10	.094	2.0	.804	AIAP-02-122K	1200	±10	2.65	.35	.200
AIAP-02-470K	47	±10	.109	1.8	.804	AIAP-02-152K	1500	±10	3.45	.33	.158
AIAP-02-560K	56	±10	.131	1.7	.804	AIAP-02-182K	1800	±10	4.03	.29	.158
AIAP-02-680K	68	±10	.142	1.5	.804	AIAP-02-222K	2200	±10	4.48	.27	.158
AIAP-02-820K	82	±10	.152	1.4	.804	AIAP-02-272K	2700	±10	5.40	.24	.125
AIAP-02-101K	100	±10	.208	1.2	.632	Inductance Values To 18,000 µH					

AIAP-03 Series THROUGH-HOLE AXIAL POWER CHOKES

Features:

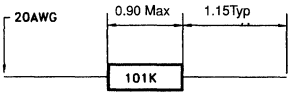
- Wire-wound construction
- Polyolefin shrink tubing
- Excellent environmental characteristics
- High reliability
- High inductance and Low RDC ratios
- Inductance Values To 100,000 µH

Options:

- Packaging: Bulk is standard Tape and Reel available (Quantity 500 pcs.)
- Tolerance: 10% is standard tighter tolerances available.
- Inductance Values To 100,000 µH

Technical Information:

- Testing: LCR Bridge measured @ 1KHz (Equivalent acceptable). RDC: QuadTech 1880 Milliohmmeter
- IDC Max: Lowers inductance by 10%
- Operating temperature: No load:-55°C to +125°C at full rated current: -55°C +85°C
- Storage temperature: -40°c to +105°C
- Shrink tube: Flame retardant UL type VW-1
- Marking: Inductance and tolerance



Dimensions: Inches

Electrical Specifications

Part Number	L µH	Tol %	RDC Max Ω	IDC Max Amps	Rated AC Amps	Part Number	L µH	Tol %	RDC Max Ω	IDC Max Amps	Rated AC Amps
AIAP-03-3R9K	3.9	±10	.007	15.5	4.0	AIAP-03-121K	120	±10	.113	2.54	1.6
AIAP-03-4R7K	4.7	±10	.008	13.9	4.0	AIAP-03-151K	150	±10	.129	2.22	1.6
AIAP-03-5R6K	5.6	±10	.011	12.6	4.0	AIAP-03-181K	180	±10	.150	1.98	1.6
AIAP-03-6R8K	6.8	±10	.011	11.6	4.0	AIAP-03-221K	220	±10	.162	1.89	1.6
AIAP-03-8R2K	8.2	±10	0.13	9.89	4.0	AIAP-03-271K	270	±10	.208	1.63	1.6
AIAP-03-100K	10	±10	.017	8.70	4.0	AIAP-03-331K	330	±10	.212	1.51	1.6
AIAP-03-120K	12	±10	.019	8.21	4.0	AIAP-03-391K	390	±10	.281	1.39	1.6
AIAP-03-150K	15	±10	.022	7.34	4.0	AIAP-03-471K	470	±10	.380	1.24	1.2
AIAP-03-180K	18	±10	.023	6.64	4.0	AIAP-03-561K	560	±10	.420	.117	1.0
AIAP-03-220K	22	±10	.026	6.07	4.0	AIAP-03-681K	680	±10	.548	1.05	1.0
AIAP-03-270K	27	±10	.027	5.36	4.0	AIAP-03-821K	820	±10	.655	.970	.80
AIAP-03-330K	33	±10	.032	4.82	4.0	AIAP-03-102K	1000	±10	.844	.870	.80
AIAP-03-390K	38	±10	.033	4.36	4.0	AIAP-03-122K	1200	±10	1.04	.790	.60
AIAP-03-470K	47	±10	.035	3.98	4.0	AIAP-03-152K	1500	±10	1.18	.700	.60
AIAP-03-560K	56	±10	.037	3.66	3.2	AIAP-03-182K	1800	±10	1.56	.640	.60
AIAP-03-680K	68	±10	.047	3.31	2.5	AIAP-03-222K	2200	±10	2.00	.580	.50
AIAP-03-820K	82	±10	.060	3.10	2.0	AIAP-03-272K	2700	±10	2.06	.530	.40
AIAP-02-101K	100	±10	.090	2.79	1.6	Inductance Values To 100,000 µH					

For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com/ Internet: http://www.abracon.com

ABRACON CORPORATION • 125 Columbia, Aliso Viejo, California 92656 • 949-448-7070 • Fax 949-448-8484

INDUCTORS

ASPI-0804T Series SURFACE-MOUNT POWER INDUCTORS

Features:

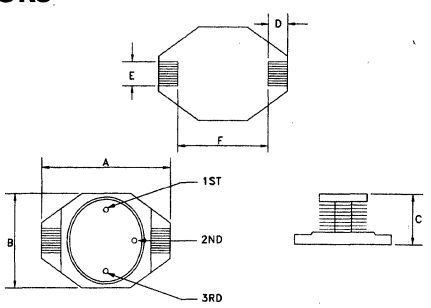
- Small size
- Low cost
- High energy storage
- Low DCR

Technical Information:

- Tested at 100 kHz, 0.1 Vrms
- Inductance drop = 10% typ. at rated Isat.
- Operating temperature: -40°C to 85°C

Options:

- Packaging Tape & Reel is standard (Qty: 700 pcs.)
- Bulk packaging available for smaller quantities
- Tolerance: 20% is standard



Dimensions

A	.510 (12.95+0)	Inches (mm)	D	.100 (2.54)	Inches (mm)
B	.370 (9.4+0)	Inches (mm)	E	.100 (2.54)	Inches (mm)
C	.200 (5.08+0)	Inches (mm)	F	.300 (7.62)	Inches (mm)

Electrical Specifications

Part Number	Inductance (µH ±20%)	DCR (Ω-°)	Isat² (A)	Part Number	Inductance (µH ±20%)	DCR (Ω-°)	Isat² (A)
ASPI-0804T-1R0M	1.0	.008	9.0	ASPI-0804T-470M	47	.12	1.6
ASPI-0804T-1R5M	1.5	.009	8.0	ASPI-0804T-680M	68	.16	1.4
ASPI-0804T-2R2M	2.2	.010	7.0	ASPI-0804T-101M	100	.23	1.2
ASPI-0804T-3R3M	3.3	.013	6.4	ASPI-0804T-151M	150	.33	1.0
ASPI-0804T-4R7M	4.7	.016	5.4	ASPI-0804T-221M	220	.53	.8
ASPI-0804T-6R8M	6.8	.019	4.6	ASPI-0804T-331M	330	.81	.6
ASPI-0804T-100M	10	.025	3.8	ASPI-0804T-471M	470	1.10	.5
ASPI-0804T-150M	15	.040	3.0	ASPI-0804T-681M	680	1.60	.4
ASPI-0804T-220M	22	.050	2.6	ASPI-0804T-102M	1000	2.15	.3
ASPI-0804T-330M	33	.088	2.0				

ASPI-0810T Series SURFACE-MOUNT POWER INDUCTORS

Features:

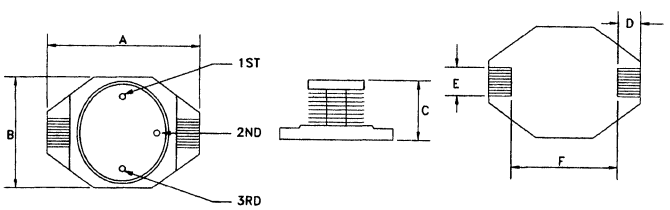
- Small footprint
- High current capacity (to 8Arms)

Technical Information:

- Tested at 100 kHz, 0.1 Vrms
- Inductance drop = 10% typ. at rated Isat.
- Operating temperature: -40°C to 85°C

Options:

- Packaging Tape & Reel is Standard (Qty: 500 pcs.)
  Bulk packaging available for smaller quantities
- Tolerance: 20% is standard



Dimensions

A	.510 (12.95+0)	Inches (mm)	D	.100 (2.54)	Inches (mm)
B	.370 (9.4+0)	Inches (mm)	E	.100 (2.54)	Inches (mm)
C	.450 (11.43+0)	Inches (mm)	F	.300 (7.62)	Inches (mm)

Electrical Specifications

Part Number	Inductance (µH ±20%)	DCR (Ω-°)	Isat² (A)	Part Number	Inductance (µH ±20%)	DCR (Ω-°)	Isat² (A)
SSL0810T-100M	10	.033	8.0	SSL0810T-151M	150	.340	2.0
SSL0810T-150M	15	.042	7.0	SSL0810T-221M	220	.440	1.6
SSL0810T-220M	22	.054	5.5	SSL0810T-331M	330	.70	1.2
SSL0810T-330M	33	.080	4.0	SSL0810T-471M	470	.95	1.0
SSL0810T-470M	47	.100	3.8	SSL0810T-681M	680	1.20	1.0
SSL0810T-680M	68	.170	3.0	SSL0810T-102M	1000	2.00	0.8
SSL0810T-101M	100	.220	2.5				

For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com/ Internet: http://www.abracon.com

ABRACON CORPORATION • 125 Columbia, Aliso Viejo, California 92656 • 949-448-7070 • Fax 949-448-8484

INDUCTORS

ASPI-1109T Series SURFACE-MOUNT POWER INDUCTORS

Features:

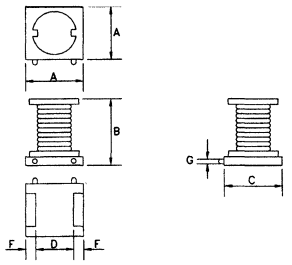
- High current and inductance capacity.
- Specially designed for all surface-mount processes.
- High strength electrodes.

Technical Information:

Test instruments:
- HP 4261 RF Impedance for Inductance
- HP 4261 RF Impedance for IDC
- Digital Multimeter SC-7401 for RDC

Options:

- Packaging Tape & Reel is standard (Qty: 400 pcs.)
  Bulk packaging available for smaller quantities
- Tolerance: 20% is standard, 10% on request.



Dimensions

A	.457 (11.6+0)	Inches (mm)	E	.157 (4)	Inches (mm)
B	.335 (8.5+0)	Inches (mm)	F	.100 (2.55)	Inches (mm)
C	.551 (14.0+0)	Inches (mm)	G	.118 (3+0)	Inches (mm)
D	.236 (6)	Inches (mm)			

Electrical Specifications

Part Number	Inductance (µH ±20%)	Test Freq (KHz)	RDC (Ω) Max.	IDC (a) Max.	Part Number	Inductance (µH ±20%)	Test Freq (KHz)	RDC (Ω) Max.	IDC (a) Max.
ASPI-1109T-100M	10	1	0.06	3.50	ASPI-1109T-121M	120	1	0.40	1.30
ASPI-1109T-120M	12	1	0.07	3.40	ASPI-1109T-151M	150	1	0.47	1.20
ASPI-1109T-150M	15	1	0.08	3.10	ASPI-1109T-181M	180	1	0.63	1.00
ASPI-1109T-180M	18	1	0.09	3.00	ASPI-1109T-221M	220	1	0.73	0.95
ASPI-1109T-220M	22	1	0.10	2.60	ASPI-1109T-271M	270	1	0.97	0.90
ASPI-1109T-270M	27	1	0.11	2.40	ASPI-1109T-331M	330	1	1.15	0.80
ASPI-1109T-330M	33	1	0.12	2.30	ASPI-1109T-391M	390	1	1.30	0.75
ASPI-1109T-390M	39	1	0.14	2.10	ASPI-1109T-471M	470	1	1.48	0.65
ASPI-1109T-470M	47	1	0.17	1.95	ASPI-1109T-561M	560	1	1.90	0.60
ASPI-1109T-560M	56	1	0.19	1.85	ASPI-1109T-681M	680	1	2.45	0.50
ASPI-1109T-680M	68	1	0.22	1.65	ASPI-1109T-821M	820	1	2.55	0.48
ASPI-1109T-820M	82	1	0.25	1.50	ASPI-1109T-102M	1000	1	3.00	0.46
ASPI-1109T-101M	100	1	0.35	1.40	ASPI-1109T-122M	1200	1	3.50	0.35

ASPI-1306T Series SURFACE-MOUNT POWER INDUCTORS

Features:

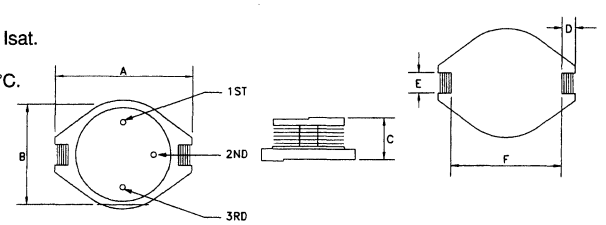
- High current up to 8.6Arms
- Saturation up to 20Amps
- Flat top for pick & place
- High temperature operation

Technical Information:

- Tested at 100 kHz, 0.1 Vrms.
- Inductance drop = 10% typ. at rated Isat.
- ΔT = 40°C typ at Irms.
- Operating temperature: -40°C to 85°C.

Options:

- Packaging Tape & Reel is standard (Qty: 500pcs.)
  Bulk packaging available for smaller quantities
- Tolerance: 20% is standard.
- Customs available,



Dimensions

A	.730 (18.54+0)	Inches (mm)	D	.100 (2.54)	Inches (mm)
B	.600 (15.24+0)	Inches (mm)	E	.100 (2.54)	Inches (mm)
C	.280 (7.11 +0)	Inches (mm)	F	.500 (12.7)	Inches (mm)

Electrical Specifications

Part Number	Inductance (µH ±20%)	DCR (Ω ±15%)	Isat[2] (A)	Irms[3] (A)	Part Number	Inductance (µH ±20%)	DCR (Ω ±15%)	Isat[2] (A)	Irms[3] (A)
ASPI-1306T-1R0M	1.0	.011	20	8.6	ASPI-1306T-680M	68	.13	3.5	2.3
ASPI-1306T-2R2M	2.2	.014	16	7.1	ASPI-1306T-101M	100	.19	3.0	1.8
ASPI-1306T-3R3M	3.3	.016	14	6.2	ASPI-1306T-151M	150	.25	2.6	1.5
ASPI-1306T-5R6M	5.6	.022	12	5.3	ASPI-1306T-221M	220	.38	2.4	1.2
ASPI-1306T-100M	10	.032	10	4.3	ASPI-1306T-331M	330	.56	1.9	1.0
ASPI-1306T-150M	15	.036	8.0	4.0	ASPI-1306T-471M	470	.85	1.4	0.82
ASPI-1306T-220M	22	.047	7.0	3.5	ASPI-1306T-681M	680	1.2	1.2	0.72
ASPI-1306T-330M	33	.066	5.5	3.0	ASPI-1306T-102M	1000	1.8	1.0	0.56
ASPI-1306T-470M	47	.087	4.5	2.6					

For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com/ Internet: http://www.abracon.com

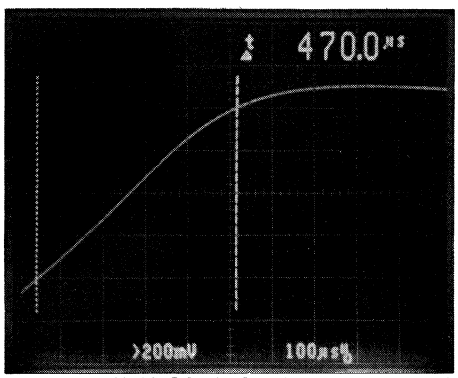
ABRACON CORPORATION • 125 Columbia, Aliso Viejo, California 92656 • 949-448-7070 • Fax 949-448-8484

AMECON
SERVING YOU SINCE 1972 WITH KNOWLEDGE & SENSIBLE PRODUCTS
1900 CHRIS LANE / ANAHEIM, CA 92085 / (714) 634-2220 / FAX (714) 634-0905 / **800-394-2234**

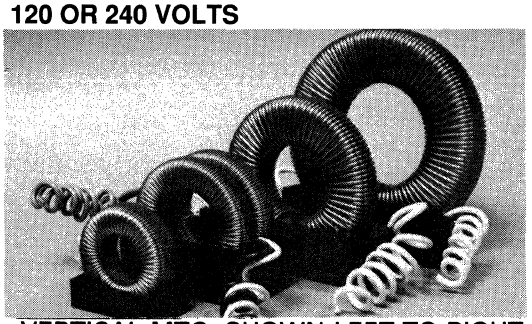
PRECISION WOUND HEAVY DUTY TOROIDAL INDUCTORS

FOR PROFESSIONAL LIGHT DIMMERS, MOTOR CONTROLS, SCR CONTROLS & LINE FILTERS

- **AVAILABLE IN SEMI OR FULL EPOXY MOLDED**
- **HORIZONTAL & VERTICAL MOUNTING**
- **ALL "UL" RECOGNIZABLE MATERIALS**
- **ABSOLUTELY LATEST "STATE OF THE ART" MATERIALS, PRODUCTION & TESTING TECHNOLOGIES ARE EMPLOYED THROUGHOUT ALL PHASES OF THIS PRODUCT LINE**
- **SPECIFICALLY DESIGNED FOR EITHER 120 OR 240 VOLTS**



TYPICAL TURN ON RISE TIME 90° FIRING


VERTICAL MTG. SHOWN LEFT TO RIGHT. 10A, DUAL 20A., 50A & 100.A.

SPECIFICALLY DESIGNED FOR 240 VOLTS

Part No.	Rating Amps Rms	di/dt 10% 90% μs.	△t°C Above Ambient	DCR Ohms 100°C	Dimensions* Open Style O.D. x Ht.
2634-116159	8.3	300	99	0.2584	2.80 x 1.30
3521-115198	10	300	101	0.2210	3.70 x 0.90
3032-114159	10	300	85	0.1640	3.20 x 1.30
2634-116159	10	300	123	0.2570	2.80 x 1.30
3532-114172	10	400	87	0.1895	3.70 x 1.30
3526-115188	10	350	101	0.2310	3.70 x 1.10
3532-115192	10	450	105	0.2630	3.70 x 1.20
3040-112125	15	300	91	0.0947	3.30 x 1.60
4021-113155	15	300	105	0.1257	4.20 x 0.90
3056-112120	15	400	93	0.1115	3.30 x 2.10
3048-113138	15	400	112	0.1450	3.30 x 1.80
3552-112134	15	500	97	0.1237	3.70 x 1.90
3542-113157	15	500	117	0.1600	3.70 x 1.60
3542-110098	20	300	84	0.0519	3.80 x 1.70
4026-111122	20	300	100	0.0703	4.20 x 1.20
4032-111131	20	400	108	0.0828	4.20 x 1.30
3542-112128	20	400	126	0.1044	3.70 x 1.60
4042-111128	20	500	110	0.0913	4.20 x 1.60
4032-110115	20	350	89	0.0587	4.30 x 1.40
3542-111113	20	350	103	0.0744	3.70 x 1.60
4042-110114	20	450	93	0.0656	4.30 x 1.70
3542-112139	20	440	133	0.1140	3.70 x 1.60

Part No.	Rating Amps Rms	di/dt 10% 90% μs.	△t°C Above Ambient	DCR Ohms 100°C	Dimensions* Open Style O.D. x Ht.
4032-109100	25	300	92	0.0413	4.30 x 1.40
3542-109096	25	300	93	0.0416	3.80 x 1.70
3552-109092	25	350	94	0.0445	3.80 x 2.00
4042-109101	25	400	97	0.0470	4.30 x 1.70
4047-109101	25	450	99	0.0498	4.30 x 1.90
4042-110113	25	450	115	0.0650	4.30 x 1.70
4052-109101	25	500	100	0.0523	4.30 x 2.00
4058-109101	25	550	102	0.0558	4.30 x 2.20
4052-110112	25	550	118	0.0717	4.30 x 2.00
4032-109098	30	300	110	0.0404	4.30 x 1.40
4042-109100	300	400	116	0.0465	4.30 x 1.70
4052-109100	30	500	119	0.0521	4.30 x 2.00
4063-210052	40	300	95	0.0187	4.30 x 2.30
4052-211061	40	300	111	0.0246	4.20 x 2.00
4067-211062	40	400	116	0.0292	4.20 x 2.50
5252-210077	40	450	103	0.0263	5.50 x 2.00
4063-210051	50	300	116	0.0184	4.30 x 2.30
5252-209068	50	400	107	0.0187	5.50 x 2.00
5252-209084	50	500	119	0.0231	5.50 x 2.00
5252-208052	60	300	100	0.0116	5.50 x 2.10
5252-209067	60	400	125	0.0185	5.50 x 2.00
5278-208057	60	500	112	0.0158	5.50 x 2.90

* Semi Epoxy Molded, Add 0.20" O.D. & 0.09" Ht. Full Epoxy Molded, Add 0.20" O.D. & Ht.
NOTES: Dimensions stated are based on perfect windings not always achieveable. Electrical data accurate to within ±6%.

AMECON
SERVING YOU SINCE 1972 WITH KNOWLEDGE & SENSIBLE PRODUCTS
1900 CHRIS LANE / ANAHEIM, CA 92085 / (714) 634-2220 / FAX (714) 634-0905 / **800-394-2234**

PRECISION WOUND HEAVY DUTY TOROIDAL INDUCTORS

SPECIFICALLY DESIGNED FOR 120 VOLTS

Part No.	Rating Amps Rms	di/dt 10% 90% μs.	△t°C Above Ambient	DCR Ohms 100°C	Dimensions* Open Style O.D. x Ht.
2626-113106	12.5	300	80	0.076	2.80 x 1.10
2634-112095	12.5	350	69	0.065	2.80 x 1.40
2634-113108	12.5	400	84	0.090	2.80 x 1.30
3521-114148	12.5	450	95	0.133	3.70 x 0.90
3032-113134	12.5	500	86	0.110	3.20 x 1.30
3024-112108	15	300	78	0.062	3.30 x 1.10
2634-112095	15	350	84	0.065	2.80 x 1.40
3032-111106	15	400	72	0.057	3.30 x 1.30
3032-112118	15	450	86	0.079	3.30 x 1.30
2634-113106	15	400	102	0.089	2.80 x 1.30
3526-112133	15	500	87	0.086	3.70 x 1.10
3032-113130	15	500	104	0.107	3.20 x 1.30
3532-111118	15	550	75	0.068	3.70 x 1.30
3024-112104	20	300	107	0.060	3.30 x 1.10
3521-111100	20	300	86	0.049	3.80 x 1.00
3032-110092	20	350	79	0.040	3.30 x 1.40
3526-112095	20	350	97	0.059	3.70 x 1.10
4021-110104	20	400	77	0.045	4.30 x 1.00
3526-110106	20	400	81	0.045	3.80 x 1.20
4021-110115	20	450	82	0.050	4.30 x 1.00
3526-111118	20	450	99	0.062	3.80 x 1.20
3532-110106	20	500	84	0.050	3.80 x 1.40
4021-111128	20	500	99	0.069	4.30 x 1.00
3532-111115	20	550	100	0.067	3.80 x 1.40
4026-110113	20	550	84	0.053	4.30 x 1.20
3521-110096	25	300	95	0.037	3.80 x 1.00
3526-110092	25	350	95	0.038	3.80 x 1.20
3532-110085	25	400	93	0.039	3.80 x 1.40
4021-109100	25	400	85	0.036	4.30 x 1.10
4026-109092	25	450	84	0.035	4.30 x 1.20
3532-110094	25	450	99	0.044	3.80 x 1.40
4026-109101	25	500	80	0.039	4.30 x 1.20
3532-110104	25	500	107	0.049	3.80 x 1.40
4032-109092	25	550	87	0.038	4.30 x 1.40

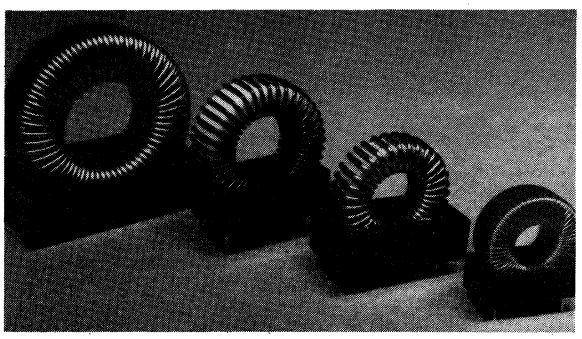
Part No.	Rating Amps Rms	di/dt 10% 90% μs.	△t°C Above Ambient	DCR Ohms 100°C	Dimensions* Open Style O.D. x Ht.
4026-110111	25	550	107	0.052	4.30 x 1.20
4026-108065	30	300	73	0.020	4.30 x 1.30
4021-109090	30	350	97	0.032	4.30 x 1.10
4032-109068	30	400	87	0.027	4.30 x 1.40
3532-109084	30	400	100	0.032	3.80 x 1.40
4042-108060	30	450	77	0.022	4.30 x 1.80
3542-109073	30	450	95	0.031	3.80 x 1.70
4042-108065	30	500	82	0.025	4.30 x 1.80
3542-109082	30	500	103	0.035	3.80 x 1.70
4042-109072	30	550	97	0.034	4.30 x 1.70
3542-109088	30	550	108	0.038	3.70 x 1.70
3542-211057	35	350	90	0.019	3.80 x 1.60
4042-211053	35	400	88	0.019	4.20 x 1.60
4042-211058	35	450	92	0.021	4.30 x 1.70
4047-211058	35	500	94	0.022	4.30 x 1.80
4047-211063	35	550	98	0.024	4.30 x 1.80
3547-210051	40	350	88	0.015	3.80 x 1.80
4042-210052	40	400	89	0.015	4.30 x 1.70
4047-210052	40	450	91	0.016	4.30 x 1.80
4042-211058	40	450	105	0.021	4.30 x 1.70
4047-211057	40	500	106	0.022	4.30 x 1.80
4047-211062	40	550	111	0.024	4.30 x 1.80
4042-209049	50	400	95	0.011	4.30 x 1.70
4042-210056	50	450	115	0.016	4.30 x 1.70
4047-210051	50	450	111	0.016	4.30 x 1.80
4052-210051	50	500	113	0.017	4.30 x 2.00
4052-210055	50	550	118	0.018	4.30 x 2.00
4047-209045	60	400	111	0.011	4.30 x 1.90
4052-209046	60	450	114	0.012	4.30 x 2.00
4063-209042	60	500	112	0.012	4.30 x 2.40
4063-209046	60	550	117	0.013	4.30 x 2.40
5252-308036	75	400	88	0.005	5.50 x 2.10
5252-208036	75	400	101	0.008	5.50 x 2.10
5252-408032	100	375	95	0.004	5.50 x 2.10
5252-308034	100	400	108	0.005	5.50 x 2.10

* Semi Epoxy Molded, Add 0.20″ O.D. & 0.09″ Ht. Full Epoxy Molded, Add 0.20″ O.D. & Ht.
NOTES: Dimensions stated are based on perfect windings not always achieveable. Electrical data accurate to within ±6%.

AMECON
SERVING YOU SINCE 1972 WITH KNOWLEDGE & SENSIBLE PRODUCTS
1900 CHRIS LANE / ANAHEIM, CA 92085 / (714) 634-2220 / FAX (714) 634-0905 / **800-394-2234**

SWITCH MODE POWER SUPPLY FILTER INDUCTORS

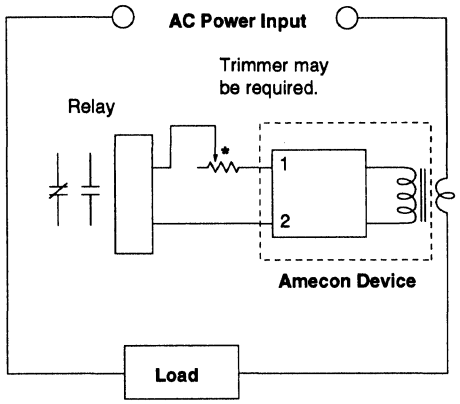
- Minimum possible size • Low profile
- Performance verified in 25KHZ switching power supply
- Large selection of sizes available
- Available with open winding type or encapsulated and semi-encapsulated constructions.
- Custom designs are available up to 200AMPS.
- Advanced materials • Best production technologies, with 27 yrs. of SMPS expertise



I_{dc} (AMPS)	Part Number	L_{MIN} (μh) @ Rated I_{dc}	L_{MIN} (μh) @ Zero I_{dc}	DCR_{NOM} (OHMS)	Min Energy Storage (μ-Joule)	Mechanical Specifications (inch)	
						$OD_{NOM.}$	$HT_{NOM.}$
5 VOLTS POWER INDUCTORS							
1	5500	480	430	0.360	240	1.12	0.49
2	5501	275	330	0.150	550	1.14	0.52
3	5502	160	210	0.080	720	1.17	0.54
5	5503	104	160	0.055	1250	1.20	0.58
8	5504	60	84	0.015	1920	1.25	0.76
10	5505	50	62	0.012	2500	1.30	0.81
12	5506	40	48	0.009	3456	1.32	0.84
15	5507	30	50	0.009	3712	1.52	0.57
20	5508	25	40	0.006	5000	1.56	0.72
25	5509	20	26	.004	6250	1.62	0.76
30	5510	16	28	.004	7200	1.65	1.25
40	5511	12	20	.003	9600	1.72	1.28
50	5512	10	14	.002	12500	2.12	1.00
60	5513	8	12	.0015	14400	2.20	1.10
100	5514	5	7	.001	25000	2.12	1.00
10 VOLTS POWER INDUCTORS							
1	5520	1000	850	0.53	500	1.12	0.63
2	5521	500	510	0.27	1000	1.14	0.66
3	5522	310	320	0.13	1395	1.17	0.68
5	5523	180	210	0.17	2250	1.42	0.55
8	5524	120	150	0.04	3840	1.72	0.73
10	5525	100	140	0.03	5000	1.75	0.76
12	5526	75	110	0.02	7920	1.78	0.80
15	5527	68	100	0.016	8437	1.81	0.82
20	5528	51	65	0.010	10200	2.10	1.00
30	5529	32	42	0.010	14400	1.90	1.87
15 VOLTS POWER INDUCTORS							
1	5530	1250	1250	0.650	625	1.60	0.52
2.5	5531	500	520	0.170	1000	1.62	0.54
5.0	5532	250	315	0.080	3937	1.70	0.70
7.5	5533	170	225	0.050	4780	1.75	0.75
10	5534	125	170	0.030	6250	1.78	0.78
15	5535	85	130	0.017	9560	2.06	0.94
25	5536	50	90	0.009	15625	2.12	1.00
30	5537	43	75	0.008	19350	2.31	1.42
24 VOLTS POWER INDUCTORS							
2	5540	1100	1050	0.22	2200	1.95	0.82
5	5541	550	510	0.10	6875	2.00	0.87
7.5	5542	300	380	0.06	8437	2.12	1.00
10	5543	225	300	0.04	11250	2.25	1.12
15	5544	150	220	0.026	16875	2.35	1.31
25	5545	90	150	0.013	28125	2.30	1.88
35	5546	65	95	0.008	39812	2.4	2.06
48 VOLTS POWER INDUCTORS							
5	5550	750	820	0.14	9375	2.0	1.6
10	5551	375	520	2.06	18750	2.25	1.87
15	5552	250	450	0.05	28125	2.37	1.93
25	5553	150	280	0.03	46875	2.5	2.5

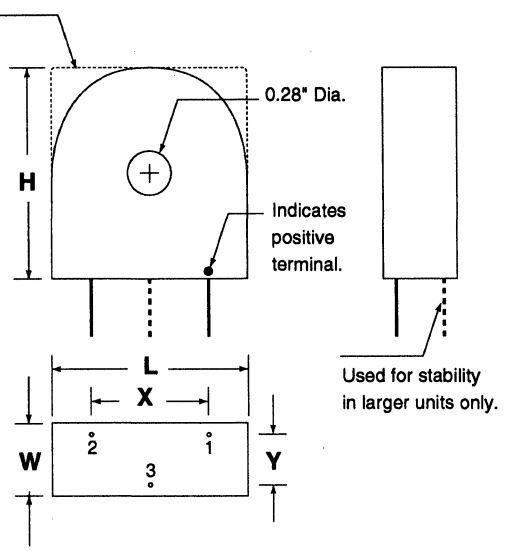
AMECON
The Energy Saver for 26 Years

AC Current to DC Voltage Relay-Driver Transducers



* Maximum value: 10% of relay DCR

Package top may be square or domed depending on availability.



		I_m=10A		I_m=20A		I_m=30A	
V_{RC}	mW_{RC}	Part No.	Code	Part No.	Code	Part No.	Code
3	50	5R10-03W5	A	5R20-03W5	A	5R30-03W5	A
3	100	5R10-0301	B	5R20-0301	A	5R30-0301	A
3	200	5R10-0302	E	5R20-0302	B	5R30-0302	B
3	400	5R10-0304	F	5R20-0304	C	5R30-0304	B
3	800	5R10-0308	H	5R20-0308	E	5R30-0308	E
3	1200	5R10-0312	H	5R20-0312	F	5R30-0312	E
3	1600			5R20-0316	G	5R30-0316	F
5	50	5R10-05W5	A	5R20-05W5	A	5R30-05W5	A
5	100	5R10-0501	B	5R20-0501	A	5R30-0501	A
5	200	5R10-0502	C	5R20-0502	B	5R30-0502	A
5	400	5R10-0504	F	5R20-0504	C	5R30-0504	B
5	800	5R10-0508	G	5R20-0508	E	5R30-0508	D
5	1200	5R10-0512	H	5R20-0512	F	5R30-0512	E
5	1600			5R20-0516	G	5R30-0516	F
12	50	5R10-12W5	A				
12	100	5R10-1201	B	5R20-1201	A		
12	200	5R10-1202	C	5R20-1202	B	5R30-1202	B
12	400	5R10-1204	F	5R20-1204	C	5R30-1204	B
12	800	5R10-1208	G	5R20-1208	E	5R30-1208	D
12	1200	5R10-1212	H	5R20-1212	G	5R30-1212	E
12	1600			5R20-1216	G	5R30-1216	F
24	100	5R10-2401	B				
24	200	5R10-2402	C	5R20-2402	B		
24	400	5R10-2404	E	5R20-2404	C	5R30-2404	B
24	800	5R10-2408	G	5R20-2408	E	5R30-2408	D
24	1200	5R10-2412	H	5R20-2412	G	5R30-2412	F
24	1600			5R20-2416	G	5R30-2416	F
48	200	5R10-4802	C				
48	400	5R10-4804	F	5R20-4804	C		
48	800	5R10-4808	G	5R20-4808	E	5R30-4808	D
48	1200	5R10-4812	H	5R20-4812	G	5R30-4812	E
48	1600			5R20-4816	G	5R30-4816	F

Code	L	H	W	X	Y
A	0.94	0.99	0.56	0.6	0.3
B	1.25	1.25	0.56	0.6	0.3
C	1.25	1.25	0.75	0.6	0.3
D	1.44	1.44	0.75	0.9	0.3
E	1.44	1.44	0.94	0.9	0.3
F	1.75	1.75	0.94	1.2	0.6
G	1.75	1.75	1.19	1.2	0.6
H	2.00	2.00	1.50	1.5	0.9

- These transducers are designed for HIGHEST POWER TRANSFER and LOWEST LOSSES.
- All transducers have a minimum overload capacity of 133% (except for the 1600 mW transducers).
- Pull-in current is attainable from 0.5 to 30 Amps. $I_{pi} = I_m/N_p$ where N_p = number of primary turns (1 to 20) installed by the user. The primary turns can be installed by the factory for a small additional charge.
- Select the I_m which yields the minimum number of primary turns for your application, i.e., $N_p = I_m/I_{pi}$ where N_p is rounded to the smallest whole number.

Abbreviations Used

I_m	Rated Primary Current
I_{pi}	Pull-In Current
V_{RC}	Relay Coil Voltage
mW_{RC}	Relay Coil Wattage
N_P	Number of Primary Turns
H	Height
W	Width
D	Depth
Dia.	Diameter

- **"Made 100% in the USA" with USA Materials**
- **Established in 1972**
- **Custom configurations available**

1900 Chris Lane • Anaheim, CA 92805 • **800-394-2234** • 714-634-2220 • Fax: 714-634-0905

Inductors

API Delevan

API Delevan Inc.
270 Quaker Road
East Aurora, New York 14052
Phone: 716-652-3600 Fax: 716-652-4814

Internet: http://www.delevan.com
E-Mail: apisales@delevan.com or
apieng@delevan.com

Full product details can be found on the Internet or by requesting a brochure via fax or E-Mail.

SMD Wire Wound

Widest array of sizes available in molded and conformal coated styles. Inductance values from 1.8nH to 1000µH. QPL to MIL-C-83446 with commercial equivalents also available.

SMD Air Cores

"Spring" type Air Core Inductors offer a high Q factor over a wide, high frequency range. Suitable for wireless applications. Flat top construction and supplied on tape and reel for automated assembly. Inductance ranges from 2.5nH to 43nH. Application specific tolerances available upon request.

Axial Leaded Wire-Wound

These wire-wound inductors are offered in unshielded and shielded versions. QPL to MIL-C-15305 and manufactured 100% in USA. Available on tape and reel

laser marked with date code for traceability or with color banding. Also available are radical leaded and variable inductance RF styles. API can also offer commercial equivalents, special tolerances down to 1%, and application specific devices.

Established Reliability

MIL-C-39010/01 through /10 molded RF inductors. Qualified to "R" level for all slash sheets ranging in inductance from .10µH to 1000µH.

Power Inductors

Standard packages include axial, radial, surface mount and toroid systems available to suit your specific application needs. Values ranging from 1.0µH to 18mH with current ratings up to 20 Amps.

Additional Products

Multilayer 0603 and 0805 sizes
SMD Variables
Ribbon Lead Chip Inductors
Filter Beads in thru-hole and SMD
Ferrite Cores

Additional Services

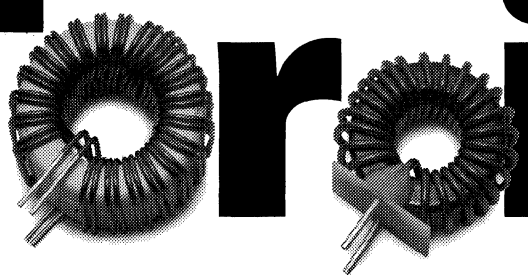
50 Years of Manufacturing Excellence
ISO-9001 Certified Manufacturing Facilities
Environmental Testing, including MIL-STD-202 & MIL-STD-981
Application Specific Devices
MIL-STD-2000 Certified Personnel
DESC Audited Product Lines and Environmental Lab

API Delevan

MAXIMUM CURRENT CAPACITY—CONDUCTORS

Size, AWG	MIL-W-5088				National Electrical Code	Underwriters Laboratory		American Insurance Association	500 c mils/A
	Copper		Aluminum			60°C	80°C		
	Single-wire	Wire-bundled	Single-wire	Wire-bundled					
30	...	...	...	...	...	0.2	0.4	...	0.20
28	...	...	...	...	...	0.4	0.6	...	0.32
26	...	...	...	...	...	0.6	1.0	...	0.51
24	...	...	...	...	...	1.0	1.6	...	0.81
22	9	5	...	...	...	1.6	2.5	...	1.28
20	11	7.5	...	...	...	2.5	4.0	3	2.04
18	16	10	...	...	6	4.0	6.0	5	3.24
16	22	13	...	...	10	6.0	10.0	7	5.16
14	32	17	...	...	20	10.0	16.0	15	8.22
12	41	23	...	...	30	16.0	26.0	20	13.05
10	55	33	...	...	35	...	...	25	20.8
8	73	46	58	36	50	...	...	35	33.0
6	101	60	86	51	70	...	...	50	52.6
4	135	80	108	64	90	...	...	70	83.4
2	181	100	149	82	125	...	...	90	132.8
1	211	125	177	105	150	...	...	100	167.5
0	245	150	204	125	200	...	...	125	212.0
00	283	175	237	146	225	...	...	150	266.0
000	328	200	...	...	275	...	...	175	336.0
0000	380	225	...	...	325	...	...	225	424.0

Custom Toroids



We specialize in toroids. Custom toroids. Designed and built to your specs and your schedule. Fast turnaround, nothing "off-the-shelf."

The only place you don't have a choice is on quality. Because we work only to the highest quality standards. Our two biggest customers have won the Malcolm Baldridge Quality Award, so you can understand the demands we're used to getting and meeting.

But apart from top quality – and competitive pricing – you call all the shots. We'll accommodate your needs – short runs, long runs, we can handle them all. When we do a job, we do it right. When we make a promise, we keep our word. That's the kind of company we are. Perhaps it's our small-town midwestern work ethic that makes us that way.

To find out how easy it can be to get engineering design and production assistance for the custom toroids you need at a reasonable price, contact us by phone **612-820-8424**, fax **612-820-8430** or e-mail bltoroid@aol.com.

B&L *Industries Inc.*

4570 West 77th Street, Suite 238
Minneapolis, MN 55435-5016

QUALITY COILS SINCE 1946

CADDELL-BURNS

258 East Second Street
Mineola, New York 11501-3508

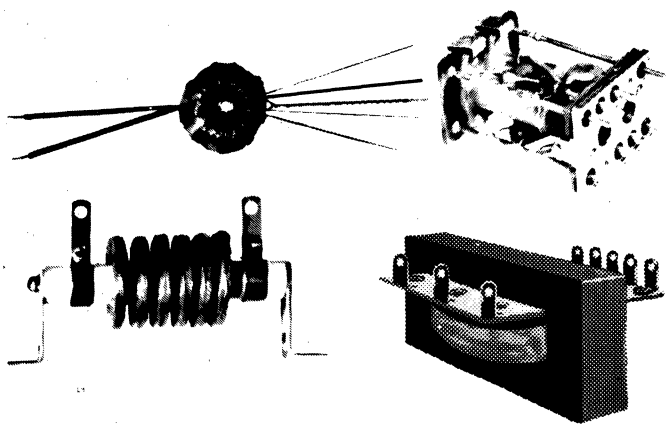
Tel: 516-746-2310 Fax: 516-742-2416
e-mail: caddell-burns@erols.com

OVER 53 YEARS OF DEPENDABILITY

in the design and manufacture of coils and transformers for industry and defense. We specialize in the manufacture of coils and assemblies to the most rigid military specifications.

CUSTOM WINDINGS COMPLETE FACILITIES

for custom winding to your specifications.



FERRITE POT CORE INDUCTORS & TRANSFORMERS

Caddell-Burns has complete facilities for winding and assembling all types of pot core assemblies, both fixed and variable. Write or phone in your specifications.

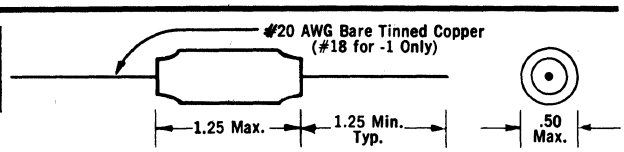
MODIFIED STOCK COILS

Any of the coils shown on these pages can be wound to intermediate inductance values or modified to meet customer requirements, often at no additional cost.

HIGH CURRENT CHOKES

TYPE 6150 10-100μH
Recommended mounting pitch — 1.50″

FOR SWITCHING REGULATORS AND POWER FILTERS



NOTES:

1. Effective inductance and Q measured on Hewlett-Packard 4342A Q-Meter at frequencies specified, in accordance with MIL-C-15305.
2. Current rating (Rated IDC) is based on .75 watt power dissipation for approx. 20°C temperature rise. Depending on the application, these units may be operated at up to twice the rated current.
3. Incremental current (INCR I) is the minimum current at which the inductance will be decreased by 5% from its initial (zero – DC) value.
4. Dielectric Withstanding Voltage – 1000 VRMS.
5. Operating Temperature Range – -55° to +85°C.
6. Materials:
   Coil Form – Ferrite
   Magnet Wire – Per FED SPEC J-W-001177/9
   Jacket – Per MIL-I-23053/5, Class 1.
   Flame Retardant IAW UL 224, Class 1.

6150

STANDARD VALUES: (Other values available on special order.)

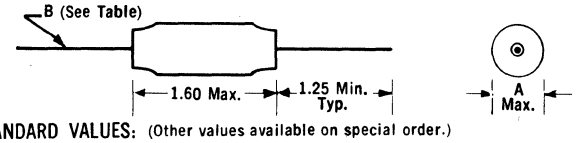
Part No.	Nominal Inductance*	Min. Q	Test Freq. MHz	Max. DCR Ohms	Min. SRF MHz	Rated I_{DC} Amps	Incr I Amps
6150-1	10μH	30	2.5	.018	10	6.40	21
6150-2	20	18	2.5	.036	7.2	4.50	15
6150-3	30	12	2.5	.063	5.0	3.40	13
6150-4	40	12	2.5	.096	4.3	2.75	12
6150-5	50	10	2.5	.110	3.7	2.60	10
6150-6	75	8	2.5	.200	3.2	1.90	9
6150-7	100	26	.79	.400	2.2	1.30	7.8

*(−10, +20%)

HIGH CURRENT CHOKES

TYPE 6490 10μH-1.0mH 10% Tolerance
Recommended mounting pitch — 1.75″

FOR SWITCHING REGULATORS AND POWER FILTERS



NOTES:

1. Inductance measured on QuadTech/GenRad 1659 RLC Digibridge at 1.0 KHz.
2. Current rating (Rated IDC) is based on 1.0 watt power dissipation for approx. 20°C temperature rise. Depending on the application, these units may be operated at up to twice the rated current.
3. Incremental current (INCR I) is the minimum current at which the inductance will be decreased by 5% from its initial (zero – DC) value.
4. Dielectric Withstanding Voltage – 1000 VRMS.
5. Operating Temperature Range – -55° to +85°C.
6. Materials:
   Coil Form – Ferrite.
   Magnet Wire – Per FED SPEC. J-W-001177/9
   Jacket – Per MIL-I-23053/5, Class 1.
   Flame Retardant IAW UL 224, Class 1.
   Lead Wires - Bare tinned copper.

6490

STANDARD VALUES: (Other values available on special order.)

Part No.	Nominal Inductance	Max. DCR Ohms	Min. SRF MHz	Rated I_{DC} Amps	Incr I Amps	A Dia. In.	B Lead Size AWG
6490-1	10μH	.010	12.0	10.0	20	.65	14
6490-2	20	.017	9.0	7.7	16	.62	16
6490-3	30	.031	6.0	5.7	12	.61	18
6490-4	40	.050	5.0	4.5	11	.60	20
6490-5	50	.068	4.5	3.8	10	.59	20
6490-6	75	.13	3.4	2.8	9.0	.58	20
6490-7	100	.056	1.5	4.2	7.0	.79	18
6490-8	250	.14	0.90	2.7	4.5	.75	20
6490-9	500	.30	0.60	1.8	3.3	.72	20
6490-10	750	.56	0.45	1.3	2.6	.68	20
6490-11	1.0mH.	.80	0.35	1.1	2.3	.66	20

SEND YOUR REQUIREMENTS. PROMPT QUOTES.

QUALITY COILS SINCE 1946

CADDELL-BURNS

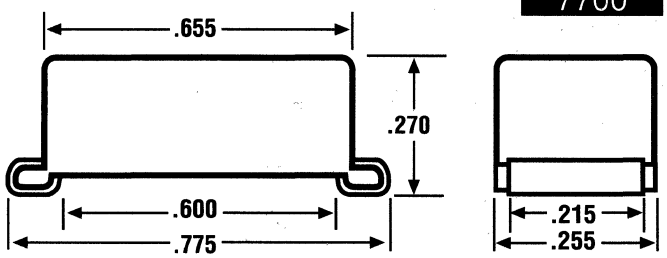
258 East Second Street
Mineola, New York 11501-3508

Tel: 516-746-2310 Fax: 516-742-2416
e-mail: caddell-burns@erols.com

SURFACE MOUNT INDUCTORS

7700

TYPE 7700 1.0µH - 100mH 10% Tolerance



NOTES:

1. INDUCTANCE measured on QuadTech/GenRad 1659 RLC Digibridge at 1.0 KHz. (Values less than 10 µH are measured at 10 KHz.)
2. CURRENT RATING (Rated IDC) is based on 0.25 watt power dissipation for approximately 20°C temperature rise. Depending on the application, these units may be operated at up to twice the rated current.
3. INCREMENTAL CURRENT (INCR I) is the minimum current at which the inductance will be decreased by 5% from its initial (zero-DC) value.
4. DIELECTRIC WITHSTANDING VOLTAGE: 1000 VRMS.
5. OPERATING TEMPERATURE RANGE: -55° to +105°C.
6. MARKING: Printed with Caddell-Burns Part Number.
7. MATERIALS:
   - Core: Ferrite
   - Case: Glass-filled Polyphenylene Sulfide (RYTON)
   - Magnet Wire: Per FED SPEC J-W 001177/9
   - Terminals: Copper, 110 alloy
     60 - 40 Solder Coated

STANDARD VALUES:

Dash No.	Nominal Inductance	Max. DCR Ohms	Min. SRF MHz	Rated IDC ma	INCR I ma
-01	1.0 µH	.010	155	5.000	6.400
-02	1.2	.011	148	4.800	6.000
-03	1.5	.012	128	4.600	5.000
-04	1.8	.013	120	4.400	4.500
-05	2.2	.014	108	4.200	4.100
-06	2.7	.015	100	4.100	3.600
-07	3.3	.016	96	4.000	3.200
-08	3.9	.017	90	3.800	3.000
-09	4.7	.022	85	3.400	2.700
-10	5.6	.028	76	3.000	2.500
-11	6.8	.031	70	2.800	2.300
-12	8.2	.035	51	2.700	2.000
-13	10	.038	35	2.600	1.900
-14	12	.043	21	2.400	1.700
-15	15	.049	14	2.300	1.500
-16	18	.054	10	2.200	1.400
-17	22	.059	8.0	2.100	1.300
-18	27	.070	6.5	1.900	1.100
-19	33	.077	6.1	1.800	1.000
-20	39	.084	5.7	1.700	940
-21	47	.093	5.1	1.600	870
-22	56	.12	4.3	1.500	790
-23	68	.13	3.6	1.400	710
-24	82	.16	3.2	1.300	650
-25	100	.24	3.0	1.000	590
-26	120	.32	2.7	880	540
-27	150	.43	2.1	760	480
-28	180	.48	1.7	720	440
-29	220	.55	1.6	670	400
-30	270	.62	1.5	640	360

Part No.	Nominal Inductance	Max. DCR Ohms	Min. SRF MHz	Rated IDC ma	INCR I ma
-31	330 µH	.72	1.4	590	320
-32	390	.79	1.3	560	300
-33	470	.88	1.2	530	270
-34	560	1.2	1.1	460	250
-35	680	1.5	1.0	410	230
-36	820	1.7	.96	380	210
-37	1.0 mH	1.9	.88	360	190
-38	1.2	2.4	.78	320	170
-39	1.5	2.8	.64	300	150
-40	1.8	3.1	.60	280	140
-41	2.2	4.5	.54	240	120
-42	2.7	5.8	.44	210	110
-43	3.3	8.1	.43	180	100
-44	3.9	8.9	.40	170	95
-45	4.7	10	.38	160	86
-46	5.6	11	.35	150	79
-47	6.8	15	.29	130	72
-48	8.2	17	.26	120	65
-49	10	22	.24	110	59
-50	12	26	.23	100	54
-51	15	34	.19	86	48
-52	18	39	.17	80	44
-53	22	54	.16	68	40
-54	27	62	.15	64	36
-55	33	82	.12	55	32
-56	39	93	.11	52	30
-57	47	120	.096	46	27
-58	56	130	.092	44	25
-59	68	190	.088	36	23
-60	82	210	.080	35	21
-61	100	270	.074	30	19

INDUCTOR SELECTION KITS FOR DESIGN ENGINEERS

Type 7700 inductors are available in kits to assist the designer of switching regulators, power supplies, and filters in selecting the optimal inductor for a given application.

Each kit contains 25 inductors, covering two decades of inductance values.

FREE REFILL order forms are included, to replace parts as they are used, or to obtain samples of additional values not included with the kits.

Kit Part No.	Dash No.'s Included	Inductance Range
7700 KIT-1	-01 thru -25 (1 ea)	1.0µH-100µH
7700 KIT-2	-13 thru -37 (1 ea)	10µH-1.0mH
7700 KIT-3	-25 thru -49 (1 ea)	100µH-10mH
7700 KIT-4	-37 thru -61 (1 ea)	1.0mH-100mH

Custom kits are also available.

CADDELL-BURNS DOES NOT SELL THRU DISTRIBUTORS. ALL SALES ARE DIRECT.

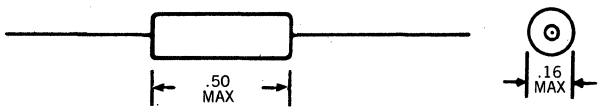
QUALITY COILS SINCE 1946

CADDELL-BURNS

258 East Second Street
Mineola, New York 11501-3508

Tel: 516-746-2310 Fax: 516-742-2416
e-mail: caddell-burns@erols.com

7120-KIT LOW POWER MINIATURE INDUCTORS



This kit contains 2 each of the following:

Part No.	L	R	I PEAK
7120-13	10 µH	.08 Ω	970 ma
7120-15	15 µH	.13 Ω	790 ma
7120-17	22 µH	.16 Ω	640 ma
7120-19	33 µH	.20 Ω	530 ma
7120-21	47 µH	.29 Ω	430 ma
7120-23	68 µH	.44 Ω	370 ma
7120-25	100 µH	.56 Ω	300 ma
7120-27	150 µH	1.0 Ω	250 ma
7120-29	220 µH	1.6 Ω	200 ma
7120-31	330 µH	2.0 Ω	170 ma
7120-33	470 µH	2.8 Ω	140 ma
7120-37	1.0 mH	6.6 Ω	95 ma

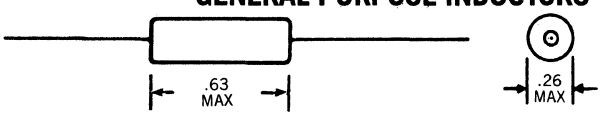
INDUCTOR SELECTION KITS FOR DESIGN ENGINEERS

These kits are intended as an aid to the designer of switching regulators, power supplies, and filters. Each kit contains an assortment of the most popular inductance values, allowing selection of the optimal inductor for a given application.

FREE REFILL ORDER FORMS are included, to replace parts as they are used or to obtain additional values not included with the kits.

FOR COMPLETE SPECIFICATIONS, SEE CATALOG DATA SHEETS.

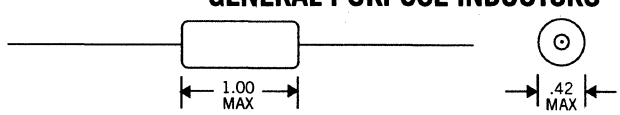
7070-KIT MEDIUM POWER GENERAL PURPOSE INDUCTORS



This kit contains 2 each of the following:

Part No.	L	R	I PEAK
7070-13	10 µH	.032 Ω	1,900 ma
7070-15	15 µH	.041 Ω	1,500 ma
7070-17	22 µH	.049 Ω	1,300 ma
7070-19	33 µH	.064 Ω	1,000 ma
7070-21	47 µH	.078 Ω	870 ma
7070-23	68 µH	.11 Ω	710 ma
7070-25	100 µH	.20 Ω	590 ma
7070-27	150 µH	.36 Ω	480 ma
7070-29	220 µH	.46 Ω	400 ma
7070-31	330 µH	.60 Ω	320 ma
7070-33	470 µH	.73 Ω	270 ma
7070-37	1.0 mH	1.6 Ω	190 ma

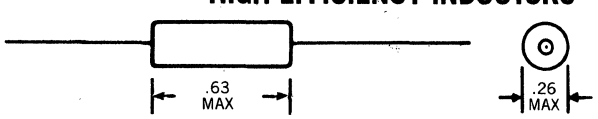
6880-KIT HIGH POWER GENERAL PURPOSE INDUCTORS



This kit contains 2 each of the following:

Part No.	L	R	I PEAK
6880-01	10 µH	.019 Ω	3.2 amps
6880-03	15 µH	.025 Ω	2.6 amps
6880-05	22 µH	.029 Ω	2.2 amps
6880-07	33 µH	.036 Ω	1.8 amps
6880-09	47 µH	.045 Ω	1.5 amps
6880-11	68 µH	.057 Ω	1.2 amps
6880-13	100 µH	.082 Ω	1.0 amps
6880-15	150 µH	.15 Ω	.83 amps
6880-17	220 µH	.23 Ω	.68 amps
6880-19	330 µH	.29 Ω	.56 amps
6880-21	470 µH	.37 Ω	.46 amps
6880-25	1.0 mH	.80 Ω	.32 amps

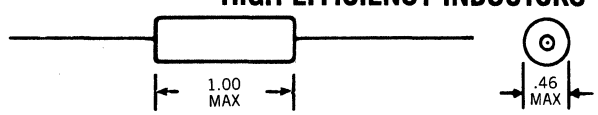
7300-KIT MEDIUM POWER HIGH EFFICIENCY INDUCTORS



This kit contains 2 each of the following:

Part No.	L	R	I PEAK
7300-01	10 µH	.055 Ω	2.8 amps
7300-03	15 µH	.069 Ω	2.2 amps
7300-05	22 µH	.084 Ω	1.9 amps
7300-07	33 µH	.11 Ω	1.5 amps
7300-09	47 µH	.13 Ω	1.3 amps
7300-11	68 µH	.15 Ω	1.1 amps
7300-13	100 µH	.27 Ω	.89 amps
7300-15	150 µH	.36 Ω	.72 amps
7300-17	220 µH	.45 Ω	.58 amps
7300-19	330 µH	.58 Ω	.47 amps
7300-21	470 µH	.86 Ω	.39 amps
7300-25	1.0 mH	2.0 Ω	.27 amps

7200-KIT HIGH POWER HIGH EFFICIENCY INDUCTORS



This kit contains 2 each of the following:

Part No.	L	R	I PEAK
7200-01	10 µH	.010 Ω	9.4 amps
7200-03	15 µH	.014 Ω	7.5 amps
7200-05	22 µH	.017 Ω	6.3 amps
7200-07	33 µH	.021 Ω	5.2 amps
7200-09	47 µH	.026 Ω	4.3 amps
7200-11	68 µH	.040 Ω	3.5 amps
7200-13	100 µH	.059 Ω	2.9 amps
7200-15	150 µH	.078 Ω	2.4 amps
7200-17	220 µH	.12 Ω	1.9 amps
7200-19	330 µH	.18 Ω	1.6 amps
7200-21	470 µH	.26 Ω	1.3 amps
7200-25	1.0 mH	.59 Ω	.92 amps

NOTE:

The 7200 and 7300 series use high permeability/high flux density cores for maximum current capacity. Core losses may reduce efficiency at higher (above 40–50 KHz) frequencies.

SEND YOUR REQUIREMENTS. PROMPT QUOTES.

QUALITY COILS SINCE 1946

CADDELL-BURNS

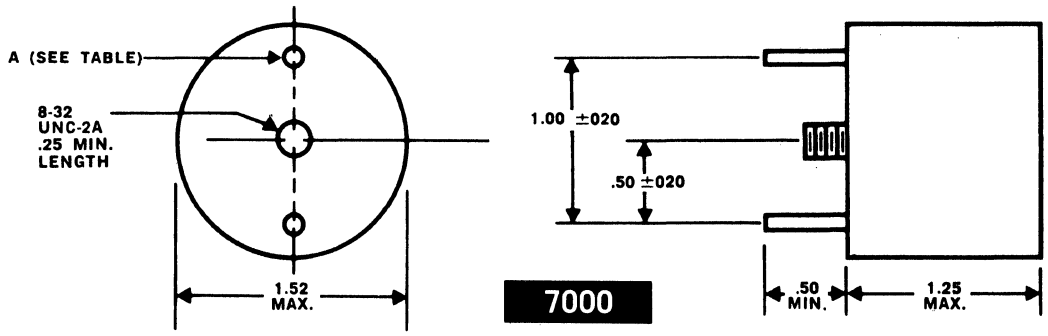
258 East Second Street
Mineola, New York 11501-3508

Tel: 516-746-2310 Fax: 516-742-2416
e-mail: caddell-burns@erols.com

HIGH CURRENT CHOKES

FOR SWITCHING REGULATORS AND POWER FILTERS

TYPE 7000 10μH — 10 mH — 10% Tolerance



NOTES:

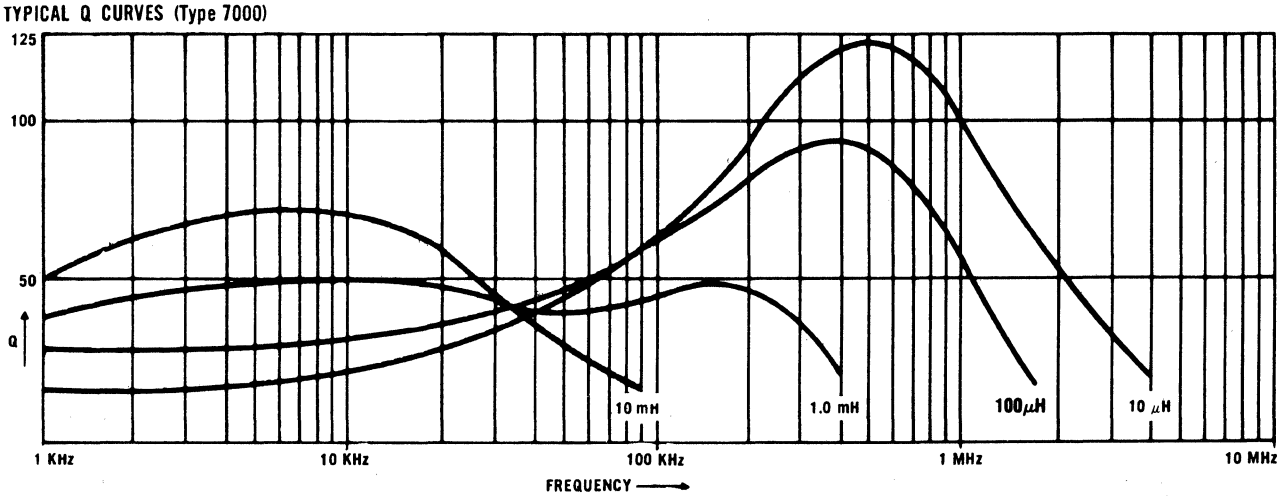
1. INDUCTANCE measured on QuadTech/GenRad 1659 RLC Digibridge at 1.0 KHz.
2. CURRENT RATING (Rated IDC) is based on 3.0 watts power dissipation for approximately 20°C temperature rise. Depending on the application, these units may be operated at up to twice the rated current.
3. INCREMENTAL CURRENT (INCR I) is the minimum current at which the inductance will be decreased by 5% from its initial (zero-DC) value.
4. DIELECTRIC WITHSTANDING VOLTAGE (winding to case mounting stud) – 500 VRMS.
5. OPERATING TEMPERATURE RANGE: -55° to +105°C.
6. MATERIALS:
   Coil Form – Ferrite
   Magnet Wire – Per FED SPEC J-W-001177/9
   Leads – Bare tinned copper.
   Mounting Stud – 18-8 stainless steel.
   Case – epoxy encapsulated.
7. MARKING – Printed with Caddell-Burns Part Number.

STANDARD VALUES: (other values available on special order)

Part No.	Nominal Inductance	Max. DCR Ohms	Min. SRF MHz	Rated IDC Amps (2)	INCR I Amps (3)	A Lead Size AWG
7000-01	10 μH	.004	9.0	27	65	10
7000-02	12	.004	7.2	27	58	10
7000-03	15	.005	5.2	24	52	10
7000-04	18	.006	4.4	22	44	11
7000-05	22	.007	3.8	21	41	11
7000-06	27	.008	3.5	19	38	12
7000-07	33	.011	2.8	17	33	13
7000-08	39	.012	2.7	16	31	13
7000-09	47	.013	2.5	15	28	13
7000-10	56	.014	2.4	14	26	13
7000-11	68	.017	2.1	13	23	13
7000-12	82	.019	2.0	13	21	13
7000-13	100	.022	1.8	12	19	13
7000-14	120	.027	1.4	11	17	14
7000-15	150	.030	1.3	10	15	14
7000-16	180	.039	1.1	8.8	14	15
7000-17	220	.054	.90	7.5	13	16
7000-18	270	.060	.85	7.1	12	16
7000-19	330	.070	.75	6.5	11	16

Part No.	Nominal Inductance	Max. DCR Ohms	Min. SRF MHz	Rated IDC Amps (2)	INCR I Amps (3)	A Lead Size AWG
7000-20	390 μH	.090	.65	5.8	10	17
7000-21	470	.10	.62	5.5	8.8	17
7000-22	560	.11	.56	5.2	8.0	17
7000-23	680	.14	.51	4.6	7.5	18
7000-24	820	.17	.49	4.2	6.7	18
7000-25	1.0 mH	.22	.43	3.7	6.0	19
7000-26	1.2	.25	.37	3.5	5.4	19
7000-27	1.5	.29	.36	3.2	4.8	19
7000-28	1.8	.32	.33	3.1	4.4	19
7000-29	2.2	.44	.31	2.6	4.0	20
7000-30	2.7	.50	.27	2.4	3.6	20
7000-31	3.3	.69	.23	2.1	3.2	21
7000-32	3.9	.75	.21	2.0	3.0	21
7000-33	4.7	1.0	.20	1.7	2.8	22
7000-34	5.6	1.1	.18	1.6	2.6	22
7000-35	6.8	1.3	.17	1.5	2.3	22
7000-36	8.2	1.6	.14	1.4	2.1	23
7000-37	10	1.8	.13	1.3	1.9	23

TYPICAL Q CURVES (Type 7000)



CADDELL-BURNS DOES NOT SELL THRU DISTRIBUTORS. ALL SALES ARE DIRECT.

QUALITY COILS SINCE 1946

CADDELL-BURNS

258 East Second Street
Mineola, New York 11501-3508

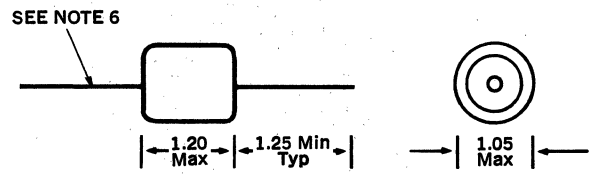
Tel: 516-746-2310 Fax: 516-742-2416
e-mail: caddell-burns@erols.com

HIGH CURRENT CHOKES

FOR SWITCHING REGULATORS AND POWER FILTERS

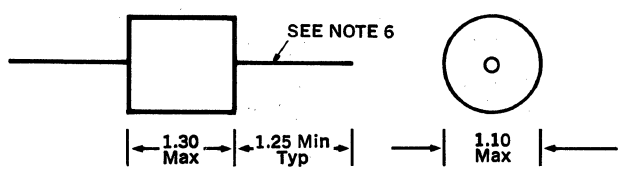
TYPE 7140

7140 10 μH-100 mH. 10% Tolerance
Recommended Mounting Pitch—1.50"



TYPE 7150 (EPOXY ENCAPSULATED VERSION)

7150



NOTES: (FOR BOTH TYPES)

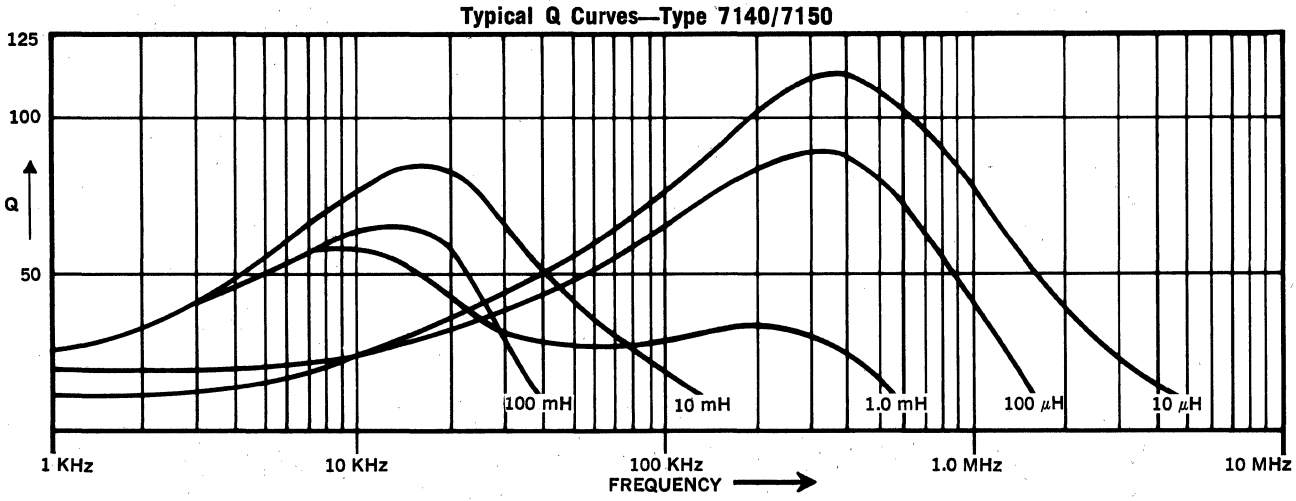
1. Inductance measured on QuadTech/GenRad 1659 RLC Digibridge at 1.0 KHz.
2. Current Rating (Rated IDC) is based on 1.5 watt power dissipation for approximately 20°C temperature rise. Depending on the application, these units may be operated at up to twice the rated current.
3. Incremental Current (INCR I) is the minimum current at which the inductance will be decreased by 5% from its initial (zero-DC) value because of saturation.
4. Dielectric Withstanding Voltage – 1000 VRMS.
5. Operating Temperature Range: -55° to +105°C.
6. Leads are bare tinned copper: -01 thru -10, #14 AWG; -11,#15 AWG; -12 thru -49, #16 AWG.
7. Marking – Printed with Caddell-Burns Part Number.
8. Materials: (See below)
   TYPE 7140
   Coil Form: Ferrite
   Magnet Wire: Per FED SPEC J-W-001177/9
   Jacket: Per MIL-I-23053/5, Class I.
   Flame Retardant IAW UL 224, Class 1.
   TYPE 7150
   Coil Form: Ferrite
   Magnet Wire: Per FED SPEC J-W-001177/9
   Cover and Coating: Epoxy encapsulated

STANDARD VALUES: (Electrical characteristics are identical for both types. Other values are available on special order.)

Dash No.	Nominal Inductance	DCR ± 20% Ohms	Min. SRF MHz	Rated IDC Amps	INCR I Amps
-01	10 μH	0.0060	8.8	16	43
-02	12	0.0065	8.0	15	39
-03	15	0.0070	7.4	15	36
-04	18	0.0080	5.4	14	32
-05	22	0.0085	3.9	13	29
-06	27	0.0090	3.3	13	26
-07	33	0.010	3.1	12	24
-08	39	0.011	2.7	12	21
-09	47	0.012	2.6	11	20
-10	56	0.013	2.3	11	18
-11	68	0.017	2.1	9.4	16
-12	82	0.023	1.8	8.1	15
-13	100	0.025	1.6	7.7	14
-14	120	0.028	1.5	7.3	12
-15	150	0.032	1.4	6.8	11
-16	180	0.042	1.2	6.0	10
-17	220	0.048	1.1	5.6	9.2
-18	270	0.055	1.0	5.2	8.0
-19	330	0.072	0.96	4.6	7.4
-20	390	0.079	0.84	4.4	6.8
-21	470	0.11	0.72	3.7	6.2
-22	560	0.12	0.64	3.5	5.7
-23	680	0.14	0.62	3.3	5.1
-24	820	0.18	0.60	2.9	4.7
-25	1.0 mH	0.20	0.52	2.7	4.2

Dash No.	Nominal Inductance	DCR ± 20% Ohms	Min. SRF MHz	Rated IDC Amps	INCR I Amps
-26	1.2 mH	0.23	0.48	2.6	3.8
-27	1.5	0.31	0.40	2.2	3.4
-28	1.8	0.35	0.37	2.1	3.1
-29	2.2	0.46	0.32	1.8	2.8
-30	2.7	0.54	0.30	1.7	2.6
-31	3.3	0.72	0.27	1.4	2.3
-32	3.9	0.79	0.25	1.4	2.1
-33	4.7	0.90	0.24	1.3	1.9
-34	5.6	1.2	0.20	1.1	1.8
-35	6.8	1.3	0.19	1.1	1.6
-36	8.2	1.7	0.16	0.94	1.5
-37	10	2.0	0.15	0.87	1.3
-38	12	2.7	0.12	0.75	1.2
-39	15	3.1	0.11	0.70	1.1
-40	18	3.5	0.10	0.65	1.0
-41	22	4.7	0.096	0.56	0.90
-42	27	5.3	0.088	0.53	0.81
-43	33	7.1	0.076	0.46	0.74
-44	39	7.9	0.070	0.44	0.68
-45	47	11	0.067	0.37	0.62
-46	56	12	0.062	0.35	0.57
-47	68	14	0.054	0.33	0.51
-48	82	18	0.051	0.29	0.46
-49	100	21	0.042	0.27	0.42

Typical Q Curves—Type 7140/7150



SEND YOUR REQUIREMENTS. PROMPT QUOTES.

QUALITY COILS SINCE 1946

CADDELL-BURNS

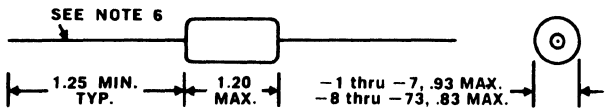
258 East Second Street
Mineola, New York 11501-3508

Tel: 516-746-2310 Fax: 516-742-2416
e-mail: caddell-burns@erols.com

HIGH CURRENT CHOKES

FOR SWITCHING REGULATORS AND POWER FILTERS **6950**

TYPE 6950 10μH - 10H — 10% Tolerance
Recommended mounting pitch — 1.40″



NOTES:

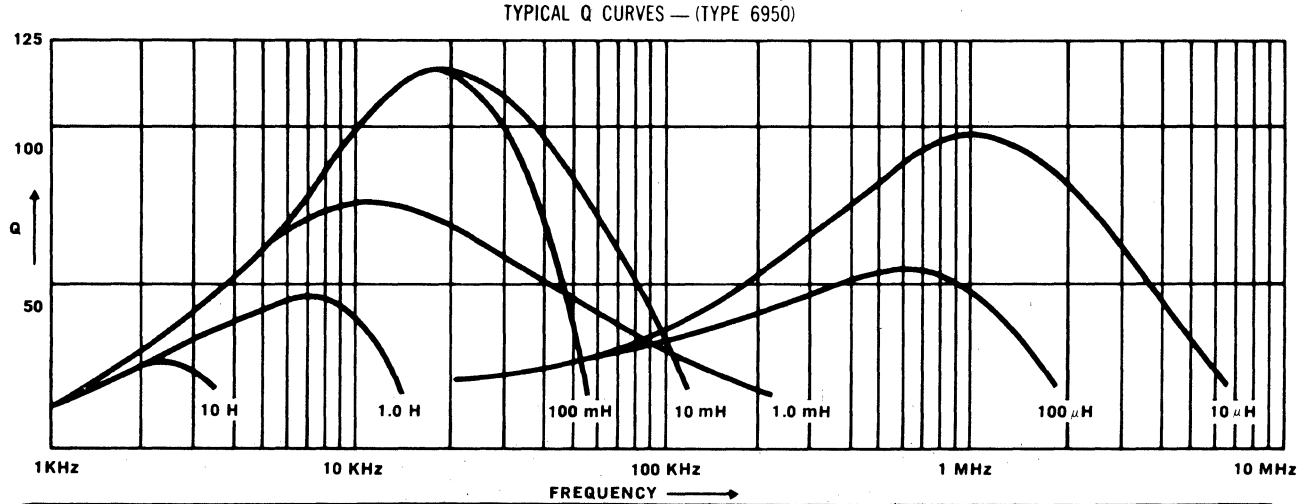
1. Inductance measured on QuadTech/GenRad 1659 RLC Digibridge at 1.0 KHz.
2. Current Rating (Rated IDC) is based on 1.0 watt power dissipation for approximately 20°C temperature rise. Depending on the application, these units may be operated at up to twice the rated current.
3. Incremental current (INCR I) is the minimum current at which the inductance will be decreased by 5% from its initial (zero-DC) value.
4. Dielectric Withstanding Voltage – 1000 VRMS.
5. Operating Temperature Range: -55° to +105°C.
6. Leads are bare tinned copper:
   -1 thru -7, #14 AWG; -8 thru-73, #16 AWG.
7. Materials:
   Coil Form – Ferrite
   Magnet Wire – Per FED SPEC J-W-001177/9
   Jacket – Per MIL-I-23053/5, Class 1.
   Flame Retardant IAW UL 224, Class 1.
8. Marking – Printed with Caddell-Burns Part Number.

STANDARD VALUES: (Other values available on special order)

Part No.	Nominal Inductance	Max. DCR Ohms	Min. SRF MHz	Rated IDC ma (2)	INCR I ma (3)
6950-01	10 μH	.007	12	12,000	35,000
6950-02	12	.008	8.0	11,200	32,600
6950-03	15	.009	6.0	10,500	28,400
6950-04	18	.010	5.7	10,000	25,900
6950-05	22	.011	5.3	9500	23,800
6950-06	27	.012	5.0	9100	21,000
6950-07	33	.013	4.5	8800	18,700
6950-08	39	.020	3.4	7100	17,600
6950-09	47	.022	3.2	6700	16,300
6950-10	56	.034	2.6	5400	14,700
6950-11	68	.038	2.4	5100	13,300
6950-12	82	.042	2.2	4900	12,400
6950-13	100	.048	1.9	4600	11,100
6950-14	120	.054	1.7	4300	10,100
6950-15	150	.073	1.5	3700	9100
6950-16	180	.082	1.3	3500	8300
6950-17	220	.091	1.2	3300	7500
6950-18	270	.12	1.1	2900	6800
6950-19	330	.13	1.0	2800	6100
6950-20	390	.18	.92	2400	5600
6950-21	470	.20	.84	2200	5100
6950-22	560	.26	.78	2000	4700
6950-23	680	.30	.69	1800	4300
6950-24	820	.40	.56	1600	3900
6950-25	1.0 mH	.45	.54	1500	3500
6950-26	1.2	.50	.50	1400	3200
6950-27	1.5	.70	.45	1200	2900
6950-28	1.8	.80	.43	1100	2600
6950-29	2.2	1.1	.42	950	2400
6950-30	2.7	1.2	.40	910	2100
6950-31	3.3	1.6	.28	790	1900
6950-32	3.9	1.8	.26	750	1800
6950-33	4.7	2.4	.23	650	1600
6950-34	5.6	2.6	.21	620	1500
6950-35	6.8	3.0	.20	580	1300
6950-36	8.2	4.0	.19	500	1200
6950-37	10	4.6	.18	470	1100

Part No.	Nominal Inductance	Max. DCR Ohms	Min. SRF MHz	Rated IDC ma (2)	INCR I ma (3)
6950-38	12 mH	6.1	.16	400	1000
6950-39	15	7.1	.15	380	910
6950-40	18	9.6	.14	320	830
6950-41	22	11	.12	300	750
6950-42	27	13	.095	280	680
6950-43	33	15	.085	260	610
6950-44	39	21	.077	220	560
6950-45	47	24	.067	200	510
6950-46	56	33	.065	180	470
6950-47	68	36	.062	170	430
6950-48	82	41	.057	160	390
6950-49	100	55	.051	140	350
6950-50	120	60	.048	130	320
6950-51	150	84	.040	110	290
6950-52	180	94	.033	100	260
6950-53	220	110	.032	95	240
6950-54	270	127	.030	88	210
6950-55	330	165	.027	78	190
6950-56	390	220	.023	67	180
6950-57	470	240	.021	65	160
6950-58	560	330	.020	55	150
6950-59	680	360	.017	53	130
6950-60	820	400	.016	50	120
6950-61	1.0 H	570	.014	42	110
6950-62	1.2	650	.013	40	100
6950-63	1.5	740	.012	37	90
6950-64	1.8	1000	.011	32	83
6950-65	2.2	1100	.010	30	75
6950-66	2.7	1500	.0090	26	68
6950-67	3.3	1700	.0085	24	61
6950-68	3.9	2200	.0080	21	56
6950-69	4.7	2500	.0073	20	51
6950-70	5.6	3500	.0062	17	47
6950-71	6.8	4000	.0058	16	43
6950-72	8.2	4800	.0050	15	39
6950-73	10	5400	.0042	14	35

TYPICAL Q CURVES — (TYPE 6950)



CADDELL-BURNS DOES NOT SELL THRU DISTRIBUTORS. ALL SALES ARE DIRECT.

QUALITY COILS SINCE 1946

CADDELL-BURNS

258 East Second Street
Mineola, New York 11501-3508

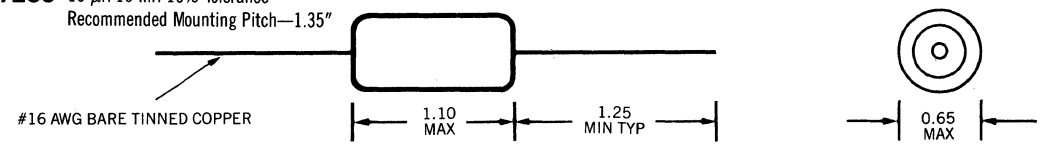
Tel: 516-746-2310 Fax: 516-742-2416
e-mail: caddell-burns@erols.com

HIGH CURRENT CHOKES

FOR SWITCHING REGULATORS AND POWER FILTERS

7230

TYPE 7230 10 μH-10 mH 10% Tolerance
Recommended Mounting Pitch—1.35"



NOTES:

1. Inductance measured on QuadTech/GenRad 1659 RLC Digibridge at 1.0 KHz.
2. The current rating (Rated IDC) is based on 0.75 watt power dissipation (I^2R) for an approximate 20°C temperature rise. Depending on the application, these units may be operated at higher currents.

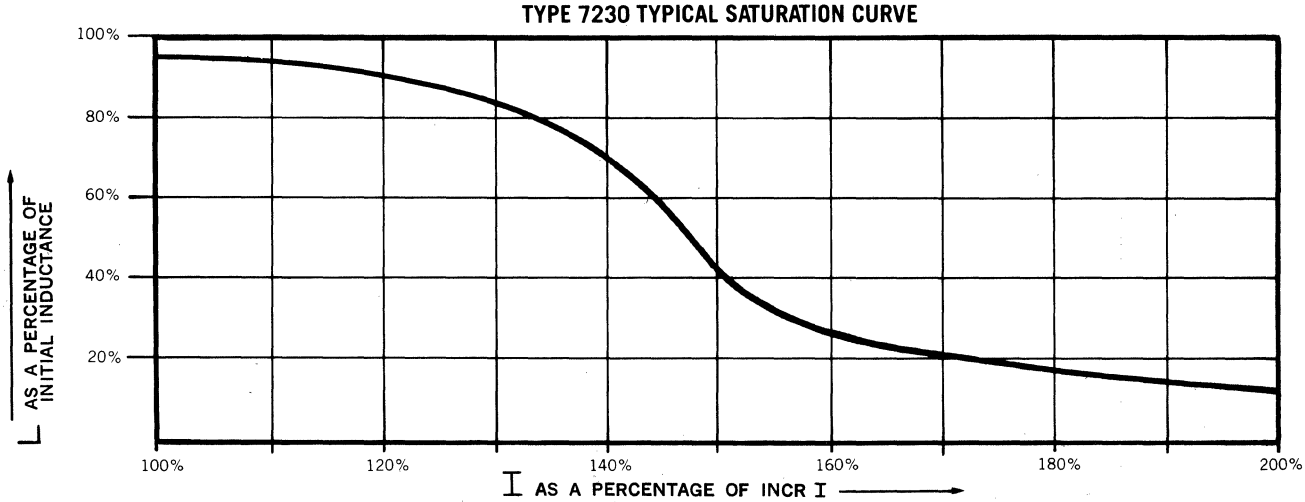
   The core material for the 7230 series has been chosen for optimum current handling capability. Because this material has a relatively low volume resistivity, the core will appear as a shunt resistance on the order of 1 Kilohm, which may have to be taken into account when determining total power dissipation; e.g., if the induced voltage across the coil is 10 volts, there will be a V^2/R loss on the order of 0.10 watt, in addition to the I^2R losses associated with the winding.
3. The incremental current (INCR I) is the approximate current at which the inductance will be decreased by 5% from its initial (zero-DC) value because of saturation. If the current is increased beyond INCR I, the inductance will continue to decrease as shown by the saturation curve below.
4. Dielectric Withstanding Voltage: 1000 VRMS.
5. Operating Temperature Range: -55° to +105°C.
6. Marking – Printed with Caddell-Burns Part Number.
7. Materials:
   Coil Form: Ferrite
   Magnet Wire: Per FED SPEC J-W-001177/9
   Jacket: Per MIL-I-23053/5, Class 1.
   Flame Retardant IAW UL 224, Class 1.

STANDARD VALUES: (Other values available on special order)

Part No.	Nominal Inductance	DCR ± 20% Ohms	Min. SRF MHz	Rated IDC Amps	INCR I Amps
7230-01	10 μH	0.0065	5.4	11	23
7230-02	12	0.0070	4.7	10	22
7230-03	15	0.0080	4.2	9.7	19
7230-04	18	0.011	3.8	8.3	18
7230-05	22	0.016	3.4	6.9	16
7230-06	27	0.021	3.1	6.0	14
7230-07	33	0.023	2.8	5.7	13
7230-08	39	0.025	2.5	5.5	12
7230-09	47	0.028	2.2	5.2	11
7230-10	56	0.031	2.0	4.9	10
7230-11	68	0.043	1.8	4.2	9.0
7230-12	82	0.047	1.6	4.0	8.3
7230-13	100	0.063	1.5	3.5	7.6
7230-14	120	0.086	1.4	3.0	6.8
7230-15	150	0.097	1.2	2.8	6.1
7230-16	180	0.11	1.1	2.6	5.6
7230-17	220	0.12	0.95	2.5	5.1
7230-18	270	0.17	0.85	2.1	4.6
7230-19	330	0.19	0.77	2.0	4.1

Part No.	Nominal Inductance	DCR ± 20% Ohms	Min. SRF MHz	Rated IDC Amps	INCR I Amps
7230-20	390 μH	0.21	0.70	1.9	3.8
7230-21	470	0.29	0.63	1.6	3.5
7230-22	560	0.32	0.56	1.5	3.2
7230-23	680	0.43	0.51	1.3	2.9
7230-24	820	0.47	0.45	1.3	2.6
7230-25	1.0 mH	0.54	0.41	1.2	2.4
7230-26	1.2	0.71	0.36	1.0	2.2
7230-27	1.5	1.0	0.33	0.87	1.9
7230-28	1.8	1.1	0.30	0.83	1.8
7230-29	2.2	1.3	0.27	0.76	1.6
7230-30	2.7	1.7	0.24	0.66	1.4
7230-31	3.3	2.3	0.22	0.57	1.3
7230-32	3.9	2.5	0.20	0.55	1.2
7230-33	4.7	2.8	0.18	0.52	1.1
7230-34	5.6	3.1	0.16	0.49	1.0
7230-35	6.8	4.2	0.14	0.42	0.91
7230-36	8.2	4.7	0.13	0.40	0.83
7230-37	10	5.3	0.12	0.38	0.75

TYPE 7230 TYPICAL SATURATION CURVE



SEND YOUR REQUIREMENTS. PROMPT QUOTES.

QUALITY COILS SINCE 1946

CADDELL-BURNS

258 East Second Street
Mineola, New York 11501-3508

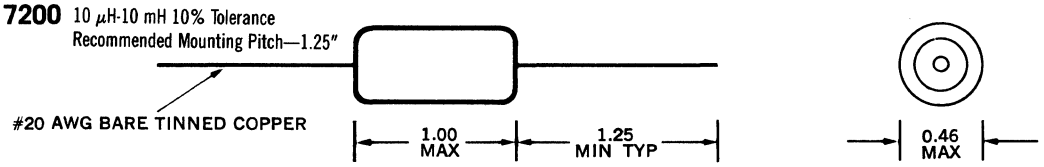
Tel: 516-746-2310 Fax: 516-742-2416
e-mail: caddell-burns@erols.com

HIGH CURRENT CHOKES

FOR SWITCHING REGULATORS AND POWER FILTERS

7200

TYPE 7200 10 μH-10 mH 10% Tolerance
Recommended Mounting Pitch—1.25"



NOTES:

1. Inductance measured on QuadTech/GenRad 1659 RLC Digibridge at 1.0 KHz.
2. The current rating (Rated IDC) is based on 0.5 watt power dissipation (I^2R) for an approximate 20°C temperature rise. Depending on the application, these units may be operated at higher currents.

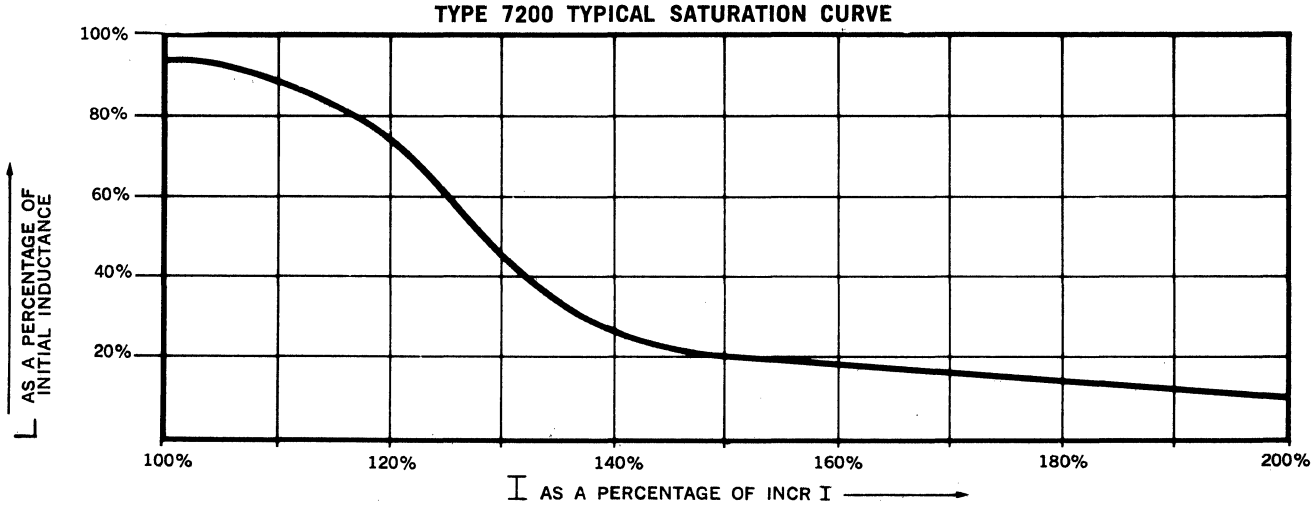
   The core material for the 7200 series has been chosen for optimum current handling capability. Because this material has a relatively low volume resistivity, the core will appear as a shunt resistance on the order of 1 Kilohm, which may have to be taken into account when determining total power dissipation; e.g., if the induced voltage across the coil is 10 volts, there will be a V^2/R loss on the order of 0.10 watt, in addition to the I^2R losses associated with the winding.
3. The incremental current (INCR I) is the approximate current at which the inductance will be decreased by 5% from its initial (zero-DC) value because of saturation. If the current is increased beyond INCR I, the inductance will continue to decrease as shown by the saturation curve below.
4. Dielectric Withstanding Voltage: 1000 VRMS.
5. Operating Temperature Range: -55° to +105°C.
6. Marking – Printed with Caddell-Burns Part Number.
7. Materials:
   Coil Form: Ferrite
   Magnet Wire: Per FED SPEC J-W-001177/9
   Jacket: Per MIL-I-23053/5, Class 1.
   Flame Retardant IAW UL 224, Class 1.

STANDARD VALUES: (Other values available on special order)

Part No.	Nominal Inductance	DCR ± 20% Ohms	Min. SRF MHz	Rated IDC Amps	INCR I Amps
7200-01	10 μH	0.010	6.0	7.1	9.4
7200-02	12	0.012	4.8	6.5	8.3
7200-03	15	0.014	4.0	6.0	7.5
7200-04	18	0.015	3.3	5.8	7.1
7200-05	22	0.017	2.9	5.4	6.3
7200-06	27	0.018	2.5	5.3	5.8
7200-07	33	0.021	2.2	4.9	5.2
7200-08	39	0.023	2.0	4.7	4.7
7200-09	47	0.026	1.7	4.4	4.3
7200-10	56	0.030	1.5	4.1	3.8
7200-11	68	0.040	1.3	3.5	3.5
7200-12	82	0.053	1.2	3.1	3.2
7200-13	100	0.059	1.1	2.9	2.9
7200-14	120	0.068	1.0	2.7	2.6
7200-15	150	0.078	0.90	2.5	2.4
7200-16	180	0.089	0.82	2.4	2.2
7200-17	220	0.12	0.74	2.0	1.9
7200-18	270	0.16	0.68	1.8	1.8
7200-19	330	0.18	0.61	1.7	1.6

Part No.	Nominal Inductance	DCR ± 20% Ohms	Min. SRF MHz	Rated IDC Amps	INCR I Amps
7200-20	390 μH	0.20	0.56	1.6	1.5
7200-21	470	0.26	0.51	1.4	1.3
7200-22	560	0.29	0.47	1.3	1.2
7200-23	680	0.39	0.43	1.1	1.1
7200-24	820	0.44	0.39	1.1	1.0
7200-25	1.0 mH	0.59	0.36	0.92	0.92
7200-26	1.2	0.66	0.33	0.87	0.84
7200-27	1.5	0.77	0.31	0.81	0.75
7200-28	1.8	0.87	0.29	0.76	0.68
7200-29	2.2	1.2	0.27	0.65	0.62
7200-30	2.7	1.6	0.25	0.56	0.56
7200-31	3.3	1.8	0.23	0.53	0.51
7200-32	3.9	2.0	0.22	0.50	0.47
7200-33	4.7	2.6	0.20	0.44	0.42
7200-34	5.6	2.9	0.19	0.42	0.39
7200-35	6.8	3.4	0.18	0.38	0.35
7200-36	8.2	4.4	0.17	0.34	0.32
7200-37	10	6.0	0.16	0.29	0.29

TYPE 7200 TYPICAL SATURATION CURVE



CADDELL-BURNS DOES NOT SELL THRU DISTRIBUTORS. ALL SALES ARE DIRECT.

QUALITY COILS SINCE 1946

CADDELL-BURNS

258 East Second Street
Mineola, New York 11501-3508

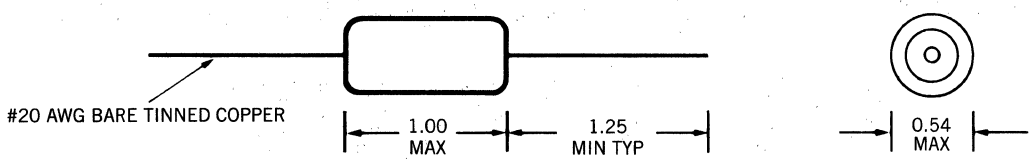
Tel: 516-746-2310 Fax: 516-742-2416
e-mail: caddell-burns@erols.com

SHIELDED HIGH CURRENT CHOKES

FOR SWITCHING REGULATORS AND POWER FILTERS

7500

TYPE 7500 10 µH - 1.0 H 10% Tolerance



LOW EMI - HIGH SATURATION CURRENT

Proprietary core design reduces radiated electromagnetic interference by over 99% compared to equivalent unshielded chokes (k typically 0.2% versus 40% using method 4.8.8.4 of MIL-C-15305), while maintaining higher saturation current (INCR I) than comparable shielded chokes. Ideal for switching regulator and filter applications where EMI must be kept to a minimum.

NOTES

1. Inductance measured on QuadTech/GenRad 1659 RLC Digibridge at 1.0 KHz.
2. The current rating (Rated IDC) is based on 0.5 watt power dissipation for an approximate 20°C temperature rise. Depending on the application, these units may be operated at higher currents.
3. The incremental current (INCR I) is the approximate current at which the inductance will be decreased by 5% from its initial (ZERO DC) value because of saturation.
4. Dielectric Withstanding Voltage: 1000 VRMS.
5. Operating Temperature Range: –55° to +105°C.
6. Marking: Printed with Caddell-Burns Part Number.
7. Materials:
   Core and Shield: Ferrite
   Magnet Wire: Per FED SPEC J-W-001177/9
   Encapsulation: Epoxy
   Jacket: Per MIL-I-23053/5, Class 1.
   Flame Retardant IAW UL 224, Class 1.

STANDARD VALUES: (Other values available on special order)

Part No.	Nominal Inductance	DCR ± 20% Ohms	Min. SRF MHz	Rated IDC Amps	INCR I Amps
7500-01	10µH	0.015	23	5.8	12
7500-02	12	0.017	14	5.4	10
7500-03	15	0.018	10	5.3	9.6
7500-04	18	0.024	8.6	4.6	8.4
7500-05	22	0.028	7.8	4.2	7.6
7500-06	27	0.040	5.2	3.5	6.8
7500-07	33	0.047	4.4	3.3	6.0
7500-08	39	0.051	4.1	3.1	5.7
7500-09	47	0.057	3.8	3.0	5.2
7500-10	56	0.064	3.5	2.8	4.7
7500-11	68	0.088	3.0	2.4	4.2
7500-12	82	0.10	2.4	2.2	3.8
7500-13	100	0.13	2.1	2.0	3.5
7500-14	120	0.19	2.0	1.6	3.1
7500-15	150	0.21	1.8	1.5	2.8
7500-16	180	0.23	1.7	1.5	2.6
7500-17	220	0.25	1.6	1.4	2.4
7500-18	270	0.31	1.5	1.3	2.1
7500-19	330	0.35	1.3	1.2	1.9
7500-20	390	0.47	1.1	1.0	1.7
7500-21	470	0.63	0.96	0.89	1.6
7500-22	560	0.69	0.92	0.85	1.5
7500-23	680	0.94	0.78	0.73	1.3
7500-24	820	1.0	0.74	0.69	1.2
7500-25	1.0mH	1.2	0.68	0.66	1.1
7500-26	1.2	1.3	0.60	0.62	1.0
7500-27	1.5	1.8	0.58	0.53	0.89
7500-28	1.8	2.0	0.52	0.50	0.81
7500-29	2.2	2.7	0.44	0.43	0.75
7500-30	2.7	3.1	0.38	0.40	0.66
7500-31	3.3	3.5	0.36	0.38	0.60

Part No.	Nominal Inductance	DCR ± 20% Ohms	Min. SRF MHz	Rated IDC Amps	INCR I Amps
7500-32	3.9mH	4.7	0.31	0.33	0.55
7500-33	4.7	5.2	0.30	0.31	0.50
7500-34	5.6	6.9	0.27	0.27	0.46
7500-35	6.8	7.6	0.26	0.26	0.42
7500-36	8.2	8.6	0.24	0.24	0.38
7500-37	10	12	0.20	0.20	0.34
7500-38	12	13	0.19	0.19	0.32
7500-39	15	18	0.17	0.17	0.28
7500-40	18	20	0.14	0.16	0.26
7500-41	22	28	0.13	0.13	0.24
7500-42	27	32	0.12	0.12	0.21
7500-43	33	42	0.10	0.11	0.19
7500-44	39	46	0.098	0.10	0.17
7500-45	47	64	0.092	0.088	0.16
7500-46	56	70	0.080	0.084	0.15
7500-47	68	95	0.072	0.072	0.13
7500-48	82	110	0.059	0.068	0.12
7500-49	100	140	0.052	0.059	0.11
7500-50	120	160	0.048	0.055	0.100
7500-51	150	220	0.040	0.048	0.090
7500-52	180	240	0.036	0.045	0.082
7500-53	220	320	0.032	0.039	0.075
7500-54	270	370	0.031	0.036	0.067
7500-55	330	530	0.027	0.030	0.060
7500-56	390	570	0.024	0.029	0.055
7500-57	470	740	0.019	0.026	0.050
7500-58	560	820	0.018	0.024	0.046
7500-59	680	910	0.016	0.023	0.042
7500-60	820	1,000	0.015	0.021	0.038
7500-61	1.0H	1,100	0.013	0.020	0.035

INDUCTOR SELECTION KITS FOR DESIGN ENGINEERS

Type 7500 Shielded High Current Chokes are available in kits to assist the designer of switching regulators, power supplies, and filters in selecting the optimal inductor for a given application. Part No. 7500 - KIT contains two each of the following inductance values: 10 µH, 15 µH, 22 µH, 33 µH, 47 µH, 68 µH, 100 µH, 150 µH, 220 µH, 330 µH, 470 µH and 1.0 mH. FREE REFILL order forms are included, to replace parts as they are used, or to obtain samples of values not included with kits.

SEND YOUR REQUIREMENTS. PROMPT QUOTES.

QUALITY COILS SINCE 1946

CADDELL-BURNS

258 East Second Street
Mineola, New York 11501-3508

Tel: 516-746-2310 Fax: 516-742-2416
e-mail: caddell-burns@erols.com

HIGH CURRENT CHOKES

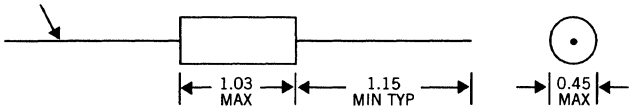
FOR SWITCHING REGULATORS AND POWER FILTERS

10 μH-1.0 mH. 10% Tolerance
Recommended Mounting Pitch—1.25″

TYPE 6870
(EPOXY ENCAPSULATED VERSION)

6870

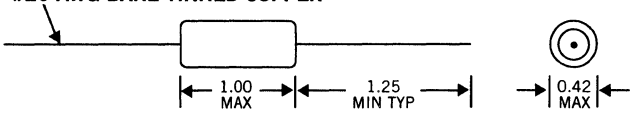
#20 AWG BARE TINNED COPPER



TYPE 6880

6880

#20 AWG BARE TINNED COPPER



NOTES: (FOR BOTH TYPES)

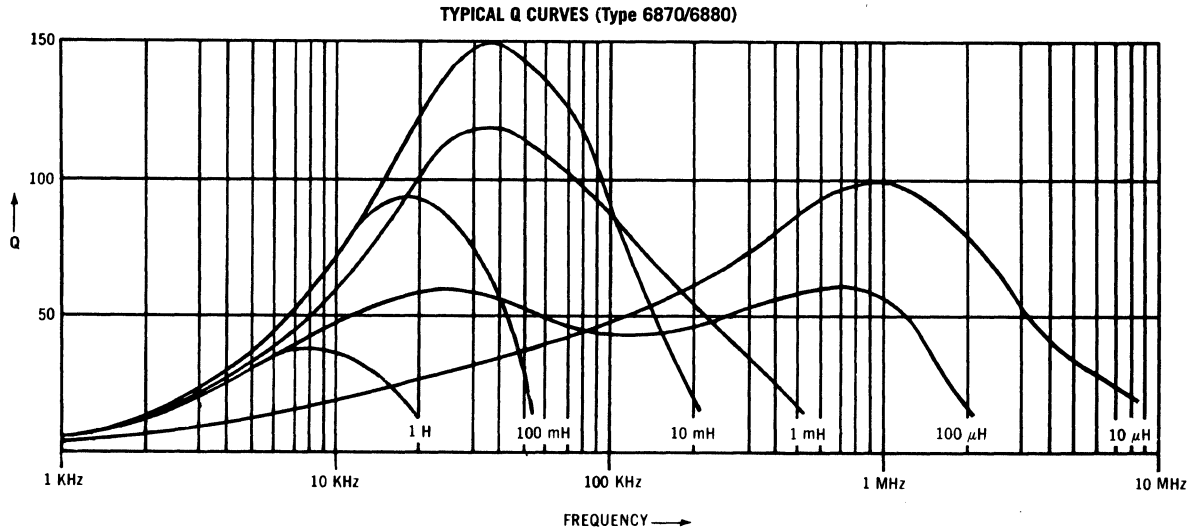
1. Inductance measured on QuadTech/GenRad 1659 RLC Digibridge at 1.0 KHz.
2. Current rating (Rated IDC) is based on 0.5 watt power dissipation for approximately 20°C temperature rise. Depending on the application, these units may be operated at up to twice the rated current.
3. Incremental current (INCR I) is the minimum current at which the inductance will be decreased by 5% from its initial (zero-DC) value.
4. Dielectric Withstanding Voltage – 1000 VRMS.
5. Operating Temperature Range – 55° to +105°C.
6. Materials: Coil Form: Ferrite
   Cover: TYPE 6870 - Cover & Coating: Epoxy Encapsulated.
   TYPE 6880 - Shrink Tube per MIL-I-23053/5, Class I Flame Retardant IAW UL 224, Class I
   Magnet Wire: Per FED SPEC J-W-001177/9

STANDARD VALUES: (Electrical characteristics are identical for both types. Other values are available on special order.)

Dash No.	Nominal Inductance	Max. DCR Ohms	Min. SRF MHz	Rated IDC ma	INCR I ma
-01	10 μH	.023	45	4600	3200
-02	12	.025	40	4500	2900
-03	15	.030	32	4100	2600
-04	18	.032	21	3900	2400
-05	22	.035	12	3700	2200
-06	27	.038	8.5	3600	2000
-07	33	.043	5.8	3400	1800
-08	39	.047	3.5	3200	1700
-09	47	.054	3.2	3000	1500
-10	56	.060	2.9	2900	1400
-11	68	.068	2.7	2700	1200
-12	82	.073	2.5	2600	1100
-13	100	.098	2.3	2300	1000
-14	120	.14	2.1	1900	930
-15	150	.18	1.9	1700	830
-16	180	.20	1.5	1600	760
-17	220	.28	1.3	1400	680
-18	270	.31	1.3	1300	620
-19	330	.35	1.2	1200	560
-20	390	.38	1.1	1100	510
-21	470	.44	1.0	1050	460
-22	560	.48	.90	1000	430
-23	680	.63	.80	890	390
-24	820	.87	.72	760	350
-25	1.0 mH	.96	.65	720	320
-26	1.2	1.3	.62	620	290
-27	1.5	1.4	.58	600	260
-28	1.8	1.7	.53	540	240
-29	2.2	2.3	.44	470	220
-30	2.7	2.6	.39	440	190
-31	3.3	3.5	.36	380	180

Dash No.	Nominal Inductance	Max. DCR Ohms	Min. SRF MHz	Rated IDC ma	INCR I ma
-32	3.9 mH	3.8	.34	360	160
-33	4.7	4.3	.32	340	150
-34	5.6	5.6	.26	300	140
-35	6.8	6.3	.24	280	120
-36	8.2	8.6	.21	240	110
-37	10	9.7	.20	220	100
-38	12	11	.19	210	92
-39	15	15	.17	180	84
-40	18	20	.14	160	75
-41	22	24	.13	140	68
-42	27	26	.12	130	62
-43	33	35	.10	120	56
-44	39	38	.095	110	51
-45	47	50	.080	100	47
-46	56	55	.072	95	43
-47	68	76	.066	81	39
-48	82	86	.062	76	35
-49	100	99	.057	71	32
-50	120	110	.052	67	29
-51	150	200	.047	50	26
-52	180	220	.043	48	24
-53	220	300	.038	41	22
-54	270	320	.035	40	20
-55	330	420	.032	35	18
-56	390	480	.029	32	16
-57	470	670	.026	27	15
-58	560	730	.024	26	14
-59	680	870	.019	24	12
-60	820	950	.018	23	11
-61	1.0 H	1100	.017	21	10

TYPICAL Q CURVES (Type 6870/6880)



CADDELL-BURNS DOES NOT SELL THRU DISTRIBUTORS. ALL SALES ARE DIRECT.

QUALITY COILS SINCE 1946

CADDELL-BURNS

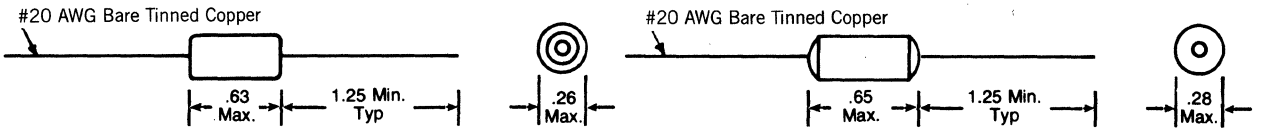
258 East Second Street
Mineola, New York 11501-3508

Tel: 516-746-2310 Fax: 516-742-2416
e-mail: caddell-burns@erols.com

MINIATURE HIGH CURRENT CHOKES

FOR SWITCHING REGULATORS AND POWER FILTERS

TYPE 7070 — **7070** — 1.0μH-100mH. 10% Tolerance — Recommended Mounting Pitch—.80" — **7080** — **TYPE 7080 (EPOXY ENCAPSULATED VERSION)**



NOTES: (FOR BOTH TYPES)

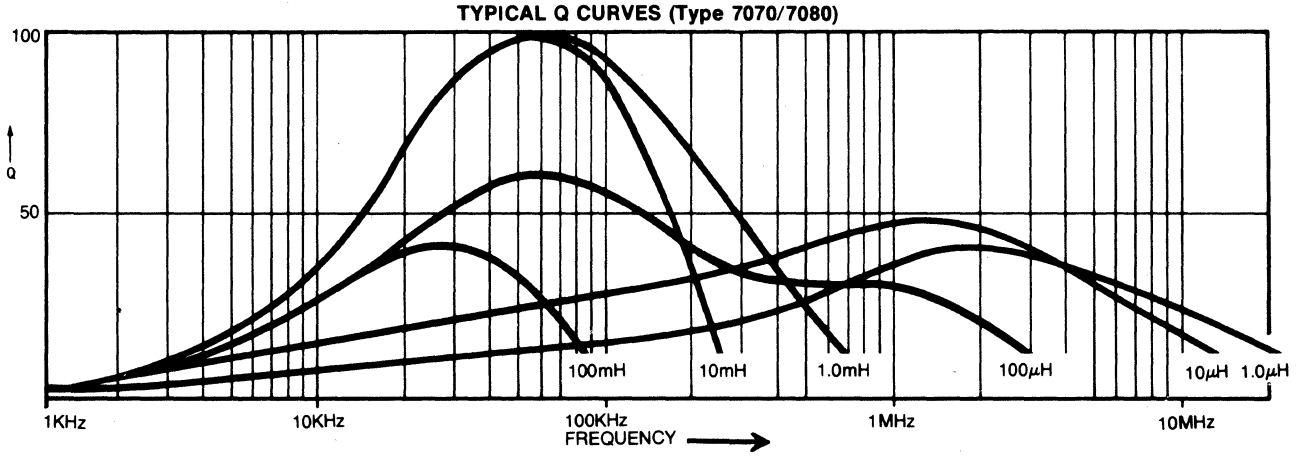
1. INDUCTANCE measured on QuadTech/GenRad 1659 RLC Digibridge at 1.0 KHz. (Values less than 10 μH are measured at 10 KHz).
2. Current rating (Rated IDC) is based on 0.25 watt power dissipation for approximately 20°C temperature rise. Depending on the application, these units may be operated at up to twice the rated current.
3. Incremental current (INCR I) is the minimum current at which the inductance will be decreased by 5% from its initial (zero-DC) value.
4. Dielectric Withstanding Voltage – 1000 VRMS.
5. Operating Temperature Range – 55° to +105°C.
6. Materials: Coil Form: Ferrite
   Cover: TYPE 7070 - Per MIL-I-23053/5, class 1. Flame Retardant IAW UL 224, class 1.
   TYPE 7080 - Epoxy encapsulated.
   Magnet Wire: Per FED SPEC J-W-001177/9

STANDARD VALUES: (Electrical characteristics are identical for both types. Other values are available on special order.)

Dash No.	Nominal Inductance	Max. DCR Ohms	Min. SRF MHz	Rated IDC ma	INCR I ma
-01	1.0μH	.010	155	5,000	6,400
-02	1.2	.011	148	4,800	6,000
-03	1.5	.012	128	4,600	5,000
-04	1.8	.013	120	4,400	4,500
-05	2.2	.014	108	4,200	4,100
-06	2.7	.015	100	4,100	3,600
-07	3.3	.016	96	4,000	3,200
-08	3.9	.017	90	3,800	3,000
-09	4.7	.022	85	3,400	2,700
-10	5.6	.028	76	3,000	2,500
-11	6.8	.031	70	2,800	2,300
-12	8.2	.035	51	2,700	2,000
-13	10	.038	35	2,600	1,900
-14	12	.043	21	2,400	1,700
-15	15	.049	14	2,300	1,500
-16	18	.054	10	2,200	1,400
-17	22	.059	8.0	2,100	1,300
-18	27	.070	6.5	1,900	1,100
-19	33	.077	6.1	1,800	1,000
-20	39	.084	5.7	1,700	940
-21	47	.093	5.1	1,600	870
-22	56	.12	4.3	1,500	790
-23	68	.13	3.6	1,400	710
-24	82	.16	3.2	1,300	650
-25	100	.24	3.0	1,000	590
-26	120	.32	2.7	880	540
-27	150	.43	2.1	760	480
-28	180	.48	1.7	720	440
-29	220	.55	1.6	670	400
-30	270	.62	1.5	640	360

Dash No.	Nominal Inductance	Max. DCR Ohms	Min. SRF MHz	Rated IDC ma	INCR I ma
-31	330μH	.72	1.4	590	320
-32	390	.79	1.3	560	300
-33	470	.88	1.2	530	270
-34	560	1.2	1.1	460	250
-35	680	1.5	1.0	410	230
-36	820	1.7	.96	380	210
-37	1.0mH	1.9	.88	360	190
-38	1.2	2.4	.78	320	170
-39	1.5	2.8	.64	300	150
-40	1.8	3.1	.60	280	140
-41	2.2	4.5	.54	240	120
-42	2.7	5.8	.44	210	110
-43	3.3	8.1	.43	180	100
-44	3.9	8.9	.40	170	95
-45	4.7	10	.38	160	86
-46	5.6	11	.35	150	79
-47	6.8	15	.29	130	72
-48	8.2	17	.26	120	65
-49	10	22	.24	110	59
-50	12	26	.23	100	54
-51	15	34	.19	86	48
-52	18	39	.17	80	44
-53	22	54	.16	68	40
-54	27	62	.15	64	36
-55	33	82	.12	55	32
-56	39	93	.11	52	30
-57	47	120	.096	46	27
-58	56	130	.092	44	25
-59	68	190	.088	36	23
-60	82	210	.080	35	21
-61	100	270	.074	30	19

TYPICAL Q CURVES (Type 7070/7080)



SEND YOUR REQUIREMENTS. PROMPT QUOTES.

QUALITY COILS SINCE 1946

CADDELL-BURNS

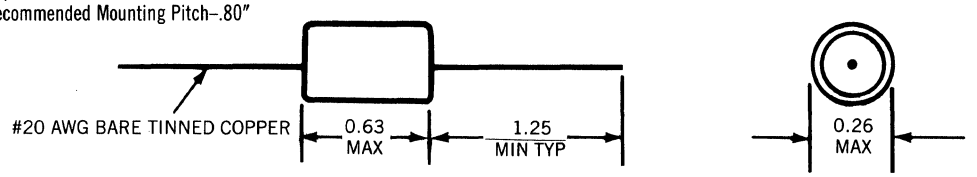
258 East Second Street
Mineola, New York 11501-3508

Tel: 516-746-2310 Fax: 516-742-2416
e-mail: caddell-burns@erols.com

MINIATURE HIGH CURRENT CHOKES

FOR SWITCHING REGULATORS AND POWER FILTERS **7300**

TYPE 7300 10µH–10mH 10% Tolerance
Recommended Mounting Pitch–.80"



NOTES:

1. Inductance measured on QuadTech/GenRad 1659 RLC Digibridge at 1.0 KHz.
2. The current rating (Rated IDC) is based on 0.25 watt power dissipation (I^2R) for an approximate 20°C temperature rise. Depending on the application, these units may be operated at higher currents.

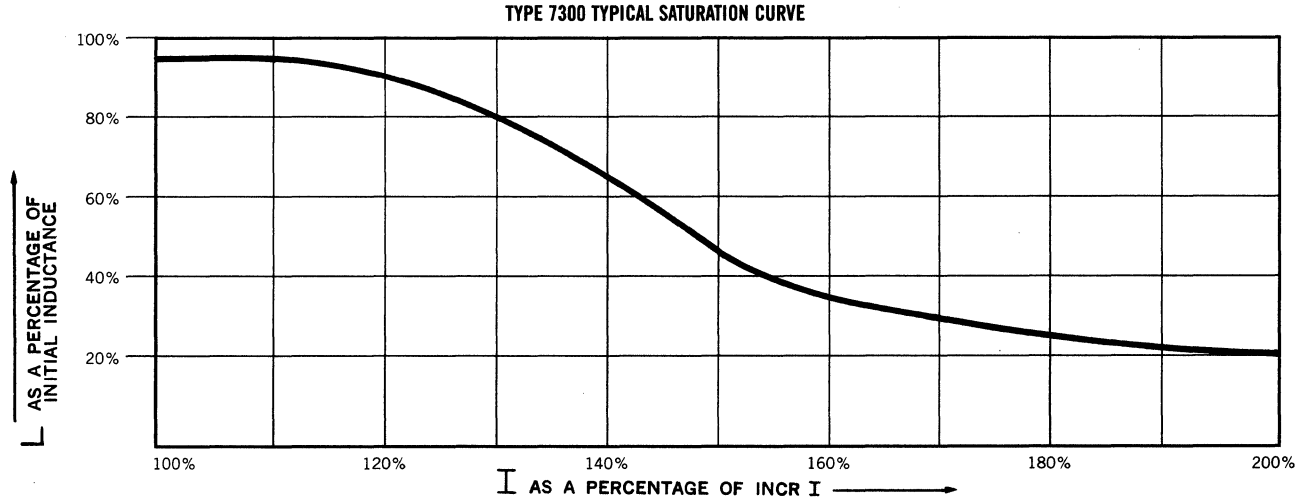
   The core material for the 7300 series has been chosen for optimum current handling capability. Because this material has a relatively low volume resistivity, the core will appear as a shunt resistance on the order of 1 Kilohm, which may have to be taken into account when determining total power dissipation; e.g., if the induced voltage (2π fLI) across the coil is 10 volts, there will be a V^2/R loss on the order of 0.10 watt, in addition to the I^2R losses associated with the winding. This is not usually a factor unless the choke is operated at high levels of R.F. excitation.
3. The incremental current (INCR I) is the approximate current at which the inductance will be decreased by 5% from its initial (zero-DC) value because of saturation. If the current is increased beyond INCR I, the inductance will continue to decrease as shown by the saturation curve below.
4. Dielectric Withstanding Voltage: 1000 VRMS.
5. Operating Temperature Range: -55° to +105°C.
6. Marking – Printed with Caddell-Burns Part Number.
7. Materials:
   Coil Form: Ferrite
   Magnet Wire: Per FED SPEC J-W-001177/9
   Jacket: Per MIL-I-23053/5, Class 1.
   Flame Retardant IAW UL 224, Class 1.

STANDARD VALUES: (Other values available on special order)

Part No.	Nominal Inductance	DCR ± 20% Ohms	Min. SRF MHz	Rated IDC Amps	INCR I Amps
7300-01	10 µH	0.055	9.0	2.1	2.8
7300-02	12	0.061	8.0	2.0	2.6
7300-03	15	0.069	7.0	1.9	2.2
7300-04	18	0.077	6.2	1.8	2.1
7300-05	22	0.084	5.6	1.7	1.9
7300-06	27	0.093	5.0	1.6	1.7
7300-07	33	0.11	4.4	1.5	1.5
7300-08	39	0.12	3.8	1.4	1.4
7300-09	47	0.13	3.4	1.4	1.3
7300-10	56	0.14	3.0	1.3	1.2
7300-11	68	0.15	2.7	1.3	1.1
7300-12	82	0.17	2.4	1.2	0.98
7300-13	100	0.27	2.1	0.96	0.89
7300-14	120	0.31	1.9	0.90	0.80
7300-15	150	0.36	1.7	0.83	0.72
7300-16	180	0.39	1.5	0.80	0.66
7300-17	220	0.45	1.3	0.75	0.58
7300-18	270	0.49	1.2	0.71	0.54
7300-19	330	0.58	1.0	0.66	0.47

Part No.	Nominal Inductance	DCR ± 20% Ohms	Min. SRF MHz	Rated IDC Amps	INCR I Amps
7300-20	390 µH	0.64	0.90	0.63	0.43
7300-21	470	0.86	0.80	0.54	0.39
7300-22	560	0.93	0.72	0.52	0.37
7300-23	680	1.1	0.64	0.48	0.33
7300-24	820	1.5	0.56	0.41	0.30
7300-25	1.0 mH	2.0	0.50	0.35	0.27
7300-26	1.2	2.2	0.44	0.34	0.25
7300-27	1.5	3.0	0.40	0.29	0.22
7300-28	1.8	3.4	0.35	0.27	0.20
7300-29	2.2	3.8	0.32	0.26	0.18
7300-30	2.7	4.4	0.28	0.24	0.16
7300-31	3.3	5.9	0.25	0.21	0.15
7300-32	3.9	7.9	0.22	0.18	0.14
7300-33	4.7	8.9	0.19	0.17	0.12
7300-34	5.6	12	0.17	0.14	0.11
7300-35	6.8	13	0.15	0.14	0.10
7300-36	8.2	14	0.14	0.13	0.094
7300-37	10	17	0.12	0.12	0.084

TYPE 7300 TYPICAL SATURATION CURVE



CADDELL-BURNS DOES NOT SELL THRU DISTRIBUTORS. ALL SALES ARE DIRECT.

QUALITY COILS SINCE 1946

CADDELL-BURNS

258 East Second Street
Mineola, New York 11501-3508

Tel: 516-746-2310 Fax: 516-742-2416
e-mail: caddell-burns@erols.com

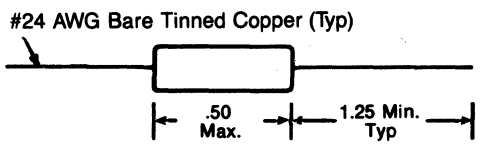
MINIATURE HIGH CURRENT CHOKES

FOR SWITCHING REGULATORS AND POWER FILTERS

TYPE 7120

7120

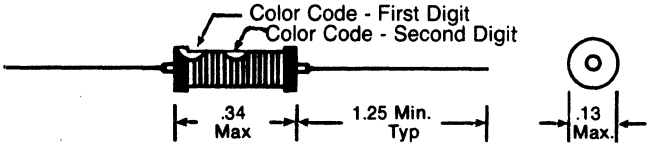
1.0μH-10mH. 10% Tolerance
Recommended Mounting Pitch—.60"



TYPE 7130

7130

(conformally coated version)



NOTES: (FOR BOTH TYPES)

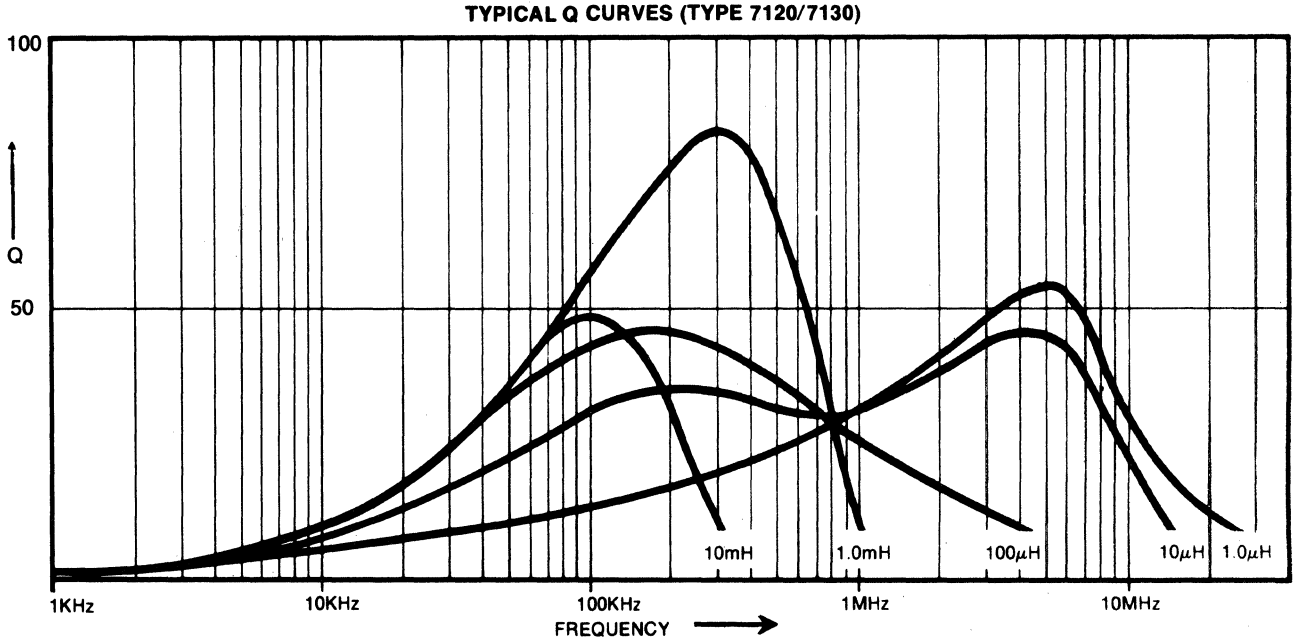
1. Inductance measured on QuadTech/GenRad 1659 RLC Digibridge at 1.0 KHz. (Values less than 10 μH are measured at 10 KHz).
2. Current rating (Rated IDC) is based on 0.2 watt power dissipation for approximately 20°C temperature rise. Depending on the application, these units may be operated at up to twice the rated current.
3. Incremental current (INCR I) is the minimum current at which the inductance will be decreased by 5% from its initial (zero-DC) value because of saturation.
4. Dielectric Withstanding Voltage: TYPE 7120 – 1000 VRMS TYPE 7130 – 100 VRMS
5. Operating Temperature Range -55° to +105°C.
6. Materials: Coil Form: Ferrite
   Cover: TYPE 7120 - Per MIL-I-23053/5, class 1. Flame Retardant IAW UL 224, class 1.
   TYPE 7130 - conformally coated with Polyurethane per MIL-I-46058
   Magnet Wire: Per FED SPEC J-W-001177/9
7. Marking: TYPE 7120 - Printed with part number
   TYPE 7130 - Color coded per dash number using standard EIA color code.

STANDARD VALUES (Electrical Characteristics are identical for both types. Other values are available on special order.)

Dash No.	Nominal Inductance	Max. DCR Ohms	Min. SRF MHz	Rated IDC ma	INCR I ma
-01	1.0 μH	.018	190	3300	3000
-02	1.2	.019	170	3200	2700
-03	1.5	.020	160	3100	2500
-04	1.8	.023	150	2900	2100
-05	2.2	.031	130	2600	2000
-06	2.7	.033	120	2500	1900
-07	3.3	.054	110	1900	1700
-08	3.9	.060	100	1800	1500
-09	4.7	.068	86	1700	1400
-10	5.6	.074	64	1600	1300
-11	6.8	.080	44	1600	1200
-12	8.2	.087	32	1500	1100
-13	10	.095	25	1500	970
-14	12	.11	17	1400	880
-15	15	.15	13	1200	790
-16	18	.16	10	1100	710
-17	22	.19	8.4	1000	640
-18	27	.22	8.0	950	580
-19	33	.24	7.6	910	530
-20	39	.26	7.1	880	480
-21	47	.35	6.0	760	430
-22	56	.47	5.8	650	400
-23	68	.53	4.3	610	370
-24	82	.60	4.1	580	330
-25	100	.67	3.9	550	300

Dash No.	Nominal Inductance	Max. DCR Ohms	Min. SRF MHz	Rated IDC ma	INCR I ma
-26	120 μH	.90	3.6	470	270
-27	150	1.2	3.2	410	250
-28	180	1.4	2.8	380	220
-29	220	1.9	2.3	320	200
-30	270	2.1	2.1	310	180
-31	330	2.4	1.9	290	170
-32	390	3.0	1.7	260	150
-33	470	3.4	1.4	240	140
-34	560	4.7	1.3	210	130
-35	680	6.4	1.2	180	110
-36	820	7.1	1.1	170	100
-37	1.0 mH	7.9	1.0	160	95
-38	1.2	9.0	.94	150	87
-39	1.5	12	.76	130	78
-40	1.8	14	.72	120	71
-41	2.2	19	.64	100	64
-42	2.7	25	.56	90	58
-43	3.3	29	.53	83	52
-44	3.9	34	.48	77	48
-45	4.7	37	.45	74	44
-46	5.6	50	.40	63	40
-47	6.8	58	.36	59	36
-48	8.2	68	.29	54	33
-49	10	75	.27	52	30

TYPICAL Q CURVES (TYPE 7120/7130)



SEND YOUR REQUIREMENTS. PROMPT QUOTES.

QUALITY COILS SINCE 1946

CADDELL-BURNS

258 East Second Street
Mineola, New York 11501-3508

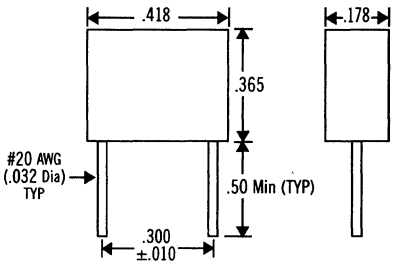
Tel: 516-746-2310 Fax: 516-742-2416
e-mail: caddell-burns@erols.com

ENCAPSULATED PRINTED CIRCUIT INDUCTORS

7600

TYPE 7600 1.0µH - 8.2µH 20% tolerance
10µH - 10mH 10% tolerance

Developed as a ruggedized update of the popular 6550 series, these inductors are intended for general use in filters, switch-mode power supplies and regulators, magnetic pickups, tuned circuits, and many other applications.



NOTES:

1. INDUCTANCE measured on QuadTech/GenRad 1659 RLC Digibridge at 1.0 KHz. (Values less than 10 µH are measured at 10 KHz.)
2. CURRENT RATING (Rated IDC) is based on 0.25 watt power dissipation for approximately 20°C temperature rise. Depending on the application, these parts may be operated at higher currents.
3. INCREMENTAL CURRENT (INCR I) is the current at which the inductance will be decreased approximately 5% from its initial (zero-DC) value because of saturation.
4. DIELECTRIC WITHSTANDING VOLTAGE: 1000 VRMS.
5. OPERATING TEMPERATURE RANGE: -55° to +105°C.
6. MARKING: Printed with Caddell-Burns Part Number.
7. MATERIALS:
   Core: Ferrite
   Magnet Wire: Per FED SPEC J-W 001177/9
   Case: Glass-filled Polyphenylene Sulfide (RYTON)

STANDARD VALUES: (Other values available on special order)

Part No.	Nominal Inductance	DCR ± 20% Ohms	Min. SRF MHz	Rated IDC Amps	INCR I Amps
7600-01	1.0 µH	0.024	190	3.2	7.0
7600-02	1.2	0.026	140	3.1	6.4
7600-03	1.5	0.028	130	3.0	5.7
7600-04	1.8	0.030	110	2.9	5.2
7600-05	2.2	0.032	100	2.8	4.7
7600-06	2.7	0.035	95	2.7	4.3
7600-07	3.3	0.040	90	2.5	3.9
7600-08	3.9	0.043	84	2.4	3.5
7600-09	4.7	0.050	80	2.2	3.2
7600-10	5.6	0.054	67	2.1	3.0
7600-11	6.8	0.060	42	2.0	2.7
7600-12	8.2	0.067	26	1.9	2.4
7600-13	10	0.073	19	1.9	2.2
7600-14	12	0.080	14	1.8	2.0
7600-15	15	0.090	9.6	1.7	1.8
7600-16	18	0.10	7.6	1.6	1.6
7600-17	22	0.11	7.4	1.5	1.5
7600-18	27	0.13	7.0	1.4	1.3
7600-19	33	0.14	6.1	1.3	1.2
7600-20	39	0.19	5.6	1.1	1.1
7600-21	47	0.21	5.2	1.1	1.0
7600-22	56	0.23	4.8	1.0	0.94
7600-23	68	0.31	4.4	0.90	0.85
7600-24	82	0.35	4.0	0.85	0.77

Part No.	Nominal Inductance	DCR ± 20% Ohms	Min. SRF MHz	Rated IDC Amps	INCR I Amps
7600-25	100 µH	0.40	3.4	0.79	0.70
7600-26	120	0.52	3.1	0.69	0.64
7600-27	150	0.59	2.8	0.65	0.57
7600-28	180	0.65	2.7	0.62	0.52
7600-29	220	0.90	2.4	0.53	0.47
7600-30	270	1.0	2.2	0.50	0.43
7600-31	330	1.4	1.8	0.42	0.39
7600-32	390	1.5	1.7	0.41	0.35
7600-33	470	1.7	1.5	0.38	0.32
7600-34	560	2.3	1.4	0.33	0.30
7600-35	680	2.6	1.3	0.31	0.27
7600-36	820	3.6	1.1	0.26	0.24
7600-37	1.0 mH	4.0	1.0	0.25	0.22
7600-38	1.2	4.5	0.96	0.24	0.20
7600-39	1.5	6.1	0.80	0.20	0.18
7600-40	1.8	6.8	0.76	0.19	0.16
7600-41	2.2	8.7	0.69	0.17	0.15
7600-42	2.7	10	0.54	0.16	0.13
7600-43	3.3	14	0.48	0.13	0.12
7600-44	3.9	16	0.46	0.13	0.11
7600-45	4.7	21	0.35	0.11	0.10
7600-46	5.6	24	0.32	0.10	0.094
7600-47	6.8	33	0.30	0.087	0.085
7600-48	8.2	38	0.29	0.081	0.077
7600-49	10	50	0.27	0.071	0.070

INDUCTOR SELECTION KITS FOR DESIGN ENGINEERS

Type 7600 inductors are available in kits to assist the designer of switching regulators, power supplies, and filters in selecting the optimal inductor for a given application.

Each kit contains 25 inductors, covering two decades of inductance values.

FREE REFILL order forms are included, to replace parts as they are used, or to obtain samples of additional values not included with the kits.

Kit Part No.	Dash No.'s Included	Inductance Range
7600 KIT-1	-01 thru -25 (1 ea)	1.0µH-100µH
7600 KIT-2	-13 thru -37 (1 ea)	10µH-1.0mH
7600 KIT-3	-25 thru -49 (1 ea)	100µH-10mH

Custom kits are also available.

CADDELL-BURNS DOES NOT SELL THRU DISTRIBUTORS. ALL SALES ARE DIRECT.

QUALITY COILS SINCE 1946

CADDELL-BURNS

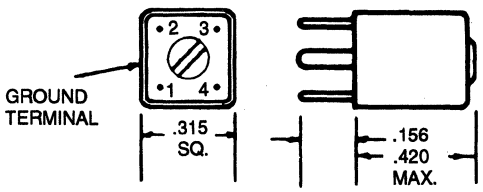
258 East Second Street
Mineola, New York 11501-3508

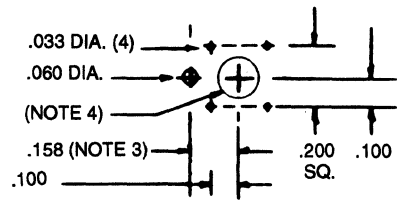
Tel: 516-746-2310 Fax: 516-742-2416
e-mail: caddell-burns@erols.com

SUBMINIATURE SHIELDED VARIABLE INDUCTORS

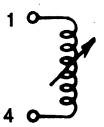
6740

TYPE 6740 0.08 µH - 12 mH





RECOMMENDED MOUNTING LAYOUT



SCHEMATIC
(TOL ± .003)

NOTES

1. Effective inductance and Q measured on Hewlett-Packard 4342A Q-meter at frequencies specified, in accordance with MIL-C-15305.
2. Self-resonant frequencies are measured at nominal inductance.
3. Ground terminal may be bent as required to fit existing layouts.
4. Provide .156 DIA hole if bottom access to tuning core is desired. Tuning range on -38 thru -61 may be extended by allowing core to extend 1/16" below mounting surface (when Lmin = 1/2Lnom.)
5. Current rating is based on 1/4 watt power dissipation.
6. MATERIALS –
   Terminals: tin plated copper.
   Terminal Base: molded phenolic
   Coil Form: polyester fiberglass.
   Core: moisture-proofed powdered iron or ferrite.
   Shield Can: tin plated copper.
   Impregnation: varnish per MIL-V-173.

STANDARD VALUES: (Intermediate and special values available on special order)

Part No.	Nominal Inductance	Minimum Range LMin.	LMax.	Min Q @LNom.	Test Freq. M Hz	Max. DCR Ohms	Min. SRF M Hz Note 2	Max. IDC mA Note 5
6740-01	0.10µH	0.08µH	0.12µH	80	25	0.020	250	3500
6740-02	0.12	0.10	0.15	80	25	0.028	250	3000
6740-03	0.15	0.12	0.18	85	25	0.030	250	2800
6740-04	0.18	0.15	0.22	85	25	0.041	250	2500
6740-05	0.22	0.18	0.27	85	25	0.047	250	2300
6740-06	0.27	0.22	0.33	85	25	0.049	250	2200
6740-07	0.33	0.27	0.39	90	25	0.053	250	2100
6740-08	0.39	0.33	0.47	90	25	0.14	240	1300
6740-09	0.47	0.39	0.56	90	25	0.16	230	1200
6740-10	0.56	0.47	0.68	90	25	0.18	210	1100
6740-11	0.68	0.56	0.82	90	25	0.19	200	1100
6740-12	0.82	0.68	1.0	90	25	0.21	180	1000
6740-13	1.0	0.82	1.2	90	25	0.35	160	850
6740-14	1.2	0.91	1.5	60	7.9	0.38	140	810
6740-15	1.5	1.0	1.8	60	7.9	0.40	120	790
6740-16	1.8	1.2	2.2	60	7.9	0.71	110	590
6740-17	2.2	1.5	2.7	65	7.9	0.86	110	540
6740-18	2.7	1.8	3.3	65	7.9	1.1	100	480
6740-19	3.3	2.2	3.9	65	7.9	1.7	95	380
6740-20	3.9	2.7	4.7	60	7.9	1.8	87	370
6740-21	4.7	3.3	5.6	60	7.9	1.9	80	360
6740-22	5.6	3.9	6.8	60	7.9	2.0	71	350
6740-23	6.8	4.7	8.2	60	7.9	2.1	62	340
6740-24	8.2	5.6	10	60	7.9	2.4	53	320
6740-25	10	6.8	12	60	7.9	2.7	45	300
6740-26	12	8.2	15	60	2.5	1.7	14	380
6740-27	15	10	18	70	2.5	1.8	12	380
6740-28	18	12	22	65	2.5	2.0	10	350
6740-29	22	15	27	65	2.5	2.2	9.5	340
6740-30	27	18	33	65	2.5	2.3	8.6	330
6740-31	33	22	39	65	2.5	2.6	7.8	310

Part No.	Nominal Inductance	Minimum Range LMin.	LMax.	Min Q @LNom.	Test Freq. M Hz	Max. DCR Ohms	Min. SRF M Hz Note 2	Max. IDC mA Note 5
6740-32	39µH	27µH	47µH	55	2.5	3.0	7.2	290
6740-33	47	33	56	55	2.5	3.1	6.6	280
6740-34	56	39	68	45	2.5	3.3	5.9	270
6740-35	68	47	82	45	2.5	3.5	5.3	260
6740-36	82	56	100	45	2.5	4.0	5.1	250
6740-37	100	68	120	45	2.5	4.1	5.0	250
6740-38	120	82	150	70	.79	4.2	4.2	240
6740-39	150	100	180	70	.79	4.3	3.4	240
6740-40	180	120	220	65	.79	7.6	3.1	180
6740-41	220	150	270	65	.79	8.4	2.8	170
6740-42	270	180	330	60	.79	9.0	2.5	170
6740-43	330	220	390	60	.79	9.6	2.3	160
6740-44	390	270	470	40	.79	12	2.1	150
6740-45	470	330	560	40	.79	13	1.9	140
6740-46	560	390	680	35	.79	14	1.8	130
6740-47	680	470	820	35	.79	16	1.7	130
6740-48	820	560	1000	30	.79	18	1.6	120
6740-49	1.0mH	.68mH	1.2mH	30	.79	20	1.5	110
6740-50	1.2	.82	1.5	30	.25	30	.93	91
6740-51	1.5	1.0	1.8	35	.25	35	.86	85
6740-52	1.8	1.2	2.2	35	.25	40	.79	79
6740-53	2.2	1.5	2.7	35	.25	45	.72	75
6740-54	2.7	1.8	3.3	35	.25	51	.70	70
6740-55	3.3	2.2	3.9	35	.25	56	.69	67
6740-56	3.9	2.7	4.7	30	.25	65	.51	62
6740-57	4.7	3.3	5.6	25	.25	88	.47	53
6740-58	5.6	3.9	6.8	25	.25	93	.43	52
6740-59	6.8	4.7	8.2	25	.25	98	.39	51
6740-60	8.2	5.6	10	25	.25	100	.38	50
6740-61	10	6.8	12	25	.25	110	.37	48

SEND YOUR REQUIREMENTS. PROMPT QUOTES.

Classic Coil Winding, Inc.

4659 Eugene Avenue • Douglas, Arizona 85607
Phone: (520) 364-3436 • Fax: (520) 364-2672
Internet: http://www.classiccoil.com • E-Mail: ccw@primenet.com

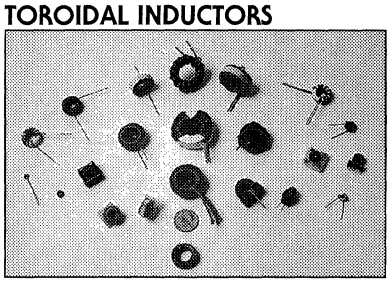
Classic Coil Winding, Inc., founded in 1967, provides a complete custom design, engineering and manufacturing service for electrical and electronic inductors, transformers, chokes, filters and assemblies.

We offer complete environmental testing, thermal-compression bonding, welding, sonic welding and an extremely versatile complement of coil winding and test equipment.

Being online with computerized Statistical Process Control assures production continuity and quality. We will, upon request, include with all shipments $\bar{X}$ and R charts, Histograms, CP and CPK data and Parts Per Million (PPM) data for all critical parameters.

Implementation of Design for Manufacturability and Time-Cycle Management have provided previously unattainable results.

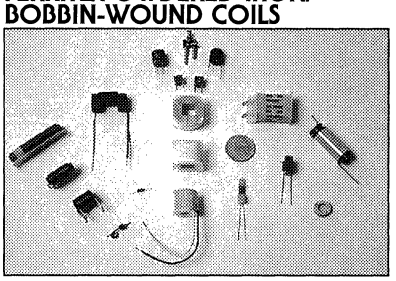
TOROIDAL INDUCTORS



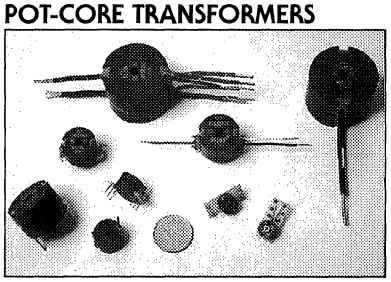
CUSTOMIZED FOR:

- Values
- Mounting
- Size
- Coating

FERRITE/POWDERED-IRON/ BOBBIN-WOUND COILS

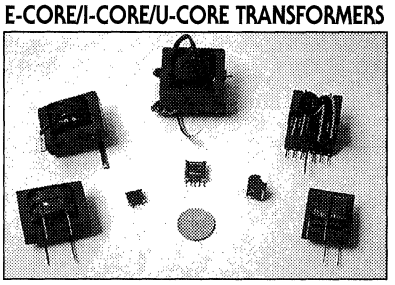


POT-CORE TRANSFORMERS



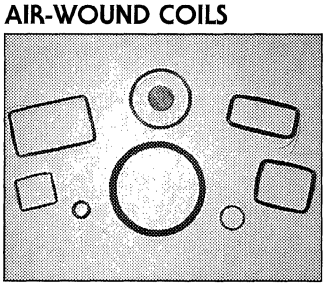
- All IEC standard core sizes available
- Special mounting available
- Custom designs available to your specific requirements at no additional cost

E-CORE/I-CORE/U-CORE TRANSFORMERS

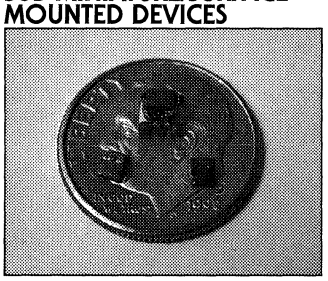


AIR-WOUND COILS

- Wide range of inductance values
- Wide range of operating frequencies
- Custom designs available to your specific requirements at no additional cost



SUB-MINIATURE/SURFACE-MOUNTED DEVICES

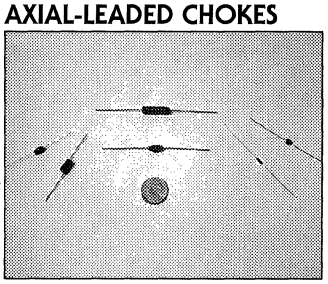


- Inductance (µH) 1.2 to 100
- Q min. 25, 30, 35
- Test Frequency (MHz) 7.9 to 2.5
- Self Resonance (MHz) min. 110 to 6

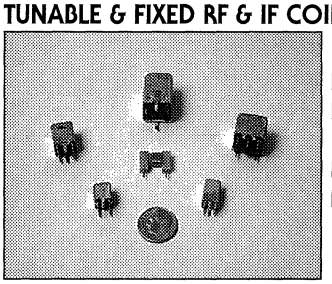
AXIAL-LEADED CHOKES

FEATURES:

- Inductances from 50nH to 10 mH
- Phenolic, ferrite or powdered-iron coilforms
- Custom designs available to your specific requirements at no additional cost



TUNABLE & FIXED RF & IF COILS



FEATURES:

- 5mm and up
- Velvetork, paper or molded coilforms
- Top or bottom tuning
- Shielded or unshielded

Please direct all inquiries to:
Classic Coil Winding, Inc.
Phone: (520) 364-3436 • Fax: (520) 364-2672
E-Mail: ccw@primenet.com

SERVING THE ELECTRONIC, COMMUNICATION, MEDICAL, AEROSPACE & AUTOMOTIVE INDUSTRIES FOR OVER 30 YEARS

Coilcraft

847/639-6400
Fax 847/639-1469
1102 Silver Lake Road
Cary, IL 60013

Price Quotes and Orders

Call 800/322-2645 Fax 847/639-1469

MasterCard VISA

Purchase orders accepted upon credit approval

Product Literature

For product catalogs call **800/322-2645**
World Wide Web **http://www.coilcraft.com**
Data by Fax system **800/651-6974**
On-line kit orders **http://order.coilcraft.com**

Coilcraft Sales Offices

Corporate Headquarters
1102 Silver Lake Road
Cary, IL 60013
847-639-6400 Fax 847-639-1469
info@coilcraft.com

421 Metzgar Street
Half Moon Bay, CA 94019-2019
650-726-9480 Fax 650-726-9315
mscoilcraft@earthlink.net

455 Washington Street
Duxbury, MA 02331
781-934-9095 Fax 781-934-5164
banderson@coilcraft.com

106 Maldon Drive
Cary NC 27513
919-460-5362 Fax 919-460-5363
sharris@coilcraft.com

14332 Montfort, Suite 7302
Dallas, TX 75240
(972) 458-2645 Fax 972-458-8855
joditucker@earthlink.net

21 Napier Place
Wardpark North
Cumbernauld, Scotland G68 0LL
+44/1236/730595
Fax +44/1236/730627
caroleh@coilcraft.co.uk

#505 MS Center Building
1-2-2 Minami Naruse
Machida-Shi, Tokyo 194-0045
+81/427/20-5404 Fax +81/427/20-5405
steve@pan-asia.net

91-2, Section 2, Chung-Yang Road
Tu-Cheng
Taipei Hsien, Taiwan, R.O.C.
+886/2/2264-3646
Fax +886/2/2270-0294
ccti@top2.ficnet.net.tw

Block 101, Boon Keng Road #06-13/20
Kallang Basin Industrial Estate
Singapore 339773
+65/296-6933 Fax +65/296-4463
tongks@singnet.com.sg

Visit our Web Site www.coilcraft.com

For the complete story on Coilcraft products, point your web browser to www.coilcraft.com.

- Complete specifications
- Newest products
- Performance curves
- Product photos
- Application notes
- Request samples
- S-parameter files
- Request catalogs
- Order Designer's Kits
- Request quotations
- Dozens more products

Coilcraft WWW http://www.coilcraft.com DATAFAX 800/651-6974
1102 Silver Lake Road, Cary IL 60013 Fax 847/639-1469 800/322-2645

Designer's Kits

To simplify your prototyping, we offer low cost Designer's Kits for many of our products. Each has an assortment of standard values along with detailed product specifications. We even offer free refills for the parts you use most often. To purchase, call **800-322-2645** or order your kits on-line at **http://order.coilcraft.com**

SMT Products

0603CS SM Inductors
Inductance: 1.8 nH - 120 nH
5% inductance tolerance
19 values (10 of each)
Kit C124 $60

0805CS SM Inductors
Inductance: 3.3 nH - 390 nH
5% inductance tolerance
22 values (10 of each)
Kit C103 $60
Kit C103-2 $85 (2% tolerance)

0805HS SM Inductors
Inductance: 3.3 nH - 220 nH
5% inductance tolerance
19 values (10 of each)
Kit C106 $60

0805HQ SM Inductors
Inductance: 2.5 nH - 51 nH
5% inductance tolerance
12 values (10 of each)
Kit C125 $60

0805HT SM Inductors
Inductance: 1.8 nH - 150 nH
5% inductance tolerance
20 values (10 of each)
Kit C121 $60

1008CS SM Inductors
Inductance: 4.7 nH - 10 µH
5% inductance tolerance
42 values (10 of each)
Kit C100 $125
Kit C100-2 $150 (2% tolerance)

1008HS SM Inductors
Inductance: 10 nH - 1 µH
5% inductance tolerance
28 values (10 of each)
Kit C107 $100

1008HQ High Q SM Inductors
Inductance: 3 nH - 100 nH
5% inductance tolerance
14 values (10 of each)
Kit C123 $60

1008HT SM Inductors
Inductance: 3.3 nH - 560 nH
5% inductance tolerance
26 values (10 of each)
Kit C122 $100

1206 CS SM Inductors
Inductance: 3.3 nH - 1.2 µH
5% inductance tolerance
28 values (10 of each)
Kit C120 $100

1812LS SM Inductors
Inductance: 12µH - 1000 µH
5% inductance tolerance
24 values (10 of each)
Kit C114 $80

"Micro Spring" Air Core Inductors
Inductance: 1.65 nH - 12.54 nH
9 values (12 of each)
Kit C108 $50

"Mini Spring" Air Core Inductors
Inductance: 2.5 nH - 43 nH
10 values (12 of each)
Kit C102 $60

"Midi Spring" Air Core Inductors
Inductance: 22 nH - 120 nH
10 values (12 of each)
Kit C118 $60

"Maxi Spring" Air Core Inductors
Inductance: 90 nH - 558 nH
12 values (8 of each)
Kit C119 $60

Common Mode Data Line EMI Filters
Attenuation bandwidth: 15 dBm, 1.5 - 300 MHz
DC current capacity: 100 mA
2, 3, 4, 8, 10 line, surface mount and leaded, 13 values (4 each)
Kit D103 $75

SMT Power Inductors DO1607 Series
Inductance: 1µH - 33 µH
Current: 0.48 - 2.3 Amps
10 values (3 of each)
Kit C127 $60

SMT Power Inductors Shielded DS1608 Series
Inductance: 1µH - 10,000 µH
Current: 0.02 - 3 Amps
25 values (3 of each)
Kit C115 $80

SMT Power Inductors Shielded DS3316 Series
Inductance: 1µH - 47 µH
Current: 0.8 - 5 Amps
11 values (3 of each)
Kit C116 $60

SMT Power Inductors DO3316HC Series
Inductance: 0.33 µH - 3.3 µH
Current: 6.4 - 16 Amps
7 values (3 of each)
Kit C126 $45

SMT Power Inductors DO1608/3316 Series
Inductance: 1 µH - 1000 µH
Current: 0.07 - 6.8 Amps
38 values (3 of each)
Kit C105 $90

SMT Power Inductors Shielded DT1608/3316 Series
Inductance: 1 µH - 1000 µH
Current: 0.8 - 5 Amps
38 values (3 of each)
Kit C104 $95

SMT Power Inductors DO3308 Series
Inductance: 10 µH - 1000 µH
Current: 0.05 - 2 Amps
13 values (3 of each)
Kit C109 $60

SMT Power Inductors DO3340 Series
Inductance: 10 µH - 1000 µH
Current: 0.1 - 3.5 Amps
13 values (3 of each)
Kit C110 $60

SMT Power Inductors Shielded DS5022 Series
Inductance: 10 µH - 1000 µH
Current: 0.53 - 3.9 Amps
13 values (3 of each)
Kit C117 $60

SMT Power Inductors DO5022 Series
Inductance: 1 µH - 1000 µH
Current: 0.56 - 8.6 Amps
17 values (3 of each)
Kit C111 $60

SMT Power Inductors DO5022HC Series
Inductance: 0.78 µH - 10 µH
Current: 6.0 - 15 Amps
9 values (3 of each)
Kit C113 $60

Other Products

"Unicoil" 7/10 mm Tunable Inductors
Inductance: .0435 µH - 1.5 µH
49 shielded, 49 unshielded (2 each)
Kit M102 $60

"Unicoil" 5 mm Tunable Inductors
Inductance: 9 nH - 281 nH
19 Shielded, 19 unshielded (2 each)
Kit M105 $60

"Slot Ten" 10 mm Tunable Inductors
Inductance: 0.7 µH - 1143 µH
18 shielded, 18 unshielded (3 each)
Kit M100 $60

"Slot Seven" 7 mm Tunable Inductors
Inductance: 0.094 µH - 275 µH
39 values (3 of each)
Kit M106 $60

Axial Lead RF Chokes
Inductance: 0.1 µH - 1000 µH
25 values (5 of each)
Kit F102 $50

Horizontal Mount Inductors
Tunable and fixed
Inductance: 31.5 nH - 720 nH
33 values (3 of each)
Kit M104 $60

Low Pass LC Filters
Poles: 3, 5 and 7
Cutoff frequency: 17 MHz
Impedance: 50 Ohms
3 filters (4 of each)
Kit D102 $60

Common Mode Line Chokes
Current: 0.25 - 8.1 Amps rms
Inductance: 731 µH - 10.5 mH
8 styles (14 total pieces)
Kit P202 $100

Current Sensors
Sensing range: 0.02 - 35 Amps
Freq. response: 20 - 50+ kHz
Transformer and sensor-only versions
10 styles (17 total pieces)
Kit P203 $50

Base/Gate Driver Transformers
Inductance: 1.5 mH min.
Frequency: 10 - 250 kHz
2 single, 2 double section (2 of each)
Kit P204 $50

Compact Vertical Mount Power Inductors
Current: 0.6 - 3.5 Amps
Inductance: 10 µH - 330 µH
19 styles (3 of each)
Kit P210 $85

Power Filter Chokes
Current: 3, 5, 10 Amps
Inductance: 5 µH - 300 µH
18 styles (48 total pieces)
Kit P205 $75

Axial Lead Power Chokes
Current: 0.04 - 4.3 AC Amps
Inductance: 3.9 µH - 82 mH
30 values (2 of each)
Kit P209 $150

Coilcraft WWWhttp://www.coilcraft.com DATAFAX 800/651-6974
1102 Silver Lake Road, Cary IL 60013 Fax 847/639-1469 800/322-2645

Surface Mount Inductors

Coilcraft's family of surface mount inductors covers the range from 1.8 nH to 1,000 µH. Our ceramic series (CS, HS, HT and CT) offer exceptionally high SRFs, high Q and tight tolerances. HS Series parts are less expensive and take up slightly less board space than their CS Series counterparts. For the lowest possible height, use the HT and CT Series. Most parts are available with inductance tolerances as low as 1% at only a small premium. Coilcraft offers several **Designer's Kits** that contain samples for prototyping. See page 2 of our EEM pages or order on-line at http://order.coilcraft.com.

0603CS (1608) Series

Part number	Inductance (nH)	Percent tolrnce.*	Q min	SRF min (MHz)	RDC max (Ohms)	IDC max (mA)	1.7 GHz L typ	1.7 GHz Q typ
0603CS-1N8T_BC	1.8 @ 250 MHz	**10,5**	16	12500	.045	700	1.66	50
0603CS-3N9T_BC	3.9 @ 250 MHz	**10,5**	22	6900	.080	700	3.96	67
0603CS-6N8T_BC	6.8 @ 250 MHz	**10,2**	27	5800	.110	700	7.1	81
0603CS-10NT_BC	10 @ 250 MHz	**5,2**	31	4800	.130	700	10.6	83
0603CS-12NT_BC	12 @ 250 MHz	**5**	35	4000	.130	700	13.5	83
0603CS-15NT_BC	15 @ 250 MHz	**5,2**	35	4000	.170	700	16.8	89
0603CS-18NT_BC	18 @ 250 MHz	**5**	35	3100	.170	700	21.4	69
0603CS-22NT_BC	22 @ 250 MHz	**5,2**	38	3000	.190	700	26.1	71
0603CS-27NT_BC	27 @ 250 MHz	**5**,2	40	2800	.220	600	34.6	65
0603CS-33NT_BC	33 @ 250 MHz	**5**,2	40	2300	.220	600	49.5	42
0603CS-39NT_BC	39 @ 250 MHz	**5**,2	40	2200	.250	600	60.2	40
0603CS-47NT_BC	47 @ 200 MHz	**5**,2	38	2000	.280	600	77.2	35
0603CS-56NT_BC	56 @ 200 MHz	**5**,2	38	1900	.310	600	97	26
0603CS-68NT_BC	68 @ 200 MHz	**5**,2	37	1700	.340	600	168	21
0603CS-72NT_BC	72 @ 150 MHz	**5**,2	34	1700	.490	400	135	20
0603CS-82NT_BC	82 @ 150 MHz	**5**,2	34	1700	.540	400	177	21
0603CS-R10T_BC	100 @ 150 MHz	**5**,2	34	1400	.580	400		
0603CS-R11T_BC	110 @ 150 MHz	**5**,2	32	1350	.610	300		
0603CS-R12T_BC	120 @ 150 MHz	**5**,2	32	1300	.650	300		

0805HT (2012) Low Profile Series

Part number	Inductance (nH)	Percent tolerance*	Q min	SRF min (MHz)	RDC max (Ohms)	IDC max (mA)
0805HT-1N8T_BC	1.8 @ 250 MHz	**10**	55 @ 1500 MHz	9400	.03	800
0805HT-3N9T_BC	3.9 @ 250 MHz	**10**	50 @ 1000 MHz	6100	.055	800
0805HT-4N7T_BC	4.7 @ 250 MHz	**10,5**	50 @ 1000 MHz	5500	.06	800
0805HT-6N8T_BC	6.8 @ 250 MHz	**10**,5	50 @ 1000 MHz	5500	.08	800
0805HT-8N2T_BC	8.2 @ 250 MHz	**10**,5	50 @ 1000 MHz	4800	.08	800
0805HT-10NT_BC	10 @ 250 MHz	**5**	55 @ 750 MHz	3300	.08	800
0805HT-12NT_BC	12 @ 250 MHz	**5**	55 @ 750 MHz	3800	.10	800
0805HT-15NT_BC	15 @ 250 MHz	**5**	50 @ 500 MHz	2950	.10	800
0805HT-18NT_BC	18 @ 250 MHz	**5**	50 @ 500 MHz	3100	.13	800
0805HT-22NT_BC	22 @ 250 MHz	**5**,2	50 @ 500 MHz	2900	.15	800
0805HT-27NT_BC	27 @ 250 MHz	**5**,2	50 @ 500 MHz	2450	.19	700
0805HT-33NT_BC	33 @ 250 MHz	**5**,2	55 @ 500 MHz	2350	.19	600
0805HT-39NT_BC	39 @ 250 MHz	**5**,2	55 @ 500 MHz	2200	.27	600
0805HT-47NT_BC	47 @ 200 MHz	**5**,2	50 @ 500 MHz	2000	.30	600
0805HT-56NT_BC	56 @ 200 MHz	**5**,2	50 @ 500 MHz	1850	.39	500
0805HT-68NT_BC	68 @ 200 MHz	**5**,2	50 @ 500 MHz	1500	.40	500
0805HT-82NT_BC	82 @ 150 MHz	**5**,2	50 @ 500 MHz	1500	.44	500
0805HT-R10T_BC	100 @ 150 MHz	**5**,2	50 @ 500 MHz	1200	.64	400
0805HT-R12T_BC	120 @ 150 MHz	**5**,2	40 @ 250 MHz	1150	.68	300
0805HT-R15T_BC	150 @ 150 MHz	**5**,2	40 @ 250 MHz	1050	.80	300

0805HQ (2012) High Q Series

Part number	Inductance (nH)	Percent tolerance*	Q min	SRF min (GHz)	RDC max (Ohms)	IDC max (A)
0805HQ-2N5X_BC	2.5 @ 250 MHz	**10**	80 @ 1500 MHz	>6.00	.020	1.6
0805HQ-5N6X_BC	5.6 @ 250 MHz	**10**	98 @ 1500 MHz	>6.00	.035	1.6
0805HQ-6N2X_BC	6.2 @ 250 MHz	**10**	88 @ 1000 MHz	4.75	.035	1.6
0805HQ-12NX_BC	12 @ 250 MHz	**10**	80 @ 1000 MHz	3.00	.045	1.6
0805HQ-16NX_BC	16 @ 250 MHz	**10,5**	72 @ 500 MHz	2.95	.060	1.5
0805HQ-18NX_BC	18 @ 250 MHz	**10,5**	75 @ 500 MHz	2.55	.060	1.4
0805HQ-20NX_BC	20 @ 250 MHz	**10,5**	70 @ 500 MHz	2.05	.055	1.4
0805HQ-27NX_BC	27 @ 250 MHz	**10,5**	75 @ 500 MHz	2.00	.070	1.3
0805HQ-30NX_BC	30 @ 250 MHz	**10,5**	65 @ 500 MHz	1.95	.095	1.2
0805HQ-39NX_BC	39 @ 250 MHz	**10,5**	65 @ 500 MHz	1.60	.110	1.1
0805HQ-48NX_BC	48 @ 250 MHz	**10,5**	65 @ 500 MHz	1.40	.095	1.2
0805HQ-51NX_BC	51 @ 250 MHz	**10,5**	65 @ 500 MHz	1.40	.120	1.0

0805CS/HS (2012) Series

To order HS Series parts, change "CS" to "HS" and "X" to "T" in part number.

Part number	Inductance (nH)	Percent tolerance*	Q min	SRF min (MHz)	Rdc max (Ohms)	Idc max (mA)
0805CS-030X_BC	3.3 @ 250 MHz	**20,10,5**	50 @ 1500 MHz	7900	.08	600
0805CS-060X_BC	6.8 @ 250 MHz	**20,10,5**	50 @ 1000 MHz	5500	.11	600
0805CS-080X_BC	8.2 @ 250 MHz	**20,10,5,2**	50 @ 1000 MHz	4700	.12	600
0805CS-120X_BC	12 @ 250 MHz	**20,10,5**	50 @ 500 MHz	4000	.15	600
0805CS-150X_BC	15 @ 250 MHz	**20,10,5,2**	50 @ 500 MHz	3400	.17	600
0805CS-180X_BC	18 @ 250 MHz	**20,10,5**	50 @ 500 MHz	3300	.20	600
0805CS-220X_BC	22 @ 250 MHz	**20,10,5,2**	55 @ 500 MHz	2600	.22	500
0805CS-270X_BC	27 @ 250 MHz	**20,10,5,2**	55 @ 500 MHz	2500	.25	500
0805CS-330X_BC	33 @ 250 MHz	**20,10,5,2**	60 @ 500 MHz	2050	.27	500
0805CS-390X_BC	39 @ 250 MHz	**20,10,5,2**	60 @ 500 MHz	2000	.29	500
0805CS-470X_BC	47 @ 200 MHz	**20,10,5**,2	60 @ 500 MHz	1650	.31	500
0805CS-560X_BC	56 @ 200 MHz	**10,5,2**,1	60 @ 500 MHz	1550	.34	500
0805CS-680X_BC	68 @ 200 MHz	**10,5,2**,1	60 @ 500 MHz	1450	.38	500
0805CS-820X_BC	82 @ 150 MHz	**10,5,2**,1	65 @ 500 MHz	1300	.42	400
0805CS-101X_BC	100 @150 MHz	**10,5,2**,1	65 @ 500 MHz	1200	.46	400
0805CS-121X_BC	120 @ 150 MHz	**10,5,2**,1	50 @ 250 MHz	1100	.51	400
0805CS-151X_BC	150 @ 100 MHz	**10,5,2**,1	50 @ 250 MHz	920	.56	400
0805CS-181X_BC	180 @ 100 MHz	**10,5,2**,1	50 @ 250 MHz	870	.64	400
0805CS-221X_BC	220 @ 100 MHz	**10,5,2**	50 @ 250 MHz	850	.70	400
The following parts are not available in HS versions						
0805CS-271X_BC	270 @ 100 MHz	**10,5,2**	48 @ 250 MHz	650	1.0	350
0805CS-331X_BC	330 @ 100 MHz	**10,5,2**	48 @ 250 MHz	600	1.4	310
0805CS-391X_BC	390 @ 100 MHz	**10,5,2**	48 @ 250 MHz	560	1.5	290

1008HT (2520) Low Profile Series

Part number	Inductance (nH)	Percent tolerance*	Q min	SRF min (MHz)	RDC max (Ohms)	IDC max (mA)
1008HT-3N3T_BC	3.3 @ 250 MHz	**10,5**	65 @ 1500 MHz	7900	.025	1000
1008HT-6N8T_BC	6.8 @ 250 MHz	**10,5**	70 @ 1500 MHz	5500	.05	1000
1008HT-7N2T_BC	7.2 @ 250 MHz	**10,5**	70 @ 1500 MHz	4800	.05	1000
1008HT-12NT_BC	12 @ 250 MHz	**10,5**	55 @ 700 MHz	3800	.065	1000
1008HT-15NT_BC	15 @ 250 MHz	**10,5**	55 @ 700 MHz	2800	.08	1000
1008HT-18NT_BC	18 @ 250 MHz	**10,5**	55 @ 500 MHz	3000	.09	1000
1008HT-22NT_BC	22 @ 250 MHz	**5**	55 @ 500 MHz	2600	.11	950
1008HT-27NT_BC	27 @ 250 MHz	**5**,2	55 @ 500 MHz	2400	.13	850
1008HT-33NT_BC	33 @ 200 MHz	**5**,2	55 @ 350 MHz	2000	.135	760
1008HT-39NT_BC	39 @ 200 MHz	**5**,2	55 @ 350 MHz	1900	.17	700
1008HT-47NT_BC	47 @ 200 MHz	**5**,2	55 @ 350 MHz	1500	.18	660
1008HT-56NT_BC	56 @ 150 MHz	**5**,2	50 @ 300 MHz	1500	.18	620
1008HT-68NT_BC	68 @ 150 MHz	**5**,2	50 @ 300 MHz	1500	.23	550
1008HT-82NT_BC	82 @ 150 MHz	**5**,2	40 @ 250 MHz	1300	.35	500
1008HT-R10T_BC	100 @ 100 MHz	**5**,2	40 @ 250 MHz	1200	.64	420
1008HT-R12T_BC	120 @ 100 MHz	**5**,2	40 @ 200 MHz	1090	.55	350
1008HT-R14T_BC	140 @ 100 MHz	**5**,2	40 @ 200 MHz	1100	.70	320
1008HT-R15T_BC	150 @ 100 MHz	**5**,2	40 @ 200 MHz	960	.75	300
1008HT-R18T_BC	180 @ 50 MHz	**5**,2	40 @ 200 MHz	920	1.02	250
1008HT-R22T_BC	220 @ 50 MHz	**5**,2	34 @ 100 MHz	750	1.15	250
1008HT-R24T_BC	240 @ 50 MHz	**5**,2	32 @ 100 MHz	800	1.15	250
1008HT-R27T_BC	270 @ 50 MHz	**5**,2	32 @ 100 MHz	770	1.25	250
1008HT-R33T_BC	330 @ 25 MHz	**5**,2	32 @ 100 MHz	635	1.35	250
1008HT-R39T_BC	390 @ 25 MHz	**5**,2	32 @ 100 MHz	555	1.45	250
1008HT-R47T_BC	470 @ 25 MHz	**5**,2	32 @ 100 MHz	530	1.65	240
1008HT-R56T_BC	560 @ 25 MHz	**5**,2	32 @ 100 MHz	485	1.90	240

* Bold numbers indicate tolerances carried in stock. When ordering, please replace underscore in part number with the proper tolerance code: F = 1%, G = 2%, J = 5%, K = 10%, M = 20%. (e.g. 1008CS-180XJBC for a 5% tolerance part.)

Coilcraft WWW http://www.coilcraft.com DATAFAX 800/651-6974
1102 Silver Lake Road, Cary IL 60013 Fax 847/639-1469 800/322-2645

1008CS/HS (2520) Series

To order HS Series parts, change "CS" to "HS" and "X" to "T" in part number.

Part number	Inductance (nH)	Percent tolerance*	Q min	SRF min (MHz)	Rdc max (Ω)	Idc max (mA)
1008CS-100X_BC	10 @ 50 MHz	**20,10,**5	50 @ 500 MHz	4100	.08	1000
1008CS-120X_BC	12 @ 50 MHz	**20,10,5**	50 @ 500 MHz	3300	.09	1000
1008CS-150X_BC	15 @ 50 MHz	**20,10,5**	50 @ 500 MHz	2500	.10	1000
1008CS-180X_BC	18 @ 50 MHz	**20,10,5,2**	50 @ 350 MHz	2500	.11	1000
1008CS-220X_BC	22 @ 50 MHz	**20,10,5,2**	55 @ 350 MHz	2400	.12	1000
1008CS-270X_BC	27 @ 50 MHz	**20,10,5,2**	55 @ 350 MHz	1600	.13	1000
1008CS-330X_BC	33 @ 50 MHz	**20,10,5,2**	60 @ 350 MHz	1600	.14	1000
1008CS-390X_BC	39 @ 50 MHz	**20,10,5,2**	60 @ 350 MHz	1500	.15	1000
1008CS-470X_BC	47 @ 50 MHz	**20,10,5,2**	65 @ 350 MHz	1500	.16	1000
1008CS-560X_BC	56 @ 50 MHz	**10,5,2**	65 @ 350 MHz	1300	.18	1000
1008CS-680X_BC	68 @ 50 MHz	**10,5,2**	65 @ 350 MHz	1300	.20	1000
1008CS-820X_BC	82 @ 50 MHz	**10,5,2**	60 @ 350 MHz	1000	.22	1000
1008CS-101X_BC	100 @ 25 MHz	**10,5,2,**1	60 @ 350 MHz	1000	.56	650
1008CS-121X_BC	120 @ 25 MHz	**10,5,2,**1	60 @ 350 MHz	950	.63	650
1008CS-151X_BC	150 @ 25 MHz	**10,5,2,**1	45 @ 100 MHz	850	.70	580
1008CS-181X_BC	180 @ 25 MHz	**10,5,2,**1	45 @ 100 MHz	750	.77	620
1008CS-221X_BC	220 @ 25 MHz	**10,5,2,**1	45 @ 100 MHz	700	.84	500
1008CS-271X_BC	270 @ 25 MHz	**10,5,2,**1	45 @ 100 MHz	600	.91	500
1008CS-331X_BC	330 @ 25 MHz	**10,5,2,**1	45 @ 100 MHz	570	1.05	450
1008CS-391X_BC	390 @ 25 MHz	**10,5,2,**1	45 @ 100 MHz	500	1.12	470
1008CS-471X_BC	470 @ 25 MHz	**10,5,2,**1	45 @ 100 MHz	450	1.19	470
1008CS-561X_BC	560 @ 25 MHz	**10,5,2,**1	45 @ 100 MHz	415	1.33	400
1008CS-621X_BC	620 @ 25 MHz	**10,5,2,**1	45 @ 100 MHz	375	1.40	300
1008CS-681X_BC	680 @ 25 MHz	**10,5,2,**1	45 @ 100 MHz	375	1.47	400
1008CS-751X_BC	750 @ 25 MHz	**10,5,2,**1	45 @ 100 MHz	360	1.54	360
1008CS-821X_BC	820 @ 25 MHz	**10,5,2,**1	45 @ 100 MHz	350	1.61	400
1008CS-911X_BC	910 @ 25 MHz	**10,5,2,**1	35 @ 50 MHz	320	1.68	380
1008CS-102X_BC	1000 @ 25 MHz	**10,5,2,**1	35 @ 50 MHz	290	1.75	370
The following parts are not available in HS versions						
1008CS-122X_BC	1200 @ 7.9 MHz	**10,5,2**	35 @ 50 MHz	250	2.0	310
1008CS-152X_BC	1500 @ 7.9 MHz	**10,5,2**	28 @ 50 MHz	200	2.3	330
1008CS-182X_BC	1800 @ 7.9 MHz	**10,5,2**	28 @ 50 MHz	160	2.6	300
1008CS-222X_BC	2200 @ 7.9 MHz	**10,5,2**	28 @ 50 MHz	160	2.8	280
1008CS-272X_BC	2700 @ 7.9 MHz	**10,5,2**	22 @ 25 MHz	140	3.2	290
1008CS-332X_BC	3300 @ 7.9 MHz	**10,5,2**	22 @ 25 MHz	110	3.4	290
1008CS-392X_BC	3900 @ 7.9 MHz	**10,5,2**	20 @ 25 MHz	100	3.6	260
1008CS-472X_BC	4700 @ 7.9 MHz	**10,5,2**	20 @ 25 MHz	90	4.0	260

1008HQ (2520) High Q Series

Part number	Inductance (nH)	Percent tolerance*	Q min	SRF min (GHz)	RDC max (Ohms)	IDC max (A)
1008HQ-3N0X_BC	3.0 @ 50 MHz	**10**	70 @ 1500 MHz	6.00	.04	1.6
1008HQ-4N1X_BC	4.1 @ 50 MHz	**10**	75 @ 1500 MHz	6.00	.05	1.6
1008HQ-7N8X_BC	7.8 @ 50 MHz	**10**	75 @ 500 MHz	3.80	.05	1.6
1008HQ-10NX_BC	10 @ 50 MHz	**10**	60 @ 500 MHz	3.60	.06	1.6
1008HQ-12NX_BC	12 @ 50 MHz	**10,5**	70 @ 500 MHz	2.80	.06	1.5
1008HQ-18NX_BC	18 @ 50 MHz	**10,5**	62 @ 350 MHz	2.70	.07	1.4
1008HQ-22NX_BC	22 @ 50 MHz	**10,5**	62 @ 350 MHz	2.05	.07	1.4
1008HQ-33NX_BC	33 @ 50 MHz	**10,5**	75 @ 350 MHz	1.70	.09	1.3
1008HQ-39NX_BC	39 @ 50 MHz	**10,5**	75 @ 350 MHz	1.30	.09	1.3
1008HQ-47NX_BC	47 @ 50 MHz	**10,5,**2	75 @ 350 MHz	1.45	.12	1.2
1008HQ-56NX_BC	56 @ 50 MHz	**10,5,**2	75 @ 350 MHz	1.23	.12	1.2
1008HQ-68NX_BC	68 @ 50 MHz	**10,5,**2	80 @ 350 MHz	1.15	.13	1.1
1008HQ-82NX_BC	82 @ 50 MHz	**10,5,**2	80 @ 350 MHz	1.06	.16	1.1
1008HQ-R10X_BC	100 @ 50 MHz	**10,5,**2	62 @ 350 MHz	0.82	.16	1.0

1008CT (2520) Low Profile Series

Part number	Inductance (nH)	Percent tolerance*	Q min	SRF min (MHz)	Rdc max (Ω)	Idc max (mA)
1008CT-040X_BC	4.7 @ 50 MHz	**20,10,5**	42 @ 500 MHz	7500	.15	600
1008CT-080X_BC	8.2 @ 50 MHz	**20,10,5**	50 @ 500 MHz	5000	.22	600
1008CT-150X_BC	15 @ 50 MHz	**20,10,5**	57 @ 500 MHz	3000	.27	600
1008CT-200X_BC	20 @ 50 MHz	**20,10,5**	72 @ 500 MHz	2400	.33	600
1008CT-300X_BC	30 @ 50 MHz	**20,10,5**	69 @ 500 MHz	2400	.38	600
1008CT-400X_BC	40 @ 50 MHz	**20,10,5**	67 @ 500 MHz	2000	.43	600
1008CT-500X_BC	50 @ 50 MHz	**10,5,**2	72 @ 500 MHz	1900	.48	600
1008CT-600X_BC	60 @ 50 MHz	**10,5,**2	75 @ 500 MHz	800	.52	600
1008CT-700X_BC	70 @ 50 MHz	**10,5,**2	68 @ 500 MHz	1700	.55	510
1008CT-800X_BC	80 @ 50 MHz	**10,5,**2	75 @ 500 MHz	1400	.56	510
1008CT-900X_BC	90 @ 50 MHz	**10,5,**2	@ 500 MHz	1400	.61	500

* Bold numbers indicate tolerances carried in stock. When ordering, please replace underscore in part number with the proper tolerance code: F = 1%, G = 2%, J = 5%, K = 10%, M = 20%. (e.g. 1008CS-180X**J**BC for a 5% tolerance part.)

1008LS (2520) Series

Part number	Inductance (nH)	Percent tolerance*	Q min	SRF min (MHz)	Rdc max (Ω)	Idc max (mA)
1008LS-122X_BC	1.2 @ 7.9 MHz	**10,5**	48 @ 50 MHz	210	.68	650
1008LS-152X_BC	1.5 @ 7.9 MHz	**10,5**	41 @ 50 MHz	190	.76	630
1008LS-182X_BC	1.8 @ 7.9 MHz	**10,5**	39 @ 50 MHz	170	.84	600
1008LS-222X_BC	2.2 @ 7.9 MHz	**10,5**	34 @ 50 MHz	150	1.10	520
1008LS-272X_BC	2.7 @ 7.9 MHz	**10,5**	34 @ 50 MHz	135	1.28	490
1008LS-332X_BC	3.3 @ 7.9 MHz	**10,5**	32 @ 50 MHz	120	1.46	450
1008LS-392X_BC	3.9 @ 7.9 MHz	**10,5**	32 @ 7.9 MHz	105	1.56	420
1008LS-472X_BC	4.7 @ 7.9 MHz	**10,5**	31 @ 7.9 MHz	90	1.68	400
1008LS-562X_BC	5.6 @ 7.9 MHz	**10,5**	31 @ 7.9 MHz	80	1.82	380
1008LS-682X_BC	6.8 @ 7.9 MHz	**10,5**	31 @ 7.9 MHz	70	2.00	360
1008LS-822X_BC	8.2 @ 7.9 MHz	**10,5**	23 @ 7.9 MHz	65	2.65	330
1008LS-103X_BC	10.0 @ 7.9 MHz	**10,5**	31 @ 7.9 MHz	60	2.95	300

1206CS (3216) Series

Part number	Inductance (nH)	Percent tolerance*	Q min	SRF min (MHz)	Rdc max (Ω)	Idc max (mA)
1206CS-030X_BC	3.3 @ 100 MHz	**20,10,**5	30 @ 300 MHz	6200	.050	1000
1206CS-060X_BC	6.8 @ 100 MHz	**20,10,5**	30 @ 300 MHz	5500	.070	1000
1206CS-100X_BC	10 @ 100 MHz	**20,10,5**	40 @ 300 MHz	4000	.080	1000
1206CS-120X_BC	12 @ 100 MHz	**20,10,5**	40 @ 300 MHz	3200	.080	1000
1206CS-150X_BC	15 @ 100 MHz	**20,10,5**	40 @ 300 MHz	3200	.100	1000
1206CS-180X_BC	18 @ 100 MHz	**20,10,5,**2	50 @ 300 MHz	2800	.100	1000
1206CS-220X_BC	22 @ 100 MHz	**20,10,5,**2	50 @ 300 MHz	2200	.100	1000
1206CS-270X_BC	27 @ 100 MHz	**20,10,5,**2	50 @ 300 MHz	1800	.110	1000
1206CS-330X_BC	33 @ 100 MHz	**20,10,5,**2	55 @ 300 MHz	1800	.110	1000
1206CS-390X_BC	39 @ 100 MHz	**20,10,5,**2	55 @ 300 MHz	1800	.120	1000
1206CS-470X_BC	47 @ 100 MHz	**20,10,5,**2	55 @ 300 MHz	1500	.130	1000
1206CS-560X_BC	56 @ 100 MHz	**20,10,5,2,**1	55 @ 300 MHz	1450	.140	1000
1206CS-680X_BC	68 @ 100 MHz	**20,10,5,2,**1	55 @ 300 MHz	1200	.260	900
1206CS-820X_BC	82 @ 100 MHz	**20,10,5,2,**1	55 @ 300 MHz	1200	.210	900
1206CS-101X_BC	100 @ 100 MHz	**20,10,5,2,**1	55 @ 300 MHz	1100	.260	850
1206CS-121X_BC	120 @ 100 MHz	**20,10,5,2,**1	60 @ 300 MHz	1100	.260	800
1206CS-151X_BC	150 @ 100 MHz	**20,10,5,2,**1	60 @ 300 MHz	950	.310	750
1206CS-181X_BC	180 @ 50 MHz	**20,10,5,2,**1	60 @ 300 MHz	900	.430	700
1206CS-221X_BC	220 @ 50 MHz	**20,10,5,2,**1	60 @ 300 MHz	760	.500	670
1206CS-271X_BC	270 @ 50 MHz	**20,10,5,2,**1	55 @ 300 MHz	730	.560	630
1206CS-331X_BC	330 @ 50 MHz	**20,10,5,2,**1	45 @ 150 MHz	650	.620	590
1206CS-391X_BC	390 @ 50 MHz	**20,10,5,2,**1	45 @ 150 MHz	600	.750	530
1206CS-471X_BC	470 @ 50 MHz	**20,10,5,2,**1	45 @ 150 MHz	550	1.30	490
1206CS-561X_BC	560 @ 50 MHz	**20,10,5,2,**1	45 @ 150 MHz	470	1.34	460
1206CS-681X_BC	680 @ 35 MHz	**20,10,5,2,**1	45 @ 150 MHz	450	1.58	430
1206CS-821X_BC	820 @ 35 MHz	**20,10,5,2,**1	45 @ 150 MHz	420	1.82	400
1206CS-102X_BC	1000 @ 35 MHz	**20,10,5,2,**1	45 @ 150 MHz	400	2.80	320
1206CS-122X_BC	1200 @ 35 MHz	**20,10,5,2,**1	45 @ 150 MHz	380	3.20	300

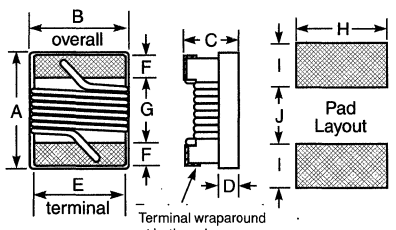
1812CS (4532) Series

Part number	Inductance (nH)	Percent tolerance*	Q min	SRF min (MHz)	Rdc max (Ω)	Idc max (mA)
1812CS-122X_BC	1.2 @ 7.9 MHz	**10,5**	62 @ 50 MHz	230	1.2	480
1812CS-152X_BC	1.5 @ 7.9 MHz	**10,5**	65 @ 50 MHz	210	1.6	430
1812CS-182X_BC	1.8 @ 7.9 MHz	**10,5**	68 @ 50 MHz	190	2.0	380
1812CS-222X_BC	2.2 @ 7.9 MHz	**10,5**	63 @ 50 MHz	170	2.2	340
1812CS-272X_BC	2.7 @ 7.9 MHz	**10,5**	63 @ 50 MHz	160	3.2	300
1812CS-332X_BC	3.3 @ 7.9 MHz	**10,5**	65 @ 50 MHz	145	3.8	270
1812CS-392X_BC	3.9 @ 7.9 MHz	**10,5**	69 @ 50 MHz	130	5.0	240
1812CS-472X_BC	4.7 @ 7.9 MHz	**10,5**	63 @ 50 MHz	115	5.4	230
1812CS-562X_BC	5.6 @ 7.9 MHz	**10,5**	59 @ 50 MHz	100	5.7	220
1812CS-682X_BC	6.8 @ 7.9 MHz	**10,5**	60 @ 50 MHz	90	6.6	210
1812CS-822X_BC	8.2 @ 7.9 MHz	**10,5**	47 @ 50 MHz	80	7.0	200
1812CS-103X_BC	10.0 @ 7.9 MHz	**10,5**	36 @ 50 MHz	70	7.7	190
1812CS-123X_BC	12.0 @ 2.5 MHz	**10,5**	35 @ 10 MHz	60	8.7	180
1812CS-153X_BC	15.0 @ 2.5 MHz	**10,5**	34 @ 10 MHz	50	9.6	170
1812CS-183X_BC	18.0 @ 2.5 MHz	**10,5**	30 @ 10 MHz	45	10.5	160
1812CS-223X_BC	22.0 @ 2.5 MHz	**10,5**	32 @ 10 MHz	40	11.5	155
1812CS-273X_BC	27.0 @ 2.5 MHz	**10,5**	29 @ 10 MHz	30	12.5	150
1812CS-333X_BC	33.0 @ 2.5 MHz	**10,5**	20 @ 10 MHz	20	13.5	145

Coilcraft WWWhttp://www.coilcraft.com DATAFAX 800/651-6974
1102 Silver Lake Road, Cary IL 60013 Fax 847/639-1469 800/322-2645

1812LS (4532) Series

Part number	Inductance µH	Percent tolerance*	Q min	Test freq (MHz)	SRF min (MHz)	Rdc max (Ω)	Idc max (mA)
1812LS-123 X_BC	12 ± 10%	10,**5**	42	2.5	55	2.0	310
1812LS-153 X_BC	15	10,**5**	42	2.5	45	2.5	290
1812LS-183 X_BC	18	10,**5**	45	2.5	37	2.8	270
1812LS-223 X_BC	22	10,**5**	45	2.5	32	3.2	260
1812LS-273 X_BC	27	10,**5**	45	2.5	27	3.6	240
1812LS-333 X_BC	33	10,**5**	45	2.5	23	4.0	230
1812LS-393 X_BC	39	10,**5**	45	2.5	19	4.5	210
1812LS-473 X_BC	47	10,**5**	42	2.5	16	5.0	200
1812LS-563 X_BC	56	10,**5**	42	2.5	13	5.5	190
1812LS-683 X_BC	68	10,**5**	40	2.5	10	6.0	180
1812LS-823 X_BC	82	10,**5**	40	2.5	9	7.0	170
1812LS-104 X_BC	100	10,**5**	40	2.5	8.5	8.0	150
1812LS-124 X_BC	120	10,**5**	33	0.79	8.5	11.5	135
1812LS-154 X_BC	150	10,**5**	36	0.79	8.5	13.0	125
1812LS-184 X_BC	180	10,**5**	36	0.79	8.0	14.2	120
1812LS-224 X_BC	220	10,**5**	38	0.79	6.0	16.2	115
1812LS-274 X_BC	270	10,**5**	38	0.79	5.0	20.5	105
1812LS-334 X_BC	330	10,**5**	38	0.79	4.5	22.5	100
1812LS-394 X_BC	390	10,**5**	38	0.79	3.5	24.5	90
1812LS-474 X_BC	470	10,**5**	38	0.79	3.0	26.5	85
1812LS-564 X_BC	560	10,**5**	33	0.79	2.0	28.5	75
1812LS-684 X_BC	680	10,**5**	33	0.79	1.9	38.0	60
1812LS-824 X_BC	820	10,**5**	30	0.79	1.6	41.0	55
1812LS-105 X_BC	1000	10,**5**	30	0.79	1.5	44.0	50



Terminal wraparound at both ends:
0603CS: .007/0,18
0805HT & 1008HT: .010/0,25
All others: .015/0,38

Dimensions

Series	A max	B max	C max	D ref	E	F	G	H	I	J
0603CS	.071 *1,80*	.044 *1,12*	.040 *1,02*		.030 *0,76*	.013 *0,33*	.034 *0,86*	.040 *1,02*	.025 *0,64*	.025 *0,64*
0805HT	.085 *2,16*	.060 *1,52*	.035 *0,89*		.050 *1,27*	.017 *0,43*	.045 *1,14*	.070 *1,78*	.040 *1,02*	.030 *0,76*
0805HQ	.090 *2,29*	.068 *1,73*	.060 *1,52*	.020 *0,51*	.050 *1,27*	.020 *0,51*	.040 *1,02*	.070 *1,78*	.040 *1,02*	.030 *0,76*
0805CS	.090 *2,29*	.068 *1,73*	.060 *1,52*	.020 *0,51*	.050 *1,27*	.020 *0,51*	.040 *1,02*	.070 *1,78*	.040 *1,02*	.030 *0,76*
0805HS	.085 *2,16*	.060 *1,52*	.057 *1,45*		.050 *1,27*	.020 *0,51*	.040 *1,02*	.070 *1,78*	.040 *1,02*	.030 *0,76*
1008HT	.105 *2,67*	.095 *2,41*	.045 *1,14*		.080 *2,03*	.020 *0,51*	.060 *1,52*	.100 *2,54*	.040 *1,02*	.050 *1,27*
1008HQ	.115 *2,92*	.110 *2,79*	.080 *2,03*	.020 *0,51*	.080 *2,03*	.020 *0,51*	.060 *1,52*	.100 *2,54*	.040 *1,02*	.050 *1,27*
1008CS	.115 *2,92*	.110 *2,79*	.080 *2,03*	.020 *0,51*	.080 *2,03*	.020 *0,51*	.060 *1,52*	.100 *2,54*	.040 *1,02*	.050 *1,27*
1008HS	.105 *2,67*	.095 *2,41*	.070 *1,78*		.080 *2,03*	.020 *0,51*	.060 *1,52*	.100 *2,54*	.040 *1,02*	.050 *1,27*
1008CT	.115 *2,92*	.110 *2,79*	.050 *1,27*	.020 *0,51*	.080 *2,03*	.020 *0,51*	.060 *1,52*	.100 *2,54*	.040 *1,02*	.050 *1,27*
1008LS	.115 *2,92*	.110 *2,79*	.080 *2,03*	.020 *0,51*	.080 *2,03*	.020 *0,51*	.060 *1,52*	.100 *2,54*	.040 *1,02*	.050 *1,27*
1206CS	.140 *3,56*	.085 *2,16*	.060 *1,52*	.020 *0,51*	.056 *1,42*	.020 *0,51*	.080 *2,03*	.076 *1,93*	.040 *1,02*	.070 *1,78*
1812CS	.195 *4,95*	.150 *3,81*	.135 *3,43*	.070 *1,78*	.100 *2,54*	.025 *0,64*	.128 *3,25*	.120 *3,05*	.045 *1,14*	.118 *3,00*
1812LS	.195 *4,95*	.150 *3,81*	.135 *3,43*	.070 *1,78*	.100 *2,54*	.025 *0,64*	.128 *3,25*	.120 *3,05*	.045 *1,14*	.118 *3,00*

Surface Mount "Spring" Air Core Inductors

These tight tolerance surface mount "spring" inductors combine the exceptionally high Q of an air wound coil with the convenience of surface mounting. They're jacketed with a high temperature material for mechanical stability and very close tolerance. It also forms a flat top, making them suitable for automatic placement and reflow or vapor phase processing. Tinned leads assure reliable soldering.

Micro Series

Part number	Turns	L (nH)	Percent Tolerance*	Q min	Test freq (MHz)	SRF min (GHz)	Idc max (A)
0906-2-_	2	1.65	**10**	100	800	10.0	1.2
0906-3-_	3	2.55	**10**,5	100	800	8.2	1.2
0906-4-_	4	3.85	**10**,5	100	800	5.0	1.2
0906-5-_	5	5.45	**5**,2	100	800	4.9	1.2
1606-6-_	6	5.60	**5**,2	100	800	4.9	1.2
1606-7-_	7	7.15	**5**,2	100	800	4.8	1.2
1606-8-_	8	8.80	**5**,2	100	800	4.8	1.2
1606-9-_	9	9.85	**5**,2	100	800	4.7	1.2
1606-10-_	10	12.55	**5**,2	100	800	4.6	1.2

Midi Series

Part number	L (nH)	Percent tolerance*	Q typ	Q min	Test freq (MHz)	SRF min (GHz)	Rdc max (mOhm)	Idc max (A)
1812SMS-22N_	22	**5**,2	135	100	150	3.2	4.2	3.0
1812SMS-27N_	27	**5**,2	135	100	150	2.7	4.0	3.5
1812SMS-33N_	33	**5**,2	130	100	150	2.5	4.8	3.0
1812SMS-39N_	39	**5**,2	135	100	150	2.1	4.4	3.0
1812SMS-47N_	47	**5**,2	135	100	150	2.1	5.6	3.0
1812SMS-56N_	56	**5**,2	125	100	150	1.5	6.2	3.0
1812SMS-68N_	68	**5**,2	120	100	150	1.5	8.2	2.5
1812SMS-82N_	82	**5**,2	120	100	150	1.3	9.4	2.5
1812SMS-R10_	100	**5**,2	115	100	150	1.2	12.3	1.7
1812SMS-R12_	120	**5**,2	125	100	150	1.1	17.3	1.5

Mini Series

Part number	Turns	L (nH)	Percent Tolerance*	Q min	Test freq (MHz)	SRF min (GHz)	Idc (A)
A01T-_	1	2.5	**10**	145	150	12.5	3
A02T-_	2	5.0	**10**,5	140	150	6.5	3
A03T-_	3	8.0	**5**,2	140	150	4.5	3
A04T-_	4	12.5	**5**,2	137	150	3.3	3
A05T-_	5	18.5	**5**,2	132	150	2.7	3
B06T-_	6	17.5	**5**,2	100	150	2.5	3
B07T-_	7	22.0	**5**,2	102	150	2.0	3
B08T-_	8	28.0	**5**,2	105	150	2.6	3
B09T-_	9	35.5	**5**,2	112	150	1.8	3
B10T-_	10	43.0	**5**,2	106	150	1.5	3

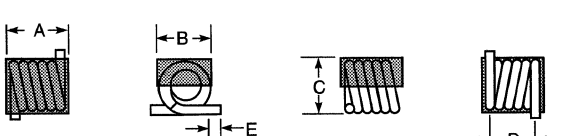
Maxi Series

Part number	L (nH)	Percent tolerance*	Q typ	Test freq Q min	SRF min (MHz)	Rdc max (MHz)	Idc max (mOhm)	(A)
132-09SM_	90	**5**,2	114	95	50	1140	15	3.5
132-10SM_	111	**5**,2	104	87	50	1020	15	3.5
132-11SM_	130	**5**,2	104	87	50	900	20	3.0
132-12SM_	169	**5**,2	114	95	50	875	25	3.0
132-13SM_	206	**5**,2	114	95	50	800	30	3.0
132-14SM_	222	**5**,2	110	92	50	730	35	3.0
132-15SM_	246	**5**,2	114	95	50	685	35	3.0
132-16SM_	307	**5**,2	114	95	50	660	35	3.0
132-17SM_	380	**5**,2	114	95	50	590	50	2.5
132-18SM_	422	**5**,2	114	95	50	540	60	2.5
132-19SM_	491	**5**,2	114	95	50	535	65	2.0
132-20SM_	538	**5**,2	104	87	50	490	90	2.0

* Bold numbers indicate tolerances carried in stock. When ordering, please replace underscore in part number with the proper tolerance code: G = 2%, J = 5%, K = 10%. (e.g. B10T-**J** for a 5% tolerance part.)

Dimensions

Series	A	B	C	D	E
0906	.087±.010 *2,21±0,25*	.056±.005 *1,42±0,13*	.054±.006 *1,37±0,15*	.072±.010 *1,83±0,25*	.035±.010 *0,89±0,25*
1606	.159±.012 *4,04±0,30*	.056±.005 *1,42±0,13*	.054±.006 *1,37±0,15*	.144±.012 *3,66±0,30*	.035±.010 *0,89±0,25*
AXXT	.145 *3,68*	.120 *3,05*	.125 *3,18*	.115±.010 *2,92±0,25*	.023±.015 *0,58±0,38*
BXXT	.270 *6,86*	.120 *3,05*	.125 *3,18*	.230±.015 *5,84±0,25*	.023±.015 *0,58±0,38*
1812	.190 *4,83*	.150 *3,81*	.165 *4,20*	.170±.015 *4,32 ± 0,39*	.060±.015 *1,53 ± 0,39*
132	.415 *10,55*	.240 *6,10*	.210 *5,34*	.314±.020 *7,98 ± 0,51*	.04±.015 *1,02 ± 0,39*

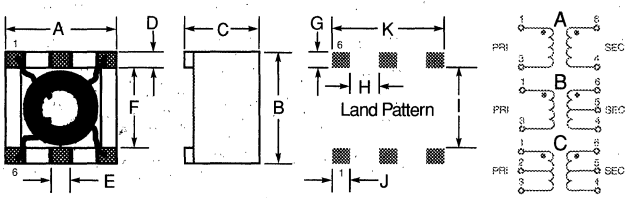


Coilcraft WWWhttp://www.coilcraft.com DATAFAX 800/651-6974
1102 Silver Lake Road, Cary IL 60013 Fax 847/639-1469 800/322-2645

Wideband RF Transformers

Surface Mount

Type	Part number	Ohm ratio	Frequency range	Insertion loss (dB)	3 dB (MHz)	2 dB (MHz)	1 dB (MHz)
A	TTWB-1-A	1:1	.080 - 450	0.60	.080 - 450	.130 - 325	.300 - 190
A	TTWB-1.5A	1.5:1	.030 - 300	0.35	.030 - 300	.035 - 250	.060 - 150
A	TTWB-2-A	2:1	.050 - 200	0.25	.050 - 200	.060 - 160	.100 - 100
A	TTWB-4-A	4:1	.100 - 290	0.50	.100 - 290	.150 - 180	.250 - 125
A	TTWB-16-A	16:1	.050 - 80	0.35	.050 - 80	.060 - 75	.110 - 30
B	TTWB-1-B	1:1	.130 - 425	0.40	.130 - 425	.180 - 325	.320 - 190
B	TTWB-1.5-B	1.5:1	.500 - 250	0.40	.500 - 250	.800 - 175	1.50 - 120
B	TTWB-2-B	2:1	.200 - 400	0.35	.200 - 400	.225 - 275	.500 - 150
B	TTWB-4-B	4:1	.100 - 1500	0.50	.100 - 1500	.150 - 700	.300 - 300
B	TTWB-16-B	16:1	.075 - 90	0.30	.075 - 90	.110 - 75	.200 - 65
C	TTWB-1-C	1:1	.100 - 300	0.60	.100 - 300	.130 - 200	.200 -150
C	TTWB-1.5-C	1.5:1	.150 - 200	0.30	.150 - 200	.225 - 150	.350 - 100
C	TTWB-2-C	2:1	.130 - 285	0.30	.130 - 285	.200 - 175	.325 - 125
C	TTWB-4-C	4:1	.400 - 1350	0.50	.400 - 1350	.625 - 300	.900 - 180

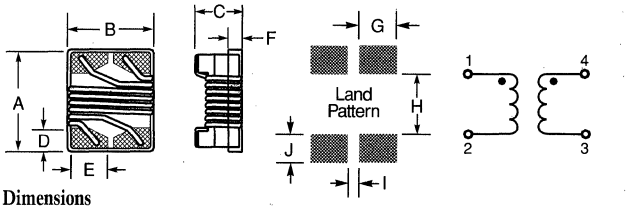


Dimensions

A max	B max	C max	D	E	F	G	H	I	J	K
.25 *6,4*	.25 *6,4*	.19 *4,8*	.035 *0,89*	.04 *1,0*	.180 *4,57*	.045 *1,14*	.055 *1,40*	.170 *4,32*	.050 *1,27*	.260 *6,60*

Surface Mount

Part number	L/winding (µH)	Test freq (MHz)	Turns ratio	DCR max (Ohms)	Idc (mA)	Isolation (Vrms)	Insertion loss (dB)	Bandwidth (MHz)
1812WBT-1	14	10	1:1	4.8	200	50	<1	.340 - 22
1812WBT-2	5.3	10	1:1	1.8	400	50	<1	.800 - 60
1812WBT-3	1.25	50	1:1	0.7	500	50	<1	4 - 200
1812WBT-4	.220	50	1:1	0.3	700	50	<1	11 - 480
1812WBT-5	.090	50	1:1	0.15	700	50	<1.5	48 - 645
1812WBT2-1	13.80/6.9	10	2:1	4.6/3.2	200	50	<1.5	.800 - 23
1812WBT2-2	5.85/2.925	10	2:1	1.25/0.95	400	50	<1.5	2.2 - 65
1812WBT2-3	2.60/1.30	10	2:1	0.52/0.42	600	50	<1.5	4 - 105
1812WBT2-4	.910/.455	50	2:1	0.27/0.23	700	50	<1.5	11 - 200

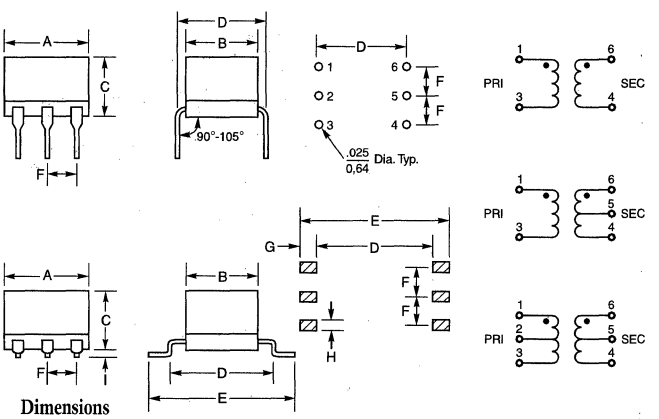


Dimensions

A max	B max	C max	D	E	F	G	H	I	J
.195 *4,95*	.150 *3,81*	.135 *3,43*	.030 *0,76*	.040 *1,02*	.070 1,78	.057 *1,45*	.102 *2,59*	.018 *0,46*	.048 *1,22*

Leaded/Gull Wing

Leaded Part number	Gull wing Part number	Style	Turns ratio	Bandwidth (MHz)	Pins 1-3 L min (µH)	Pins 1-3 DCR max (Ohms)	Pins 6-4 L min (µH)	Pins 6-4 DCR max (Ohms)
WBT1010PC	WBT1010SM	A	1:1	.005 - 100	780	.320	780	.320
WBT1010-1PC	WBT1010-1SM	A	1:1	.04 - 175	95	.200	95	.200
WBT1015PC	WBT1015SM	A	1.5:1	.1 - 150	80	.145	51	.130
WBT1040PC	WBT1040SM	A	4:1	.2 - 300	95	.160	25	.115
WBT2010PC	WBT2010SM	B	1:1	.005 - 100	780	.320	780	.320
WBT2010-1PC	WBT2010-1SM	B	1:1	.04 - 175	95	.200	95	.200
WBT2040PC	WBT2040SM	B	4:1	.2 - 300	95	.160	25	.115
WBT3010PC	WBT3010SM	C	1:1	.005 - 100	780	.320	780	.320
WBT3010-1PC	WBT3010-1SM	C	1:1	.04 - 175	95	.200	95	.200
WBT3015PC	WBT3015SM	C	1.5:1	.1 - 150	80	.145	51	.130
WBT3040PC	WBT3040SM	C	4:1	.2 - 300	95	.160	25	.115



Dimensions

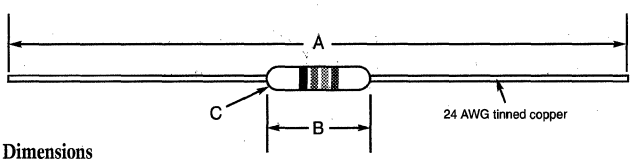
Series	A ref	B ref	C max	D ref	E	F	G	H
Leaded	.300 *7,62*	.260 *6,60*	.225 *5,72*	.300 *7,62*	.30 *7,8*	.10 *2,5*		
Gull wing	.300 *7,62*	.260 *6,60*	.225 *5,72*	.400 *10,16*	.520 *13,2*	.10 *2,5*	.06 *1,52*	.03 *0,76*

Coilcraft WWWhttp://www.coilcraft.com DATAFAX 800/651-6974
1102 Silver Lake Road, Cary IL 60013 Fax 847/639-1469 800/322-2645

Fixed Inductors

Axial Lead RF Inductors

Coilcraft's axial lead chokes are totally encapsulated in a durable epoxy coating. Their low cost compared to molded type chokes makes them particularly attractive to high volume users. Coilcraft chokes are available in the standard values listed here as well as in custom values to meet your specific requirements. Coilcraft **Designer's Kit F102** contains samples of 25 standard parts.



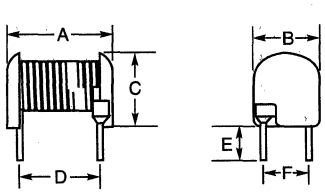
Dimensions

A	B max	C max dia.
2.52 ± .080 *64 ± 2,03*	.300 *7,62*	.118 *2,997*

Part number	L ± 10% (µH)	Q min	Test freq (MHz)	Rdc max (Ω)	SRF min (MHz)	Idc max (mA)
90-01	0.10	38	25	0.08	680	1380
90-02	0.12	38	25	0.09	640	1300
90-03	0.15	38	25	0.11	600	1230
90-04	0.18	35	25	0.12	550	1120
90-05	0.22	33	25	0.14	510	1040
90-06	0.27	33	25	0.16	460	975
90-07	0.33	30	25	0.22	410	830
90-08	0.39	30	25	0.3	365	710
90-09	0.47	30	25	0.35	330	660
90-10	0.56	30	25	0.5	310	550
90-11	0.68	28	25	0.6	280	500
90-12	0.82	28	25	0.85	260	420
90-13	1.0	25	25	1	240	390
90-14	1.2	60	7.9	0.15	150	620
90-15	1.5	60	7.9	0.16	140	560
90-16	1.8	60	7.9	0.2	125	480
90-17	2.2	60	7.9	0.29	115	415
90-18	2.7	50	7.9	0.4	100	355
90-19	3.3	50	7.9	0.42	90	285
90-20	3.9	50	7.9	0.6	80	263
90-21	4.7	40	7.9	0.66	60	239
90-22	5.6	40	7.9	0.7	45	195
90-23	6.8	40	7.9	0.9	40	185
90-24	8.2	40	7.9	1	28	160
90-25	10	35	7.9	1.1	24	144
90-26	12	60	2.5	1.62	20	160
90-27	15	60	2.5	1.75	17	157
90-28	18	60	2.5	1.85	16	149
90-29	22	50	2.5	2	14	144
90-30	27	50	2.5	2.1	12	140
90-31	33	50	2.5	2.2	10	130
90-32	39	50	2.5	2.3	9.5	125
90-33	47	50	2.5	2.4	9	110
90-34	56	50	2.5	3	7.8	100
90-35	68	50	2.5	3.4	7	92
90-36	82	50	2.5	3.8	6.7	88
90-37	100	50	2.5	4.1	6.1	84
90-38	120	60	0.79	6.5	4.8	66
90-39	150	60	0.79	8.3	4.1	61
90-40	180	60	0.79	8.9	4	57
90-41	220	60	0.79	10.1	3.6	52
90-42	270	60	0.79	11	3.3	47
90-43	330	60	0.79	12.4	3.1	45
90-44	390	60	0.79	13.6	2.9	40
90-45	470	60	0.79	18.4	2.4	36
90-46	560	60	0.79	20.3	2.2	35
90-47	680	60	0.79	22.3	2	30
90-48	820	60	0.79	25	1.9	29
90-49	1000	60	0.79	27.4	1.8	28

132 Series Inductors

These fixed RF coils are part of Coilcraft's series of insert molded inductors. This precision construction technique assures constant winding pitch, long term stability and tight tolerance. These high Q fixed inductors are available in standard values from 31.5 nH to 720 nH. Coilcraft **Designer's Kit M104** contains samples of each of 20 standard values plus 13 additional values of tunable horizontal mount inductors.



Dimensions

A max	B max	C max	D	E
.380 *9,65*	.230 *5,84*	.260 *6,60*	.290 ± .005 *7,63 ± 0,13*	.187 ± .030 *4,75 ± 0,76*

Part number	Color	Turns	Dim F	L ± 5% (nH)	Q min
132-01	Brown	1½	.148 inches/3.76 mm	31.5	60 @ 50 MHz
132-02	Red	2½		36.5	64
132-03	Orange	3½		44.0	68
132-04	Yellow	4½		53.5	72
132-05	Green	5½		64.0	75
132-06	Blue	6½		79.0	80
132-07	Violet	7½		99.0	66 @ 25 MHz
132-08	Gray	8½		117	68
132-09	White	9½		138	68
132-10	Black	10½		158	68
132-11	Brown	11½		197	66
132-12	Red	12½	.153 inches/3.89 mm	235	72
132-13	Orange	13½		260	70
132-14	Yellow	14½		290	70
132-15	Green	15½	.154 inches/3.91 mm	345	72
132-16	Blue	16½	.156 inches/3.96 mm	410	72
132-17	Violet	17½		475	66
132-18	Gray	18½		550	66
132-19	White	19½		600	68
132-20	Black	20½	.160 inches/4.06 mm	720	66

Coilcraft WWWhttp://www.coilcraft.com DATAFAX 800/651-6974
1102 Silver Lake Road, Cary IL 60013 Fax 847/639-1469 800/322-2645

"Slot Seven" 7 mm Tunable RF Coils

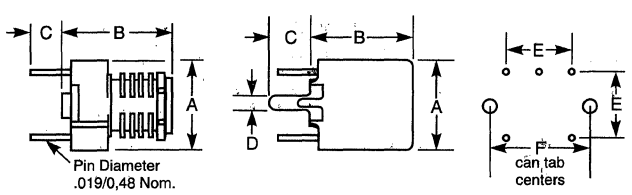
These versatile Coilcraft inductors operate over a wide frequency range. Standard inductance values are available from less than 100 nH to over 250 µH. Custom values can also be provided upon request. Coilcraft "Slot Seven" RF coils come in an international 7 mm package. Their precision molded slotted bobbins assure tight tolerances and high stability. A variety of magnetic and electrostatic shielding options are offered. "Slot Seven" coils are tuned by means of slotted ferrite tuning cores for easy, positive adjustment. Coilcraft **Designer's Kit M106** contains 39 coils (3 each).

Series 7M2 With plastic sleeve

Part number	L min (µH)	L nom (µH)	L max (µH)	Test freq (MHz)	Q min @ L nom	Rdc max (Ω)
7M2-101	0.094	0.100	0.106	25	27	0.124
7M2-121	0.113	0.120	0.127	25	27	0.124
7M2-151	0.141	0.150	0.159	25	30	0.151
7M2-181	0.169	0.180	0.191	25	30	0.151
7M2-221	0.207	0.220	0.233	25	35	0.176
7M2-271	0.254	0.270	0.286	25	35	0.198
7M2-331	0.310	0.330	0.350	25	40	0.248
7M2-391	0.367	0.390	0.413	25	40	0.271
7M2-471	0.442	0.470	0.498	25	40	0.291
7M2-561	0.526	0.560	0.594	25	40	0.317
7M2-681	0.612	0.680	0.748	25	40	0.333
7M2-821	0.738	0.820	0.902	25	45	0.368
7M2-102	0.9	1.0	1.1	25	45	0.396
7M2-122	1.1	1.2	1.3	7.9	27	0.412
7M2-152	1.4	1.5	1.7	7.9	27	0.466
7M2-182	1.6	1.8	2.0	7.9	27	0.544
7M2-222	2.0	2.2	2.4	7.9	27	0.595
7M2-272	2.4	2.7	3.0	7.9	27	0.898
7M2-332	3.0	3.3	3.6	7.9	27	1.04
7M2-392	3.5	3.9	4.3	7.9	27	1.12
7M2-472	4.2	4.7	5.2	7.9	27	1.38
7M2-562	5.0	5.6	6.2	7.9	27	1.42
7M2-682	6.1	6.8	7.5	7.9	27	1.49
7M2-822	7.4	8.2	9.0	7.9	27	1.65
7M2-103	9.0	10	11	7.9	27	2.42
7M2-123	10	12	14	2.5	20	2.75
7M2-153	13	15	17	2.5	20	3.71
7M2-183	15	18	21	2.5	20	4.01
7M2-223	19	22	25	2.5	20	7.37
7M2-273	23	27	31	2.5	20	8.48
7M2-333	28	33	38	2.5	20	13.34
7M2-393	33	39	45	2.5	20	14.72
7M2-473	40	47	54	2.5	20	16.42
7M2-563	48	56	64	2.5	20	17.76
7M2-683	58	68	78	2.5	20	19.76
7M2-823	70	82	94	2.5	20	22.01
7M2-104	85	100	115	2.5	20	24.25

Series 7M3 With ferrite magnetic shield

Part number	L min (µH)	L nom (µH)	L max (µH)	Test freq (MHz)	Q min @ L nom	Rdc max (Ω)
7M3-151	0.128	0.150	0.173	25	40	0.124
7M3-181	0.153	0.180	0.207	25	45	0.124
7M3-221	0.187	0.220	0.253	25	45	0.151
7M3-271	0.230	0.270	0.311	25	50	0.151
7M3-331	0.281	0.330	0.380	25	50	0.151
7M3-391	0.332	0.390	0.449	25	55	0.176
7M3-471	0.400	0.470	0.541	25	55	0.198
7M3-561	0.476	0.560	0.644	25	60	0.198
7M3-681	0.544	0.680	0.816	25	60	0.248
7M3-821	0.656	0.820	0.984	25	60	0.271
7M3-102	0.8	1.0	1.2	25	60	0.317
7M3-122	1.0	1.2	1.4	7.9	45	0.333
7M3-152	1.2	1.5	1.8	7.9	45	0.368
7M3-182	1.4	1.8	2.2	7.9	45	0.396
7M3-222	1.8	2.2	2.6	7.9	45	0.412
7M3-272	2.2	2.7	3.2	7.9	45	0.466
7M3-332	2.6	3.3	4.0	7.9	40	0.544
7M3-392	3.1	3.9	4.7	7.9	40	0.595
7M3-472	3.8	4.7	5.6	7.9	40	0.898
7M3-562	4.5	5.6	6.7	7.9	40	1.04
7M3-682	5.4	6.8	8.2	7.9	35	1.04
7M3-822	6.6	8.2	9.8	7.9	35	1.12
7M3-103	8	10	12	7.9	35	1.38
7M3-123	9	12	15	2.5	35	1.49
7M3-153	11	15	19	2.5	35	1.65
7M3-183	14	18	23	2.5	35	2.42
7M3-223	17	22	28	2.5	35	2.75
7M3-273	20	27	34	2.5	40	3.71
7M3-333	25	33	41	2.5	40	3.71
7M3-393	29	39	49	2.5	40	4.01
7M3-473	35	47	59	2.5	40	7.37
7M3-563	42	56	70	2.5	40	8.48
7M3-683	51	68	85	2.5	40	13.34
7M3-823	62	82	103	2.5	40	14.72
7M3-104	75	100	125	2.5	40	16.42
7M3-124	90	120	150	2.5	40	17.76
7M3-154	113	150	188	2.5	40	19.76
7M3-184	135	180	225	2.5	40	22.01
7M3-224	165	220	275	2.5	40	24.25



Dimensions

A max square	B	C	D	E	F ref	Pin dia nom
.300 *7,62*	.460 ± .008 *11,68 ± 0,20*	.138 ± .040 *3,51 ± 1,02*	.039 ± .008 *0,99 ± 0,20*	.177 ± .005 *4,50 ± 0,13*	.285 ± *7,24*	.019 *0,48*

Coilcraft WWWhttp://www.coilcraft.com DATAFAX 800/651-6974
1102 Silver Lake Road, Cary IL 60013 Fax 847/639-1469 800/322-2645

"Slot Ten" 10 mm Tunable RF Coils

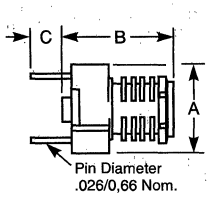
These versatile Coilcraft variable inductors operate over a wide range of frequencies. Standard inductance values are available from less than 1 µH to over 1 mH. Custom values can also be provided upon request. Coilcraft "Slot Ten" RF coils come in an international 10 mm package. Their precision molded slotted bobbins assure tight tolerances and high stability. A variety of magnetic and electrostatic shielding options are offered. "Slot Ten" coils are tuned by means of ferrite or powdered iron tuning cores with a hex hole for easy, positive adjustment. Coilcraft **Designer's Kit M100** contains 18 shielded coils (3 each) plus extra cores and sleeves to create all of the standard values shown.

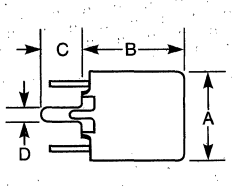
Style 1 Unshielded with Carbonyl E core

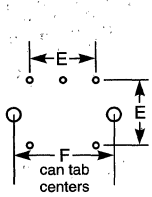
Part number	Color	L min (µH)	L max (µH)	L nom (µH)	Q min @ L nom	Test freq
Slot Ten-1-01	Brown	.800	1.2	1.0	48	7.9 MHz
Slot Ten-1-02	Red	1.2	1.8	1.5	50	7.9
Slot Ten-1-03	Orange	1.76	2.64	2.2	56	7.9
Slot Ten-1-04	Yellow	2.56	3.84	3.2	54	7.9
Slot Ten-1-05	Green	3.6	5.4	4.5	54	7.9
Slot Ten-1-06	Blue	5.2	7.8	6.5	51	7.9
Slot Ten-1-07	Violet	7.6	11.4	9.5	48	7.9
Slot Ten-1-08	Grey	11.2	16.8	14.0	38	2.5
Slot Ten-1-09	White	16.0	24.0	20.0	38	2.5
Slot Ten-1-10	Black	22.4	33.6	28.0	38	2.5
Slot Ten-1-11	Brown	32.0	48.0	40.0	38	2.5
Slot Ten-1-12	Red	46.4	69.6	58.0	47	2.5
Slot Ten-1-13	Orange	67.2	100.2	84.0	48	2.5
Slot Ten-1-14	Yellow	96	144	120.0	40	790 KHz
Slot Ten-1-15	Green	137.6	206.4	172.0	34	790
Slot Ten-1-16	Blue	200	300	250.0	39	790
Slot Ten-1-17	Violet	280	432	360.0	30	790
Slot Ten-1-18	Grey	416	624	520.0	35	790

Style 2 Unshielded with ferrite core

Part number	Color	L min (µH)	L max (µH)	L nom (µH)	Q min @ L nom	Test freq
Slot Ten-2-01	Brown	.80	1.7	1.2	47	7.9 MHz
Slot Ten-2-02	Red	1.25	2.75	2.0	48	7.9
Slot Ten-2-03	Orange	1.75	4.0	2.9	48	7.9
Slot Ten-2-04	Yellow	2.4	5.4	3.9	47	7.9
Slot Ten-2-05	Green	3.5	7.8	5.6	47	7.9
Slot Ten-2-06	Blue	4.7	10.6	7.6	46	7.9
Slot Ten-2-07	Violet	7.4	15.6	11.5	38	2.5
Slot Ten-2-08	Grey	11	25	18.2	40	2.5
Slot Ten-2-09	White	16	35	25.3	40	2.5
Slot Ten-2-10	Black	22	50	36.5	40	2.5
Slot Ten-2-11	Brown	33	72	52.5	39	2.5
Slot Ten-2-12	Red	46	103	74.8	51	2.5
Slot Ten-2-13	Orange	66	136	100	40	790 KHz
Slot Ten-2-14	Yellow	95	198	146	44	790
Slot Ten-2-15	Green	136	297	216	40	790
Slot Ten-2-16	Blue	198	426	312	45	790
Slot Ten-2-17	Violet	286	630	530	33	790
Slot Ten-2-18	Grey	418	927	790	38	790







Style 3 Shielded with carbonyl E core & plastic sleeve

Part number	Color	L min (µH)	L max (µH)	L nom (µH)	Q min @ L nom	Test freq
Slot Ten-3-01	Brown	.70	.94	.82	65	7.9 MHz
Slot Ten-3-02	Red	1.05	1.41	1.23	37	7.9
Slot Ten-3-03	Orange	1.5	2.0	1.75	40	7.9
Slot Ten-3-04	Yellow	2.04	2.76	2.4	40	7.9
Slot Ten-3-05	Green	2.9	3.9	3.4	39	7.9
Slot Ten-3-06	Blue	4.25	5.75	5.0	38	7.9
Slot Ten-3-07	Violet	6	8.2	7.1	35	7.9
Slot Ten-3-08	Grey	9.4	12.6	11.0	25	2.5
Slot Ten-3-09	White	12.8	17.2	15.0	25	2.5
Slot Ten-3-10	Black	18.7	25.3	22.0	26	2.5
Slot Ten-3-11	Brown	26.4	35.6	31.0	25	2.5
Slot Ten-3-12	Red	37.4	50.6	44	29	2.5
Slot Ten-3-13	Orange	52.7	71.3	62	30	2.5
Slot Ten-3-14	Yellow	79	105	92	28	2.5
Slot Ten-3-15	Green	108.8	147.2	128	18	790 KHz
Slot Ten-3-16	Blue	155	208	182	20	790
Slot Ten-3-17	Violet	230	310	270	16	790
Slot Ten-3-18	Grey	336	450	390	18	790

Style 4 Shielded with carbonyl E core and sleeve

Part number	Color	L min (µH)	L max (µH)	L nom (µH)	Q min @ L nom	Test freq
Slot Ten-4-01	Brown	.80	1.2	1.0	44	7.9 MHz
Slot Ten-4-02	Red	1.2	1.8	1.5	45	7.9
Slot Ten-4-03	Orange	1.76	2.64	2.2	48	7.9
Slot Ten-4-04	Yellow	2.56	3.84	3.2	48	7.9
Slot Ten-4-05	Green	3.6	5.4	4.5	46	7.9
Slot Ten-4-06	Blue	5.2	7.8	6.5	43	7.9
Slot Ten-4-07	Violet	7.6	11.4	9.5	40	7.9
Slot Ten-4-08	Grey	11.2	16.8	14	32	2.5
Slot Ten-4-09	White	16.0	24.0	20	33	2.5
Slot Ten-4-10	Black	22.4	33.6	28	32	2.5
Slot Ten-4-11	Brown	32.0	48.0	40	32	2.5
Slot Ten-4-12	Red	46.4	69.6	58	40	2.5
Slot Ten-4-13	Orange	67.2	100.8	85	40	2.5
Slot Ten-4-14	Yellow	96	144	120	33	790 KHz
Slot Ten-4-15	Green	137.6	206.4	172	28	790
Slot Ten-4-16	Blue	200.0	300.0	250	32	790
Slot Ten-4-17	Violet	288	432	360	26	790
Slot Ten-4-18	Grey	416	624	520	29	790

Style 5 Shielded with ferrite core and sleeve

Part number	Color	L min (µH)	L max (µH)	L nom (µH)	Q min @ L nom	Test freq
Slot Ten-5-01	Brown	.86	2.0	1.4	43	7.9 MHz
Slot Ten-5-02	Red	1.27	3.25	2.25	44	7.9
Slot Ten-5-03	Orange	1.83	4.6	3.25	41	7.9
Slot Ten-5-04	Yellow	2.48	6.4	4.5	40	7.9
Slot Ten-5-05	Green	3.58	9.3	6.5	40	7.9
Slot Ten-5-06	Blue	5.0	12.7	8.8	38	7.9
Slot Ten-5-07	Violet	7.7	18.4	13.0	30	2.5
Slot Ten-5-08	Grey	12.0	30.0	20.9	35	2.5
Slot Ten-5-09	White	16	42	29.4	34	2.5
Slot Ten-5-10	Black	25	60	42.3	32	2.5
Slot Ten-5-11	Brown	36	90	62.8	30	2.5
Slot Ten-5-12	Red	48	126	87.2	42	2.5
Slot Ten-5-13	Orange	72	163	116	35	790 KHz
Slot Ten-5-14	Yellow	102	238	168	36	790
Slot Ten-5-15	Green	147	360	252	36	790
Slot Ten-5-16	Blue	215	522	312	45	790
Slot Ten-5-17	Violet	303	765	530	33	790
Slot Ten-5-18	Grey	440	1143	790	38	790

Dimensions

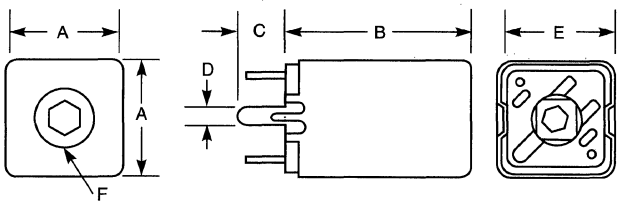
Style	A square	B	C	D	E	F	Pin dia nom
1 and 2, unshielded	.380 ± .005 *9,65 ± 0,127*	.500 ± .010 *12,7 ± 0,254*	.138 ± .020 *3,50 ± 0,508*		.276 ± .005 *7,01 ± 0,127*		.026 *0,66*
3, 4 and 5, shielded	.411 *10,45*	.512 ± .008 *13,0 ± 0,203*	.157 ± .010 *4,00 ± 0,25*	.060 ± .010 *1,5 ± 0,25*	.276 ± .005 *7,01 ± 0,127*	.375 *9,5*	

Coilcraft WWWhttp://www.coilcraft.com DATAFAX 800/651-6974
1102 Silver Lake Road, Cary IL 60013 Fax 847/639-1469 800/322-2645

Tunable RF Coils

"Unicoil" 5, 7, and 10 mm Inductors

These variable inductors are precision molded in plastic to assure constant winding pitch and a consistent relationship to the printed circuit board. Extremely economical, even in small quantities, they come in standard inductance values from 9 to 945 nH. Tuning is done by means of a threaded powdered iron core with a hex socket or slot for easy, positive tuning. Plated brass cans with solderable tabs are provided for electromagnetic shielding. Coilcraft **Designer's Kit M102** contains samples of all standard parts shown.



Dimensions

Series	A max	B max	C tab length*	D*	E tab centers	F dia	G pin dia nom
142	.380 *9,65*	.531 *13,5*	.157 *3,99*	.060 *1,5*	.375 *9,5*	.197 *5,0*	.025 *0,64*
143/144	.380 *9,65*	.750 *19,0*	.157 *3,99*	.060 *1,5*	.375 *9,5*	.197 *5,0*	.025 *0,64*
146/150	.300 *7,62*	.475 *12,1*	.138 *3,51*	.039 *1,0*	.280 *12,1*	.216 *5,5*	.020 *0,51*
164/165	.230 *5,84*	.340 *8,64*	.120 *3,05*	.031 *0,8*	.212 *5,4*	.120 *3,1*	.018 *0,46*

* ±.010 *0,25*

Part number	Color	Turns	No core L ref (µH)	L min (µH)	L nom (µH)	L max (µH)	Min Q @ L nom
5 mm coils							
164-01A06S	Brown	1½	.016	.014	.015	.016	115 @ 150 MHz
164-02A06S	Red	2½	.027	.022	.025	.027	98 "
164-03A06S	Orange	3½	.041	.032	.037	.041	82 "
164-04A06S	Yellow	4½	.056	.043	.050	.056	75 "
164-05A06S	Green	5½	.071	.053	.062	.071	69 "
164-06A06S	Blue	6½	.088	.065	.073	.080	68 "
164-07A06S	Violet	7½	.105	.076	.089	.101	62 @ 100 MHz
164-08A06S	Grey	8½	.122	.087	.102	.117	59 "
164-09A06S	White	9½	.141	.100	.117	.134	57 "
164-10A06S	Black	10½	.160	.113	.132	.150	55 "
164-11A06S	Brown	11½	.079	.127	.146	.164	55 "
165-00A06S	Black	½	.009	.009	.009	.009	129 @ 150 MHz
165-01A06S	Brown	1½	.016	.014	.015	.016	114 "
165-02A06S	Red	2½	.025	.021	.023	.025	98 "
165-03A06S	Orange	3½	.035	.028	.031	.033	90 "
165-04A06S	Yellow	4½	.046	.035	.038	.041	79 "
165-05A06S	Green	5½	.057	.043	.047	.050	74 "
165-06A06S	Blue	6½	.068	.052	.056	.059	70 "
165-07A06S	Violet	7½	.080	.060	.065	.070	69 "
7 mm coils							
150-01J08S	Brown	1½	.0425	.0435	.0445	.0445	72 @ 50 MHz
150-02J08S	Red	2½	.054	.056	.060	.064	80 "
150-03J08S	Orange	3½	.068	.071	.076	.081	84 "
150-04J08S	Yellow	4½	.0825	.086	.095	.104	85 "
150-05J08S	Green	5½	.0955	.107	.115	.123	84 "
150-06J08S	Blue	6½	.109	.125	.134	.143	82 "
150-07J08S	Violet	7½	.123	.150	.156	.162	80 "
146-01J08S	Brown	1½	.044	.045	.046	.047	76 "
146-02J08S	Red	2½	.059	.062	.065	.068	78 "
146-03J08S	Orange	3½	.075	.080	.085	.090	78 "
146-04J08S	Yellow	4½	.095	.100	.110	.120	78 "
146-05J08S	Green	5½	.115	.120	.135	.150	76 "
146-06J08S	Blue	6½	.136	.142	.163	.184	72 "
146-07J08S	Violet	7½	.155	.172	.194	.216	68 "
146-08J08S	Gray	8½	.176	.200	.224	.248	66 "
146-09J08S	White	9½	.202	.234	.260	.284	60 "
146-10J08S	Black	10½	.224	.260	.288	.315	56 "
10 mm coils							
144-01J12S	Brown	1½	.050	.052	.053	.054	97 @ 40 MHz
144-02J12S	Red	2½	.067	.070	.074	.078	98 "
144-03J12S	Orange	3½	.088	.092	.099	.106	98 "
144-04J12S	Yellow	4½	.106	.111	.122	.133	100 "
144-05J12S	Green	5½	.126	.132	.149	.165	101 "
144-06J12S	Blue	6½	.147	.154	.175	.196	106 "
144-07J12S	Violet	7½	.168	.176	.200	.223	104 "
144-08J12S	Gray	8½	.190	.202	.226	.250	108 "
144-09J12S	White	9½	.210	.239	.256	.274	108 "
144-10J12S	Black	10½	.232	.270	.282	.295	106 "
142-01J08S	Brown	1½	.058	.058	.0595	.061	82 "
142-02J08S	Red	2½	.081	.084	.086	.089	83 "
142-03J08S	Orange	3½	.110	.115	.120	.121	83 "
142-04J08S	Yellow	4½	.140	.147	.156	.160	88 "
142-05J08S	Green	5½	.174	.182	.197	.205	94 "
142-06J08S	Blue	6½	.210	.220	.240	.248	94 "
142-07J08S	Violet	7½	.247	.259	.280	.290	90 "
142-08J08S	Gray	8½	.284	.299	.322	.337	86 "
142-09J08S	White	9½	.319	.338	.363	.377	88 "
142-10J08S	Black	10½	.357	.382	.410	.422	82 "
143-09J12S	White	9½	.300	.315	.369	.423	80 "
142-10J12S	Black	10½	.338	.355	.416	.477	82 "
143-11J12S	Brown	11½	.377	.396	.468	.540	78 "
143-12J12S	Red	12½	.412	.433	.509	.585	80 "
143-13J12S	Orange	13½	.452	.475	.556	.637	80 "
143-14J12S	Yellow	14½	.490	.515	.604	.693	78 "
143-15J12S	Green	15½	.522	.583	.660	.738	80 "
143-16J12S	Blue	16½	.575	.638	.720	.801	76 "
143-17J12S	Violet	17½	.612	.693	.770	.846	76 "
143-18J12S	Gray	18½	.650	.754	.814	.874	82 "
143-19J12S	White	19½	.675	.792	.846	.900	80 "
143-20J12S	Black	20½	.715	.847	.896	.945	74 "

Coilcraft WWWhttp://www.coilcraft.com DATAFAX 800/651-6974
1102 Silver Lake Road, Cary IL 60013 Fax 847/639-1469 800/322-2645

EMI/RFI Filters

Data Line EMI Filters

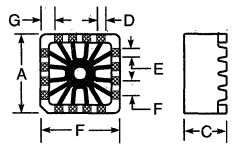
These filters virtually eliminate the problem of conducted EMI and RFI in data line applications. They provide common mode noise attenuation and can reduce conducted noise by a factor of 32 from nearly 1 MHz to 300 MHz while data frequencies below 300 MHz pass without attenuation. These low resistance filters have been designed for excellent electrical isolation, environmental stability, and low cost. Custom filters with additional circuits, increased current carrying capability or lower Rdc are also available. Coilcraft **Designer's Kit D103** contains samples of all values shown.

Dimensions

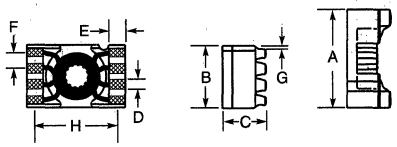
Series	A max	B max	C max	D ref	E typ	F cen	G ref	H cen
CCDLF 10000	.360 *9,14*	.360 *9,14*	.170 *4,32*	.030 *0,76*	.040 *1,02*	.050 *1,27*	.060 *1,52*	
CCDLF 8X00	.305 *7,75*	.305 *7,75*	.170 *4,32*	.030 *0,76*	.040 *1,02*	.050 *1,27*	.060 *1,52*	
TTDLF (all)	.320 *8,13*	.198 *5,03*	.155 *3,94*	.030 *0,76*	.050 *1,27*	.050 *1,27*	.008 *0,20*	.250 *6,35*
M2022-A	.195 *4,95*	.150 *3,81*	.135 *3,43*	.030 *0,76*	.040 *1,02*		.070 *1,78*	
DLF 8X00C	.858 *21,79*	.450 *11,43*	.650 *16,51*	.700 *17,78*	.115 *2,90*	.100 *2,54*		
DLF 8X00	.850 *21,59*	.450 *11,43*	.400 *10,16*	.700 *17,78*	.115 *2,90*	.100 *2,54*		
DLF 4X00	.450 *11,43*	.450 *11,43*	.400 *10,16*	.300 *7,62*	.115 *2,90*	.100 *2,54*		
DLF 3X00	.350 *8,90*	.450 *11,43*	.400 *10,16*	.200 *5,08*	.115 *2,90*	.100 *2,54*		
DLF 2X00	.350 *8,90*	.450 *11,43*	.400 *10,16*	.200 *5,08*	.115 *2,90*	.100 *2,54*		

Part number	Lines	Current max (mA)	L typ (µH/wind)	Rdc max (mΩ)	Isolation (Vrms)
CCDLF 10000	10	100	5	250	300
CCDLF 8000	8	100	5	250	300
CCDLF 8500	8	500	5	200	300
TTDLF 4000	4	100	5	250	300
TTDLF 4500	4	500	5	200	300
TTDLF 3000	3	100	5	250	300
TTDLF 3500	3	500	5	200	300
TTDLF 2000	2	100	5	250	300
TTDLF 2500	2	500	5	200	300
M2022-A	2	500	4.2	800	50
DLF 8000C	8	100	28	100	300
DLF 8000	8	100	28	100	300
DLF 8500C	8	500	5	45	300
DLF 8500	8	500	5	45	300
DLF 4000	4	100	28	100	300
DLF 4500	4	500	24	45	300
DLF 3000	3	100	28	100	300
DLF 3500	3	500	24	45	300
DLF 2000	2	100	28	100	300
DLF 2500	2	500	24	45	300

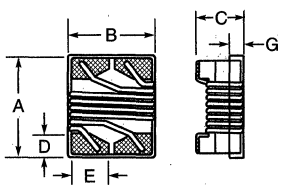
CCDLF Series



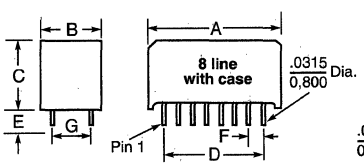
TTDLF Series



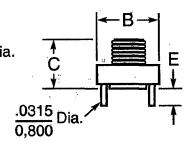
M2022-A



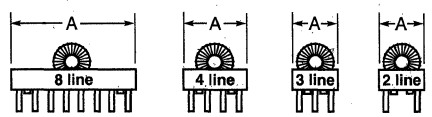
DLF8X00C



DLF8X000



DLF4X00 DLF3X00 DLF2X00



Tip/Ring Filters

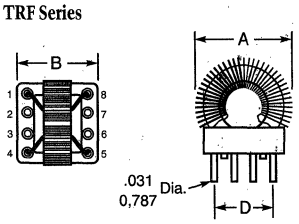
These economical filters are designed to help telecommunications equipment engineers meet FCC and CCITT requirements. Available in 1 or 2 line (2 or 4 wire) versions, Coilcraft "tip/ring" filters provide 15 to 25 dB attenuation of common mode noise over the 30 to 300 MHz range.

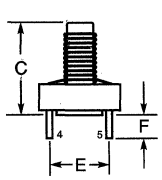
Dimensions

Series	A max	B max	C max	D cen	E cen	F	G ref	H
TRFX000	.475 *12,07*	.425 *10,80*	.550 *13,97*	.300 *7,62*	.300 *7,62*	.115 *2,92*		
TTTRFX000	.320 *8,13*	.198 *5,03*	.155 *3,94*	.250 *6,35*	.050 *1,27*	.050 *1,27*	.030 *0,76*	.008 *0,20*

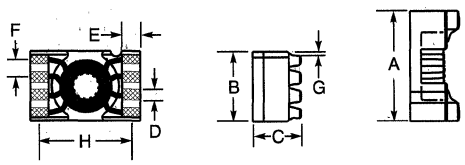
Part number	Lines	L min (µH)	Rated current (mA)	Rdc max (mΩ)	Dielectric strength min (Vrms)
TRF2000	1	20	500	65	1500
TRF4000	2	20	500	65	1500
TTTRF2000	1	35	500	75	1500
TTTRF4000	2	35	500	75	1500

TRF Series





TTTRF Series



Coilcraft WWW http://www.coilcraft.com DATAFAX 800/651-6974
1102 Silver Lake Road, Cary IL 60013 Fax 847/639-1469 800/322-2645

Surface Mount Power Inductors

Coilcraft offers several series of ultraminiature surface mount inductors for DC-DC conversion and other power applications. The DS and DT Series are shielded; the DO1607 and DO3308 Series have the lowest profiles; and the DO3316HC, DO3340 and DO5022HC Series offer exceptionally high current capabilities. In addition to the standard versions shown here, custom inductors are available to meet your exact requirements. Coilcraft **Designer's Kits** are available for many of these series.

DO1607 Series

Part number	L ± 20% (µH)	Rdc max (Ω)	Isat (Adc)	Irms (A)
DO1607C-102	1.0	.06	2.3	2.3
DO1607C-152	1.5	.07	2.1	2.3
DO1607C-222	2.2	.10	1.8	1.9
DO1607C-332	3.3	.12	1.6	1.6
DO1607C-472	4.7	.13	1.4	1.2
DO1607C-682	6.8	.165	1.2	1.1
DO1607C-103	10	.19	0.88	0.96
DO1607C-153	15	.32	0.72	0.88
DO1607C-223	22	.43	0.56	0.64
DO1607C-333	33	.55	0.46	0.48

DO1608 Series

Part number	L ± 20% (µH)	Rdc max (Ω)	Isat (Adc)	Irms (A)
DO1608C-102	1.0	.06	2.90	2.9
DO1608C-152	1.5	.06	2.60	2.8
DO1608C-222	2.2	.07	2.30	2.4
DO1608C-332	3.3	.08	2.00	2.0
DO1608C-472	4.7	.09	1.50	1.5
DO1608C-682	6.8	.13	1.20	1.4
DO1608C-103	10	.16	1.10	1.1
DO1608C-153	15	.23	0.90	1.2
DO1608C-223	22	.37	0.70	0.8
DO1608C-333	33	.51	0.58	0.6
DO1608C-473	47	.64	0.50	0.5
DO1608C-683	68	.86	0.40	0.4
DO1608C-104	100	1.27	0.31	0.3
DO1608C-154	150	2.00	0.27	0.25
DO1608C-224	220	2.65	0.22	0.2
DO1608C-334	330	3.80	0.18	0.16
DO1608C-474	470	5.06	0.16	0.15
DO1608C-684	680	9.20	0.14	0.12
DO1608C-105	1000	13.8	0.10	0.07

DS1608 Series - Shielded

Part number	L ± 20% (µH)	Q min @100 kHz	Rdc max (Ω)	SRF (MHz)	Current max (A)
DS1608C-102	1.0	30	.040	250	3.0
DS1608C-152	1.5	30	.045	125	2.8
DS1608C-222	2.2	40	.050	120	1.8
DS1608C-332	3.3	40	.055	120	1.6
DS1608C-472	4.7	40	.060	105	1.4
DS1608C-682	6.8	40	.065	50	1.2
DS1608C-103	10	40	.075	38	1.0
DS1608C-153	15	40	.090	33	.80
DS1608C-223	22	40	.11	25	.70
DS1608C-333	33	40	.19	20	.60
DS1608C-473	47	40	.23	20	.50
DS1608C-683	68	40	.29	15	.40
DS1608C-104	100	40	.48	10	.30
DS1608C-154	150	40	.59	9	.26
DS1608C-224	220	40	.77	6	.22
DS1608C-334	330	40	1.4	5	.20
DS1608C-474	470	40	1.8	4	.19
DS1608C-684	680	40	2.2	3	.18
DS1608C-105	1000	40	3.4	2	.15
DS1608C-155	1500	50	4.2	2	.12
DS1608C-225	2200	50	8.5	2	.10
DS1608C-335	3300	50	11.0	1	.08
DS1608C-475	4700	50	13.9	1	.06
DS1608C-685	6800	50	25.0	1	.04
DS1608C-106	10000	50	32.8	0.8	.02

DT1608 Series - Shielded

Part number	0 Adc L ± 20% (µH)	Rdc max (Ω)	L at rated current (µH)	Current rating (A)	Max energy storage (µJoules)	Max switching freq
DT1608C-102	1.0	.045	.60	2.0	1.8	1 MHz
DT1608C-152	1.5	.050	.80	1.9	1.8	1 MHz
DT1608C-222	2.2	.060	.90	1.5	1.8	1 MHz
DT1608C-332	3.3	.070	1.5	1.2	1.4	1 MHz
DT1608C-472	4.7	.080	2.0	1.2	1.6	1 MHz
DT1608C-682	6.8	.085	3.0	1.0	1.9	1 MHz
DT1608C-103	10	.095	5.0	.7	1.2	1 MHz
DT1608C-153	15	.135	6.0	.6	1.1	1 MHz
DT1608C-223	22	.160	10	.5	1.2	1 MHz
DT1608C-333	33	.275	12	.45	1.5	1 Mhz
DT1608C-473	47	.550	20	.34	1.3	1 MHz
DT1608C-683	68	.575	30	.29	1.4	1 MHz
DT1608C-104	100	1.10	40	.24	1.5	1 MHz
DT1608C-154	150	1.40	60	.20	1.4	500 kHz
DT1608C-224	220	2.25	90	.17	1.6	500 kHz
DT1608C-334	330	2.90	100	.16	1.4	500 kHz
DT1608C-474	470	3.60	150	.14	1.5	500 kHz
DT1608C-684	680	4.55	200	.12	1.4	500 kHz
DT1608C-105	1000	8.10	400	.08	1.4	500 kHz

DO3316 Series

Part number	L ± 20% (µH)	Rdc max (Ω)	Isat (Adc)	Irms (A)
DO3316P-102	1.0	.009	9.0	6.8
DO3316P-152	1.5	.010	8.0	6.4
DO3316P-222	2.2	.012	7.0	6.1
DO3316P-332	3.3	.015	6.4	5.4
DO3316P-472	4.7	.018	5.4	4.8
DO3316P-682	6.8	.022	4.6	4.4
DO3316P-103	10	.029	3.8	3.9
DO3316P-153	15	.046	3.0	3.1
DO3316P-223	22	.058	2.6	2.7
DO3316P-333	33	.10	2.0	2.1
DO3316P-473	47	.14	1.6	1.8
DO3316P-683	68	.18	1.4	1.5
DO3316P-104	100	.26	1.2	1.3
DO3316P-154	150	.38	1.0	1.0
DO3316P-224	220	.61	.8	.8
DO3316P-334	330	.93	.6	.6
DO3316P-474	470	1.27	.5	.5
DO3316P-684	680	1.84	.4	.4
DO3316P-105	1000	2.47	.3	.3

DO3316HC Series - High Current

Part number	L ± 20% (µH)	Rdc max (Ω)	Isat (Adc)	Irms (A)
DO3316P-331HC	0.33	.004	20.0	16.0
DO3316P-681HC	0.68	.005	13.0	12.0
DO3316P-102HC	1.0	.006	11.0	10.0
DO3316P-152HC	1.5	.008	9.0	9.0
DO3316P-222HC	2.2	.011	7.8	7.4
DO3316P-272HC	2.7	.012	7.0	6.6
DO3316P-332HC	3.3	.014	6.4	5.9

DS3316 Series - Shielded

Part Number	L ± 20% (µH)	Rdc max (Ω)	Isat (A)	Irms (A)
DS3316P-102	1.0	.021	5.6	5.0
DS3316P-152	1.5	.022	5.2	4.5
DS3316P-222	2.2	.032	5.0	3.8
DS3316P-332	3.3	.039	3.9	3.3
DS3316P-472	4.7	.054	3.2	2.7
DS3316P-682	6.8	.075	2.8	2.2
DS3316P-103	10.0	.101	2.4	2.0
DS3316P-153	15.0	.150	2.0	1.5
DS3316P-223	22.0	.207	1.6	1.3
DS3316P-333	33.0	.334	1.2	1.1
DS3316P-473	47.0	.472	1.0	0.8

Coilcraft WWWhttp://www.coilcraft.com DATAFAX 800/651-6974
1102 Silver Lake Road, Cary IL 60013 Fax 847/639-1469 800/322-2645

DT3316 Series - Shielded

Part number	0 Adc L ± 20% (µH)	Rdc max (Ω)	L at rated current (µH)	Current rating (A)	Max energy storage (µJoules)	Max switching freq
DT3316P-102	1.0	.025	.50	5.0	9	1 MHz
DT3316P-152	1.5	.030	.70	5.0	12	1 MHz
DT3316P-222	2.2	.035	1.0	5.0	15	1 MHz
DT3316P-332	3.3	.040	1.5	5.0	16	1 MHz
DT3316P-472	4.7	.045	2.0	3.0	10	1 MHz
DT3316P-682	6.8	.050	4.0	2.5	14	1 MHz
DT3316P-103	10	.055	5.0	2.0	11	1 MHz
DT3316P-153	15	.060	6.0	1.8	12	1 MHz
DT3316P-223	22	.084	10	1.5	11	1 MHz
DT3316P-333	33	.090	12	1.3	13	1 MHz
DT3316P-473	47	.11	27	1.0	13	1 MHz
DT3316P-683	68	.15	40	.90	17	1 MHz
DT3316P-104	100	.29	50	.80	15	1 MHz
DT3316P-154	150	.36	80	.60	15	500 kHz
DT3316P-224	220	.39	90	.50	10	500 kHz
DT3316P-334	330	.73	150	.40	13	500 kHz
DT3316P-474	470	.88	200	.35	13	500 kHz
DT3316P-684	680	1.15	300	.30	13	500 kHz
DT3316P-105	1000	1.45	420	.25	13	500 kHz

DO3308 Series

Part number	L ± 20% (µH)	Rdc max (Ω)	Isat (Adc)	Irms (A)
DO3308P-103	10	.09	2.4	2.0
DO3308P-153	15	.12	2.0	1.5
DO3308P-223	22	.19	1.6	1.3
DO3308P-333	33	.25	1.4	1.1
DO3308P-473	47	.32	1.0	.8
DO3308P-683	68	.55	.9	.7
DO3308P-104	100	.70	.7	.6
DO3308P-154	150	1.0	.6	.5
DO3308P-224	220	1.6	.5	.4
DO3308P-334	330	2.2	.4	.3
DO3308P-474	470	3.3	.3	.2
DO3308P-684	680	4.4	.2	.1
DO3308P-105	1000	7.0	.1	.05

DO3340 Series - High Current

Part number	L ± 20% (µH)	Rdc max (Ω)	Isat (Adc)	Irms (A)
DO3340P-103	10	.033	8.0	3.5
DO3340P-153	15	.042	7.0	3.0
DO3340P-223	22	.054	5.5	2.5
DO3340P-333	33	.08	4.0	2.0
DO3340P-473	47	.10	3.8	1.6
DO3340P-683	68	.17	3.0	1.2
DO3340P-104	100	.22	2.5	1.2
DO3340P-154	150	.34	2.0	.9
DO3340P-224	220	.44	1.6	.7
DO3340P-334	330	.70	1.2	.6
DO3340P-474	470	.95	1.0	.3
DO3340P-684	680	1.2	1.0	.2
DO3340P-105	1000	2.0	.8	.1

DO5022 Series

Part number	L ± 20% (µH)	Rdc max (Ω)	Isat (Adc)	Irms (A)
DO5022P-102	1.0	.009	20	8.6
DO5022P-222	2.2	.014	16	7.1
DO5022P-332	3.3	.015	14	6.2
DO5022P-562	5.6	.020	12	5.3
DO5022P-103	10	.031	10	4.3
DO5022P-153	15	.036	8.0	4.0
DO5022P-223	22	.047	7.0	3.5
DO5022P-333	33	.066	5.5	3.0
DO5022P-473	47	.086	4.5	2.6
DO5022P-683	68	.13	3.5	2.3
DO5022P-104	100	.19	3.0	1.8
DO5022P-154	150	.25	2.6	1.5
DO5022P-224	220	.38	2.4	1.2
DO5022P-334	330	.56	1.9	1.0
DO5022P-474	470	.85	1.4	0.82
DO5022P-684	680	1.1	1.2	0.72
DO5022P-105	1000	1.8	1.0	0.56

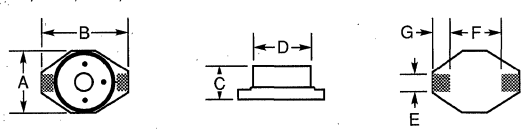
DS5022 Series - Shielded

Part Number	L ± 20% (µH)	Rdc max (Ω)	Isat (A)	Irms (A)
DS5022P-103	10	.040	8.0	3.9
DS5022P-153	15	.048	7.0	3.4
DS5022P-223	22	.059	6.0	3.1
DS5022P-333	33	.075	5.0	2.8
DS5022P-473	47	.097	4.0	2.4
DS5022P-683	68	.138	3.0	2.0
DS5022P-104	100	.207	2.4	1.7
DS5022P-154	150	.293	2.1	1.3
DS5022P-224	220	.47	1.9	1.1
DS5022P-334	330	.78	1.1	0.86
DS5022P-474	470	1.08	1.1	0.73
DS5022P-684	680	1.40	0.96	0.64
DS5022P-105	1000	2.01	0.80	0.53

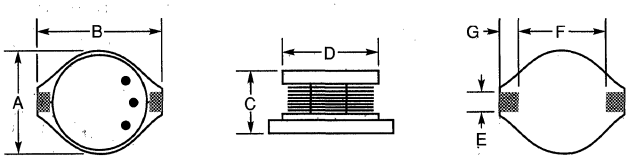
DO5022HC Series - High Current

Part number	L ± 20% (µH)	Rdc max (mΩ)	Isat (Adc)	Irms (A)
DO5022P-781HC	.78	2.6	30	15
DO5022P-152HC	1.5	4.0	25	15
DO5022P-222HC	2.2	6.1	20	12
DO5022P-332HC	3.3	8.6	17	10
DO5022P-392HC	3.9	10	15	9.0
DO5022P-472HC	4.7	14	13	8.4
DO5022P-602HC	6.0	17	12	7.5
DO5022P-782HC	7.8	18	11	7.5
DO5022P-103HC	10	26	10	6.0

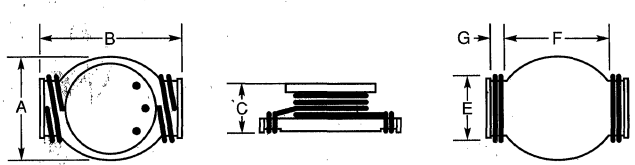
1607, 1608, 3308, 3316, 3340 Series



DS/DO5520 Series



DO5022HC Series



Dimensions

Series	A max	B max	C	D dia	E	F	G
DO1607	.175 *4,45*	.260 *6,60*	.098 *2,49*	.155 *3,94*	.050 *1,27*	.190 *4,83*	.030 *0,76*
DT/DS/DO1608	.175 *4,45*	.260 *6,60*	.115 *2,92*	.155 *3,94*	.050 *1,27*	.190 *4,83*	.030 *0,76*
DO3308	.370 *9,40*	.510 *12,95*	.118 *3,00*	.330 *8,38*	.100 *2,54*	.300 *7,62*	.100 *2,54*
DT/DS/DO3316	.370 *9,40*	.510 *12,95*	.200 *5,08*	.330 *8,38*	.100 *2,54*	.300 *7,62*	.100 *2,54*
DO3316HC	.380 *9,65*	.510 *12,95*	.250 *6,35*	.330 *8,38*	.160 *4,06*	.400 *10,16*	.060 *1,52*
DO3340	.370 *9,40*	.510 *12,95*	.450 *11,43*	.330 *8,38*	.100 *2,54*	.300 *7,62*	.100 *2,54*
DS/DO5022	.600 *15,24*	.730 *18,54*	.280 *7,11*	.500 *12,70*	.100 *2,54*	.500 *12,70*	.100 *2,54*
DO5022HC	.640 *16,26*	.880 *22,35*	.315 *8,00*	.500 *12,70*	.340 *8,64*	.690 *17,53*	.125 *3,18*

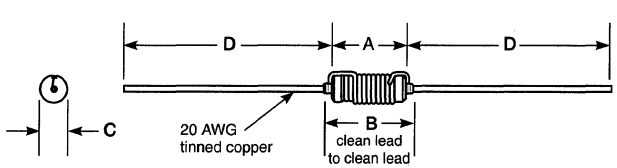
Coilcraft WWW http://www.coilcraft.com DATAFAX 800/651-6974
1102 Silver Lake Road, Cary IL 60013 Fax 847/639-1469 800/322-2645

Axial Lead Power Chokes

Coilcraft's horizontal mount power chokes provide a wide range of inductance in a low profile design. Two sizes are available: the compact PCH-27 Series, and the larger PCH-45 Series with higher current ratings. They're ideal for use as output chokes in low power, downsized switching power supplies, DC-DC converters and inverters, EMI/RFI noise suppression, and smoothing choke applications. Coilcraft **Designer's Kit P209** contains samples of 60 standard parts from both series.

PCH-27 Series

Part number	L nom ± 10%	Rdc max (Ω)	Sat current (Adc)	Rated current (Aac)
PCH-27-392	3.9 µH	.017	7.01	1.7
PCH-27-472	4.7 µH	.024	6.16	1.3
PCH-27-562	5.6 µH	.025	5.79	1.3
PCH-27-682	6.8 µH	.028	5.20	1.3
PCH-27-822	8.2 µH	.030	4.70	1.3
PCH-27-103	10 µH	.033	4.30	1.3
PCH-27-123	12 µH	.037	3.80	1.3
PCH-27-153	15 µH	.041	3.41	1.3
PCH-27-183	18 µH	.045	3.09	1.3
PCH-27-223	22 µH	.064	2.82	1.0
PCH-27-273	27 µH	.071	2.53	1.0
PCH-27-333	33 µH	.078	2.29	1.0
PCH-27-393	39 µH	.085	2.09	1.0
PCH-27-473	47 µH	.094	1.88	1.0
PCH-27-563	56 µH	.12	1.74	.84
PCH-27-683	68 µH	.16	1.57	.67
PCH-27-823	82 µH	.22	1.41	.52
PCH-27-104	100 µH	.25	1.28	.52
PCH-27-124	120 µH	.35	1.17	.42
PCH-27-154	150 µH	.39	1.04	.42
PCH-27-184	180 µH	.43	.943	.42
PCH-27-224	220 µH	.47	.848	.42
PCH-27-274	270 µH	.65	.764	.33
PCH-27-334	330 µH	.72	.690	.33
PCH-27-394	390 µH	.78	.632	.33
PCH-27-474	470 µH	1.04	.573	.26
PCH-27-564	560 µH	1.14	.520	.26
PCH-27-684	680 µH	1.49	.472	.21
PCH-27-824	820 µH	2.14	.427	.16
PCH-27-105	1.00 mH	2.36	.385	.16
PCH-27-125	1.20 mH	2.59	.350	.16
PCH-27-155	1.50 mH	3.57	.312	.13
PCH-27-225	2.20 mH	4.33	.255	.13
PCH-27-275	2.70 mH	5.91	.229	.10
PCH-27-335	3.30 mH	8.63	.207	.083
PCH-27-395	3.90 mH	9.38	.189	.083
PCH-27-475	4.70 mH	10.3	.172	.083
PCH-27-565	5.60 mH	11.2	.157	.083
PCH-27-685	6.80 mH	15.0	.142	.067
PCH-27-825	8.20 mH	21.7	.128	.052
PCH-27-106	10.0 mH	24.0	.116	.052
PCH-27-126	12.0 mH	33.2	.105	.040
PCH-27-156	15.0 mH	47.2	.094	.031
PCH-27-186	18.0 mH	51.7	.085	.031

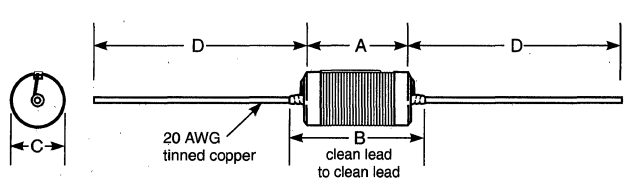


Dimensions

A max	B max	C max dia.	D
.585 *14,85*	.650 *16,51*	.277 *7,04*	1.25 ± .250 *31,75 ± 6,35*

PCH-45 Series

Part number	L nom ± 10%	Rdc max (Ω)	Sat current (Adc)	Rated current (Aac)
PCH-45-392	3.90 µH	.008	14.3	4.3
PCH-45-472	4.70 µH	.009	13.0	4.3
PCH-45-562	5.60 µH	.009	11.9	4.3
PCH-45-682	6.80 µH	.010	11.0	4.3
PCH-45-822	8.20 µH	.011	9.50	4.3
PCH-45-103	10.0 µH	.012	8.93	4.3
PCH-45-123	12.0 µH	.013	7.94	4.3
PCH-45-153	15.0 µH	.015	7.15	4.3
PCH-45-183	18.0 µH	.016	6.50	4.3
PCH-45-223	22.0 µH	.017	5.95	4.3
PCH-45-273	27.0 µH	.019	5.50	4.3
PCH-45-333	33.0 µH	.021	4.93	4.3
PCH-45-393	39.0 µH	.025	4.46	4.3
PCH-45-473	47.0 µH	.035	4.08	3.4
PCH-45-563	56.0 µH	.037	3.76	3.4
PCH-45-683	68.0 µH	.044	3.40	2.7
PCH-45-823	82.0 µH	.060	3.10	2.1
PCH-45-104	100 µH	.086	2.80	1.7
PCH-45-124	120 µH	.095	2.55	1.7
PCH-45-154	150 µH	.14	2.30	1.3
PCH-45-184	180 µH	.15	2.10	1.3
PCH-45-224	220 µH	.17	1.90	1.3
PCH-45-274	270 µH	.19	1.72	1.3
PCH-45-334	330 µH	.21	1.55	1.3
PCH-45-394	390 µH	.26	1.43	1.0
PCH-45-474	470 µH	.32	1.30	1.0
PCH-45-564	560 µH	.38	1.19	.84
PCH-45-684	680 µH	.51	1.08	.67
PCH-45-824	820 µH	.59	.986	.67
PCH-45-105	1.00 mH	.69	.893	.67
PCH-45-125	1.20 mH	.78	.817	.67
PCH-45-155	1.50 mH	.92	.729	.67
PCH-45-225	2.20 mH	1.67	.600	.42
PCH-45-275	2.70 mH	2.28	.543	.33
PCH-45-335	3.30 mH	2.59	.491	.33
PCH-45-395	3.90 mH	2.87	.452	.33
PCH-45-475	4.70 mH	3.22	.412	.33
PCH-45-565	5.60 mH	4.25	.377	.26
PCH-45-685	6.80 mH	5.88	.342	.21
PCH-45-825	8.20 mH	6.46	.311	.21
PCH-45-106	10.0 mH	9.10	.282	.16
PCH-45-126	12.0 mH	9.99	.257	.16
PCH-45-156	15.0 mH	11.2	.230	.16
PCH-45-186	18.0 mH	15.2	.210	.13
PCH-45-226	22.0 mH	16.8	.190	.13
PCH-45-276	27.0 mH	18.6	.171	.13
PCH-45-336	33.0 mH	26.7	.155	.10
PCH-45-396	39.0 mH	29.0	.143	.10
PCH-45-476	47.0 mH	31.8	.131	.10
PCH-45-566	56.0 mH	42.6	.119	.083
PCH-45-686	68.0 mH	46.9	.108	.083
PCH-45-826	82.0 mH	64.9	.098	.067
PCH-45-107	100.0 mH	71.7	.099	.067



Dimensions

A max	B max	C max dia.	D
.863 *21,92*	.938 *23,8*	.453 *11,5*	1.25 ± .250 *31,75 ± 6,35*

Coilcraft WWWhttp://www.coilcraft.com DATAFAX 800/651-6974
1102 Silver Lake Road, Cary IL 60013 Fax 847/639-1469 800/322-2645

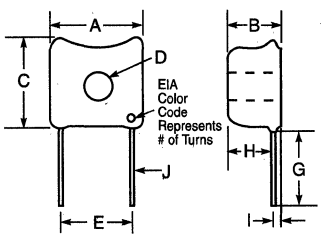
Current Sensors

High Frequency Sensors

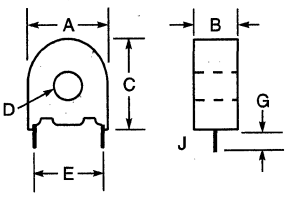
Designed for use at 20-50 kHz and higher, these sensors are ideal for sensing branch circuit overload, switcher feedback, detecting load drop or shutdown, etc. They come in sensor-only (D18XX and CS1XXX Series) and transformer (CS4XXX Series) versions. The sensor-only parts function as the secondaries of a current transformer. The conductor carrying the current to be measured is the "one turn primary." By suitable termination, sensitivity can be set at 1 Volt per Ampere or at other desired values. Sensitivity can also be doubled by looping the conductor through the hole twice. The transformer versions incorporate the current and sense windings in one small, encapsulated package requiring minimum board space. Coilcraft **Designer's Kit P203** contains samples of all parts shown.

Part number	Turns	L (mH)	Sensed current max (A)	Sensitivity Vout (V)	Sensitivity Iin (A)	Terminating resistor (Ω)	Color code
D1869	50	5	10	1	1	50	Green
D1870	100	20	24	1	1	100	Brown
D1871	200	100	35	1	1	200	Red
CS1050	50	5	10	1	1	50	
CS1100	100	20	24	1	1	100	
CS1200	200	100	35	1	1	200	
CS1750	750	1125	30	1	1	750	
CS4050V	50	5	10	1	1	50	
CS4100V	100	20	24	1	1	100	
CS4200V	200	80	35	1	1	200	

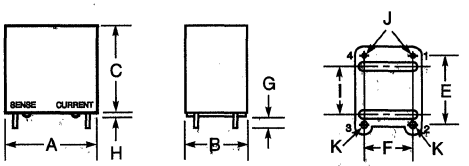
D18XX Series



CS1XXX Series



CS4XXX Series



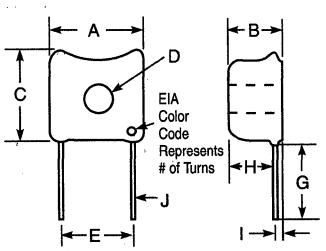
Series	A max	B max	C max	D min	E	F	G	H	I	J dia	K dia
D18XX	.75 *19,05*	.465 *11,81*	.80 *20,30*	.20 *5,08*	.50 ± .015 *12,7 ± 0,38*		.45 *11,43*	.34 *8,64*	.125 *3,175*	.033 ± .002 *0,84 ± 0,05*	
CS1XXX	.70 *17,8*	.375 *9,53*	.80 *20,30*	.20 *5,08*	.50 ± .015 *12,7 ± 0,38*		.19 ± .03 *4,83 ± 0,76*			.033 ± .003 *0,84 ± 0,08*	
CS4XXX	.77 *19,56*	.57 *14,48*	.75 *19,05*		.60 ± .01 *15,24 ± 0,25*	.40 ± .01 *10,16 ± 0,25*	.125 ± .025 *3,18 ± 0,64*	.03 *0,76*	.40 ± .01 *10,16 ± 0,25*	.041 *1,041*	.052 *1,321*

50/60 Hz Sensors

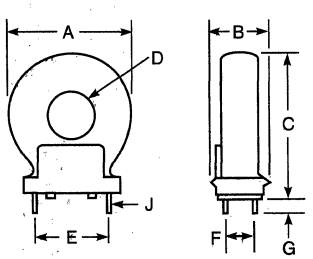
These parts come in sensor-only (CS60) and current transformer (CS2106) versions and are designed for measuring current from .5 to 100 Amps rms. The sensor-only versions function as the encapsulated secondary of a current transformer while the conductor carrying the current to be measured serves as the "one turn primary." Sensitivity may be enhanced by increasing primary turns. Minimum wall thickness of the hole is 0.5 mm which meets IEC 380 and other requirements when used with an insulated conductor.

Part number	Recommended current (Arms)	V out tolerance	Isolation (Vrms)
CS60-010	1-10	± 10%	
CS60-050	5-50	± 10%	
CS60-075	5-75	± 10%	
CS60-100	5-100	± 10%	
CS2106	.5-20		2500

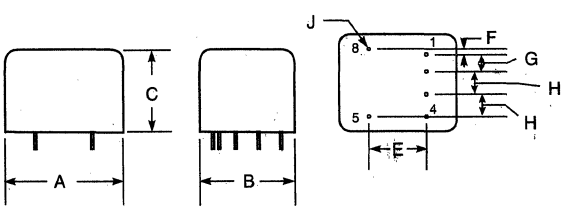
CS60-010



CS60-XXX Series

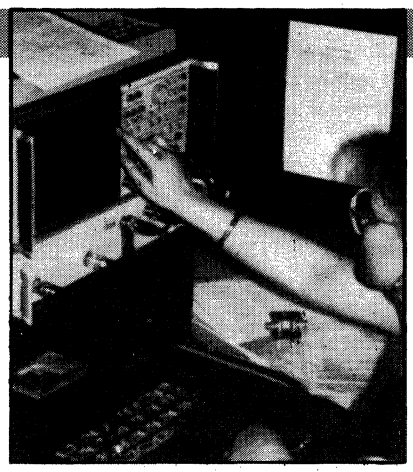


CS2106



COILS ✦ CHOKES
INDUCTORS ✦ BALUNS

COMMUNICATION COIL , INC. ✦ ASSURED RELIABILITY ✦ CUSTOM DESIGNS ✦ TIMELY DELIVERY ✦ MANUFACTURED TO SPEC.



COMMUNICATION COIL, INC. has been designing and producing high reliability RF Coils, Chokes, Inductors, Baluns and Toroids since 1944... to high exacting standards for communications and signal processing in military, industrial, avionics, satellite, telemetry, marine, GPS and commercial applications.

Using the latest CAD and CAE technology our engineers use patented and proprietary software to perform complete simulations of your RF designs. Our optimization system enables us to rapidly reproduce reliable up-to-date designs. We will custom design **Inductors, Baluns, Coils, Chokes and Toroids** to meet your high frequency requirements.

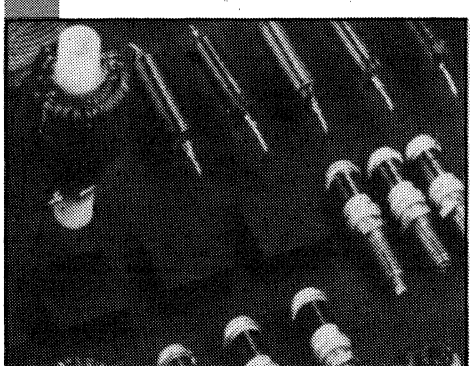
Surface Mount designs offer high performance while conserving board space.

Each and every unit is 100% parametric tested. Our ultra-modern **HP®** computerized testing equipment can provide complete data on each component. If desired, complete lot traceability is available.

Our award-winning quality control program is approved by major customers world-wide.

Communication Coil Inc. RF Magnetics are designed and manufactured in Schiller Park (Chicago), IL U.S.A. to meet rigid global marketplace demands.

Call us at 847/671-1333 today and speak directly to the Communication Coil design & applications engineering staff with your questions, orders or sample requests...or FAX your requirements to 847/671-9191.



RF MAGNETICS

- OPEN AIRWOUND
- POT CORE
- TOROIDAL
- MOLYPERM
- SATURABLE
- MOLDED CASE
- SUBMINIATURE
- SHIELDED
- METAL CASE
- EPOXY COATED
- HERMETICALLY SEALED
- AXIAL-RADIAL
- MIL-C-15305
- MIL-I-45208
- FERRITE CORE
- SURFACE MOUNT
- POWERED IRON
- VARIABLE INDUCTANCE
- ENCAPSULATED
- MINIATURE
- PI-MULTI-PI
- FIXED
- BEAD CORES
- IMPREGNATED
- RF BALUNS
- MIL-T-27
- MIL-T-21038

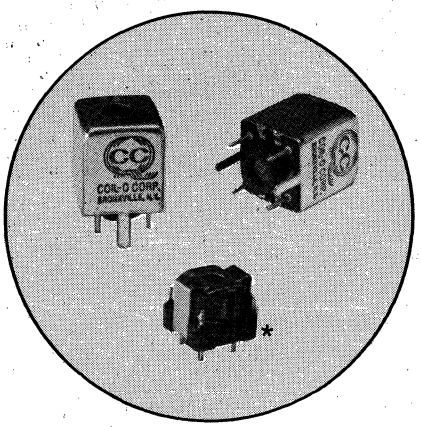
APPLICATIONS • MILITARY • INDUSTRIAL • COMMERCIAL • AVIONICS • TELECOMMUNICATIONS • GPS • RFI • EMI • SATCOM • SWITCHMODE POWER SOURCES • UPS • TELEMETRY • INSTRUMENTATION • MEDICAL • MARINE

COMMUNICATION COIL, INC. •

9601 Soreng Avenue
Schiller Park (Chicago), IL 60176
847-671-1333 • FAX 847-671-9191
www.communicationcoil.com

...BALUNS, COILS, CHOKES, INDUCTORS, TOROIDS, FILTERS, TRANSFORMERS...

Custom Designed High Q RF Coils and transformers

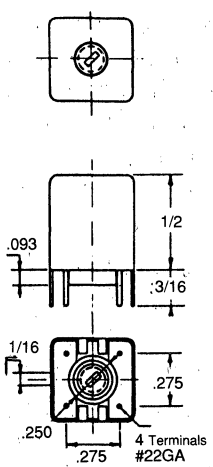


High stability for the most exacting tuning and filter applications. TC 30 ppm/°C.

Features

- **Mil Quality at a Commercial Price**
- Highest Q for its size without the use of ferrites
- Very low TC, typically 30 ppm/°C
- Magnetic and electrostatic shielding
- Moisture sealed construction
- Very low distributed capacitance (high Fo)
- Designed to meet Mil-C-15305 C, Grade 1

Q2 SERIES



At Coil Q Corp we can custom design any coil. We find solutions for the hard to find, complex, discontinued, retrofit utilizing industry standard forms, ie. 5mm, 7mm, 10mm, potcore, toroids, etc. We make the highest quality inductors and transformers for IF/RF filter applications. Precision, stable, mil-standard, quick turnaround, short lead time, no minimum quantity.

For values above 1000µH, the Q2 & Q1 series is also available. In this range of L values, Q's of 150 to 300 are available in miniature pot core coils.*

RF Coils, Q2 series

Part No.	L nom µH	F test MHz	Q @ L nom	Fo @ L nom MHz	DCR Ohms
Q2 .10	.10	25	120	>500	<.1
Q2 .12	.12	25	125	>500	<.1
Q2 .15	.15	25	135	>500	<.1
Q2 .18	.18	25	145	450	<.1
Q2 .22	.22	25	150	390	<.1
Q2 .27	.27	25	155	340	<.1
Q2 .33	.33	25	158	320	<.1
Q2 .39	.39	25	160	290	<.1
Q2 .47	.47	25	160	250	<.1
Q2 .56	.56	25	160	240	<.1
Q2 .68	.68	25	155	220	<.1
Q2 .82	.82	25	155	200	<.1
Q2 1.0	1.0	25	150	175	<.1
Q2 1.2	1.2	7.9	150	160	<.1
Q2 1.5	1.5	7.9	150	140	.1
Q2 1.8	1.8	7.9	160	135	.15
Q2 2.2	2.2	7.9	150	125	.15
Q2 2.7	2.7	7.9	160	110	.20
Q2 3.3	3.3	7.9	165	96	.20
Q2 3.9	3.9	7.9	160	95	.30
Q2 4.7	4.7	7.9	160	86	.40
Q2 5.6	5.6	7.9	160	78	.40
Q2 6.8	6.8	7.9	155	68	.40
Q2 8.2	8.2	7.9	150	62	.70
Q2 10	10	7.9	145	55	.80
Q2 12	12	2.5	165	47	.42
Q2 15	15	2.5	165	40	.60
Q2 18	18	2.5	165	35	.60
Q2 22	22	2.5	165	31	.90
Q2 27	27	2.5	165	29	1.0
Q2 33	33	2.5	160	25	1.1
Q2 39	39	2.5	160	21.5	1.2
Q2 47	47	2.5	155	20.5	1.8
Q2 56	56	2.5	150	20	2.0
Q2 68	68	2.5	148	16.5	1.7
Q2 82	82	2.5	140	14.5	1.8
Q2 100	100	2.5	135	13.5	2.1
Q2 120	120	.79	137	10.8	2.2
Q2 150	150	.79	137	9.6	2.6
Q2 180	180	.79	135	9.5	4.2
Q2 220	220	.79	135	8.3	4.5
Q2 270	270	.79	135	7.1	4.9
Q2 330	330	.79	135	5.5	5.5
Q2 390	390	.79	140	5.6	6.8
Q2 470	470	.79	142	5.2	7.4
Q2 560	560	.79	132	4.8	10.8
Q2 680	680	.79	130	4.5	11.5
Q2 820	820	.79	130	4.0	13.0
Q2 1000	1,000	.79	125	3.8	15.0

Nanohenry Coils, Tunable, High Q For UHF

Part No.	L nom µH	F test MHz	Q @ L nom
Q2V 027	.024-.029	100	140
Q2V 033	.029-.036	100	140
Q2V 043	.036-.047	100	150
Q2V 056	.047-.063	100	150
Q2V 068	.060-.080	100	160
Q2V 082	.075-.100	100	160

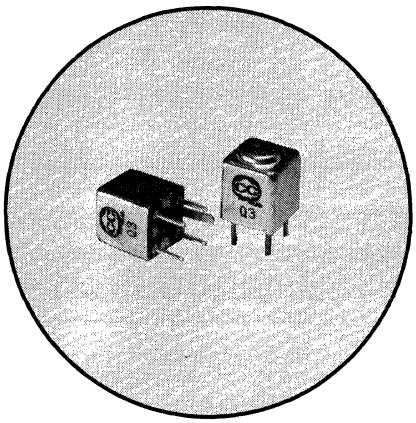
Transformers: All of the tabulated inductors are available as transformers or tapped coils to individual requirements.

coil-Q corp.
340 Bronxville Road
Bronxville, New York 10708
Tel: 1-888-383-COIL (2645)
914-337-4775
Fax: 914-779-7109
E-Mail: COILQCORP@AOL.COM
Web Page: WWW.COILQCORP.COM

High Q tunable Coils

High Stability, TC<35 ppm/°C

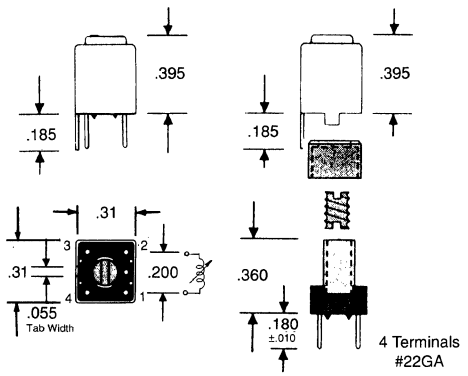
Miniature size For High Performance Filter Applications



Features

- **Mil Quality at a Commercial Price**
- Highest Q for its size without the use of ferrites
- Sealed in epoxy for moisture protection
- Magnetic and electrostatic shielding
- Very low TC<35 ppm/°C
- Very low distributed capacitance (high Fo)
- Designed to meet Mil-C-15305 C, Grade 1

Q3 SERIES



This is a new line of tunable coils which we consider unique in the industry. These miniature coils exhibit unusually high Q for their size, combined with high stability of performance as exemplified by a very small temperature coefficient of less than 35 ppm/oC. We believe that engineers working in the filter design area would be very interested in the availability of such high performance inductors.

The tabulated data represent the group of our standard values of inductors. We will modify, invent and create any component you may need. See the yellow pages under our heading for the extent of our design and manufacture capabilities of signal processing components.

coil-Q corp.

340 Bronxville Road
Bronxville, New York 10708
Tel: 1-888-383-COIL (2645)
914-337-4775
Fax: 914-779-7109
E-Mail: COILQCORP@AOL.COM
Web Page: WWW.COILQCORP.COM

High Q Coils for VHF-UHF

Part No.	L nom nH	L range nH	Q @ L nom	F Test MHz	Fo @ L nom MHz	NOTES
Q3-.015	15	14-16	90	100	1800	Q and inductance were measured on a Boonton 190A Q meter. Inductance is net, i.e. parasitics were subtracted from readings. Q was obtained by the use of soldered lead extensions to the terminals.
Q3-.018	18	16.5-19.5	90	100	1560	
Q3-.022	22	20-24	100	100	1450	
Q3-.027	27	24-29	100	100	1400	
Q3-.033	33	28-36	105	100	1330	
Q3-.039	39	35-43	110	100	1280	
Q3-.047	47	40-55	110	100	1100	
Q3-.056	56	49-63	120	100	1000	
Q3-.068	68	61-76	120	100	900	
Q3-.082	82	73-94	120	100	800	

High Q Coils for HF

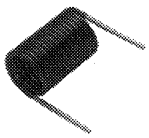
Part No.	L nom µH	L range µH	Q @ L nom	F Test MHz	Fo @ L nom MHz	NOTES
Q3-.10	.10	.085-.115	95	25	650	The inductance adjustment range of Q3 type coils was deliberately stated below the attainable values by mechanically adjusting capability, in order to keep Q variations below 7%. Of course a larger adjustment range is possible if Q variation is not of great importance to the circuit. Inductance and Q of the HF coils were measured on the HP 4324A Q meter. Data was obtained by the use of soldered leads, in order to avoid errors due to contact resistance. Please note that the VHF-UHF coil inductance is indicated in nanohenries. The HF portion of the listing is stated in microhenries. **MATERIALS** Pins are tin plated. Coil base is made of temperature resistant DAP. Coil form is made of glass woven polyester. The core structure of the coil consists of cup core and a threaded center core which combine to give good magnetic shield. Both core elements are made of powdered iron, to minimize performance variation with temperature. Electrostatic shield consists of a copper can, tin plated.
Q3-.12	.12	.10-.14	102	25	580	
Q3-.15	.15	.135-.165	102	25	520	
Q3-.18	.18	.14-.23	105	25	480	
Q3 -.22	.22	.20-.24	110	25	400	
Q3-.27	.27	.24-.35	110	25	380	
Q3-.33	.33	.27-.45	110	25	365	
Q3-.39	.39	.34-.46	105	25	300	
Q3-.47	.47	.39-.54	105	25	270	
Q3-.56	.56	.42-.66	105	25	250	
Q3-.68	.68	.56-.78	110	25	220	
Q3-.82	.82	.62-.94	110	25	200	
Q3-1.0	1.0	.75-1.2	110	25	185	
Q3-1.2	1.2	.98-1.4	98	7.9	160	
Q3-1.5	1.5	1.2-1.8	105	7.9	135	
Q3-1.8	1.8	1.3-2.1	102	7.9	145	
Q3-2.2	2.2	1.8-2.6	102	7.9	125	
Q3-2.7	2.7	2.3-3.1	111	7.9	105	
Q3-3.3	3.3	2.6-3.8	104	7.9	95	
Q3-3.9	3.9	3.0-4.6	100	7.9	80	
Q3-4.7	4.7	3.5-6.0	95	7.9	70	
Q3-5.6	5.6	4.5-6.2	102	7.9	60	
Q3-6.8	6.8	5.6-8.2	110	7.9	55	
Q3-8.2	8.2	7.0-9.2	112	7.9	48	
Q3-10	10.0	8.8-12	108	7.9	47.5	
Q3-12	12.0	10-14	106	2.5	40.5	
Q3-15	15	13-17	106	2.5	40	
Q3-18	18	14-24	105	2.5	35	
Q3-22	22	17-26	126	2.5	29	
Q3-27	27	22-32	117	2.5	24.5	
Q3-33	33	27-38	122	2.5	23	
Q3-39	39	32-45	114	2.5	21	
Q3-47	47	37-57	118	2.5	19	
Q3-56	56	45-65	106	2.5	16	
Q3-68	68	60-82	104	2.5	12.5	
Q3-82	82	65-95	112	2.5	11.8	
Q3-100	100	80-120	100	2.5	11	
Q3-120	120	100-140	80	.79	10.5	
Q3-150	150	130-165	85	.79	10.2	
Q3-180	180	140-220	80	.79	8.5	
Q3-220	220	180-245	80	.79	6.5	
Q3-270	270	220-320	80	.79	6.0	
Q3-330	330	280-380	80	.79	5.7	
Q3-390	390	330-450	80	.79	5.3	
Q3-470	470	390-520	80	.79	4.8	
Q3-560	560	460-680	80	.79	4.3	
Q3-680	680	545-810	80	.79	3.8	
Q3-820	820	660-980	80	.79	3.6	
Q3-1000	1,000	800-1200	80	.79	3.2	

EAG Electronics
409 Noble Road • Girard, PA 16417
Toll Free: 888-774-3054 • Fax: 814-774-2737

Call factory for technical and design assistance

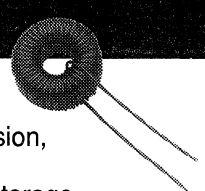
EAG ELECTRONICS
http://www.eagelec.com

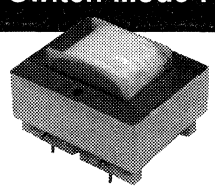
Air Cores — RF - Telecommunications

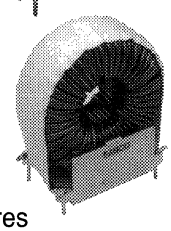


- CATV, TV, Radio, Satellites, EMI/RFI, Networking
- Wire: 56 to 8 gauge
- Precision windings through automated machine assembly
- 100% testing and verification
- Multi-aperture cores, Wound beads, Surface mount coils, RF suppression, Baluns
- Ferrite, Powdered iron, MMP

Toroids — Switch Mode Power Conversion

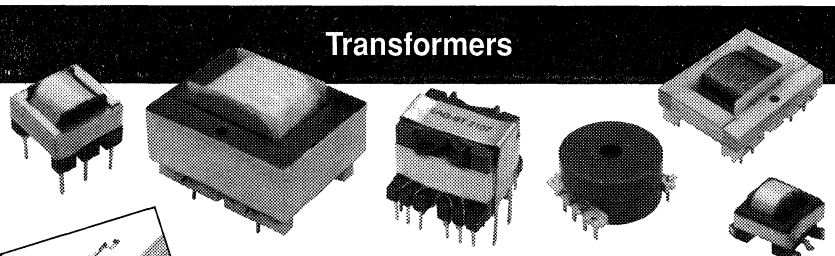


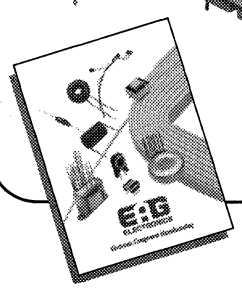




- EMI/RFI suppression, filtering, energy storage
- Powdered iron, Ferrite, MMP, Tape/bobbin cores
- 1/10" (2.5 mm) to 12" (30 cm) diameters
- Vertical, horizontal, PC mount, leads, encapsulated
- Precision wound by automated equipment
- Smoothing chokes and filters
- Powdered iron, Ferrite, MMP, Tape/bobbin cores, laminations and cut cores
- Small SMT to large toroids and laminated cores
- Vertical, horizontal, PC mount, encapsulated,and frame mount

Transformers





- Power/Switch mode
- Digital/ Telecommunications
- TV/Audio
- Cellular/Computer

*Toll Free: **888-774-3054** for literature*

Feature Products

- Switch mode filters
- Common mode/ differential chokes
- Energy storage
- Air cores
- Precision wound coils
- Linear and Saturated inductors
- Variable and Tuned inductors
- RF/IF inductors
- EMI suppression

Value Added Services

- Cable Assemblies
- Wire Harnessing
- Lead Termination

Toroidal Transformers and Inductors

Military and Commercial

TOROIDAL INDUCTORS

- Light dimming reactors
- High Q inductors MPP and powdered iron
- Switch mode inductors
- Custom LC networks

TOROIDAL TRANSFORMERS

- Power transformers 50/60Hz
- Power transformers 400Hz
- Switch mode transformers to 500 KHz
- Pulse transformers
- Data bus transformers

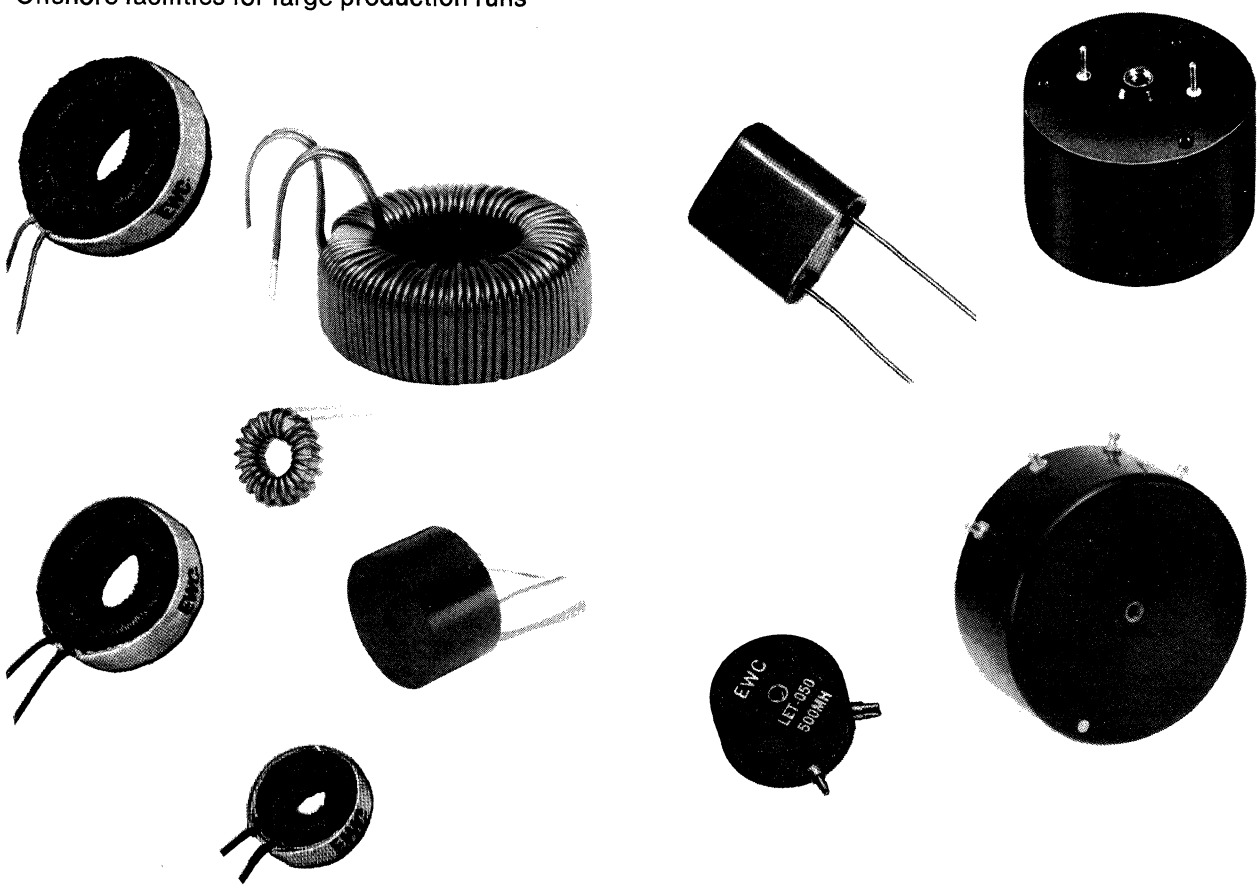
ENGINEERING — experienced engineers available to discuss your requirements. Inspection System approved to Mil-I-45208 Listed on the current QPL-27

COMMERCIAL

- High quality
- Large selection
- Competitive prices
- Sizes from subminiature to 100 lbs.
- Offshore facilities for large production runs

MILITARY

- Experience — over 25 years on programs such as B1B, F16, JTIDS, Space Shuttle, etc.
- Facilities — modern efficient plant



CUSTOM ORDERS WELCOMED

Depend on EWC for quality components, delivered on time. Put more than 35 years experience making quality components to work for you. Call or write EWC today.

THE CHOICE FOR MAGNETIC COMPONENTS

385 HIGHWAY 33, ENGLISHTOWN, NJ 07726
732/446-3110 FAX 732/446-5362
E-MAIL: info@ewcincorporated.com

EWC® INC.

FRONTIER ELECTRONICS

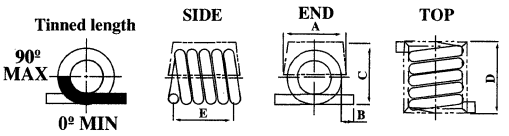
Your Best Magnetic Source For.....

Axial Leaded Inductors
Radial Leaded inductors
Air Coils
IFT Type Coils
Insert Molded Coils
Common Mode Chokes Line Filters
RF Balun Coils and

Directional Couplers
SMD Air Coils
SMD Multilayer Chip Beads and Chip Inductors
SMD Ceramic Chip Inductors
SMD Power Chokes
Switch Mode Transformers

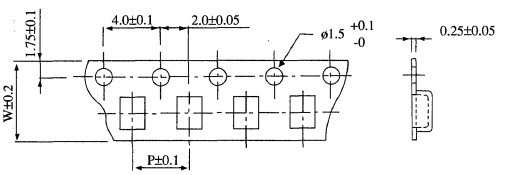
FRONTIER ELECTRONICS CORP.
685 COCHRAN ST, SIMI VALLEY, CA 93065
TEL: (805) 522-9998 • FAX: (805) 522-9989
E-MAIL:frontiersale@frontierusa.com

SMD AIR WOUND COILS



Part No.	Turns	Ind. nH	Q MIN	Test Freq. (MHz)	S R F GHz Min
291A-01	1	2.5 ± 10%	143	150	>3
291A-02	2	5.0 ± 10%	140	150	>3
291A-03	3	8.0 ± 5%	139	150	>3
291A-04	4	12.5 ± 5%	138	150	>3
291A-05	5	18.5 ± 5%	133	150	>3

TAPE DIMENSIONS (mm)

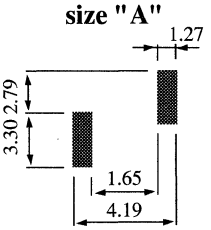


Part No.	Turns	Ind. nH	Q MIN	Test Freq. (MHz)	S R F GHz Min
291B-06	6	17.5 ± 5%	100	150	>3
291B-07	7	22.0 ± 5%	103	150	>3
291B-08	8	28.0 ± 5%	104	150	2.6
291B-09	9	35.5 ± 5%	108	150	1.8
291B-10	10	43.5 ± 5%	108	150	1.5

SIZE	A	B	C	D	E
A	3.05	0.58 ± 0.38	3.18	3.68	2.92 ± 0.25
B	3.05	0.58 ± 0.38	3.18	6.86	5.84 ± 0.25

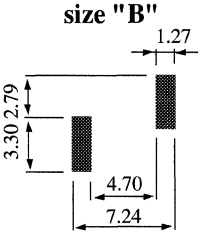
Typical Pad Layout

size "A"



Parts/reel: 500/7"
Tape wide: 12 mm
Carton: 12000

size "B"

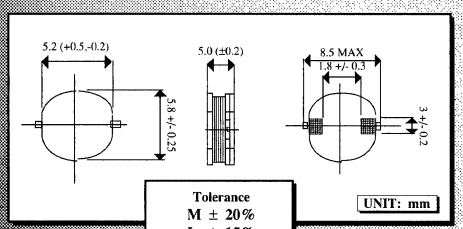


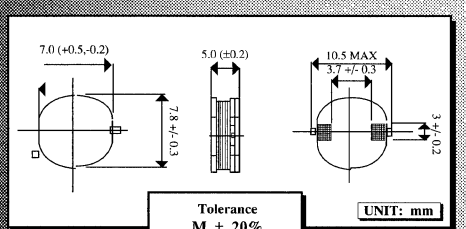
Parts/reel: 500/7"
Tape wide: 16 mm
Carton: 9000

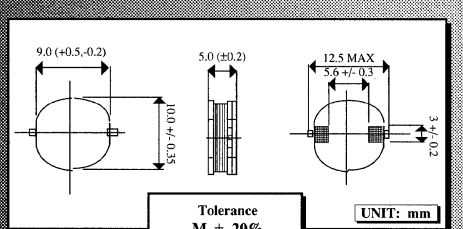
SIZE	W	P
A	12	8
B	16	8

Toll Free: 1-800-929-9888

SMD POWER CHOKES







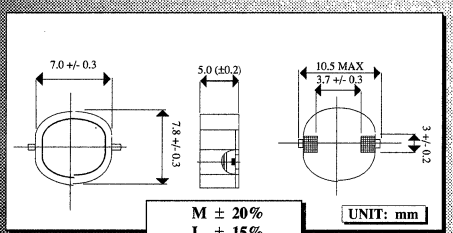
FOR MORE INFORMATION

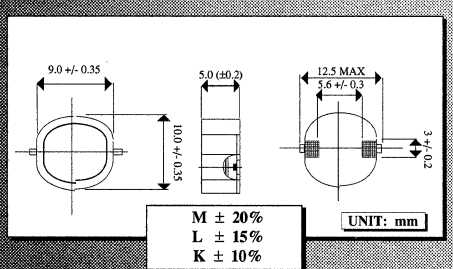
FRONTIER ELECTRONICS CORP.
685 COCHRAN ST, SIMI VALLEY, CA 93065
TEL : (805) 522-9998 • FAX: (805) 522-9989
E-MAIL:frontiersale@frontierusa.com
Toll Free: 1-800-929-9888

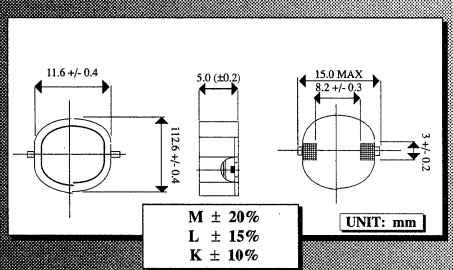
Part No.	Mark	Inductance	Test Freq.	D.C.R. (at 200C) Max. (Ohm)	Rated Current (A)*
CSN054B					
CSN054B-100M	AM	10uH +/- 20%	2.52MHz	0.10	1.44
CSN054B-120M	BM	12uH +/- 20%	2.52MHZ	0.12	1.40
CSN054B-150M	CM	15uH +/- 20%	2.52MHz	0.14	1.30
CSN054B-180M	DM	18uH +/- 20%	2.52MHz	0.15	1.23
CSN054B-220M	EM	22uH +/- 20%	2.52MHz	0.18	1.11
CSN054B-270M	FM	27uH +/- 20%	2.52MHz	0.20	0.97
CSN054B-33OL	GL	33uH +/- 15%	2.52MHz	0.23	0.88
CSN054B-390L	HL	39uH +/- 15%	2.52MHz	0.32	0.80
CSN054B-470L	JL	47uH +/- 15%	2.52MHz	0.37	0.72
CSN054B-560K	KK	56uH +/- 10%	2.52MHz	0.42	0.68
CSN054B-680K	LK	68uH +/- 10%	2.52MHz	0.46	0.61
CSN054B-820K	MK	82uH +/- 10%	2.52MHz	0.60	0.58
CSN054B-101K	NK	100uH +/- 10%	1KHz	0.70	0.52
CSN054B-121K	PK	120uH +/- 10%	1KHz	0.93	0.48
CSN054B-151K	QK	150uH +/- 10%	1KHz	1.10	0.40
CSN054B-181K	RK	180uH +/- 10%	1KHz	1.38	0.38
CSN054B-221K	SK	220uH +/- 10%	1KHz	1.57	0.35
CSN075B					
CSN075B-100K	100K	10uH +/- 10%	2.52MHz	0.07	2.30
CSN075B-120K	120K	12uH +/- 10%	2.52MHz	0.08	2.00
CSN075B-150K	150K	15uH +/- 10%	2.52MHz	0.09	1.80
CSN075B-180K	180K	18uH +/- 10%	2.52MHz	0.10	1.60
CSN075B-220K	220K	22uH +/- 10%	2.52MHz	0.11	1.50
CSN075B-270K	270K	27uH +/- 10%	2.52MHz	0.12	1.30
CSN075B-330K	330K	33uH +/- 10%	2.52MHz	0.13	1.20
CSN075B-390K	390K	39uH +/- 10%	2.52MHz	0.16	1.10
CSN075B-470K	470K	47uH +/- 10%	2.52MHz	0.18	1.10
CSN075B-560K	560K	56uH +/- 10%	2.52MHz	0.24	0.94
CSN075B-680K	680K	68uH +/- 10%	2.52MHz	0.28	0.85
CSN075B-820K	820K	82uH +/- 10%	2.52MHz	0.37	0.78
CSN075B-101K	101K	100uH +/- 10%	1KHz	0.43	0.72
CSN075B-121K	121K	120uH +/- 10%	1KHz	0.47	0.66
CSN075B-151K	151K	150uH +/- 10%	1KHz	0.64	0.58
CSN075B-181K	181K	180uH +/- 10%	1KHz	0.71	0.51
CSN075B-221K	221K	220uH +/- 10%	1KHz	0.96	0.49
CSN075B-271K	271K	270uH +/- 10%	1KHz	1.11	0.42
CSN075B-331K	331K	330uH +/- 10%	1KHz	1.26	0.40
CSN075B-391K	391K	390uH +/- 10%	1KHz	1.77	0.36
CSN075B-471K	471K	470uH +/-10%	1KHz	1.96	0.34
CSN105B					
CSN105B-100M	100M	10uH +/- 20%	2.52MHz	0.06	2.60
CSN105B-120M	120M	12uH +/- 20%	2.52MHZ	0.07	2.45
CSN105B-150M	150M	15uH +/- 20%	2.52MHz	0.08	2.27
CSN105B-180M	180M	18uH +/- 20%	2.52MHz	0.09	2.15
CSN105B-220M	220M	22uH +/- 20%	2.52MHz	0.10	1.95
CSN105B-270M	270M	27uH +/- 20%	2.52MHZ	0.11	1.76
CSN105B-330M	330M	33uH +/- 20%	2.52MHz	0.12	1.50
CSN105B-390M	390M	39uH +/- 20%	2.52MHz	0.14	1.37
CSN105B-470K	470K	47uH +/- 10%	2.52MHz	0.17	1.28
CSN105B-560K	560K	56uH +/- 10%	2.52MHz	0.19	1.17
CSN105B-680K	680K	68uH +/- 10%	2.52MHz	0.22	1.11
CSN105B-820K	820K	82uH +/- 10%	2.52MHz	0.25	1.00
CSN105B-101K	101K	100uH +/- 10%	1KHz	0.35	0.97
CSN105B-121K	121K	120uH +/- 10%	1KHz	0.40	0.89
CSN105B-151K	151K	150uH +/- 10%	1KHz	0.47	0.78
CSN105B-181K	181K	180uH +/- 10%	1KHz	0.63	0.72
CSN105B-221K	221K	220uH +/- 10%	1KHz	0.73	0.66
CSN105B-271K	271K	270uH +/- 10%	1KHz	0.97	0.57
CSN105B-331K	331K	330uH +/- 10%	1KHz	1.15	0.52
CSN105B-391K	391K	390uH +/- 10%	1KHz	1.30	0.48
CSN105B-471K	471K	470uH +/-10%	1KHz	1.48	0.42
CSN105B-561K	561K	560uH +/- 10%	1KHz	1.90	0.33
CSN105B-681K	681K	680uH +/- 10%	1KHz	2.25	0.28
CSN105B-821K	821K	820uH +/-10%	1KHz	2.55	0.24

* Inductance drops no more than 10% at rated current applied or temperature rise Δ T = 40° C

SMD POWER CHOKES







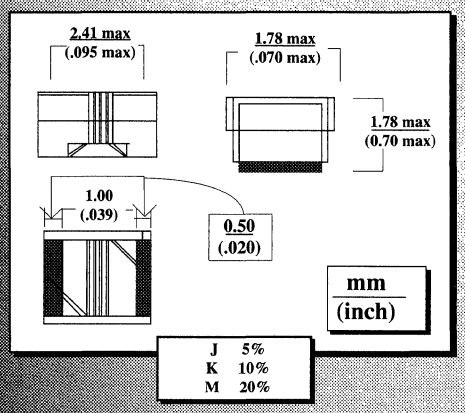
Part No.	Mark	Inductance	Test Freq.	D.C.R. (at 200C) Max. (Ohm)	Rated Current (A)*
CSS054B					
CSN054B-100M	AM	10uH +/- 20%	2.52MHz	0.08	1.60
CSN054B-120M	BM	12uH +/- 20%	2.52MHZ	0.09	1.50
CSN054B-150M	CM	15uH +/- 20%	2.52MHz	0.11	1.40
CSN054B-180M	DM	18uH +/- 20%	2.52MHz	0.12	1.30
CSN054B-220M	EM	22uH +/- 20%	2.52MHz	0.14	1.10
CSN054B-270M	FM	27uH +/- 20%	2.52MHz	0.16	1.00
CSN054B-33OL	GL	33uH +/- 15%	2.52MHz	0.18	0.92
CSN054B-390L	HL	39uH +/- 15%	2.52MHz	0.26	0.84
CSN054B-470L	JL	47uH +/- 15%	2.52MHz	0.30	0.76
CSN054B-560L	KL	56uH +/- 15%	2.52MHz	0.34	0.68
CSN054B-680L	LL	68uH +/- 15%	2.52MHz	0.37	0.63
CSN054B-820L	ML	82uH +/- 15%	2.52MHz	0.48	0.58
CSN054B-101L	NL	100uH +/- 15%	1KHz	0.56	0.50
CSN054B-121L	PL	120uH +/- 15%	1KHz	0.74	0.46
CSN054B-151L	QL	150uH +/- 15%	1KHz	0.88	0.40
CSN054B-181L	RL	180uH +/- 15%	1KHz	1.10	0.38
CSN054B-221L	SL	220uH +/- 15%	1KHz	1.26	0.36
CSS075B					
CSN075B-100M	100M	10uH +/- 20%	2.52MHz	0.05	2.40
CSN075B-120M	120M	12uH +/- 20%	2.52MHZ	0.06	2.30
CSN075B-150M	150M	15uH +/- 20%	2.52MHz	0.07	2.10
CSN075B-180M	180M	18uH +/- 20%	2.52MHz	0.08	1.90
CSN075B-220M	220M	22uH +/- 20%	2.52MHz	0.09	1.70
CSN075B-270M	270M	27uH +/- 20%	2.52MHZ	0.10	1.60
CSN075B-330L	330L	33uH +/- 15%	2.52MHz	0.11	1.40
CSN075B-390L	390L	39uH +/- 15%	2.52MHz	0.13	1.30
CSN075B-470L	470L	47uH +/- 15%	2.52MHz	0.15	1.20
CSN075B-560L	560L	56uH +/- 15%	2.52MHz	0.19	1.10
CSN075B-680L	680L	68uH +/- 15%	2.52MHz	0.22	0.97
CSN075B-820L	820L	82uH +/- 15%	2.52MHz	0.30	0.88
CSN075B-101L	101L	100uH +/- 15%	1KHz	0.34	0.80
CSN075B-121L	121L	120uH +/- 15%	1KHz	0.38	0.73
CSN075B-151L	151L	150uH +/- 15%	1KHz	0.51	0.65
CSN075B-181L	181L	180uH +/- 15%	1KHz	0.57	0.60
CSN075B-221L	221L	220uH +/- 15%	1KHz	0.77	0.54
CSN075B-271L	271L	270uH +/- 15%	1KHz	0.89	0.49
CSN075B-331L	331L	330uH +/- 15%	1KHz	1.01	0.44
CSN075B-391L	391L	390uH +/- 15%	1KHz	1.42	0.41
CSN075B-471L	471L	470uH +/- 15%	1KHz	1.57	0.37
CSS105B					
CSN105B-100M	100M	10uH +/- 20%	2.52MHz	0.05	2.50
CSN105B-120M	120M	12uH +/- 20%	2.52MHZ	0.06	2.40
CSN105B-150M	150M	15uH +/- 20%	2.52MHz	0.07	2.30
CSN105B-180M	180M	18uH +/- 20%	2.52MHz	0.08	2.20
CSN105B-220M	220M	22uH +/- 20%	2.52MHz	0.09	2.10
CSN105B-270M	270M	27uH +/- 20%	2.52MHZ	0.10	2.00
CSN105B-330L	330L	33uH +/- 15%	2.52MHz	0.11	1.90
CSN105B-390L	390L	39uH +/- 15%	2.52MHz	0.12	1.80
CSN105B-470L	470L	47uH +/- 15%	2.52MHz	0.14	1.60
CSN105B-560L	560L	56uH +/- 15%	2.52MHz	0.15	1.40
CSN105B-680L	680L	68uH +/- 15%	2.52MHz	0.18	1.30
CSN105B-820L	820L	82uH +/- 15%	2.52MHz	0.20	1.20
CSN105B-101L	101L	100uH +/- 15%	1KHz	0.28	1.10
CSN105B-121L	121L	120uH +/- 15%	1KHz	0.32	0.97
CSN105B-151L	151L	150uH +/- 15%	1KHz	0.38	0.86
CSN105B-181L	181L	180uH +/- 15%	1KHz	0.50	0.84
CSN105B-221L	221L	220uH +/- 15%	1KHz	0.58	0.72
CSN105B-271L	271L	270uH +/- 15%	1KHz	0.78	0.65
CSN105B-331L	331L	330uH +/- 15%	1KHz	0.92	0.61
CSN105B-391L	391L	390uH +/- 15%	1KHz	1.04	0.58
CSN105B-471L	471L	470uH +/- 15%	1KHz	1.18	0.50
CSN105B-561L	561L	560uH +/- 15%	1KHz	1.52	0.48
CSN105B-681L	681L	680uH +/- 15%	1KHz	1.80	0.43
CSN105B-821L	821L	820uH +/- 15%	1KHz	2.04	0.38

* Inductance drops no more than 10% at rated current applied or temperature rise Δ T = 40° C

FOR MORE INFORMATION

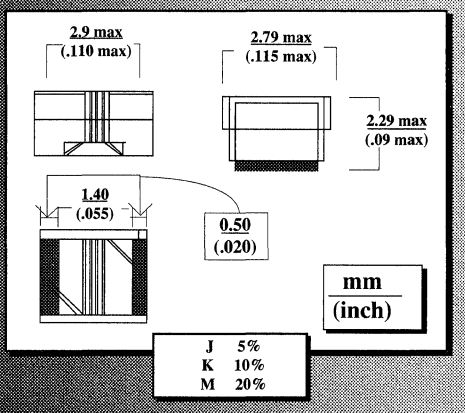
FRONTIER ELECTRONICS CORP.
685 COCHRAN ST, SIMI VALLEY, CA 93065
TEL : (805) 522-9998 • FAX: (805) 522-9989
E-MAIL:frontiersale@frontierusa.com
Toll Free: 1-800-929-9888

SMD CERAMIC CHIP INDUCTORS



0805 SERIES

Part No.	Inductance (nH)	Q Min.	Test Frequency MHz	S R F HMz MIN	Rdc Ohms Max	Rated DC Current (mA)
0805C-3N3	3.3nH +/- 20%	30	250	>3000	0.10	600
0805C-6N8	6.8nH +/- 20%	30	250	>3000	0.11	600
0805C-8N2	8.2nH +/- 20%	35	250	>3000	0.12	600
0805C-12N	12nH +/- 20%	30	250	2750	0.15	600
0805C-15N	15nH +/- 20%	45	250	2500	0.17	600
0805C-18N	18nH +/- 20%	45	250	2400	0.20	600
0805C-22N	22nH +/- 20%	45	250	2200	0.22	500
0805C-27N	27nH +/- 20%	45	250	2000	0.25	500
0805C-33N	33nH +/- 20%	40	250	1800	0.27	500
0805C-39N	39nH +/- 20%	40	250	1600	0.29	500
0805C-47N	47nH +/- 20%	40	200	1400	0.31	500
0805C-56N	56nH +/- 20%	40	200	1300	0.34	500
0805C-68N	68nH +/- 20%	40	200	1200	0.38	500
0805C-82N	82nH +/- 20%	40	150	1020	0.42	400
0805C-R10	100nH +/- 20%	40	150	950	0.46	400
0805C-R12	120nH +/- 20%	35	150	860	0.51	400
0805C-R15	150nH +/- 10%	35	100	780	0.56	400
0805C-R18	180nH +/- 10%	35	100	710	0.64	400
0805C-R22	220nH +/- 10%	30	100	630	0.70	400



1008 SERIES

Part No.	Inductance (nH)	STD	Q Min.	Test Frequency MHz	S R F HMz MIN	Rdc Ohms Max.	Rated DC Current (mA) Max
1008C-10N	10 @ 50MHz	20, 10	40 @ 500MHz	50	>3000	0.08	1000
1008C-12N	12 @ 50MHz	20, 10	40 @ 500MHz	50	>3000	0.09	1000
1008C-15N	15 @ 50MHz	20, 10	40 @ 500MHz	50	>3000	0.10	1000
1008C-18N	18 @ 50MHz	20, 10	50 @ 350MHz	50	2500	0.11	1000
1008C-22N	22 @ 50MHz	20, 10	50 @ 350MHz	50	2000	0.12	1000
1008C-27N	27 @ 50MHz	20, 10	50 @ 350MHz	50	1500	0.13	1000
1008C-33N	33 @ 50MHz	20, 10	50 @ 350MHz	50	1500	0.14	1000
1008C-39N	39 @ 50MHz	20, 10	50 @ 350MHz	50	1500	0.15	1000
1008C-47N	47 @ 50MHz	20, 10	50 @ 350MHz	50	1350	0.16	1000
1008C-56N	56 @ 50MHz	20, 10	50 @ 350MHz	50	1150	0.18	1000
1008C-68N	68 @ 50MHz	20, 10	50 @ 350MHz	50	1050	0.20	1000
1008C-82N	82 @ 50MHz	20, 10	50 @ 350MHz	50	950	0.22	1000
1008C-R10	100 @ 50MHz	10, 5	50 @ 350MHz	25	950	0.56	800
1008C-R12	120 @ 50MHz	10, 5	50 @ 350MHz	25	900	0.63	800
1008C-R15	150 @ 50MHz	10, 5	25 @ 100MHz	25	850	0.70	800
1008C-R18	180 @ 50MHz	10, 5	25 @ 100MHz	25	700	0.77	750
1008C-R22	220 @ 50MHz	10, 5	28 @ 100MHz	25	600	0.84	720
1008C-R27	270 @ 50MHz	10, 5	28 @ 100MHz	25	550	0.91	690
1008C-R33	330 @ 50MHz	10, 5	30 @ 100MHz	25	500	1.05	660
1008C-R39	390 @ 50MHz	10, 5	30 @ 100MHz	25	465	1.12	630
1008C-R47	470 @ 50MHz	10, 5	30 @ 100MHz	25	425	1.19	600
1008C-R56	560 @ 50MHz	10, 5	30 @ 100MHz	25	415	1.33	580
1008C-R62	620 @ 50MHz	10, 5	30 @ 100MHz	25	375	1.40	560
1008C-R68	680 @ 50MHz	10, 5	30 @ 100MHz	25	340	1.42	540
1008C-R75	750 @ 50MHz	10, 5	33 @ 100MHz	25	330	1.54	520
1008C-R82	820 @ 50MHz	10, 5	33 @ 100MHz	25	325	1.61	500
1008C-R91	910 @ 50MHz	10, 5	33 @ 50MHz	25	305	1.68	480
1008C-1R0	1000 @ 50MHz	10, 5	33 @ 50MHz	25	290	1.75	460

FOR MORE INFORMATION

FRONTIER ELECTRONICS CORP.
685 COCHRAN ST, SIMI VALLEY, CA 93065
TEL : (805) 522-9998 • FAX: (805) 522-9989
E-MAIL:frontiersale@frontierusa.com
Toll Free: 1-800-929-9888

FEATURES:

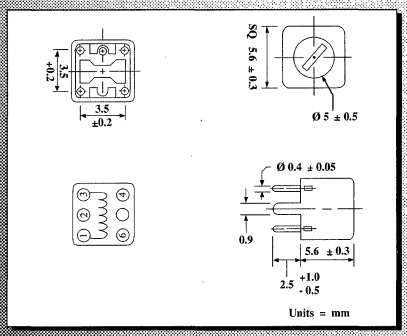
- Small & lightweight surface mounting type.
- Coil body made of ceramic material in chip form.
- High Q at high frequency
- High self-resonance frequency
- Inductance Range: 10-1000 nH
- Applicable to 100 MHz - 2GHz

APPLICATIONS:

- Pagers
- Mobile communication units
- Portable telephone
- Hybrid

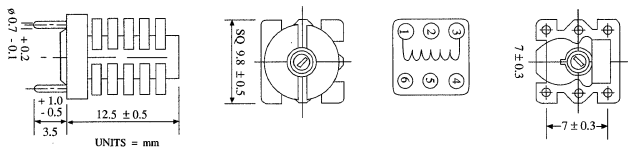
ADJUSTABLE RF COILS

5 MM



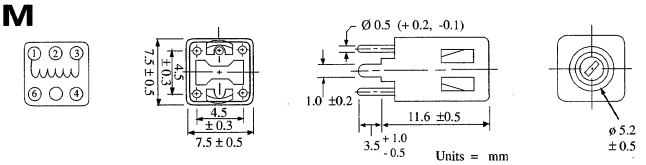
Part Number	Inductance Range (µH)	Test Freq (MHz)	Q Min.
KM57A1287N	1.0 ±5%	55	7.96
KM57A1288N	1.2 ±5%	55	7.96
KM57A1289N	1.5 ±5%	55	7.96
KM57A1290N	1.8 ±5%	55	7.96
KM57A1291N	2.2 ±5%	55	7.96
KM57A1292N	2.7 ±5%	55	7.96
KM57A1293N	3.3 ±5%	55	7.96
KM57A1294N	3.9 ±5%	55	7.96
KM57A1295N	4.7 ±5%	55	7.96
KM57A1296N	5.6 ±5%	55	7.96
KM57A1297N	6.8 ±5%	55	7.96
KM57A1298N	8.2 ±5%	55	7.96
KM57A1299N	10.0 ±5%	55	2.52
KM57A1300N	12.0 ±5%	55	2.52
KM57A1301N	15.0 ±5%	55	2.52
KM57A1302N	18.0 ±5%	55	2.52
KM57A1303N	22.0 ±5%	55	2.52
KM57A1304N	27.0 ±5%	55	2.52
KM51A1202N	33.0 ±5%	40	2.52
KM51A1203N	39.0 ±5%	40	2.52
KM51A1204N	47.0 ±5%	40	2.52
KM51A1205N	56.0 ±5%	40	2.52
KM51A1206N	68.0 ±5%	40	2.52
KM51A1207N	82.0 ±5%	40	2.52
KM51A1208N	100.0 ±5%	40	0.796
KM51A1209N	120.0 ±5%	40	0.796
KM51A1210N	150.0 ±5%	40	0.796
KM51A1211N	180.0 ±5%	40	0.796
KM51A1212N	220.0 ±5%	40	0.796
KM51A1213N	270.0 ±5%	40	0.796
KM51A1214N	330.0 ±5%	40	0.796
KM51A1215N	390.0 ±5%	40	0.796
KM51A1216N	470.0 ±5%	40	0.796
KM51A1217N	560.0 ±5%	40	0.796
KM51A1218N	680.0 ±5%	40	0.796

10 MM



Part No.	Color	L Min. (µH)	L Nom (µH)	L Max (µH)	Test Freq. (MHz)	Q Max
KM703N	Brown	0.80	1.2	1.70	7.9	47
KM704N	Red	1.25	2.0	2.75	7.9	48
KM705N	Orange	1.75	2.9	4.00	7.9	48
KM706N	Yellow	2.40	3.9	5.40	7.9	47
KM707N	Green	3.50	5.6	7.80	7.9	47
KM708N	Blue	4.70	7.8	10.60	7.9	46
KM709N	Violet	7.40	11.5	15.60	2.5	38
KM710N	Grey	11.00	18.2	25.00	2.5	40
KM711N	White	16.00	25.3	35.00	2.5	40
KM712N	Black	22.00	36.5	50.00	2.5	40
KM713N	Brown*	33.00	52.5	72.00	2.5	39
KM714N	Red*	46.00	74.8	103.00	2.5	51
KM715N	Orange*	66.00	100.0	136.00	790.0	40
KM716N	Yellow*	95.00	146.0	198.00	790.0	44
KM717N	Green*	136.00	216.0	297.00	790.0	40
KM718N	Blue*	198.00	312.0	426.00	790.0	45
KM719N	Violet*	286.00	530.0	630.00	790.0	33
KM720N	Grey*	418.00	790.0	927.00	790.0	38

7 MM



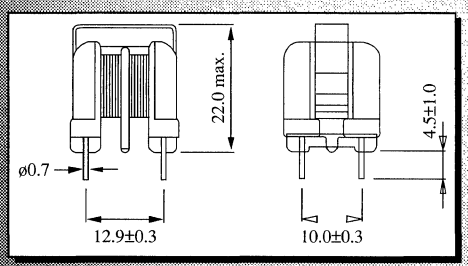
Part No.	L Min. (µH)	L Nom (µH)	L Max (µH)	Test Freq. (MHz)	Q Max	DCR Max. (ohms)
KS1346N	0.094	0.100	0.106	25.0	27	0.124
KS1347N	0.113	0.120	0.127	25.0	27	0.124
KS1348N	0.141	0.150	0.159	25.0	30	0.151
KS1349N	0.169	0.180	0.191	25.0	30	0.151
KS1350N	0.207	0.220	0.233	25.0	35	0.176
KS1351N	0.254	0.170	0.286	25.0	35	0.198
KS1352N	0.310	0.330	0.350	25.0	40	0.248
KS1353N	0.367	0.390	0.413	25.0	40	0.271
KS1354N	0.442	0.470	0.498	25.0	40	0.291
KS1355N	0.526	0.560	0.594	25.0	40	0.317
KS1356N	0.612	0.680	0.748	25.0	40	0.333
KS1357N	0.738	0.820	0.902	25.0	45	0.368
KS1358N	0.900	1.000	1.100	25.0	45	0.396
KS1359N	1.100	1.200	1.300	7.9	27	0.412
KS1360N	1.400	1.500	1.700	7.9	27	0.466
KS1361N	1.600	1.800	2.000	7.9	27	0.544
KS1362N	2.000	2.200	2.400	7.9	27	0.595
KS1363N	2.400	2.700	3.000	7.9	27	0.698
KS1364N	3.000	3.300	3.600	7.9	27	1.040
KS1365N	3.500	3.900	4.300	7.9	27	1.120
KS1366N	4.200	4.700	5.200	7.9	27	1.380
KS1367N	5.000	5.600	6.200	7.9	27	1.420
KS1368N	6.100	6.800	7.500	7.9	27	1.490
KS1369N	7.400	8.200	9.000	7.9	27	1.650
KS1370N	9.000	10.000	11.000	7.9	27	2.420
KS1371N	10.000	12.000	14.000	2.5	20	2.750
KS1372N	13.000	15.000	17.000	2.5	20	3.710
KS1373N	15.000	18.000	21.000	2.5	20	4.010
KS1374N	19.000	22.000	25.000	2.5	20	7.370
KS1375N	23.000	27.000	31.000	2.5	20	8.480
KS1376N	28.000	33.000	38.000	2.5	20	13.340
KS1377N	33.000	39.000	45.000	2.5	20	14.720
KS1378N	40.000	47.000	54.000	2.5	20	16.420
KS1379N	48.000	56.000	64.000	2.5	20	17.760
KS1380N	58.000	68.000	78.000	2.5	20	19.760
KS1381N	70.000	82.000	95.000	2.5	20	22.010
KS1382N	85.000	100.000	115.000	2.5	20	24.250

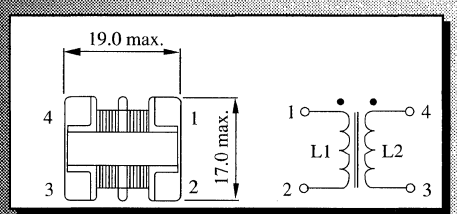
FOR MORE INFORMATION

FRONTIER ELECTRONICS CORP.
685 COCHRAN ST, SIMI VALLEY, CA 93065
TEL : (805) 522-9998 • FAX: (805) 522-9989
E-MAIL:frontiersale@frontierusa.com
Toll Free: 1-800-929-9888

COMMON MODE FILTERS

CFU 1101

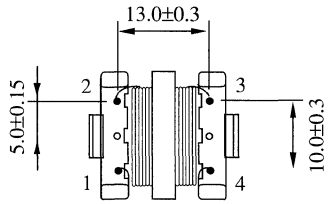


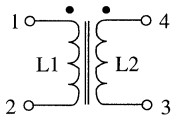


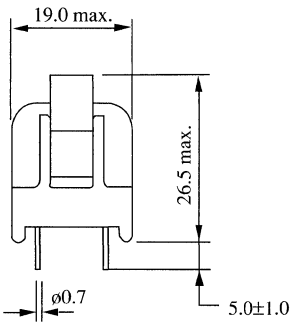
Part No.	Ind (mH) min	/L1-L2/ (µH) max.	Rdc (ohm) max.	Rated Current (A) rms
CFU1101-01	2x3	80	0.5	0.9
CFU1101-02	2x1.5	80	0.15	1.0
CFU1101-03	2x8	80	0.65	0.8
CFU1101-04	2x8	80	1.2	0.7
CFU1101-05	2x20	200	1.8	0.5
CFU1101-06	2x1	80	0.1	2.9

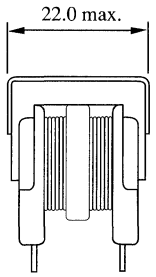
1. Insulation Resistance: 100M (Ohm) at 500 (Vdc)
2. Rated Voltage: 100 to 270 V/50-60 Hz
3. Temperature Rise: 40°C
4. Withstanding Voltage: 1.5K vac/1 minute
5. Test Condition: 1KHz/1V
6. Operating Temp: -20°C to +105°C

CFU1602



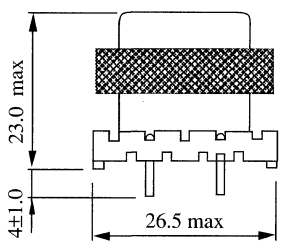


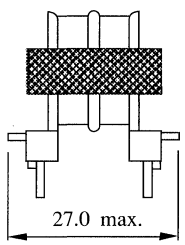


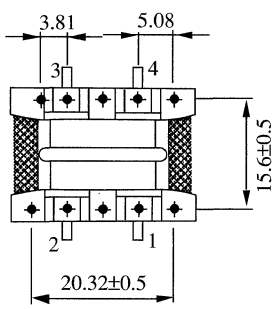


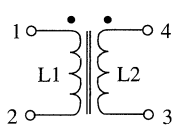
Part No.	Ind (mH) min	/L1-L2/ (µH) max.	Rdc (ohm) max.	Rated Current (A) rms
CFUI602-01	2x10	100	0.5	1.0
CFUI602-02	2x8	75	0.4	1.2
CFUI602-03	2x8	75	0.3	1.5
CFUI602-04	2x25	200	1.2	0.5

CFH2501









Part No.	Ind (mH) min	/L1-L2/ (µH) max.	Rdc (ohm) max.	Rated Current (A) rms
CFH2501-01	2x3.6	50	0.2	2.0
CFH2501-02	2x22	500	0.6	1.2
CFH2501-03	2x9	100	0.3	1.9
CFH2501-04	2x40	500	1.5	0.8
CFH2501-05	2x9.9	100	1.0	1.2

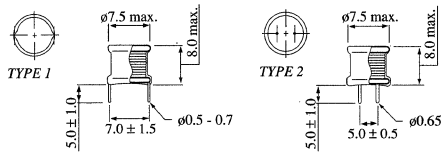
FOR MORE INFORMATION

FRONTIER ELECTRONICS CORP.
685 COCHRAN ST, SIMI VALLEY, CA 93065
TEL : (805) 522-9998 • FAX: (805) 522-9989
E-MAIL:frontiersale@frontierusa.com
Toll Free: 1-800-929-9888

RADIAL LEADED CHOKE COILS

18401

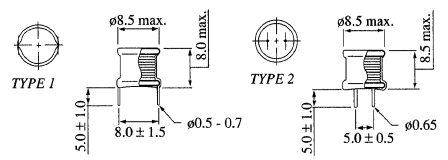
• Wide inductance range 1.0uh to 1000uh



Part No.	Ind (µh)@1KHz	Q Min	Test Freq. (MHz)	SRF Min. (MHz)	DCR Max. (ohms)	Rated Current Max. (A)	Type
184011ROM	1.0	20	7.9	70	0.007	6.6	1
184011R5M	1.5	20	7.9	60	0.010	5.4	1
184012R2M	2.2	20	7.9	45	0.015	4.5	1
184013R3M	3.3	20	7.9	35	0.020	3.6	1
184014R7M	4.7	20	7.9	30	0.025	3.1	1
184016R8M	6.8	20	7.9	25	0.030	2.5	1
18401100K	10	20	2.5	20	0.045	2.1	2
18401120K	12	20	2.5	17	0.050	1.9	2
18401150K	15	20	2.5	15	0.065	1.7	2
18401180K	18	20	2.5	13	0.08	1.5	2
18401220K	22	20	2.5	12	0.10	1.4	2
18401270K	27	20	2.5	10	0.12	1.2	2
18401330K	33	20	2.5	9.2	0.14	1.1	2
18401390K	39	20	2.5	8.5	0.17	1.0	2
18401470K	47	20	2.5	7.5	0.21	0.95	2
18401560K	56	20	2.5	7.0	0.24	0.80	2
18401680K	68	20	2.5	6.5	0.28	0.75	2
18401820K	82	20	2.5	5.5	0.31	0.70	2
18401101K	100	20	0.79	5.0	0.35	0.65	2
18401121K	120	20	0.79	4.5	0.45	0.60	2
18401151K	150	20	0.79	4.0	0.56	0.53	2
18401181K	180	20	0.79	3.5	0.65	0.48	2
18401221K	220	20	0.79	3.2	0.72	0.44	2
18401271K	270	20	0.79	2.8	0.86	0.40	2
18401331K	330	20	0.79	2.5	1.1	0.36	2
18401391K	390	20	0.79	2.2	1.5	0.33	2
18401147K	470	20	0.79	2.0	1.7	0.30	2
18401561K	560	20	0.79	1.8	2.0	0.27	2
18401681K	680	20	0.79	1.7	2.5	0.25	2
18401821K	820	20	0.79	1.5	3.0	0.22	2
18401102K	1000	50	0.25	1.3	4.5	0.20	2

18402

• Wide inductance range 1.0uh to 1500uh



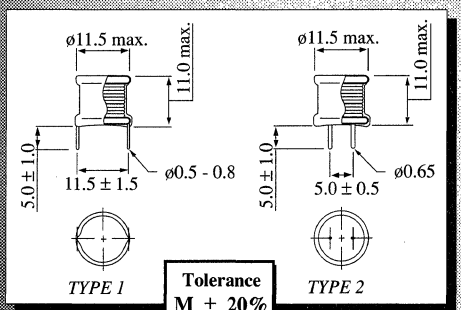
Part No.	Ind (µh)@1KHz	Q Min	Test Freq. (MHz)	SRF Min. (MHz)	DCR Max. (ohms)	Rated Current Max. (A)	Type
184021ROM	1.0	20	7.9	68	0.005	7.5	1
184021R5M	1.5	20	7.9	56	0.008	6.6	1
184022R2M	2.2	20	7.9	45	0.010	5.4	1
184023R3M	3.3	20	7.9	38	0.013	4.5	1
184024R7M	4.7	20	7.9	30	0.017	3.7	1
184026R8M	6.8	20	7.9	24	0.022	3.1	1
18402100K	10	20	2.5	19	0.03	2.5	1
18402120K	12	20	2.5	17	0.04	2.2	1
18402150K	15	20	2.5	15	0.05	2.0	1
18402180K	18	20	2.5	13	0.06	1.8	2
18402220K	22	20	2.5	12	0.07	1.6	2
18402270K	27	20	2.5	11	0.08	1.4	2
18402330K	33	20	2.5	10	0.10	1.3	2
18402390K	39	20	2.5	9.0	0.12	1.2	2
18402470K	47	20	2.5	8.0	0.14	1.1	2
18402560K	56	20	2.5	7.0	0.16	0.96	2
18402680K	68	20	2.5	6.5	0.18	0.91	2
18402820K	82	20	2.5	6.0	0.20	0.83	2
18402101K	100	15	0.79	5.5	0.25	0.75	2
18402121K	120	15	0.79	5.0	0.33	0.68	2
18402151K	150	15	0.79	4.5	0.40	0.61	2
18402181K	180	15	0.79	4.0	0.50	0.55	2
18402221K	220	15	0.79	3.5	0.60	0.50	2
18402271K	270	15	0.79	3.2	0.70	0.45	2
18402331K	330	15	0.79	2.8	0.80	0.41	2
18402391K	390	15	0.79	2.5	0.90	0.37	2
18402471K	470	15	0.79	2.3	1.0	0.34	2
18402561K	560	15	0.79	2.1	1.3	0.31	2
18402681K	680	15	0.79	1.9	1.5	0.28	2
18402821K	820	15	0.79	1.7	2.0	0.25	2
18402102K	1000	30	0.25	1.5	2.5	0.23	2
18402122K	1200	30	0.25	1.3	3.0	0.20	2
18402152K	1500	30	0.25	1.2	3.5	0.18	2

FEATURES:
- Mini size
- High reliability
- Temp. rise 25ºC max
- Low cost
- Operating temp. -40ºC to +85ºC
- Ambient temp 60ºC max

TEST EQUIPMENT:
L-HP 4276A LCZ meter
Q-HP4342A at specified freq.
DCR-Milli ohm meter
SRF-HP4191A

18403

• Wide inductance range 1.0uh to 15000uh



Tolerance
M ± 20%
L ± 15%
K ± 10%

Part No.	Ind (µh)@1KHz	Q Min	Test Freq. (MHz)	SRF Min. (MHz)	DCR Max. (ohms)	Rated Current Max. (A)	Type
184031ROM	1.0	20	7.9	85.0	0.004	10.00	1
184031R5M	1.5	20	7.9	64.0	0.005	8.30	1
184032R2M	2.2	20	7.9	48.0	0.006	6.90	1
184033R3M	3.3	20	7.9	36.0	0.008	5.60	1
184034R7M	4.7	20	7.9	28.0	0.009	4.70	1
184036R8M	6.8	20	7.9	22.0	0.012	3.90	1
18403100K	10	20	2.5	16.0	0.016	3.20	1
18403120K	12	20	2.5	14.0	0.018	2.90	1
18403150K	15	20	2.5	12.0	0.020	2.60	1
18403180K	18	20	2.5	11.0	0.025	2.40	1
18403220K	22	20	2.5	10.0	0.030	2.20	1
18403270K	27	20	2.5	9.0	0.04	2.00	1
18403330K	33	20	2.5	8.0	0.05	1.80	1
18403390K	39	20	2.5	7.0	0.06	1.65	1
18403470K	47	20	2.5	6.0	0.07	1.50	1
18403560K	56	20	2.5	5.5	0.08	1.35	1
18403680K	68	20	2.5	5.0	0.10	1.20	1
18403820K	82	20	2.5	4.5	0.12	1.10	2
18403101K	100	20	0.79	4.0	0.14	1.00	2
18403121K	120	20	0.79	3.5	0.18	0.90	2
18403151K	150	20	0.79	3.0	0.22	0.82	2
18403181K	180	20	0.79	2.8	0.25	0.75	2
18403221K	220	20	0.79	2.5	0.31	0.68	2
18403271K	270	20	0.79	2.2	0.36	0.61	2
18403331K	330	20	0.79	2.0	0.42	0.55	2
18403391K	390	20	0.79	1.8	0.48	0.50	2
18403471K	470	15	0.79	1.6	0.52	0.46	2
18403561K	560	15	0.79	1.4	0.65	0.42	2
18403681K	680	15	0.79	1.3	0.8	0.38	2
18403821K	820	15	0.79	1.2	1.0	0.34	2
18403102K	1000	20	0.25	1.0	1.5	0.31	2
18403122K	1200	20	0.25	0.9	1.8	0.28	2
18403152K	1500	20	0.25	0.85	2.0	0.25	2
18403182K	1800	20	0.25	0.80	2.5	0.23	2
18403222K	2200	20	0.25	0.75	3.0	0.21	2
18403272K	2700	20	0.25	0.70	3.5	0.19	2
18403332K	3300	20	0.25	0.65	4.0	0.17	2
18403392K	3900	20	0.25	0.60	5.0	0.15	2
18403472K	4700	20	0.25	0.55	6.0	0.14	2
18403562K	5600	20	0.25	0.50	7.5	0.13	2
18403682K	6800	20	0.25	0.45	9.5	0.12	2
18403822K	8200	20	0.25	0.40	11	0.11	2
18403103K	10000	50	0.079	0.35	12	0.10	2
18403123K	12000	50	0.079	0.30	13.5	0.09	2
18403153K	15000	50	0.079	0.25	15	0.08	2

FOR MORE INFORMATION

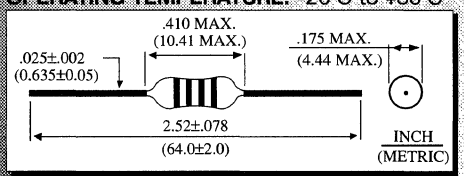
FRONTIER ELECTRONICS CORP.
685 COCHRAN ST, SIMI VALLEY, CA 93065
TEL : (805) 522-9998 • FAX: (805) 522-9989
E-MAIL:frontiersale@frontierusa.com
Toll Free: 1-800-929-9888

AXIAL LEADED RF CHOKES

OPERATING TEMPERATURE:
PHENOLIC /1 25°C Max. • FERRITE / 105°C Max.

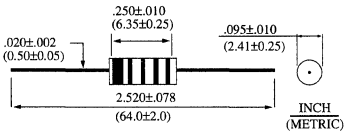
1206 RF COATED

OPERATING TEMPERATURE: -20°C to +80°C



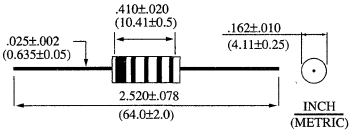
Part No.	Ind (µh)@1KHz	Q Min	Test Freq. (MHz)	SRF Min. (MHz)	DCR Max. (ohms)	Rated Current Max. (mA)
1206R10M	.10	45	25.0	300	.10	1400
1206R12M	.12	45	25.0	300	.10	1400
1206R15M	.15	45	25.0	300	.10	1400
1206R18M	.18	45	25.0	300	.10	1400
1206R22M	.22	45	25.0	300	.10	1400
1206R27M	.27	45	25.0	270	.11	1320
1206R33M	.33	45	25.0	250	.12	1280
1206R39M	.39	45	25.0	230	.13	1200
1206R47M	.47	45	25.0	220	.14	1150
1206R56M	.56	45	25.0	200	.15	1100
1206R68M	.68	45	25.0	190	.16	1030
1206R82M	.82	45	25.0	172	.17	980
12061R0K	1.0	45	25.0	157	.19	920
12061R2K	1.2	50	7.9	144	.21	880
12061R5K	1.5	50	7.9	131	.23	830
12061R8K	1.8	50	7.9	121	.25	790
12062R2K	2.2	50	7.9	110	.28	750
12062R7K	2.7	60	7.9	100	.30	720
12063R3K	3.3	65	7.9	94	.34	670
12063R9K	3.9	65	7.9	65	.37	640
12064R7K	4.7	70	7.9	56	.39	620
12065R6K	5.6	70	7.9	48	.43	590
12066R8K	6.8	75	7.9	37	.48	550
12068R2K	8.2	80	7.9	25	.52	530
1206100K	10.0	65	7.9	21	.58	500
1206120K	12.0	50	2.5	19	.63	480
1206150K	15.0	50	2.5	17	.72	460
1206180K	18.0	50	2.5	13	.77	430
1206220K	22.0	50	2.5	9.6	.84	410
1206270K	27.0	55	2.5	7.2	.94	390
1206330K	33.0	55	2.5	6.3	1.03	370
1206390K	39.0	50	2.5	6.3	1.12	350
1206470K	47.0	45	2.5	6.3	1.22	340
1206560K	56.0	40	2.5	6.2	1.34	320
1206680K	68.0	40	2.5	5.7	1.47	305
1206820K	82.0	35	2.5	5.3	1.62	290
1206101K	100.0	30	2.5	4.8	1.80	275
1206121K	120.0	55	.79	3.8	3.70	185
1206151K	150.0	45	.79	3.5	4.20	175
1206181K	180.0	50	.79	3.3	4.60	165
1206221K	220.0	55	.79	3.0	5.10	155
1206271K	270.0	65	.79	2.8	5.80	145
1206331K	330.0	65	.79	2.6	6.40	137
1206391K	390.0	65	.79	2.4	7.00	133
1206471K	470.0	60	.79	2.25	7.70	126
1206561K	560.0	60	.79	2.1	8.50	120
1206681K	680.0	55	.79	1.95	9.40	113
1206821K	820.0	55	.79	1.85	10.50	105
1206102K	1000.0	50	.79	1.4	14.00	100

1303 RF MOLDED



Part No.	Ind (µh)@1KHz	Q Min	Test Freq. (MHz)	SRF Min. (MHz)	DCR Max. (ohms)	Rated Current Max. (A)
1303-01K	.10	40	25.0	680	.08	1380
1303-02K	.12	40	25.0	640	.09	1300
1303-03K	.15	38	25.0	600	.10	1230
1303-04K	.18	35	25.0	550	.12	1120
1303-05K	.22	33	25.0	510	.14	1040
1303-06K	.27	33	25.0	430	.16	975
1303-07K	.33	30	25.0	410	.22	830
1303-08K	.39	30	25.0	365	.30	710
1303-09K	.47	30	25.0	330	.35	660
1303-10K	.56	30	25.0	300	.50	550
1303-11K	.68	28	25.0	275	.60	500
1303-12K	.82	28	25.0	250	.85	420
1303-13K	1.00	25	25.0	230	1.00	390
1303-14K	1.20	25	7.9	150	.18	620
1303-15K	1.50	28	7.9	140	.22	560
1303-16K	1.80	30	7.9	125	.30	480
1303-17K	2.20	30	7.9	115	.40	415
1303-18K	2.70	37	7.9	100	.55	355
1303-19K	3.30	45	7.9	90	.85	285
1303-20K	3.90	45	7.9	80	1.00	263
1303-21K	4.70	45	7.9	75	1.20	239
1303-22K	5.60	50	7.9	65	1.80	195
1303-23K	6.80	50	7.9	60	2.00	185
1303-24K	8.20	55	7.9	55	2.70	160
1303-25K	10.00	55	7.9	50	3.30	144
1303-26K	12.00	45	2.5	40	2.70	160
1303-27K	15.00	45	2.5	35	2.80	157
1303-28K	18.00	50	2.5	30	3.10	149
1303-29K	22.00	50	2.5	25	3.30	144
1303-30K	27.00	50	2.5	20	3.50	140
1303-31K	33.00	45	2.5	24	3.40	130
1303-32K	39.00	45	2.5	22	3.60	125
1303-33K	47.00	45	2.5	20	4.50	110
1303-34K	56.00	45	2.5	18	5.70	100
1303-35K	68.00	50	2.5	15	6.70	92
1303-36K	82.00	50	2.5	14	7.30	88
1303-37K	100.0	50	2.5	13	8.00	84
1303-38K	120.0	30	.79	12	13.00	66
1303-39K	150.0	30	.79	11	15.00	61
1303-40K	180.0	30	.79	10	17.00	57
1303-41K	220.0	30	.79	9	21.00	52
1303-42K	270.0	30	.79	8	25.00	47
1303-43K	330.0	30	.79	7	28.00	45
1303-44K	390.0	30	.79	6.5	35.00	40
1303-45K	470.0	30	.79	6	42.00	36
1303-46K	560.0	30	.79	5	46.00	35
1303-47K	680.0	30	.79	4.2	60.00	30
1303-48K	820.0	30	.79	3.8	65.00	29
1303-49K	1000.0	30	.79	3.4	72.00	28

1501 RF MOLDED SHIELDED



Part No.	Ind (µh)	Q Min	Test Freq. (MHz)	SRF Min. (MHz)	DCR Max. (ohms)	Rated Current Max. (mA)	Incr. Current Max. (mA)
1501-01K	.10	50	25	250	.025	1790	1790
1501-02K	.12	51	25	250	.034	1530	1530
1501-03K	.15	51	25	250	.037	1470	1470
1501-04K	.18	50	25	250	.047	1300	1300
1501-05K	.22	49	25	250	.067	1100	1100
1501-06K	.27	47	25	250	.11	855	855
1501-07K	.33	46	25	250	.13	780	780
1501-08K	.39	44	25	250	.18	670	670
1501-09K	.47	44	25	235	.25	565	565
1501-10K	.56	43	25	210	.33	490	490
1501-11K	.68	42	25	190	.45	420	420
1501-12K	.82	40	25	180	.59	370	370
1501-13K	1.00	44	25	140	.07	1070	1070
1501-14K	1.20	44	7.9	130	.10	895	895
1501-15K	1.50	44	7.9	115	.12	815	815
1501-16K	1.80	44	7.9	105	.14	775	775
1501-17K	2.20	44	7.9	100	.19	650	650
1501-18K	2.70	44	7.9	92	.28	535	535
1501-19K	3.30	44	7.9	85	.35	480	480
1501-20K	3.90	44	7.9	75	.40	450	450
1501-21K	4.70	44	7.9	70	.55	380	380
1501-22K	5.60	44	7.9	65	.72	335	335
1501-23K	6.80	50	7.9	55	1.02	280	280
1501-24K	8.20	50	7.9	50	1.32	250	250
1501-25K	10.00	50	7.9	46	1.62	220	220
1501-26K	12.00	55	2.5	44	2.00	200	200
1501-27K	15.00	45	2.5	49	.80	315	250
1501-28K	18.00	45	2.5	45	.89	300	235
1501-29K	22.00	45	2.5	41	.96	290	220
1501-30K	27.00	45	2.5	38	1.19	260	200
1501-31K	33.00	45	2.5	34	1.37	240	190
1501-32K	39.00	50	2.5	29	1.93	205	180
1501-33K	47.00	50	2.5	27	2.11	195	175
1501-34K	56.00	50	2.5	25	2.23	190	160
1501-35K	68.00	50	2.5	21	2.70	170	150
1501-36K	82.00	50	2.5	10.5	2.44	180	140
1501-37K	100.0	50	2.5	10	3.12	160	120
1501-38K	120.0	55	.79	9.7	3.60	150	95
1501-39K	150.0	55	.79	8.5	4.10	140	90
1501-40K	180.0	55	.79	8.0	4.40	135	85
1501-41K	220.0	55	.79	7.5	5.00	125	80
1501-42K	270.0	55	.79	7.0	5.80	115	70
1501-43K	330.0	55	.79	6.5	6.40	110	65
1501-44K	390.0	60	.79	6.2	7.40	105	60
1501-45K	470.0	60	.79	5.7	9.50	92	58
1501-46K	560.0	60	.79	4.7	10.5	90	55
1501-47K	680.0	60	.79	4.5	11.8	80	50
1501-48K	820.0	60	.79	4.2	13.0	80	45
1501-49K	1000.0	60	.79	3.8	17.5	70	40
1501-50K	1200.0	45	.25	1.5	22.1	60	35
1501-51K	1500.0	45	.25	1.2	26.5	55	33
1501-52K	1800.0	45	.25	1.0	29.9	50	30
1501-53K	2200.0	45	.25	.97	33.8	50	27
1501-54K	2700.0	45	.25	.92	47.3	40	25
1501-55K	3300.0	45	.25	.84	53.0	40	22
1501-56K	3900.0	45	.25	.80	73.8	35	20
1501-57K	4700.0	45	.25	.74	81.6	31	19
1501-58K	5600.0	44	.25	.73	98.9	28	17
1501-59K	6800.0	40	.25	.66	111.0	27	16
1501-60K	8200.0	40	.25	.54	119.0	26	15
1501-61K	10000.0	40	.25	.47	137.0	24	14

FEATURES:
- Low cost
- High Q and SRF, low DCR
- Permanent color band
- High reliability
- Wide inductance range 0.10µH to 1000µH

COLOR CODE IN ACCORDANCE WITH EIA
J FOR 5%
K FOR 10%
M FOR 20%

MOISTURE & HEAT RESIST.

Δ L/L	≤ ± 5%
Δ Q/Q	≤ ± 10%

CURRENT RATING:
Based on a temperature rise not to exceed 200C

TERMINAL STRENGTH: 3 lbs
DIELECTRIC STRENGTH: 1KV r.m.s.
TEST EQUIPMENT:
L&Q - HP4342A AT SPECIFIED FREQ.
DCR - MILLIOHM METER
SRF - HP 4191A

FOR MORE INFORMATION

FRONTIER ELECTRONICS CORP.
685 COCHRAN ST, SIMI VALLEY, CA 93065
TEL : (805) 522-9998 • FAX: (805) 522-9989
E-MAIL:frontiersale@frontierusa.com
Toll Free: 1-800-929-9888

MINIGLOSSARY
BASIC ASCII CODE

				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0	NUL	DLE	SP	0	@	P	`	p
0	0	0	1	1	SOH	DC1	!	1	A	Q	a	q
0	0	1	0	2	STX	DC2	"	2	B	R	b	r
0	0	1	1	3	ETX	DC3	#	3	C	S	c	s
0	1	0	0	4	EOT	DC4	$	4	D	T	d	t
0	1	0	1	5	ENQ	NAK	%	5	E	U	e	u
0	1	1	0	6	ACK	SYN	&	6	F	V	f	v
0	1	1	1	7	BEL	ETB	'	7	G	W	g	w
1	0	0	0	8	BS	CAN	(	8	H	X	h	x
1	0	0	1	9	HT	EM	)	9	I	Y	i	y
1	0	1	0	10	LF	SUB	*	:	J	Z	j	z
1	0	1	1	11	VT	ESC	+	;	K	[	k	{
1	1	0	0	12	FF	FS	,	<	L	\	l	|
1	1	0	1	13	CR	GS	-	=	M	]	m	}
1	1	1	0	14	SO	RS	.	>	N	^	n	~
1	1	1	1	15	SI	US	/	?	O	_	o	DEL

Control Character Representations

NUL	Null
SOH	Start of Heading (CC)
STX	Start of Text (CC)
ETX	End of Text (CC)
EOT	End of Transmission (CC)
ENQ	Enquiry (CC)
ACK	Acknowledge (CC)
BEL	Bell
BS	Backspace (FE)
HT	Horizontal Tabulation (FE)
LF	Line Feed (FE)
VT	Vertical Tabulation (FE)
FF	Form Feed (FE)
CR	Carriage Return (FE)
SO	Shift Out
SI	Shift In
DLE	Data Link Escape (CC)
DC1	Device Control 1
DC2	Device Control 2
DC3	Device Control 3
DC4	Device Control 4
NAK	Negative Acknowledge (CC)
SYN	Synchronous Idle (CC)
ETB	End of Transmission Block (CC)
CAN	Cancel
EM	End of Medium
SUB	Substitute
ESC	Escape
FS	File Separator (IS)
GS	Group Separator (IS)
RS	Record Separator (IS)
US	Unit Separator (IS)
DEL	Delete

(CC) Communication Control
(FE) Format Effector
(IS) Information Separator

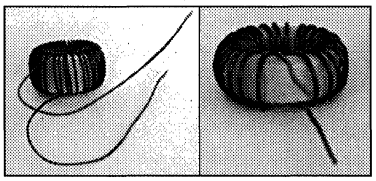
Special Graphic Characters

SP	Space
!	Exclamation Point
|	Logical OR
"	Quotation Marks
#	Number Sign
$	Dollar Sign
%	Percent
&	Ampersand
'	Apostrophe
(	Opening Parenthesis
)	Closing Parenthesis
*	Asterisk
+	Plus
,	Comma
-	Hyphen (Minus)
.	Period (Decimal Point)
/	Slant
:	Colon
;	Semicolon
<	Less Than
=	Equals
>	Greater Than
?	Question Mark
@	Commercial At
[	Opening Bracket
\	Reverse Slant
]	Closing Bracket
^	Circumflex
¬	Logical NOT
_	Underline
`	Grave Accent
{	Opening Brace
¦	Vertical Line (This graphic is stylized to distinguish it from Logical OR)
}	Closing Brace
~	Tilde

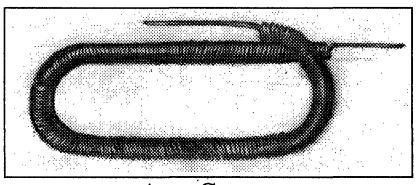
GENERAL LINEAR SYSTEMS, INC.

COIL WINDERS OF FULLERTON

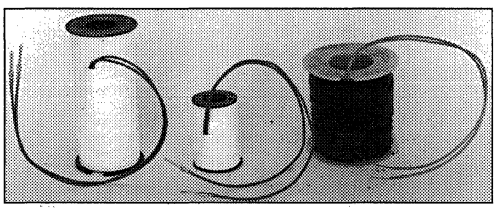
Phone: (714) 994-4822 ▬ Fax: (714) 994-4823 ▬ Email: coilwinding@earthlink.net



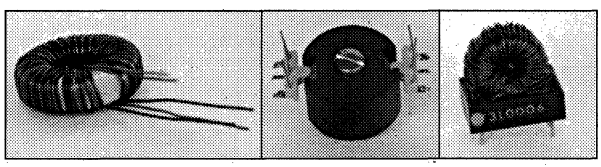
ALL SIZES
CUSTOM INDUCTORS, FERRITE & RF CHOKES



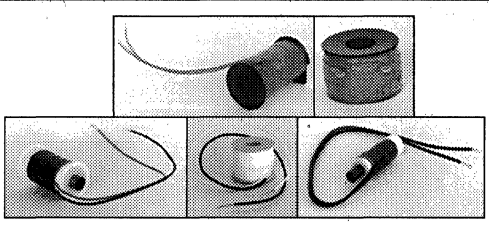
ALL SIZES
WIRE WOUND HEATING ELEMENTS



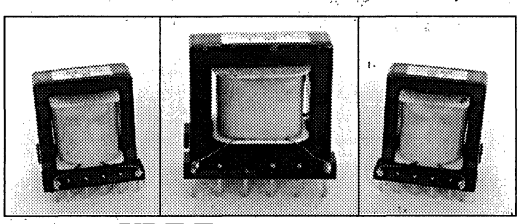
SOLENOID & FLOW CONTROL COILS



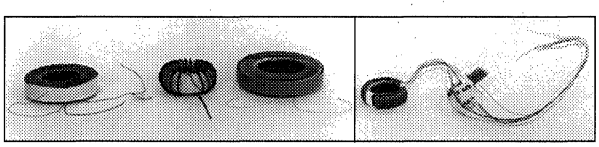
COMMON MODE CHOKES



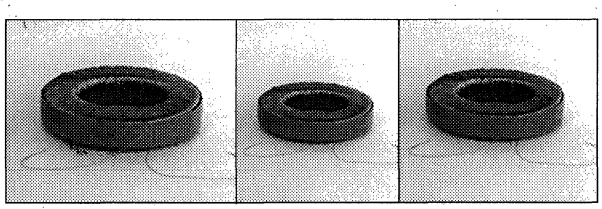
CUSTOM BOBBIN COILS



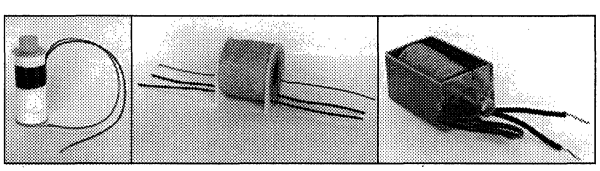
VDE TRANSFORMERS



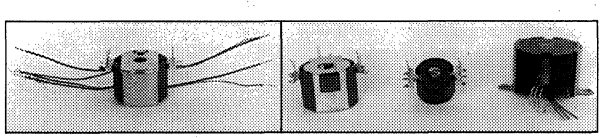
TOROIDAL COILS .375" TO 3" OD"



CURRENT SENSING TRANSFORMERS



CUSTOM WINDING



POT CORE TRANSFORMERS

Other Services Available:

- ***Product Development and Prototypes***
- ***Cost Efficient Packaging Development and Engineering Assistance***

4332 Artesia Blvd., Fullerton, CA 92833

SURFACE MOUNT PRODUCTS

Since 1963, GOWANDA ELECTRONICS has pioneered and manufactured board level passive devices. As technology has shifted from thru-hole boards to surface mount designs, our research and development, engineering, and manufacturing groups have worked together to develop the LATEST GENERATION OF INNOVATIVE PRODUCTS. By employing sophisticated process control and paying close attention to details, we have been able to maintain THE LOWEST DEFECT RATE in the industry. Along with some of the most reliable surface mount components, Gowanda can also provide you a broad standard product line, FULL CUSTOM CAPABILITIES and years of industry expertise!

New "POWER i" family of Surface Mount Inductors

- *POWER LINE - 3 sizes with current ratings up to 10 amps*
- *RF LINE - 3 sizes with an inductance range from 10 nH to 1000μH*
- *Custom values by request*

SURFACE MOUNT INDUCTORS

All of Gowanda's SM series inductors are available in a wide range of inductance and current values.

- *Operating temperatures -55°C to +125°C*
- *Inductance values with standard tolerances of 5% and 10%*
- *Molded epoxy and high resistivity ferrite form*
- *Solder plated terminals*
- *Vapor phase and infrared compatible*
- *Compatible with reflow processes to 230°C*
- *Internal terminations*

SURFACE MOUNT TOROIDS

Flame retardant construction and superior electromagnetic shielding are just a few reasons to choose Gowanda's SM components.

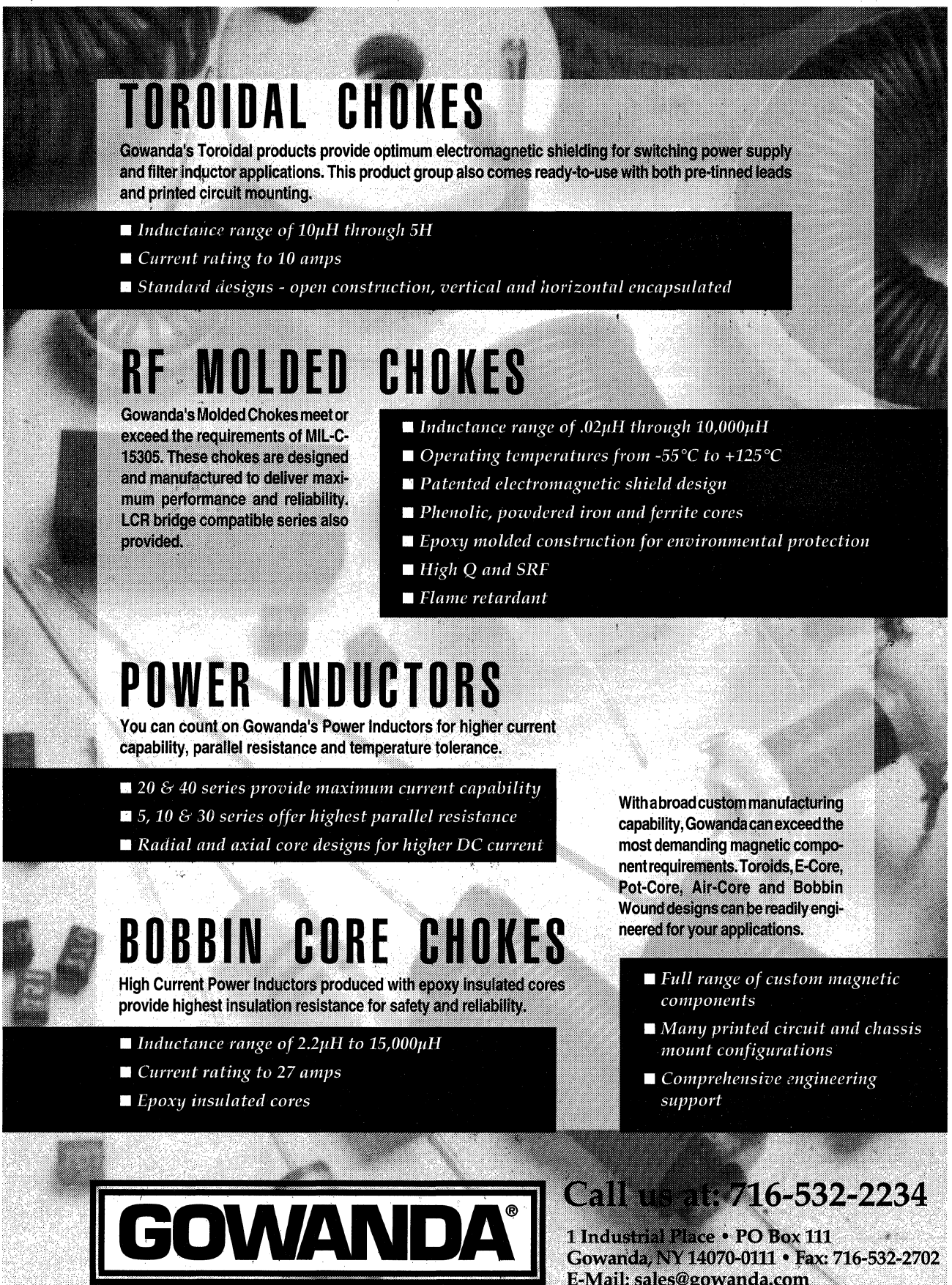
- *Operating temperatures -55°C to +125°C*
- *Inductance values with standard tolerances of 5% and 10%*
- *Solder plated terminals*
- *Vapor phase and infrared compatible*
- *Compatible with reflow processes to 230°C*
- *EMI suppression for high frequency switching circuits*

GOWANDA®

Call us at: 716-532-2234

1 Industrial Place • PO Box 111
Gowanda, NY 14070-0111 • Fax: 716-532-2702
E-Mail: sales@gowanda.com

Look us up at: http://www.gowanda.com for our complete product listings and specifications!



TOROIDAL CHOKES

Gowanda's Toroidal products provide optimum electromagnetic shielding for switching power supply and filter inductor applications. This product group also comes ready-to-use with both pre-tinned leads and printed circuit mounting.

- *Inductance range of 10μH through 5H*
- *Current rating to 10 amps*
- *Standard designs - open construction, vertical and horizontal encapsulated*

RF MOLDED CHOKES

Gowanda's Molded Chokes meet or exceed the requirements of MIL-C-15305. These chokes are designed and manufactured to deliver maximum performance and reliability. LCR bridge compatible series also provided.

- *Inductance range of .02μH through 10,000μH*
- *Operating temperatures from -55°C to +125°C*
- *Patented electromagnetic shield design*
- *Phenolic, powdered iron and ferrite cores*
- *Epoxy molded construction for environmental protection*
- *High Q and SRF*
- *Flame retardant*

POWER INDUCTORS

You can count on Gowanda's Power Inductors for higher current capability, parallel resistance and temperature tolerance.

- *20 & 40 series provide maximum current capability*
- *5, 10 & 30 series offer highest parallel resistance*
- *Radial and axial core designs for higher DC current*

With a broad custom manufacturing capability, Gowanda can exceed the most demanding magnetic component requirements. Toroids, E-Core, Pot-Core, Air-Core and Bobbin Wound designs can be readily engineered for your applications.

BOBBIN CORE CHOKES

High Current Power Inductors produced with epoxy insulated cores provide highest insulation resistance for safety and reliability.

- *Inductance range of 2.2μH to 15,000μH*
- *Current rating to 27 amps*
- *Epoxy insulated cores*

- *Full range of custom magnetic components*
- *Many printed circuit and chassis mount configurations*
- *Comprehensive engineering support*

GOWANDA®

Call us at: 716-532-2234

1 Industrial Place • PO Box 111
Gowanda, NY 14070-0111 • Fax: 716-532-2702
E-Mail: sales@gowanda.com

Look us up at: http://www.gowanda.com for our complete product listings and specifications!

INDUCTOR SUPPLY, INC.

5445 E. LA PALMA AVENUE • ANAHEIM • CA 92807

714-701-9890 • 1-800-854-1881 • FAX: 714-701-9590

ISI
WHERE COMMITMENT IS EVERYTHING

LCB0805, LCB1206, LCB1210, LCB1806, LCB1812, & LCB0603 MULTI-LAYER CHIP BEADS

FEATURES

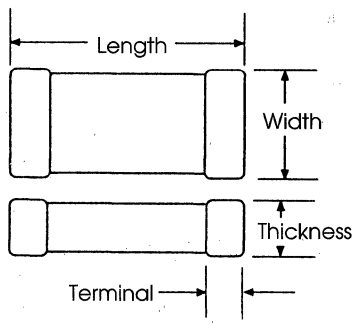
- High inherent Q.
- Greater impedance per unit volume.
- Lower DC resistance reduces assembly time.
- Can be mounted with surface mounting equipment.
- Available in 5 different sizes and 3 different materials that will permit their use in a wide range of applications.
- Suitable for flow and re-flow soldering systems.

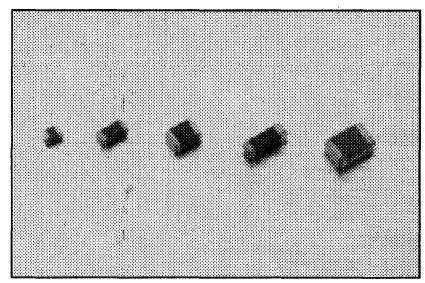
APPLICATIONS

- To eliminate EMI/RFI attenuation and suppression on electronic products.
- Small VCRs, video cameras, hand-held TVs, DAT (Digital Audio Tape)
- Communications devices.
- Portable electronic products.

PACKAGING

- LCB0603, LCB0805, LCB1206, LCB1210, LCB1806 & LCB1812 see paragraph 7.3.





LCB0805, LCB1206, LCB1210, LCB1806 & LCB1812.

LCB0805, LCB1206, LCB1210, LCB1806 & LCB1812 SERIES CHART

Part Number	Length	Width	Thickness	Terminal
LCB0603	.063" (1.6mm)	.032" (0.79mm)	.032" (0.79mm)	.02" ±.001" (.5mm)
LCB0805	.079" (2.0mm)	.049" (1.20mm)	.034" (0.80mm)	.02" ±.001" (.5mm)
LCB1206	.126" (3.2mm)	.063" (1.60mm)	.044" (1.10mm)	.02" ±.001" (.5mm)
LCB1210	.120" (3.2mm)	.100" (2.50mm)	.050" (1.30mm)	.02" ±.001" (.5mm)
LCB1806	.180" (4.5mm)	.060" (1.60mm)	.060" (1.60mm)	.02" ±.001" (.5mm)
LCB1812	.180" (4.5mm)	.120" (3.20mm)	.050" (1.50mm)	.02" ±.001" (.5mm)

LCB0805, LCB1206, LCB1210, LCB1806 & LCB1812 SERIES CHART

Part Number	Z @ 100MHz ±2 5%	Tolerance	DC Resistance OHMS Maximum (Ω)	Rated DC Current Max. (mA)
LCB0603-121	120	±25%	0.7	200
LCB0805-070	7	±25%	0.1	600
LCB0805-100	10	±25%	0.1	600
LCB0805-170	17	±25%	0.1	600
LCB0805-400	40	±25%	0.3	500
LCB0805-800	80	±25%	0.4	400
LCB0805-121	120	±25%	0.5	300
LCB0805-301	300	±25%	0.9	200
LCB1206-190	19	±25%	0.2	500
LCB1206-260	26	±25%	0.2	500
LCB1206-310	31	±25%	0.2	500
LCB1206-600	60	±25%	0.2	200
LCB1206-900	90	±25%	0.3	200
LCB1206-601	600	±25%	0.9	200
LCB1206-102	1000	±25%	0.9	200
LCB1210-310	31	±25%	0.2	400
LCB1210-520	52	±25%	0.3	400
LCB1210-600	60	±25%	0.3	200
LCB1210-101	100	±25%	0.3	300
LCB1806-600	60	±25%	0.2	300
LCB1806-800	80	±25%	0.2	300
LCB1806-101	100	±25%	0.3	400
LCB1806-151	150	±25%	0.2	200
LCB1812-700	70	±25%	0.4	300
LCB1812-121	120	±25%	0.4	300

CUSTOM ORDERS WELCOMED

LET ISI ASSIST YOU WITH YOUR UPCOMING DESIGNS

In addition to the standard parts shown on these pages ISI can custom design/build a wide range of inductive devices. Prototypes can be quickly manufactured and shipped for your approval. For further information and technical assistance please call us at 1-800-854-1881. Experienced engineers are available to discuss your requirements.

NEED A MANUFACTURER WITH CUSTOM CAPABILITIES ... Contact us for further information & technical assistance.

INDUCTOR SUPPLY, INC.

5445 E. LA PALMA AVENUE • ANAHEIM • CA 92807

714-701-9890 • 1-800-854-1881 • FAX: 714-701-9590

ISI

WHERE COMMITMENT IS EVERYTHING

LC0805 & LC1008 CERAMIC CORE SERIES

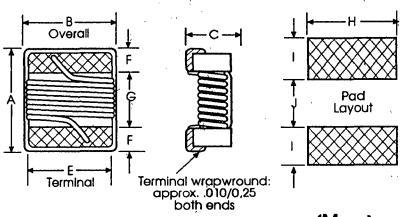
APPLICATIONS

- LC resonant circuits such as oscillators and signal generators
- Impedance matching
- Circuit isolation
- RF filters
- Disk drives and computer peripherals
- Audio equipment
- Video equipment
- TV and radio

CHARACTERISTICS

Dielectric Strength: 500 Volts RMS at sea level
Operating Temperature: -25°C to + 85°C.
Storage Temperature: -45°C to +100°C in original tape and reel package.
Soldering Heat Resistance: 250°C for 10 seconds after 120°C preheat for 5 minutes.
Solderability: Terminals are covered 95% with solder.
Resistance to Solvent: No change in appearance when dipped into alcohol or freon for 3 minutes.

Marking: Marked with Inductance value in EIA code.



(Max.)

LC0805 DIMENSIONS

A	B	C	E	F	G	H	I	J
.085	.060	.035	.050	.017	.045	.070	.040	.030
2,16	1,52	0,89	1,27	0,43	1,14	1,78	1,02	0,76

LC1008 DIMENSIONS

A	B	C	E	F	G	H	I	J
.105	.095	.070	.080	.020	.060	.100	.040	.050
2,67	2,41	1,78	2,03	0,51	1,52	2,54	1,02	0,77

LC0805 SERIES

Part Number	Inductance Nominal (nhy)	Inductance Frequency (MHZ)	Inductance Standard Tolerance %(1)	Typical Capacitance	Q Minimum (2)	Q @ MHZ (2)	DC Resistance OHMS Max (Ω) (3)	Self Resonant Frequency Min (MHZ) (4)	Rated DC Current Max (mA)
LC0805( )-3N3( )	3.30	250	20	122.82	50	1500	.08	6000	600
LC0805( )-6N8( )	6.80	250	20	59.60	50	1000	.11	5500	600
LC0805( )-8N2( )	8.20	250	20	49.43	50	500	.12	4700	600
LC0805( )-120( )	12.00	250	20	33.78	50	500	.15	4000	600
LC0805( )-150( )	15.00	250	20	27.02	50	500	.17	3400	600
LC0805( )-180( )	18.00	250	20	22.52	50	500	.20	3300	600
LC0805( )-220( )	22.00	250	20	18.42	55	500	.22	2600	500
LC0805( )-270( )	27.00	250	20	15.01	55	500	.25	2500	500
LC0805( )-330( )	33.00	250	20	12.28	60	500	.27	2050	500
LC0805( )-390( )	39.00	250	20	10.39	60	500	.29	2000	500
LC0805( )-470( )	47.00	200	20	13.47	60	500	.31	1650	500
LC0805( )-560( )	56.00	200	10	11.31	60	500	.34	1550	500
LC0805( )-680( )	68.00	200	10	9.31	60	500	.38	1450	500
LC0805( )-820( )	82.00	150	10	13.73	65	500	.42	1300	400
LC0805( )-101( )	100.00	150	10	11.26	65	500	.46	1200	400
LC0805( )-121( )	120.00	150	10	9.38	60	250	.56	1100	400
LC0805( )-151( )	150.00	100	10	16.89	50	250	.60	900	400
LC0805( )-181( )	180.00	100	10	14.07	50	250	.69	875	350
LC0805( )-221( )	220.00	100	10	11.51	50	250	.85	800	300

LC01008 SERIES

Part Number	Inductance Nominal (nHy)	Inductance Frequency (MHZ)	Inductance Standard Tolerance %(1)	Typical Capacitance	Q Minimum (2)	Q @ MHZ (2)	DC Resistance OHMS Max (Ω) (3)	Self Resonant Frequency Min (MHZ) (4)	Rated DC Current Max (mA)
LC1008( )-4N7-( )	4.70	50	20	N/A	60	1500	.025	6000	1000
LC1008( )-8N2-( )	8.20	50	20	N/A	60	1000	.050	6000	1000
LC1008( )-102-( )	10.00	50	20	N/A	50	500	.090	5000	1000
LC1008( )-120-( )	12.00	50	20	84.39	65	500	.090	2300	1000
LC1008( )-150-( )	15.00	50	20	675.51	55	500	.160	1850	1000
LC1008( )-180-( )	18.00	50	20	562.93	55	350	.060	2200	1000
LC1008( )-220-( )	22.00	50	20	460.58	55	350	.090	1800	1000
LC1008( )-270-( )	27.00	50	10	375.29	60	350	.090	1500	1000
LC1008( )-330-( )	33.00	50	10	307.05	55	350	.180	1800	800
LC1008( )-390-( )	39.00	50	10	259.81	70	350	.120	1400	1000
LC1008( )-470-( )	47.00	50	10	215.59	70	350	.075	1200	1000
LC1008( )-560-( )	56.00	50	10	180.94	60	350	.120	1150	1000
LC1008( )-680-( )	68.00	50	10	149.01	70	350	.070	1100	1000
LC1008( )-820-( )	82.00	50	10	123.57	65	350	.140	860	950
LC1008( )-101-( )	100.00	25	10	405.31	65	350	.150	900	650
LC1008( )-121-( )	120.00	25	10	337.76	60	350	.220	825	650
LC1008( )-151-( )	150.00	25	10	270.21	50	100	.160	625	850
LC1008( )-181-( )	180.00	25	10	225.17	50	100	.250	600	620
LC1008( )-221-( )	220.00	25	10	184.23	50	100	.240	625	500
LC1008( )-271-( )	270.00	25	10	150.11	45	100	.500	525	500
LC1008( )-331-( )	330.00	25	10	122.82	50	100	.500	500	450
LC1008( )-391-( )	390.00	25	10	103.92	50	100	.800	475	425
LC1008( )-471-( )	470.00	25	10	86.24	50	100	.750	450	350
LC1008( )-561-( )	560.00	25	10	72.38	50	100	.700	425	350
LC1008( )-621-( )	620.00	25	10	65.37	45	100	.800	375	200
LC1008( )-681-( )	680.00	25	10	59.60	45	100	1.900	375	200
LC1008( )-751-( )	750.00	25	10	54.04	45	100	2.300	350	200
LC1008( )-821-( )	820.00	25	10	49.43	40	100	1.600	325	200
LC1008( )-911-( )	910.00	25	10	44.54	40	50	3.300	300	200
LC1008( )-102-( )	1000.00	25	10	40.53	40	50	2.100	300	200
LC1008( )-122-( )	1200.00	10	10	N/A	40	50	1.700	250	200
LC1008( )-152-( )	1500.00	10	10	N/A	40	50	3.000	200	150
LC1008( )-182-( )	1800.00	10	10	N/A	40	50	3.800	150	150
LC1008( )-222-( )	2200.00	10	10	N/A	30	25	4.000	80	150
LC1008( )-272-( )	2700.00	10	10	N/A	30	25	4.400	90	150
LC1008( )-332-( )	3300.00	10	10	N/A	25	15	7.000	40	150
LC1008( )-392-( )	3900.00	10	10	N/A	20	15	7.800	35	136
LC1008( )-472-( )	4700.00	10	10	N/A	16	15	8.300	25	150

Don't See What You Need On Our Pages ... CONTACT ISI AT 1-800-854-1881 FOR OUR LATEST CATALOG!

INDUCTOR SUPPLY, INC.

5445 E. LA PALMA AVENUE • ANAHEIM • CA 92807

714-701-9890 • 1-800-854-1881 • FAX: 714-701-9590

ISI

WHERE COMMITMENT IS EVERYTHING

HIGH CURRENT SURFACE MOUNT INDUCTORS LSM SERIES

FEATURES

- Wide inductance ranges available
- Low Cost
- Pick and place compatible
- Low DC Resistance vs. Inductance
- UL Class B materials
- Resistance to solvents
- Compatible to reflow processes
- Custom designs available (Tighter tolerance may also be available)

LSM3325 SERIES CHART

Dash Number	Inductance uhy +/-30%	DC Resistance Max. ohms	Max. Rated DC Current (A)*	Saturating Current (A)**
LSM3325-100	10	0.068	1.010	0.109
LSM3325-150	15	0.080	0.910	0.089
LSM3325-220	22	0.090	0.830	0.074
LSM3325-330	33	0.110	0.750	0.060
LSM3325-470	47	0.140	0.690	0.050
LSM3325-680	68	0.160	0.630	0.042
LSM3325-101	100	0.200	0.570	0.038
LSM3325-151	150	0.760	0.290	0.028
LSM3325-221	220	0.920	0.260	0.023
LSM3325-331	330	1.130	0.240	0.019
LSM3325-471	470	1.350	0.220	0.016
LSM3325-681	680	1.620	0.200	0.013
LSM3325-102	1000	1.970	0.180	0.011
LSM3325-152	1500	2.410	0.160	0.009
LSM3325-222	2200	3.000	0.150	0.007
LSM3325-332	3300	5.960	0.100	0.006
LSM3325-392	3900	7.000	0.100	0.005

LSM4942 SERIES CHART

Dash Number	Inductance mhy	DC Resistance Max. ohms	Max. Rated DC Current (A)*	Saturating Current (A)**
LSM4942-101	.100	0.170	0.880	0.048
LSM4942-151	.150	0.210	0.790	0.039
LSM4942-221	.220	0.250	0.720	0.033
LSM4942-331	.330	0.300	0.650	0.027
LSM4942-471	.470	0.360	0.600	0.022
LSM4942-681	.680	0.440	0.540	0.019
LSM4942-102	1.00	0.530	0.490	0.015
LSM4942-152	1.50	0.650	0.450	0.012
LSM4942-222	2.20	0.790	0.400	0.010
LSM4942-332	3.30	1.550	0.290	0.008
LSM4942-472	4.70	1.850	0.260	0.007
LSM4942-682	6.80	4.360	0.170	0.006
LSM4942-103	10.00	5.290	0.160	0.005
LSM4942-153	15.00	6.480	0.140	0.004
LSM4942-223	22.00	13.100	0.100	0.003
LSM4942-333	33.00	16.000	0.090	0.003
LSM4942-393	47.00	19.100	0.080	0.002

LSM5247 SERIES CHART

Dash Number	Inductance mhy	DC Resistance Max. ohms	Max. Rated DC Current (A)*	Saturating Current (A)**
LSM5247-150	.150	0.200	0.790	0.075
LSM5247-221	.220	0.240	0.720	0.062
LSM5247-221	.220	0.290	0.650	0.050
LSM5247-471	.470	0.350	0.590	0.042
LSM5247-681	.680	0.420	0.540	0.035
LSM5247-102	1.00	0.510	0.490	0.029
LSM5247-152	1.50	0.630	0.440	0.024
LSM5247-222	2.20	0.760	0.400	0.020
LSM5247-332	3.30	1.000	0.350	0.018
LSM5247-472	4.70	2.240	0.240	0.013
LSM5247-682	6.80	2.700	0.210	0.011
LSM5247-103	10.00	3.270	0.190	0.009
LSM5247-153	15.00	6.260	0.140	0.008
LSM5247-223	22.00	7.580	0.130	0.006
LSM5247-333	33.00	9.500	0.110	0.005
LSM5247-473	47.00	18.500	0.080	0.004
LSM5247-683	68.00	24.100	0.070	0.003

*DC current that will create a maximum temp. rise of 30 deg.C when applied at + 25 deg C ambient.
**DC current that will typically reduce the initial inductance by 20%.

MECHANICAL MEASUREMENT

Consult factory for the following :

Series LSM3325

Series LSM4942

Series LSM5247

MOLDED SERIES ARE ALSO AVAILABLE ... Contact factory for further information & technical assistance.

INDUCTOR SUPPLY, INC.

5445 E. LA PALMA AVENUE • ANAHEIM • CA 92807

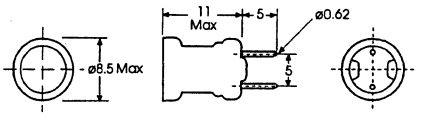
714-701-9890 • 1-800-854-1881 • FAX: 714-701-9590

ISI
WHERE COMMITMENT IS EVERYTHING

RADIAL LEADED R.F. INDUCTOR

APPLICATIONS
- Small size, radial leaded type
- Excellent Q for High Frequency
- UL Sleeving on the Outside
- Low Cost Construction
- Higher Current Ratings

Notes:
(1) Tolerance code as suffix to Part Number: K = ± 10%, M = ±20%
(2) Q and Inductance are measured by Q meter YHP-4342B
(3) The rated DC current is that which the Inductance value decreases 10% by the applied DC current, measured at 1kHz by universal bridge or equivalent.
(4) Self Resonant Frequency is measured by Network Analyzer 3577A (hp), MS560J (Anristo) or equivalent.
(5) DC Resistance is measured by Digital Multimeter TF6871, (Advantest) or equivalent.
(6) Self Resonant Frequency is for reference only.



(Unit: mm)

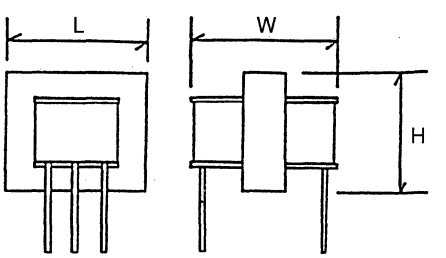
RADIAL LEADED RF INDUCTORS CHART

RL187 Part Number	Inductance (µH) (1, 2)	Q Min. (2)	Test Freq. (kHz)	DC Resist. Ohms Max (Ω)	Rated DC Current Max (mA (3))	Self Reson. Freq. (MHZ)
RL 187-101K	100	80	796	2	200	5.3
RL 187-121K	120	80	796	2	200	4.5
RL 187-151K	150	80	796	2	200	3.8
RL 187-181K	180	80	796	3	200	3.3
RL 187-221K	220	80	796	3	200	2.9
RL 187-271K	270	80	796	3	200	2.6
RL 187-331K	330	80	796	4	200	2.3
RL 187-391K	390	80	796	4	200	2.1
RL 187-471K	470	80	796	4	200	1.9
RL 187-561K	560	80	796	4	200	1.7
RL 187-681K	680	80	796	4	200	1.6
RL 187-821K	820	80	796	6	200	1.4
RL 187-102K	1000	90	252	6	150	1.3
RL 187-122K	1200	90	252	9	150	1.2
RL 187-152K	1500	90	252	9	150	1.1
RL 187-182K	1800	90	252	9	100	1.0
RL 187-222K	2200	90	252	13	100	0.9
RL 187-272K	2700	90	252	13	100	0.8
RL 187-332K	3300	90	252	13	100	0.7
RL 187-392K	3900	90	252	13	50	0.7
RL 187-472K	4700	90	252	18	50	0.6
RL 187-562K	5600	90	252	18	50	0.6
RL 187-682K	6800	90	252	26	50	0.5
RL 187-882K	8200	90	252	26	50	0.5
RL 187-103K	10000	90	79.6	40	40	0.4
RL 187-123K	12000	100	79.6	40	40	0.4
RL 187-153K	15000	100	79.6	60	40	0.4
RL 187-183K	18800	100	79.6	60	30	0.3
RL 187-223K	22200	100	79.6	80	30	0.3
RL 187-273K	27000	100	79.6	80	30	0.3
RL 187-333K	33000	100	79.6	80	30	0.3

RL622 Part Number	Inductance (µH) (1)	Q Min (1, 2)	Test Freq. (MHz)	DC Resist. Ohms Max (Ω)	Rated DC Current Max (mA) (3))	Self Reson. Freq. (MHZ) (4, 6)
RL622-1R0M	1.0	20	7.960	0.013	10.00	150.0
RL622-1R5M	1.5	20	7.960	0.016	8.50	130.0
RL622-2R2M	2.2	20	7.960	0.021	6.50	100.0
RL622-3R3M	3.3	20	7.960	0.025	5.50	79.0
RL622-4R7M	4.7	20	7.960	0.030	4.30	51.0
RL622-6R8M	6.8	20	7.960	0.035	3.70	29.0
RL622-100K	10.0	50	2.520	0.045	3.00	14.0
RL622-120K	12.0	50	2.520	0.040	2.60	13.0
RL622-150K	15.0	50	2.520	0.056	2.30	12.0
RL622-180K	18.0	40	2.520	0.061	2.20	11.0
RL622-220K	22.0	40	2.520	0.070	2.00	9.2
RL622-270K	27.0	40	2.520	0.080	1.70	8.5
RL622-330K	33.0	30	2.520	0.090	1.60	7.8
RL622-390K	39.0	30	2.520	0.100	1.50	6.9
RL622-470K	47.0	30	2.520	0.160	1.40	6.5
RL622-560K	56.0	30	2.520	0.180	1.30	5.4
RL622-680K	68.0	30	2.520	0.210	1.20	4.9
RL622-820K	82.0	30	2.520	0.230	1.10	4.1
RL622-101K	100.0	20	0.796	0.280	0.91	3.7
RL622-121K	120.0	20	0.796	0.320	0.84	3.4
RL622-151K	150.0	20	0.796	0.370	0.75	3.2
RL622-181K	180.0	20	0.796	0.580	0.69	2.8
RL622-221K	220.0	20	0.796	0.650	0.64	2.7
RL622-271K	270.0	20	0.796	0.750	0.57	2.4
RL622-331K	330.0	20	0.796	0.850	0.54	2.3
RL622-391K	390.0	20	0.796	1.000	0.48	2.1
RL622-471K	470.0	20	0.796	1.100	0.46	1.9
RL622-561K	560.0	20	0.796	1.400	0.41	1.8
RL622-681K	680.0	20	0.796	1.600	0.38	1.6
RL622-821K	820.0	20	0.796	1.800	0.35	1.5
RL622-102K	1000.0	50	0.252	2.900	0.29	1.3

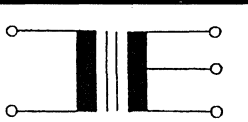
AUDIO TRANSFORMERS CHART

Part Number	Impedance (Ω) PRI	Impedance (Ω) SEC	Resistance (Ω) PRI	Resistance (Ω) SEC	Circuit Diagram	Dielectric Test PRI-SEC	Dimension (mm)
EL - 14150	10K	500	520	135	A	1000V RMS	
EL - 14197	7K	8	480	1.7	A	1000V RMS	
EL - 14238	4.6K	8	270	1.7	A	1000V RMS	
EL - 14227	1.5K	1.5K	180	150	A	1000V RMS	
EL - 14133	1.4K	8	125	1	A	1000V RMS	
EL - 14134	1.2K CT	8	30	0.5	C	1000V RMS	L =14.5
EL - 14149	1K	8	65	1	A	1000V RMS	W =15.0
EL - 14107	650	600 CT	65	70	B	1000V RMS	H =11.1
EL - 14168	600 CT	600 CT	65	55	D	1000V RMS	
EL - 14145	600	600	65	55	A	1000V RMS	
EL - 14153	600	220	110	65	A	1000V RMS	
EL - 14125	600 CT	8	57	1	C	1000V RMS	
EL - 19124	10K CT	10K CT	530	700	D	1000V RMS	
EL - 19230	10K CT	600 CT	480	35	D	1000V RMS	L =19.5
EL - 19186	1.4K CT	8	80	1.2	C	1000V RMS	W =17.0
EL - 19058	600 CT	600 CT	45	55	D	1000V RMS	H =15.5
EL - 19068	600	600	40	50	A	1000V RMS	



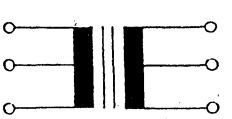
- Economical construction
- Standard and custom design
- Factory direct prices

A



B

C



D

Don't See What You Need On Our Pages ... CONTACT ISI AT 1-800-854-1881 FOR OUR LATEST CATALOG!

INDUCTOR SUPPLY, INC.

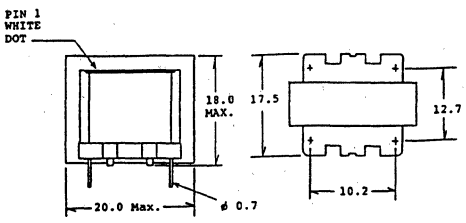
5445 E. LA PALMA AVENUE • ANAHEIM • CA 92807

714-701-9890 • 1-800-854-1881 • FAX: 714-701-9590

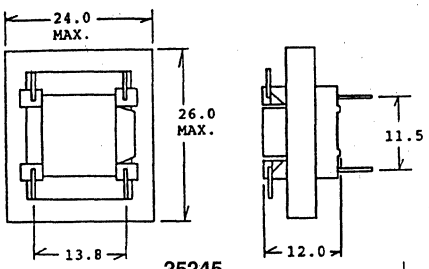
ISI
WHERE COMMITMENT IS EVERYTHING

TELECOMMUNICATION TRANSFORMERS

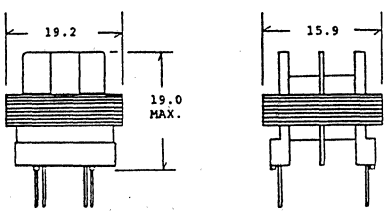
MECHANICAL MEASUREMENTS



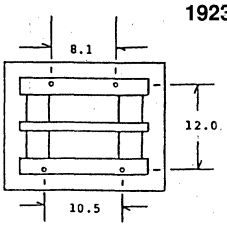
19204

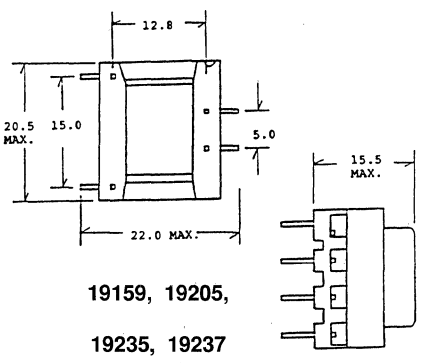


25245



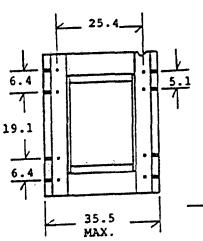
19232



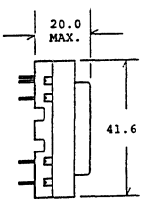


19159, 19205,

19235, 19237



41256

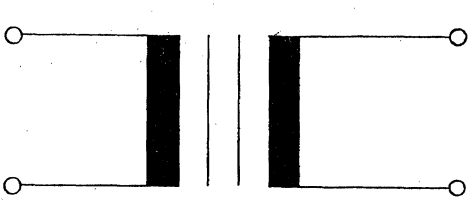


ELECTRICAL SPECIFICATIONS

Part Number	Impedance (Ω)		Resistance (Ω)		mA DC Unbalanced	Frequency Response (dB)	Insertion Loss (dB)	Return Loss (dB)	Dielectric Test PRI-SEC V. RMS.
	PRI	SEC	PRI	SEC					
TT41256	600	900	60	90	80	±0.3 0.3 - 3.4KHZ	1.0	25	1500
TT19235	600	900	60	70	80	± 2.0 0.5 - 3KHZ	2.2	8.5	1250
TT19205	600	600	35	35	-	± 1.2 0.3 - 5KHZ	1.2		1250
TT19232	600	560	52	52	-	± 0.5 0.3 - 4KHZ	1.1	22	3000
TT19204	600	530	35	45	-	± 0.2 0.3 - 3.4KHZ	0.8	25	1500
TT19159	600	470	110	115	60	± 1.0 0.3 - 3.5KHZ	2.0	12	1250
TT25245	600	374	108	120	-	± 0.15 0.2 - 4KHZ	2.0	30	1250
TT19237	600	374	100	130	-	± 0.25 0.2 - 4KHZ	2.3	25	1250

CHARACTERISTICS

- Designed for your sophisticated application.
- Small size and very low profile.
- Suitable for interconnection of voice / data modem terminals to telephone lines.



- Standard and custom design
- Economical
- Premium quality at factory direct prices

NEED A MANUFACTURER WITH CUSTOM CAPABILITIES ... Contact us for further information & technical assistance.

INPHASE INC.

PUT US TO

THE TEST

QUALITY...ON TIME

Custom designed and manufactured:

- Toroidal,bobbin,or layer wound
- Switch mode power supply inductors
- Common mode chokes
- Surface mount and pc mount components
- High frequency, high Q inductors
- Current transformers
- High current filter inductors

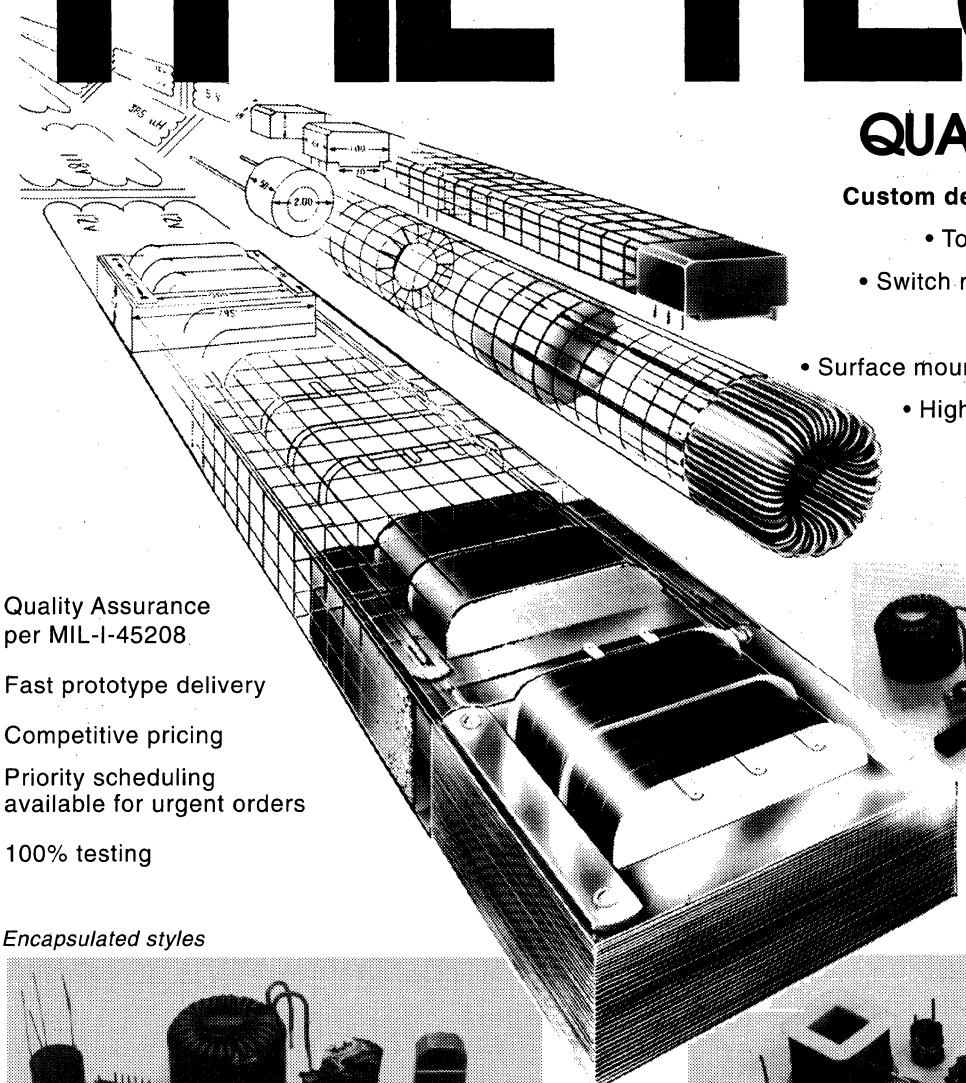
Quality Assurance per MIL-I-45208

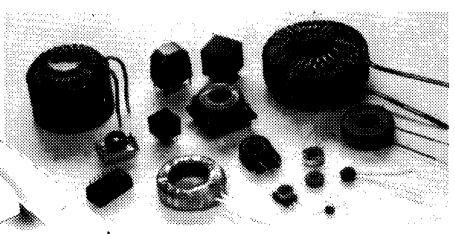
Fast prototype delivery

Competitive pricing

Priority scheduling available for urgent orders

100% testing

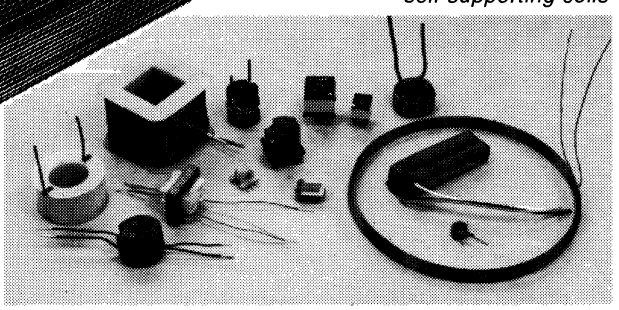




Toroidal components

Encapsulated styles

Bobbin wound and self supporting coils



Military, MIL-T-27 • Industrial • Commercial • UL • CSA • VDE

SEE OUR WEB SITE: **www.inphaseinc.com** for more details on our company, products, industry links and downloadable software.

INPHASE INC. **• 100 Mill Street, Unit 15, Clifton Heights, PA 19018**
(610) 394-9280 • FAX: (610) 394-9281

KOA SPEER ELECTRONICS, INC.

CHIP INDUCTORS

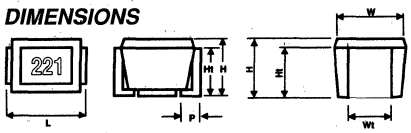
KL32 CHIP INDUCTOR

- UL94V-0 Epoxy Case
- Suitable for Reflow & Wave Solder
- 1210 Size - Surface Mount Type
- E - 12 Series of Values
- Wound Coil Type

STANDARD APPLICATIONS

Ordering Code	Inductance (µH)	Inductance Tolerance (%)	Quality Factor (min)	SRF Mhz Min.	DC. Res. Ω (max)	Allowable DC Current (mA)
KL32	.005µ~330µ	.005µ~..082µ = ±20% .010µ~330µ = ±10% .027µ~330µ = ±5%	11~30	2700~5	0.12~34	450~50

DIMENSIONS



Dimensions	L	W	Wt	H	Ht	P
MM	3.2 ±0.2	2.5 ±0.2	1.7 ±0.1	2.2 ±0.2	1.9 ±0.1	0.5 nominal
INCH	.126 ±.008	.098 ±.008	.067 ±.004	.087 ±.008	.075 ±.004	.02 nominal

MARKING ON INDUCTOR CHIP

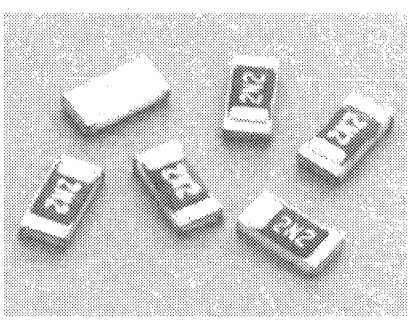
The marking consists of three characters as detailed below:

Value	Code
0.005µH to 0.082µH	005 to 082
0.10µH to 8.2µH	R10 to 8R2 "R" indicates decimal pt.
10µH to 330µH	100 to 331 1st two figures are significant, the last figure indicates the number of zeros to follow

ORDERING & SPECIFYING INFORMATION

KL	32	TE	221	K
Type	**Size Code**	**Packaging**	**Nominal Inductance**	**Tolerance**
Wound Coil	3.2 x 2.5 x 2.2(mm) 1210 Size	TE: Embossed Taping, 2000 pcs. No Suffix: Bulk, 1000 pcs.	Value designation same as marking on inductor chip	J: ±5% K: ±10% M: ±20%

KL73



STANDARD APPLICATIONS

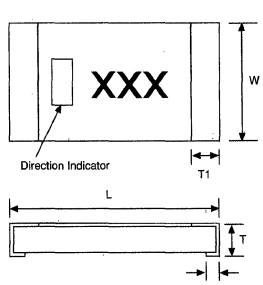
Type	Inductance (µH)	Inductance Tolerance (%)	Quality Factor (min)	SRF Mhz Min.	DC. Res. Ω (max)	Allowable DC Current (mA)
KL731E	1.0 ~ 27	1.0 ~4.7 = ±0.2 nH 5.6 ~ 27 = ±2% = ±5%	10 ~ 7	12000 ~ 1500	0.15 ~ 5.00	700 ~ 150
KL731J	1.0 ~ 82	1.0 ~4.7 = ±0.2 nH 5.6 ~ 82 = ±2% = ±5%	13 ~ 25	13000 ~ 600	0.05 ~ 4.50	650 ~ 100
KL732A	1.0 ~ 82	1.0 ~4.7 = ±0.2 nH 5.6 ~ 82 = ±2% = ±5%	32 ~ 15	13000 ~ 600	0.03 ~ 4.00	900 ~ 150
KL732B	2.2 ~ 100	2.2 ~4.7 = ±0.2 nH 5.6 ~ 100 = ±2% = ±5%	44 ~ 17	9000 ~ 470	0.07 ~ 1.90	1000 ~ 250

MARKING ON INDUCTOR CHIP

Part Marking	Value (nH) 2.2 - 8.2	Value (nH) 10 - 47
1J	Ex. = 2.2 = 2.2nH	Ex. = 15 = 15nH
2A	Ex. = 2.2 = 2.2nH	Ex. = 15 = 15nH
2B	Ex. = 2N2 = 2.2nH	Ex. = 15N = 1nH

DIMENSIONS

Dimensions	L	W	T	T1	T2
1E (mm)	1.0±0.1	0.5±0.05	0.35±0.05	0.15±0.1	0.25±0.1
(in)	0.039±0.001	0.019±0.002	0.014±0.002	0.006±0.004	0.009±0.004
1J (mm)	1.6±0.2	0.8±0.1	0.5±0.1	0.3±0.1	0.3±0.1
(in)	0.63±0.008	0.03±0.004	0.12±0.004	0.012±0.008 - 0.004	
2A (mm)	2.0±0.2	1.25±0.2	0.5±0.1	0.4±0.2	0.3+0.2 - 0.1
(in)	0.08±0.008	0.05±0.008	0.02±0.004	0.015±0.008	0.012+0.008 - 0.004
2B (mm)	3.2±0.2	1.6±0.2	0.6±0.1	0.5±0.2	0.4+0.2 - 0.1
(in)	0.125±0.008	0.063±0.008	0.024±0.004	0.02±0.008	0.015+0.008 - 0.004



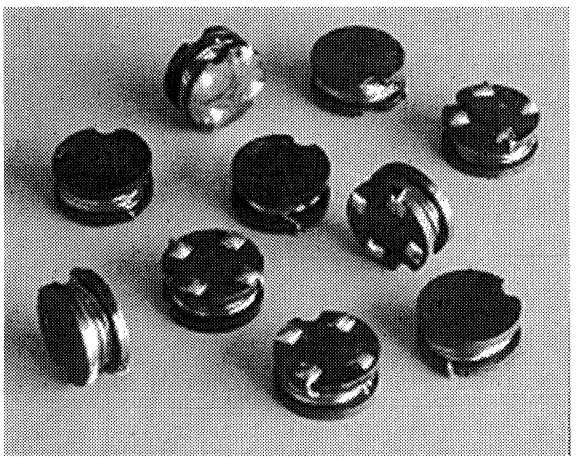
ORDERING & SPECIFYING INFORMATION

KL73	2A	TE	4N7	G
Type	**Size Code**	**Packaging**	**Nominal Inductance**	**Tolerance**
	1E: 0402 1J: 0603 2A: 0805 2B: 1206	TE: Embossed Plastic 4000 pcs/reel	4N7 : 4.7nH 47N : 47nH	C: ± 0.2nH G: ±2% J: ±5%

KOA SPEER ELECTRONICS, INC.

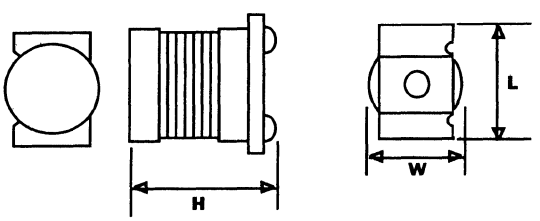
CHIP COIL LPC SERIES
WIRE WOUND SMT CHOKE COIL

LPC SERIES WIRE WOUND SMT CHOKE COIL



- Small size allows for High Mounting Density
- Suitable for Reflow Solder
- Large DC Current capability with Low DC resistance
- Embossed Carrier Tape Available
- Polarity Identification available
- E - 6 Series of Values (Custom Available)

DIMENSIONS



Dimensions	L	W	H
LPC 4045	4.5 ± 0.2	4.0 ± 0.2	4.5 max
LPC 9040	9.3	9.0 ± 0.1	4.9 max
LPC 12065	12.4 ± 0.2	10.0 ± 0.2	7.5 max

(Dimensions in mm)

STANDARD APPLICATIONS

Ordering Code	Inductance (µH)	Inductance Tolerance (%)	Self Resonance (min.) (mHz)	DC. Res. (±15%) (OHMS)	Allowable DC Current (Amps)
LPC4045	10µ ~ 680µ	10	23.5 ~ 2.2	0.08 ~ 5.80	1.02 ~ 0.12
LPC9040	10µ ~ 680µ	10µ = 20% 15µ ~ 680 = 10%	25.0 ~ 1.2	0.06 ~ 2.30	1.55 ~ 0.14
LPC12065	0.68µ ~ 6800µ	R68 ~ 6.8 = 20% 10µ ~ 6800µ = 10%	77 ~ 0.34	2.6 ~ 13,200	10,000 ~ 165

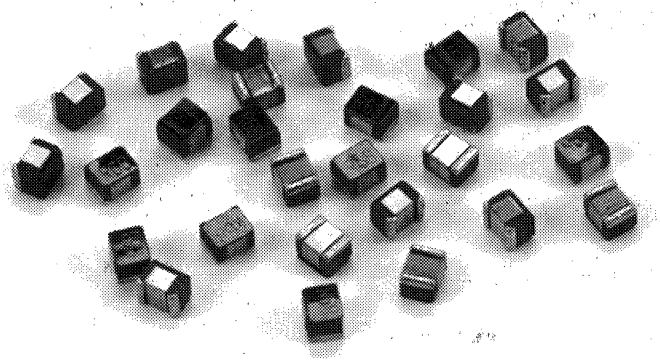
ORDERING AND SPECIFYING INFORMATION

LPC	4095	TE D	221	K
Type	**Size Code**	**Packaging**	**Nominal Resistance**	**Tolerance**
	4045 9040 12065	TEP: Embossed Taping No Suffix: Bulk	2 Significant Figures & 1 Multiplier R indicates decimal point	K: ±10% M: ±20%

SPEER ELECTRONICS, INC.

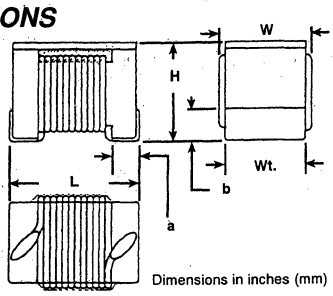
CHIP INDUCTOR KQ SERIES

KQ SERIES CHIP INDUCTOR



- Surface mount 1008, 0805, 0603 style
- Excellent High Frequency Applications
- High Q Factors and Self-Resonant Frequency

DIMENSIONS



Dimensions in inches (mm)

Dimensions	L	W	Wt	H	a	b
KQ 0603	1.6 ± 0.1	1.0 ± 0.1	0.85 ± 0.1	0.9 ± 0.1	0.35 ± 0.1	0.25 ± 0.15
KQ 0805	2.0±0.2	1.5±0.2	1.4±0.1	1.3±0.2	0.4±0.1	0.4±0.15
KQ 1008	2.5±0.2	2.2±0.2	2.0±0.1	1.8±0.2	0.45±0.15	

(Dimensions in mm)

MARKING ON CHIP INDUCTOR *The marking of nominal inductance consists of only one-figure number as detailed below.*

Type	Value	Number/ Code	Value	Number/ Code
KQ 0603	1.8 nH	0	39 nH	0
	3.9 nH	1	47 nH	1
	6.8 nH	2	56 nH	2
	10 nH	3	68 nH	3
	12 nH	4	72 nH	4
	15 nH	5	82 nH	5
	18 nH	6	100 nH	6
	22 nH	7	110 nH	7
	27 nH	8	120 nH	8
	33 nH	9		
KQ 0805	3.3 nH	0	47 nH	0
	6.8 nH	1	56 nH	1
	8.2 nH	2	68 nH	2
	12 nH	3	82 nH	3
	15 nH	4	100 nH	4
	18 nH	5	120 nH	5
	22 nH	6	150 nH	6
	27 nH	7	180 nH	7
	33 nH	8	220 nH	8
	39 nH	9		
KQ 1008	10 nH to 82 nH	10N to 82N	0.1 µH to 1.0 µH	R10 ro 1R0 "R" indicates the decimal point

No tolerance of inductance shall be indicated.

ORDERING AND SPECIFYING INFORMATION

KQ	0603	TE	R10	K
Type	Size Code	Packaging	Nominal Resistance	Tolerance
Air Core Winding Form	0603 0805 1008	TEP: Embossed Taping No Suffix: Bulk	10N: 10nH R10: 0.1µH 1R0: 1.0µH	G: ±2% J: ±5% K: ±10% M: ±20%

PHONE: (800) 694-8092
Facsimile: (714) 970-0800

E-Mail: sales@lodestonepacific.com
Internet: http://www.lodestonepacific.com

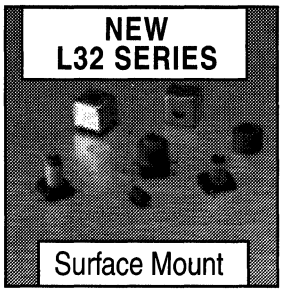
LODESTONE PACIFIC

Lodestone Pacific is not a Coil Winder

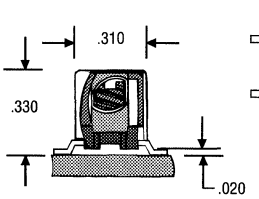
SHEILDED COIL FORMS

Lodestone Pacific manufactures this family of Shielded Coil Forms in the USA. They have been used from "Fish Finders to Sidewinders" for over 25 years and are characterized by:

- High Q
- High Reliability
- Great Temp Stability
- Closely Scheduled Deliveries
- Most Configurations in Stock
- Iron Powder and Ferrite Core Materials
- Solderability to Mil-STD-202, Method 208



in/mm

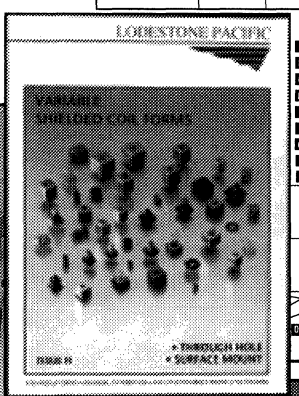


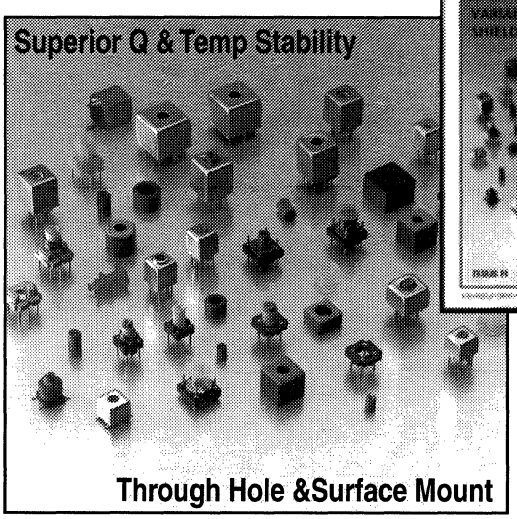
Not to Scale

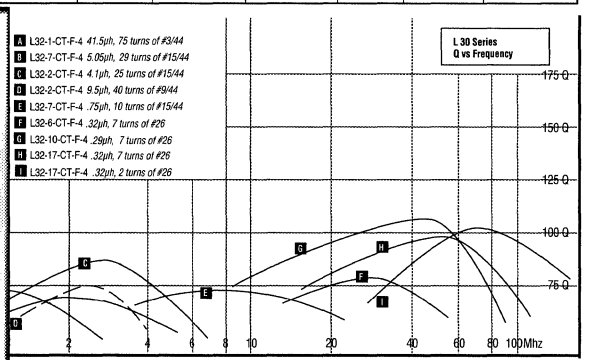
Superior inductance, Temperature and Q performance in a variable Surface Mount assembly. **Request our New Catalog.**

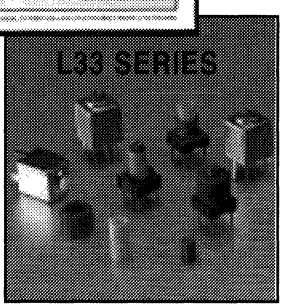
ASSEMBLY PART NO.	COLOR CODE	MAGNETIC MATERIAL	FREQUENCY RANGE(2)	MATERIAL PERMEABILITY	ASSEMBLY A_L nH/turns² (3)	MAX uh 100 turns	MIN uh (4) 100 turns	TEMPERATURE STABILITY
L32-1-CT-F-4	BLUE	CARBONYL C	.15-2.0 MHz	20.0	7.4	74	45	280 ppm/ C
L32-2-CT-F-4	RED	CARBONYL E	.25-10 MHz	10.0	6.8	68	45	95 ppm/ C
L32-3-CT-F-4	GREY	CARBONYL HP	.02-1.0 MHz	35.0	7.8	78	46	370 ppm/ C
L32-6-CT-F-4	YELLOW	CARBONYL SF	2.0-50 MHz	8.5	6.1	61	38	35 ppm/ C
L32-7-CT-F-4	WHITE	CARBONYL TH	1.0-20 MHz	9.0	6.4	64	40	30 ppm/ C
L32-10-CT-F-4	BLACK	CARBONYL W	10-100 MHz	6.0	5.7	57	37	150 ppm/ C
L32-17-CT-F-4	LAVENDER	CARBONYL	20-200 MHz	4.0	5.2	52	37	50 ppm/ C

REQUEST OUR NEW CATALOG OF OVER 80 CONFIGURATIONS

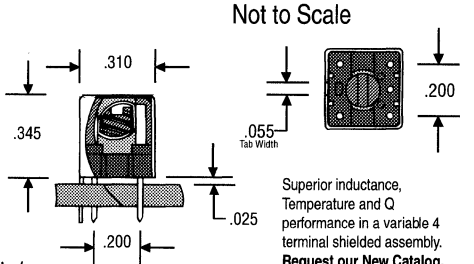








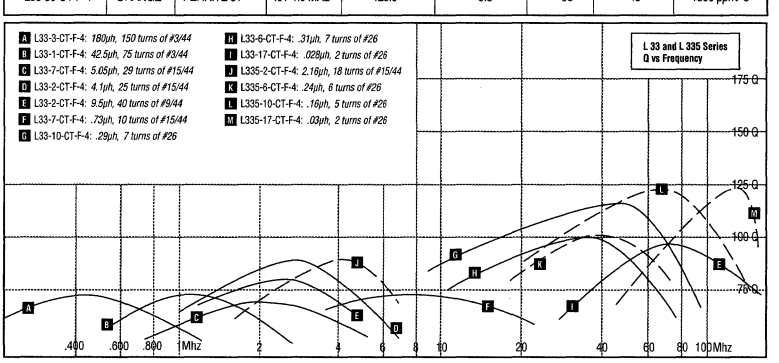
Not to Scale



in/mm

Superior inductance, Temperature and Q performance in a variable 4 terminal shielded assembly. **Request our New Catalog.**

ASSEMBLY PART NO.	COLOR CODE	MAGNETIC MATERIAL	FREQUENCY RANGE(2)	MATERIAL PERMEABILITY	ASSEMBLY A_L nH/turns² (3)	MAX uh 100 turns	MIN uh (4) 100 turns	TEMPERATURE STABILITY
L33-1-CT-F-4	BLUE	CARBONYL C	.15-2.0 MHz	20.0	7.6	76	45	280 ppm/ C
L33-2-CT-F-4	RED	CARBONYL E	.25-10 MHz	10.0	6.8	68	45	95 ppm/ C
L33-3-CT-F-4	GREY	CARBONYL HP	.02-1.0 MHz	35.0	8.0	80	46	370 ppm/ C
L33-6-CT-F-4	YELLOW	CARBONYL SF	2.0-50 MHz	8.5	6.0	60	38	35 ppm/ C
L33-7-CT-F-4	WHITE	CARBONYL TH	1.0-20 MHz	9.0	6.4	64	40	30 ppm/ C
L33-10-CT-F-4	BLACK	CARBONYL W	10-100 MHz	6.0	5.4	54	37	150 ppm/ C
L33-17-CT-F-4	LAVENDER	CARBONYL	20-200 MHz	4.0	4.8	48	37	50 ppm/ C
L33-50-CT-F-4	ORANGE	FERRITE 61	.01-1.0 MHz	125.0	9.5	95	48	1500 ppm/ C



COILWINDER DATA BASE ©

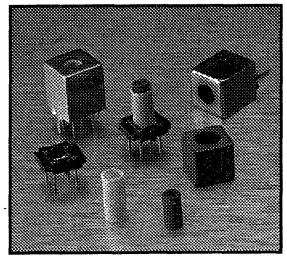
Lodestone Pacific maintains a data base of coilwinders as a free service to the Electronics Industry.

From Litz to Foil,
From 1 to 1000 turns,
Commercial or Military,
From Toroids to Bobbins,
From 1 to 1 Million Pieces,
Engineered or to your Drawing.

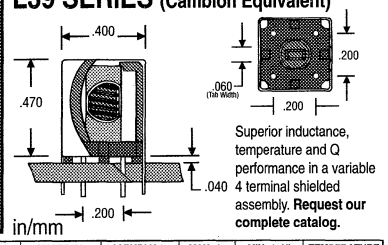
Over 125 CoilWinders...

...By Name
...By Location
...By Experience
...By Fax at No Charge

Ask for this Free Service

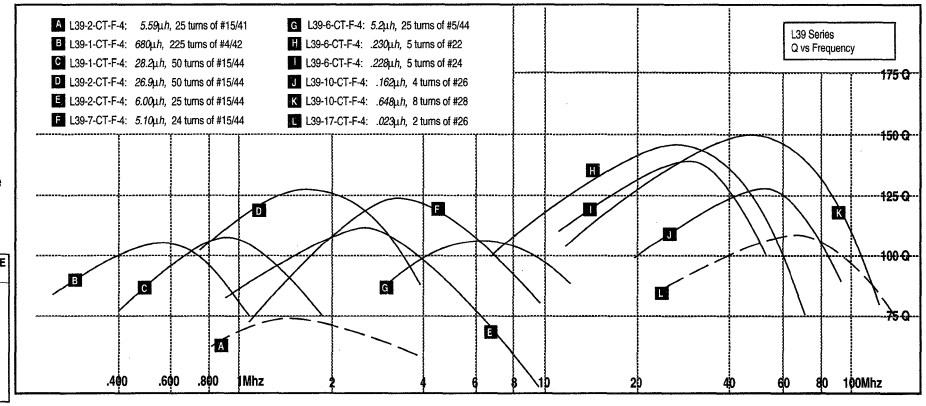


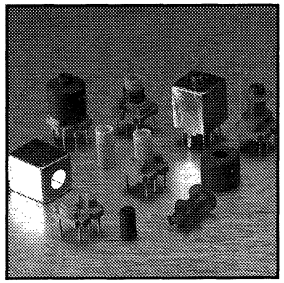
L39 SERIES (Cambion Equivalent)



Superior inductance, temperature and Q performance in a variable 4 terminal shielded assembly. **Request our complete catalog.**

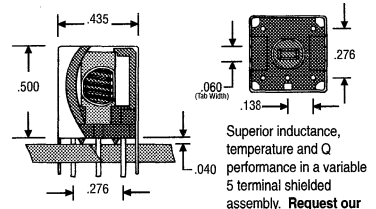
ASSEMBLY PART NO.	COLOR CODE	MAGNETIC MATERIAL	FREQUENCY RANGE(2)	MATERIAL PERMEABILITY	ASSEMBLY A_L nH/turns² (3)	MAX uh 100 turns	MIN uh (4) 100 turns	TEMPERATURE STABILITY
L39-1-CT-F-4	BLUE	CARBONYL C	.15-2.0 MHz	20.0	11.5	115	54	280 ppm/ C
L39-2-CT-F-4	RED	CARBONYL E	.25-10 MHz	10.0	9.8	98	48	95 ppm/ C
L39-3-CT-F-4	GREY	CARBONYL HP	.02-1.0 MHz	35.0	13.3	133	60	370 ppm/ C
L39-6-CT-F-4	YELLOW	CARBONYL SF	2.0-50 MHz	8.5	8.5	85	44	35 ppm/ C
L39-7-CT-F-4	WHITE	CARBONYL TH	1.0-20 MHz	9.0	9.3	93	46	30 ppm/ C
L39-10-CT-F-4	BLACK	CARBONYL W	10-100 MHz	6.0	7.2	72	43	150 ppm/ C
L39-17-CT-F-4	LAVENDER	CARBONYL	20-200 MHz	4.0	5.6	56	43	50 ppm/ C
L39-50-CT-F-4	ORANGE	FERRITE	.01-.500 MHz	125.0	19.0	190	70	1500 ppm/ C





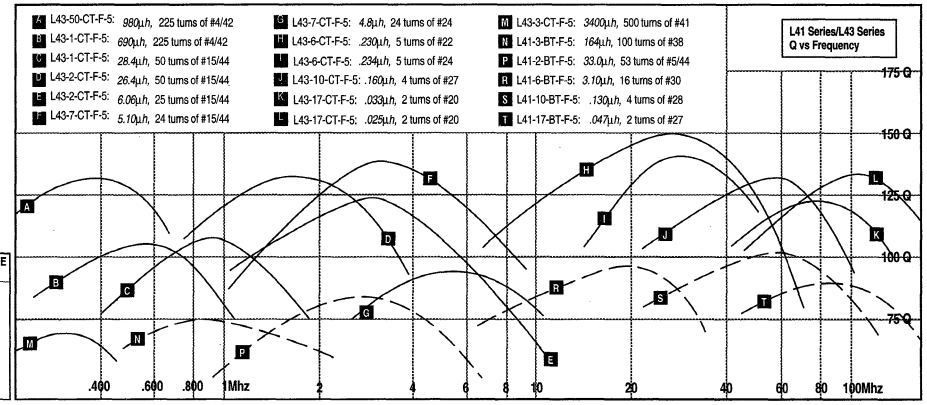
L43 SERIES

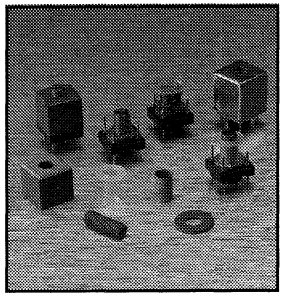
Not to Scale



Superior inductance, temperature and Q performance in a variable 5 terminal shielded assembly. **Request our complete catalog.**

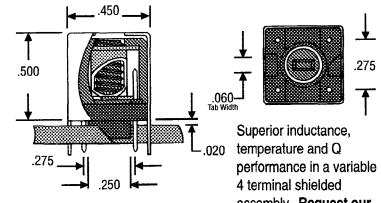
ASSEMBLY PART NO.	COLOR CODE	MAGNETIC MATERIAL	FREQUENCY RANGE(2)	MATERIAL PERMEABILITY	ASSEMBLY A_L nH/turns² (3)	MAX uh 100 turns	MIN uh (4) 100 turns	TEMPERATURE STABILITY
L43-1-CT-F-5	BLUE	CARBONYL C	.15-2.0 MHz	20.0	11.5	115	54	280 ppm/ C
L43-2-CT-F-5	RED	CARBONYL E	.25-10 MHz	10.0	9.8	98	48	95 ppm/ C
L43-3-CT-F-5	GREY	CARBONYL HP	.02-1.0 MHz	35.0	13.3	133	60	370 ppm/ C
L43-6-CT-F-5	YELLOW	CARBONYL SF	2.0-50 MHz	8.5	8.5	85	44	35 ppm/ C
L43-7-CT-F-5	WHITE	CARBONYL TH	1.0-20 MHz	9.0	9.3	93	46	30 ppm/ C
L43-10-CT-F-5	BLACK	CARBONYL W	10-100 MHz	6.0	7.2	72	43	150 ppm/ C
L43-17-CT-F-5	LAVENDER	CARBONYL	20-200 MHz	4.0	5.6	56	43	50 ppm/ C
L43-50-CT-F-5	ORANGE	FERRITE 61	.01-.500 MHz	125.0	19.0	190	70	1500 ppm/ C





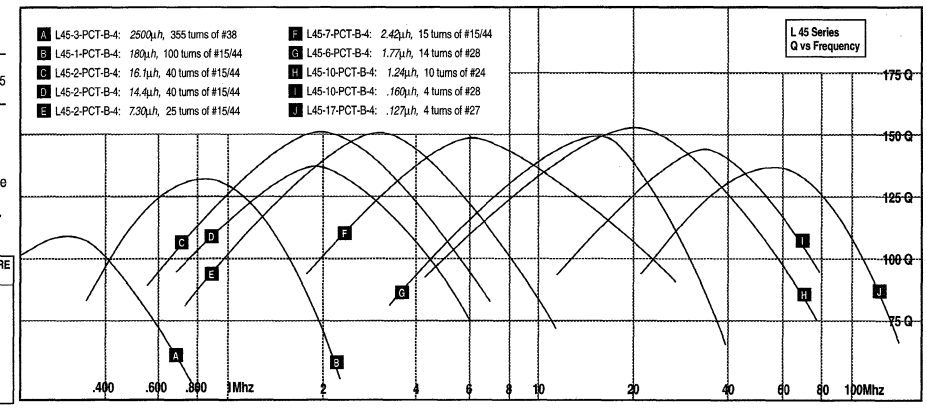
L45 SERIES

Not to Scale



Superior inductance, temperature and Q performance in a variable 4 terminal shielded assembly. **Request our complete catalog.**

ASSEMBLY PART NO.	COLOR CODE	MAGNETIC MATERIAL	FREQUENCY RANGE(2)	MATERIAL PERMEABILITY	ASSEMBLY A_L nH/turns² (3)	MAX uh 100 turns	MIN uh (4) 100 turns	TEMPERATURE STABILITY
L45-1-PCT-B-4	BLUE	CARBONYL C	.15-2.0 MHz	20.0	17.5	175	58	280 ppm/ C
L45-2-PCT-B-4	RED	CARBONYL E	.25-10 MHz	10.0	12.5	125	52	95 ppm/ C
L45-3-PCT-B-4	GREY	CARBONYL HP	.02-1.0 MHz	35.0	20.4	204	64	370 ppm/ C
L45-3F-PCT-B-4	GREY/ORANGE	HP/FERRITE	.01-1.0 MHz	80.0	31.5	315	79	1000 ppm/ C
L45-6-PCT-B-4	YELOW	CARBONYL SF	2.0-50 MHz	8.5	11.5	115	47	35 ppm/ C
L45-7-PCT-B-4	WHITE	CARBONYL TH	1.0-20 MHz	9.0	12.0	120	48	30 ppm/ C
L45-10-PCT-B-4	BLACK	CARBONYL W	10-100 MHz	6.0	10.0	100	46	150 ppm/ C
L45-17-PCT-B-4	LAVENDER	CARBONYL	20-200 MHz	4.0	6.7	67	45	50 ppm/ C



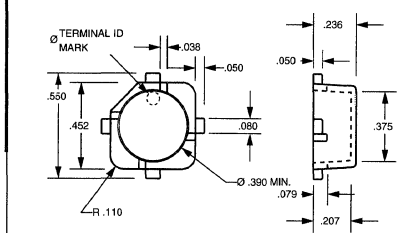
PHONE (800) 694-8092 • Fax (714) 970-0800

Web Page: http://www.lodestonepacific.com

LODESTONE PACIFIC

"Finest In The Field"

STM385-04



MOULDING: Phenolic (Black)

RATING: UL 94-VO

4 TERMINALS: Self Leading

APPLICATION: For surface mounting of toroids with wound diameters up to .385 inches. The toroid leads are tinned, and wrapped around the tabs on the toroid mount.. The toroid leads then make a direct connection to the solderpaste on the printed circuit board pad during Infrared solder reflow. Coplanarity is dependant on the quality of the tinned wire wrap on the tabs.

TM401 SERIES & TM402-6

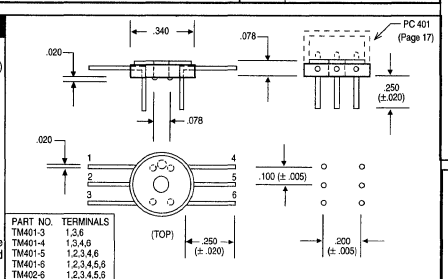
MOULDING: TM401 DAP (Green) TM402-6 Ryton (Black)

RATING: UL 94-VO MIL-STD-2000

TERMINALS: Copper Wire .020 Dia. (#24 AWG) 100% Tin Plated

SOLDERABILITY: Per MIL-STD-202 Method 208

APPLICATION: This series is suitable for components and wound toroids up to .340 inches in diameter. Potting cup PC401 is available for encapsulation of the entire series (sold separately).



PART NO.	TERMINALS
TM401-3	1,3,6
TM401-4	1,3,4,6
TM401-5	1,2,3,4,6
TM401-6	1,2,3,4,5,6
TM402-6	1,2,3,4,5,6

TM506-4 & TM507-4

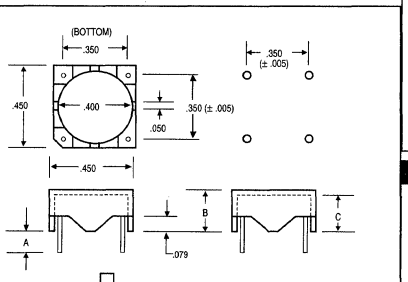
MOULDING: Diallyl Phthalate (Green), (Black)

RATING: UL 94-VO MIL-STD-2000

4 TERMINALS: Copper Wire .025 Dia. (#22 AWG) 100% Tin Plated

SOLDERABILITY: Per MIL-STD-202 Method 208

APPLICATION: For enclosed horizontal mounting of wound toroids up to .400 inches in diameter.



PART NO.	A	B	C
TM506-4 (Green)	.120	.236	.197
TM507-4 (Black)	.158	.287	.248

TM550-8

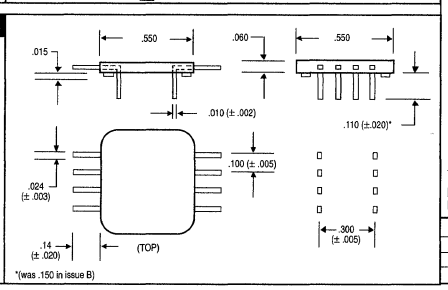
MOULDING: Epoxy (Black)

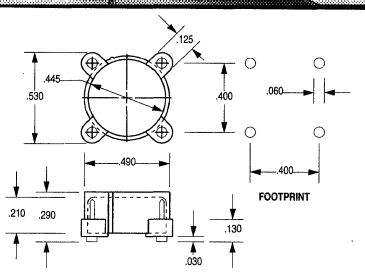
RATING: UL 94-VO MIL-STD-2000

8 TERMINALS: Alloy 42 .024 x .010 Lead Frame 90/10 Tin Plated

SOLDERABILITY: Per MIL-STD-202 Method 208

APPLICATION: For horizontal mounting of components and wound toroids up to .550 inches in diameter.





STM450-4

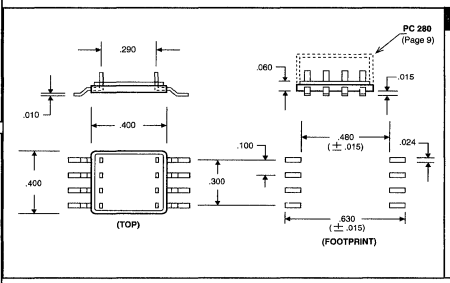
MOULDING: Diallyl Phthalate (Black or Green)

RATING: UL 94-VO

4 TERMINALS: Brass 100% Tin Plated

SOLDERABILITY: Per MIL-STD-202 Method 208

APPLICATION: For low profile horizontal surface mounting of wound toroids up to .445 inches in diameter. "Lunar Lander" terminal design improves coplainarity, terminal durability during handling and transit, and uses less circuit board real estate. Ideal for automatic pick and place.



STM280-8

MOULDING: EPOXY (Black)

RATING: UL 94-VO

8 TERMINALS: Alloy 42 .024 X .010 Lead Frame 90/10 Tin Plated

SOLDERABILITY: Per MIL-STD-202 Method 208

APPLICATION: For surface mounting of components and wound toroids up to .280 inches in diameter. Potting cup PC280 may be used to encapsulate the component and its connections.

STM LCC SERIES

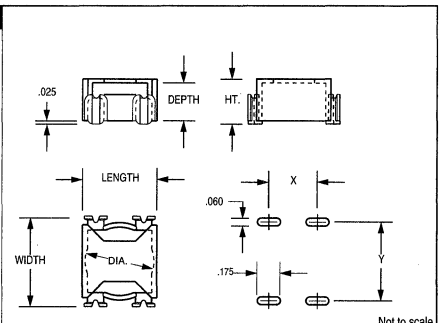
MOULDING: Ryton R4 (Black)

RATING: UL 94-VO

4 TERMINALS: Self Leading

APPLICATION: The STM LCC Series is for self leading surface mount low current coupled inductors and transformers. The series will accommodate wound toroidal cores from .485 up to .605 in diameter and uses the toroid's winding leads to surface mount the toroid and case to the printed circuit board. The wound toroids leads are held in position by the slots and channels incorporated in the mounting case.

This product and concept is the patented property of **Pulse Engineering Inc.**, San Diego, CA.



PART NO.	LENGTH	WIDTH	HT.	DIA.	DEPTH	X	Y	RECOMMENDED WIRE SIZE
STM37LCC-04	.550	.630	.310	.485	.255	.340	.530	# 32 (.009) to # 20 (.034) AWG.
STM44LCC-04	.575	.700	.350	.530	.295	.370	.610	# 32 (.009) to # 20 (.034) AWG.
STM50LCC-04	.650	.750	.350	.605	.295	.445	.660	# 32 (.009) to # 20 (.034) AWG.

PHONE (800) 694-8092 • Fax (714) 970-0800 LODESTONE PACIFIC

Web Page: http://www.lodestonepacific.com *"Finest In The Field"*

TOROID MOUNTS AND HEADERS

THROUGH HOLE & SURFACE MOUNT

TS SERIES

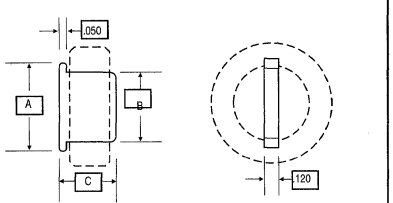
MOULDING: Nylon 6/6 (Tan)

RATING: UL 94-VO

APPLICATION:
Toroid spacers are ideal for common mode chokes requiring voltage isolation.

TOROID SPACER SIZES

PART #	A	B	C
TS33-13	0.460	0.315	0.285
TS48-12	0.660	0.465	0.365
TS52-03	0.660	0.510	0.412
TS52-05	0.660	0.510	0.600
TS59-06	0.730	0.560	0.412
TS73-01	0.930	0.720	0.700
TS89-07	1.025	0.875	0.690
TS94-14	1.030	0.930	0.670
TS130-10	1.450	1.290	0.740
TS140-08	1.372	1.212	0.875



Not To Scale
± .010 inches

VTM555-4

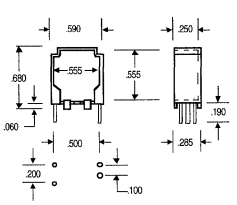
MOULDING: Nylon 6/6 (Grey)

RATING: UL 94-VO MIL-STD-2000

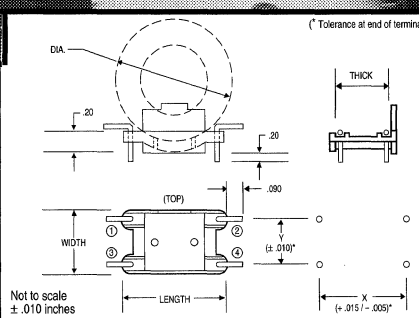
4 TERMINALS: Copper Wire .024 x .018 60/40 Tin Plate

SOLDERABILITY: Per MIL-STD-202 Method 208

APPLICATION:
For vertical mounting of wound toroids up to .555 inches in diameter. Avail-able in Anti-Static Tubes for Pick and Place.



VTM SERIES



MOULDING: Nylon 6/6 (Tan)

RATING: UL 94-VO

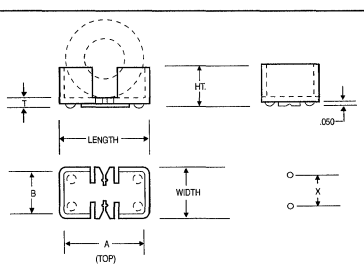
4 TERMINALS: Copper Wire .050 Dia. (#16 AWG) 100% Tin Plated

SOLDERABILITY: Per MIL-STD-202 Method 208

APPLICATION:
For vertical mounting of wound toroids from 1.00 to 2.8 inches in diameter. The VTM series is available with the four terminals shown or without terminals (.048 through hole). Non-standard through holes of .067, .082 and .089 are available. #16 AWG (.050) is the only terminal diameter available.

PART NO.	LENGTH	WIDTH	THICK	DIA.	X	Y	TERMINALS
VTM120-0 VTM120-4	1.00	.60	.51	1.20	.80	.40	None (.048 Holes) 4-#16 AWG (.050)
VTM160-0 VTM160-4	1.10	.80	.71	1.60	.90	.60	None (.048 Holes) 4-#16 AWG (.050)
VTM254-0 VTM254-4	1.40	.90	.81	2.54	1.20	.70	None (.048 Holes) 4-#16 AWG (.050)
VTM280-0 VTM280-4	1.70	1.10	1.01	2.80	1.50	.90	None (.048 Holes) 4-#16 AWG (.050)

KM SERIES



MOULDING: Vydyne (Black)

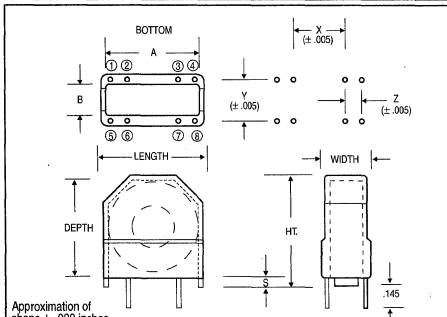
RATING: UL 94-VO

2 TERMINALS: Self Leading

APPLICATION:
Klip mounts are designed as a self leaded inductor mount for wound toroids from .030 to 1.10 inches in diameter. The molded "Klip" holds the toroid leads for circuit board termination. (Patented)

PART NO.	LENGTH	WIDTH	A	B	HT.	T	X	KLIP WIRE SIZE	TOROID DIA.
KM44-01 KM44-02	.580	.340	.480	.240	.280	.110	.220	24-23 AWG 22-21 AWG	.450
KM50-01 KM50-02	.650	.450	.550	.350	.300	.110	.300	24-21 AWG 20-18 AWG	.550
KM68-01 KM68-02	.830	.450	.730	.350	.370	.110	.300	24-21 AWG 20-18 AWG	.725
KM80-01 KM80-02	.950	.600	.850	.500	.420	.110	.450	22-19 AWG 18-17 AWG	.850
KM106-01 KM106-02	1.250	.700	1.150	.600	.580	.130	.500	22-19 AWG 18-17 AWG	1.150

VTC SERIES



Approximation of shape ± .020 inches

MOULDING: Nylon 6/6 (Grey or Tan)

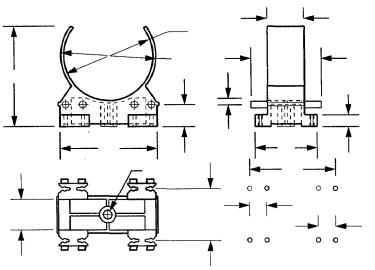
RATING: UL 94-VO

TERMINALS: Copper / Zinc .026 x .026 60/40 Tin Plated

SOLDERABILITY: Per MIL-STD-202 Method 208

APPLICATION:
A European standard for enclosed vertical mounting of wound toroids from .500 to 1.46 inches in diameter. Four terminals in positions 2, 3, 6, 7 or no terminals (ie: VTC1156-0) is standard. Any terminal pattern can be provided. Example part number for a special terminal pattern is VTC774-5/12356. (five terminals in positions 1, 2, 3, 5, 6). Anti-static shipping tubes available for VTC613.

PART NO	LENGTH	WIDTH	A	B	HT.	DEPTH	S	X	Y	Z
VTC 512-0 VTC 512-4	.750	.350	.510	.270	.600	.500	.050	.590 (15mm)	.197 (5mm)	———
VTC 613-0 VTC 613-4	.710	.510	.610	.310	.780	.670	.060	.197 (5mm)	.394 (10mm)	.197 (5mm)
VTC 774-0 VTC 774-4	.900	.610	.780	.490	.980	.870	.060	.394 (10mm)	.492 (12.5mm)	.197 (5mm)
VTC 935-0 VTC 935-4	1.070	.710	.920	.500	1.180	1.050	.060	.492 (12.5mm)	.590 (15mm)	.197 (5mm)
VTC 1156-0 VTC 1156-4	1.260	.710	1.150	.500	1.370	1.230	.080	.492 (12.5mm)	.590 (15mm)	.295 (7.5mm)
VTC 1227-0 VTC 1227-4	1.370	.905	1.270	.660	1.450	1.300	.080	.590 (15mm)	.787 (20mm)	.295 (7.5mm)
VTC 1468-0 VTC 1468-4	1.650	1.100	1.555	.840	1.770	1.680	.080	.984 (25mm)	.984 (25mm)	.295 (7.5mm)



VTM1060-08

MOULDING: Nylon (6/6) (Tan)

RATING: UL 94-VO

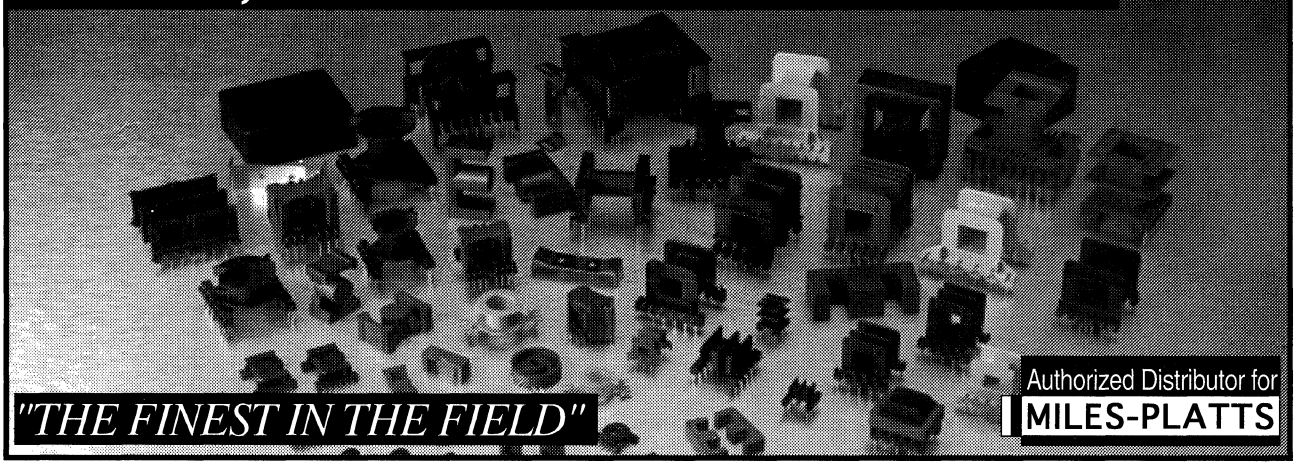
8 TERMINALS: Self leading #16 to 18 AWG

APPLICATION:
Designed for vertical mounting of 1.06 inch un-wound toroids. The mount is designed to have the unwound core placed in the yoke, then to have the wire winding cover the core and yoke, holding the two in a single unit. Up to 8 winding leads are then snapped into the mount base. Best suited for #16 (.048) through #18 (.040) AWG.

PHONE (800) 694-8092 • Fax (714) 970-0800 **LODESTONE PACIFIC**

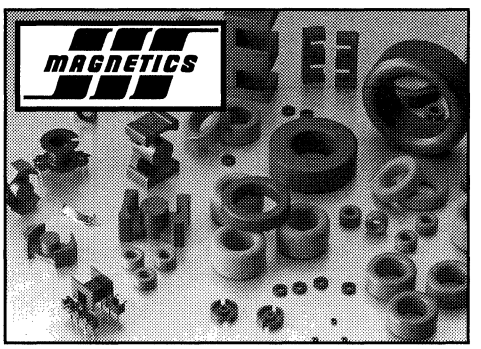
Web Page: http://www.lodestonepacific.com *"Finest In The Field"*

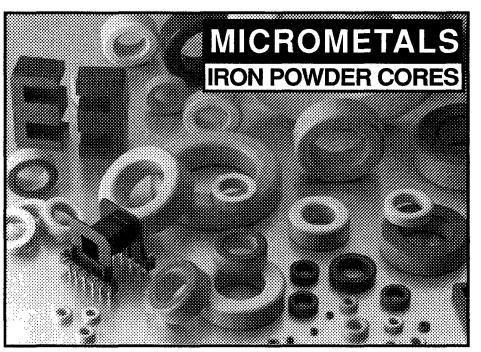
CORES, BOBBINS AND HARDWARE

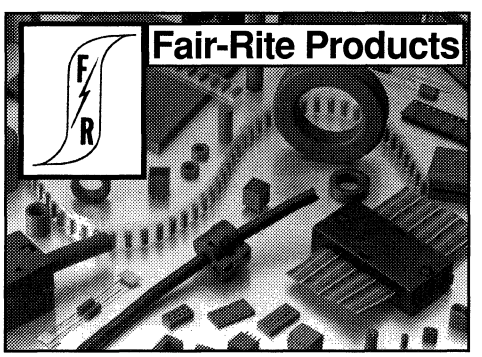


Core Size	Bobbin Part Number	No. of Terminals	Terminal Style	Bobbin Sections	Bobbin Material	UL Rating	Temp Class	Clips
E-Core								
EI 187	B-EI187-X-1	8	Thru Hole	1	Nylon 6/6	94VO	130°C (B)	No
EE 24/25	B-EE24/25-10-1	10	Thru Hole	1	Nylon 6/6	94VO	130°C (B)	No
EI 375	B-EI375-12-1	12	Thru Hole	1	Nylon 6/6	94VO	130°C (B)	No
EI 21	B-EII21-12-1	12	Thru Hole	1	Nylon 6/6	94VO	130°C (B)	No
EI 625	B-EI625-12-1	18	Thru Hole	1	Nylon 6/6	94VO	130°C (B)	No
DIN 30/7	FE0150	12	Thru Hole	1	Nylon 6/6	94VO	130°C (B)	No
DIN 42/15	FE0230	12	Thru Hole	1	Nylon 6/6	94VO	130°C (B)	No
DIN 42/20	FE0250	12	Thru Hole	1	Nylon 6/6	94VO	130°C (B)	No
ER-Core								
ER9.5	B-ER9.5-8	8	Gull Wing	1	LCP	94VO	180°C (H)	Yes
ER11	B-ER11-10	10	Gull Wing	1	LCP	94VO	180°C (H)	Yes
ER14.5	B-ER14.5-10	10	Gull Wing	1	LCP	94VO	180°C (H)	Yes
EFD Core								
EFD15	B-EFD15-10	10	Gull Wing	1	LCP	94VO	155°C (F)	Yes
EFD25	B-EFD25-10	10	Gull Wing	1	LCP	94VO	180°C (H)	Yes
ETD Core								
ETD 29	FD6980	12	Thru Hole	1	Rynite	94VO	155°C (F)	Yes
ETD34	FD7000	14	Thru hole	1	Rynite	94VO	155°C (F)	Yes
ETD39	FD7010	16	Thru hole	1	Rynite	94VO	155°C (F)	Yes
ETD44	FD7020	18	Thru hole	1	Rynite	94VO	155°C (F)	Yes
ETD49	FD7030	20	Thru hole	1	Rynite	94VO	155°C (F)	Yes
PQ Cores								
PQ2016	PQ0010	14	Thru Hole	1	Rynite	94VO	155°C (F)	Yes
PQ2020	PQ0020	14	Thru Hole	1	Rynite	94VO	155°C (F)	Yes
PQ2620	PQ0030	12	Thru Hole	1	Rynite	94VO	155°C (F)	Yes
PQ2625	PQOO40	12	Thru Hole	1	Rynite	94VO	155°C (F)	Yes
PQ3220	PQ0050	12	Thru Hole	1	Rynite	94VO	155°C (F)	Yes
PQ3230	PQ0060	12	Thru Hole	1	Rynite	94VO	155°C (F)	Yes
PQ3535	PQ0070	12	Thru Hole	1	Rynite	94VO	155°C (F)	Yes
PQ4040	PQ0080	12	Thru Hole	1	Rynite	94VO	155°C (F)	Yes
RM Cores								
RM8	RM0080	12	Thru Hole	1	Nylon 46	94VO	130°C (B)	Yes
RM10	RM0100	12	Thru hole	1	Nylon 46	94VO	130°C (B)	Yes
RM12	B-RM12-12	12	Thru Hole	1	Nylon 6/6	94VO	130°C (B)	Yes
EP Cores								
EP7	B-EP7-6	6	Gull Wing	1	LCP	94VO	180°C (H)	Yes
EP10	B-EP10-8	8	Gull Wing	1	LCP	94VO	180°C (H)	Yes
EP13	B-E13-10	10	Gull Wing	1	LCP	94VO	180°C (H)	Yes
EP17	B-EP17-8	8	Thru Hole	1	Phenolic	94VO	180°C (H)	Yes
Pot Cores								
1107	B-1107-0-1	0	--------	1	Nylon 6/6	94VO	130°C (B)	No
1408	B-1408-4-1	4	Thru Hole	1	Nylon 6/6	94VO	130°C (B)	Yes
1811	B-1811-6-1	6	Thru Hole	1	Nylon 6/6	94VO	130°C (B)	Yes
2213	B-2213-6-1	6	Thru Hole	1	Nylon 6/6	94VO	130°C (B)	Yes
2616	B-2616-6-1	6	Thru Hole	1	Nylon 6/6	94VO	130°C (B)	Yes
3019	B-3019-6-1	6	Thru Hole	1	Nylon 6/6	94VO	130°C (B)	Yes

COMPLETE SYSTEMS SOLUTIONS FEATURING THE FINEST BOBBINS AND MAGNETIC CORE MATERIALS







MAGNETIC CIRCUIT ELEMENTS ®

1540 MOFFETT STREET, SALINAS, CALIFORNIA 93905

PHONE: (831) 757-8752 FAX: (831) 757-5478 E-MAIL: M_C_E@COMPUSERVE.COM

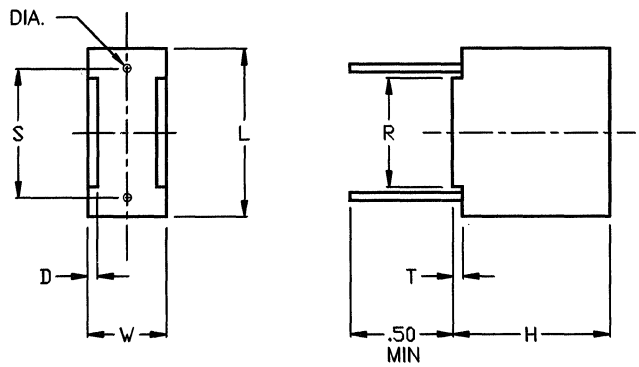
NEW! LOW LOSS IRON POWDER TOROIDAL CHOKES NEW!

ELECTRICAL SPECIFICATIONS

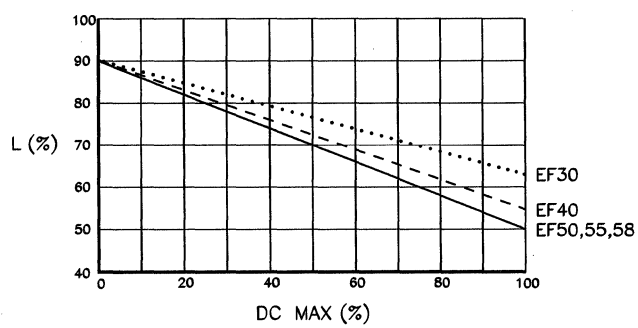
PART NUMBER	L_O +15-10% MILLI-H	DCR ±15% OHMS	DC AMPS MAX	SELF RES. FREQ.-KHZ
EF30PL19	.0063	.0084	9.1	3300
EF30PL20	.010	.013	7.3	3600
EF30PL21	.016	.019	6.0	3800
EF30PL22	.025	.029	4.9	3900
EF30PL23	.040	.047	3.8	3800
EF30PL24	.063	.072	3.1	3400
EF30PL25	.10	.12	2.4	2900
EF30PL26	.16	.18	2.0	2200
EF30PL27	.25	.28	1.6	1600
EF30PL28	.40	.46	1.2	1200
EF30PL29	.63	.70	1.0	880
EF30PL30	1.0	1.2	.76	650
EF30PL31	1.6	1.8	.62	460
EF30PL32	2.5	2.8	.50	350
EF30PL33	4.0	4.6	.39	250
EF40PL18	.016	.012	10	6600
EF40PL19	.025	.018	7.9	6400
EF40PL20	.040	.028	6.2	4600
EF40PL21	.063	.043	4.9	3400
EF40PL22	.10	.066	3.9	2500
EF40PL23	.16	.10	3.1	1900
EF40PL24	.25	.16	2.5	1400
EF40PL25	.40	.26	2.0	980
EF40PL26	.63	.41	1.5	750
EF40PL27	1.0	.67	1.2	520
EF40PL28	1.6	1.1	1.0	390
EF40PL29	2.5	1.7	.79	290
EF40PL30	4.0	2.9	.63	230
EF40PL31	6.3	4.3	.50	180
EF40PL32	10	6.7	.40	130
EF50PL17	.025	.013	11	6100
EF50PL18	.040	.019	9.2	5600
EF50PL19	.063	.030	7.3	4400
EF50PL20	.10	.047	5.9	3800
EF50PL21	.16	.073	4.6	1500
EF50PL22	.25	.11	3.7	1100
EF50PL23	.40	.18	2.9	860
EF50PL24	.63	.29	2.3	620
EF50PL25	1.0	.46	1.8	440
EF50PL26	1.6	.74	1.4	350
EF50PL27	2.5	1.2	1.1	250
EF50PL28	4.0	1.9	.94	200
EF50PL29	6.3	3.0	.74	150
EF50PL30	10	4.9	.59	130
EF50PL31	16	7.8	.47	95
EF55PL16	.025	.011	13	5600
EF55PL17	.040	.016	10	4400
EF55PL18	.063	.024	8.6	5100
EF55PL19	.10	.037	6.8	4500
EF55PL20	.16	.058	5.5	3600
EF55PL21	.25	.091	4.3	1100
EF55PL22	.40	.14	3.4	790
EF55PL23	.63	.23	2.7	590
EF55PL24	1.0	.37	2.1	430
EF55PL25	1.6	.58	1.7	300
EF55PL26	2.5	.93	1.3	240
EF55PL27	4.0	1.5	1.1	180
EF55PL28	6.3	2.4	.87	140
EF55PL29	10	3.8	.69	100
EF55PL30	16	6.0	.55	83
EF58PL15	.040	.010	15	4700
EF58PL16	.063	.016	12	4200
EF58PL17	.10	.024	9.8	3500
EF58PL18	.16	.038	7.9	3100
EF58PL19	.25	.060	6.2	2300
EF58PL20	.40	.096	4.9	760
EF58PL21	.63	.15	3.9	550
EF58PL22	1.0	.24	3.1	410
EF58PL23	1.6	.38	2.4	310
EF58PL24	2.5	.61	1.9	220
EF58PL25	4.0	.98	1.5	160
EF58PL26	6.3	1.6	1.2	130
EF58PL27	10	2.5	.99	92
EF58PL28	16	4.1	.78	72
EF58PL29	25	6.0	.63	56

MECHANICAL SPECIFICATIONS

SIZE	H MAX	W MAX	L MAX	T ± .01	R ± .01	D ± .01	S ± .01	DIA. ± .003	WT. (g)
EF30	.8	.40	.85	.035	.55	.035	.65	.040	8
EF40	1.0	.50	1.06	.035	.70	.035	.80	.040	16
EF50	1.2	.55	1.25	.035	.80	.035	1.00	.050	29
EF55	1.3	.65	1.40	.035	1.00	.040	1.15	.050	41
EF58	1.5	.85	1.65	.035	1.20	.040	1.35	.064	74



MINIMUM INDUCTANCE WITH DC



NOTES

1. Initial inductance (L_O) is measured at 1 KHz.
2. DC Amps maximum rating is for a 50°C rise.
3. Maximum operating temperature is 130°C.
4. Self-Resonant Frequency is typical and for reference only.
5. Dielectric Withstanding Voltage (winding-to-case) is 1800 VDC, 10 μA MAX leakage per UL1950.
6. For very low values of L & DCR, measure adjacent to case.
7. All electrical data at 20° ± 5°C.
8. All mechanical dimensions are in inches.
9. Packaging: Epoxy encapsulated.
10. Pins are tinned copper.

Contact us for information on other standard or custom chokes and transformers.

See MAGNETIC CIRCUIT ELEMENTS in EEM section 5600 for standard transformers.

MAGNETIC CIRCUIT ELEMENTS ®

1540 MOFFETT STREET, SALINAS, CALIFORNIA 93905

PHONE: (831) 757-8752 FAX: (831) 757-5478 E-MAIL: M_C_E@COMPUSERVE.COM

NEW! "EP" CORE CHOKES - FERRITE NEW!

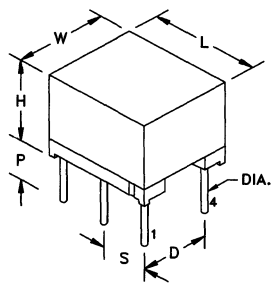
ELECTRICAL SPECIFICATIONS

PART NUMBER	L_O ±10% MILLI-H	DCR ±15% OHMS	DC AMPS MAX	SELF RES. FREQ.-KHZ	PIN CONNECTIONS
OE07DL22	.00279	.0081	6.6	>3000	1,2,3 - 4,5,6
OE07DL23	.00462	.012	5.4	>3000	1,2,3 - 4,5,6
OE07DL24	.00690	.018	4.5	>3000	1,3 - 4,6
OE07DL25	.0128	.033	3.3	>3000	1,3 - 4,6
OE07DL26	.0185	.047	2.7	>3000	1,3 - 4,6
OE07DL27	.0251	.067	2.3	>3000	1 - 4
OE07DL28	.0584	.14	1.6	>3000	1 - 4
OE07DL29	.0780	.20	1.3	>3000	1 - 4
OE07DL30	.148	.34	1.0	>3000	1 - 4
OE07DL31	.295	.62	.76	2700	1 - 4
OE07DL32	.374	.86	.64	2300	1 - 4
OE07DL33	.605	1.4	.51	1800	1 - 4
OE07DL34	.993	2.3	.39	1400	1 - 4
OE07DL35	1.50	3.5	.32	1100	1 - 4
OE07DL36	1.89	4.7	.27	1000	1 - 4
OE10DL22	.0160	.026	4.4	>3000	1,2,3,4 - 5,6,7,8
OE10DL23	.0223	.038	3.7	>3000	1,2,3,4 - 5,6,7,8
OE10DL24	.0502	.075	2.6	2800	1,4 - 5,8
OE10DL25	.0668	.11	2.2	2400	1,4 - 5,8
OE10DL26	.139	.22	1.5	1100	1,2,4 - 5,6,8
OE10DL27	.217	.32	1.3	2800	1 - 5
OE10DL28	.279	.45	1.1	2500	1 - 5
OE10DL29	.444	.70	.86	2100	1 - 5
OE10DL30	.813	1.3	.63	1500	1 - 5
OE10DL31	1.24	1.9	.52	1100	1 - 5
OE10DL32	1.93	2.9	.42	890	1 - 5
OE10DL33	3.30	4.9	.32	670	1 - 5
OE10DL34	4.40	7.0	.27	570	1 - 5
OE10DL35	6.98	11	.21	440	1 - 5
OE10DL36	12.7	20	.16	350	1 - 5
OE13DL20	.0116	.014	6.8	>3000	1,2,3,4,5 - 6,7,8,9,10
OE13DL21	.0144	.019	5.8	>3000	1,2,4,5 - 6,7,9,10
OE13DL22	.0250	.034	4.4	>3000	1,2,4,5 - 6,7,9,10
OE13DL23	.0462	.057	3.4	2800	1,2,4,5 - 6,7,9,10
OE13DL24	.0810	.092	2.7	2800	2,4 - 7,9
OE13DL25	.108	.13	2.2	1600	2,4 - 7,9
OE13DL26	.196	.23	1.7	1200	2,4 - 7,9
OE13DL27	.324	.38	1.3	2000	3 - 8
OE13DL28	.666	.70	.98	1300	3 - 8
OE13DL29	1.05	1.1	.78	1100	3 - 8
OE13DL30	1.80	1.9	.60	840	3 - 8
OE13DL31	2.30	2.5	.51	740	3 - 8
OE13DL32	3.55	3.9	.41	580	3 - 8
OE13DL33	6.72	7.0	.31	400	3 - 8
OE13DL34	9.41	10	.25	350	3 - 8
OE17DL19	.0259	.016	6.7	>3000	1,2,3,4 - 5,6,7,8
OE17DL20	.0500	.027	5.1	2300	1,2,3,4 - 5,6,7,8
OE17DL21	.0769	.041	4.2	2000	1,2,3,4 - 5,6,7,8
OE17DL22	.104	.058	3.5	1600	1,4 - 5,8
OE17DL23	.135	.082	2.9	1400	1,4 - 5,8
OE17DL24	.328	.17	2.1	710	1,4 - 5,8
OE17DL25	.620	.29	1.6	1200	1 - 5
OE17DL26	.816	.41	1.3	1000	1 - 5
OE17DL27	1.46	.69	1.0	780	1 - 5
OE17DL28	2.31	1.1	.80	630	1 - 5
OE17DL29	2.89	1.5	.70	570	1 - 5
OE17DL30	5.04	2.6	.53	440	1 - 5
OE17DL31	8.55	4.2	.41	300	1 - 5
OE17DL32	12.9	6.3	.34	240	1 - 5
OE17DL33	21.7	11	.26	190	1 - 5
OE20DL18	.0706	.022	7.3	1500	1,2,3,4,5 - 6,7,8,9,10
OE20DL19	.172	.048	4.9	830	1,2,4,5 - 6,7,9,10
OE20DL20	.271	.073	4.0	520	1,3,5 - 6,8,10
OE20DL21	.380	.10	3.3	560	1,2,4,5 - 6,7,9,10
OE20DL22	.602	.16	2.7	400	1,5 - 6,10
OE20DL23	1.04	.28	2.0	780	1,5 - 6,10
OE20DL24	1.37	.39	1.7	680	1,5 - 6,10
OE20DL25	3.23	.78	1.2	440	1 - 6
OE20DL26	4.04	1.1	1.0	400	1 - 6
OE20DL27	6.78	1.8	.82	290	1 - 6
OE20DL28	11.1	2.9	.63	230	1 - 6
OE20DL29	18.4	4.6	.50	180	1 - 6
OE20DL30	29.4	7.7	.39	140	1 - 6
OE20DL31	39.3	11	.33	120	1 - 6
OE20DL32	58.6	17	.26	98	1 - 6

MECHANICAL SPECIFICATIONS

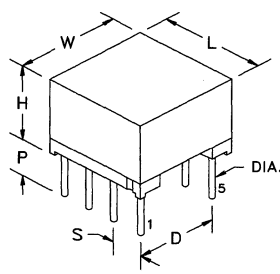
SIZE	Fig.	H MAX	W MAX	L MAX	P MIN	D ±.01	S ±.01	DIA. ±.003	WT. (g)
OE07	A	.40	.33	.40	.11	.20	.10	.024	2.2
OE10	B	.47	.47	.49	.15	.30	.10	.026	4.4
OE13	C	.51	.55	.55	.15	.40	.10	.028	7.1
OE17	B	.65	.78	.78	.15	.60	.20	.026	15
OE20	C	.80	.89	.99	.15	.70	.20	.026	37

Figure A



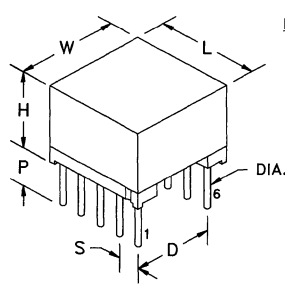
PC Board Footprint (Top View)

Figure B



PC Board Footprint (Top View)

Figure C



PC Board Footprint (Top View)

NOTES

1. Initial inductance (L_O) is measured at 1 KHz.
2. DC Amps maximum rating is for a 50°C rise.
3. Maximum operating temperature is 130°C.
4. Self-Resonant Frequency is typical and for reference only.
5. Dielectric Withstanding Voltage (winding-to-core) is 1800 VDC, 10 µA MAX leakage per UL1950.
6. All electrical data at 20° ± 5°C with multiple windings in parallel.
7. All mechanical dimensions are in inches.
8. Clear acrylic resin impregnated.
9. Pins are hot solder dipped.

Contact us for information on other standard or custom chokes and transformers.

See MAGNETIC CIRCUIT ELEMENTS in EEM section 5600 for standard transformers.

MAGNETIC CIRCUIT ELEMENTS ®

1540 MOFFETT STREET, SALINAS, CALIFORNIA 93905

PHONE: (408) 757-8752 FAX: (408) 757-5478 E-MAIL: M_C_E@COMPUSERVE.COM

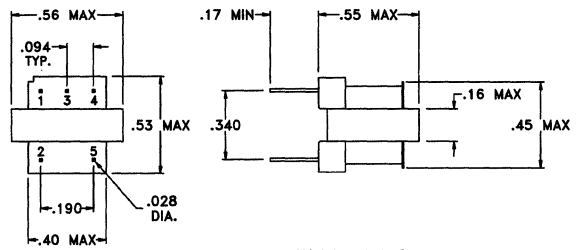
"E" CORE CHOKES - FERRITE

ELECTRICAL SPECIFICATIONS

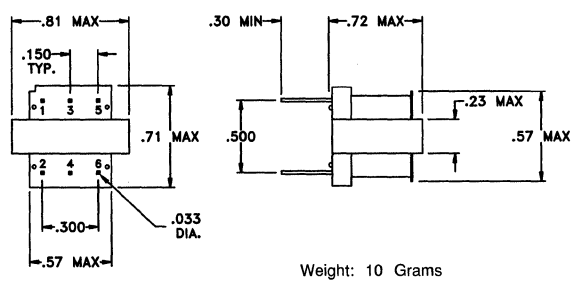
PART NUMBER	L_O ±15% MILLI-H	DCR ±15% OHMS	DC AMPS MAX	SELF RES. FREQ.-KHZ	PIN CONNECTIONS
OC12BL22	.019	.026	4.0	3900	1,4 - 2,5
OC12BL23	.030	.042	3.2	3900	1,4 - 2,5
OC12BL24	.048	.065	2.5	3200	1,4 - 2,5
OC12BL25	.076	.10	2.0	3100	1 - 2
OC12BL26	.12	.17	1.6	3700	1 - 2
OC12BL27	.19	.26	1.3	2600	1 - 2
OC12BL28	.30	.42	1.0	2300	1 - 2
OC12BL29	.48	.66	.80	2200	1 - 2
OC12BL30	.76	1.1	.63	1700	1 - 2
OC12BL31	1.2	1.7	.50	1100	1 - 2
OC12BL32	1.9	2.7	.40	880	1 - 2
OC12BL33	3.0	4.2	.32	830	1 - 2
OC12BL34	4.8	6.8	.25	650	1 - 2
OC12BL35	7.6	11	.20	490	1 - 2
OC12BL36	12	17	.16	400	1 - 2
OC12BL37	19	27	.13	310	1 - 2
OC12BL38	30	43	.10	240	1 - 2
OC12BL39	48	69	.080	190	1 - 2
OC12BL40	76	120	.063	160	1 - 2
OC12BL41	120	170	.050	120	1 - 2
OC18BL20	.051	.035	5.0	3200	1,3,5 - 2,4,6
OC18BL21	.081	.054	4.0	3000	1,5 - 2,6
OC18BL22	.13	.085	3.2	3400	1,5 - 2,6
OC18BL23	.20	.14	2.5	1200	1,5 - 2,6
OC18BL24	.32	.22	2.0	2100	1 - 2
OC18BL25	.51	.35	1.6	1800	1 - 2
OC18BL26	.81	.54	1.3	1400	1 - 2
OC18BL27	1.3	.85	1.0	1100	1 - 2
OC18BL28	2.0	1.4	.80	850	1 - 2
OC18BL29	3.2	2.2	.63	670	1 - 2
OC18BL30	5.1	3.5	.50	530	1 - 2
OC18BL31	8.1	5.4	.40	430	1 - 2
OC18BL32	13	8.5	.32	280	1 - 2
OC18BL33	20	14	.25	260	1 - 2
OC18BL34	32	22	.20	210	1 - 2
OC18BL35	51	35	.16	160	1 - 2
OC18BL36	81	54	.13	110	1 - 2
OC18BL37	130	85	.10	92	1 - 2
OC18BL38	200	140	.080	69	1 - 2
OC18BL39	320	230	.063	57	1 - 2
OC25BL18	.070	.031	6.0	1700	1,2,3,4 - 5,6,7,8
OC25BL19	.11	.050	4.8	1000	1,2,3,4 - 5,6,7,8
OC25BL20	.18	.080	3.8	930	1,2,3,4 - 5,6,7,8
OC25BL21	.28	.13	3.0	1000	1,4 - 5,8
OC25BL22	.44	.20	2.4	960	1,4 - 5,8
OC25BL23	.70	.31	1.9	800	1,4 - 5,8
OC25BL24	1.1	.50	1.5	1100	1 - 8
OC25BL25	1.8	.80	1.2	890	1 - 8
OC25BL26	2.8	1.3	.95	720	1 - 8
OC25BL27	4.4	2.0	.75	530	1 - 8
OC25BL28	7.0	3.1	.60	450	1 - 8
OC25BL29	11	5.0	.48	340	1 - 8
OC25BL30	18	8.0	.38	270	1 - 8
OC25BL31	28	13	.30	210	1 - 8
OC25BL32	44	20	.24	170	1 - 8
OC25BL33	70	31	.19	140	1 - 8
OC25BL34	110	50	.15	110	1 - 8
OC25BL35	180	80	.12	76	1 - 8
OC25BL36	280	140	.095	61	1 - 8
OC25BL37	440	210	.075	47	1 - 8

MECHANICAL SPECIFICATIONS

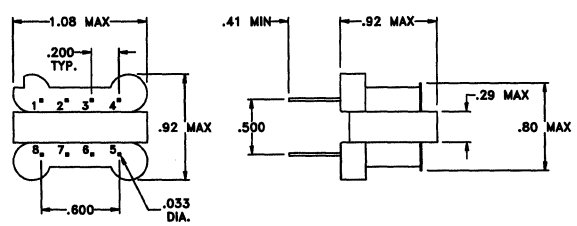
Also available in a VERTICAL configuration with two self leads.



Weight: 3.5 Grams



Weight: 10 Grams



Weight: 26 Grams

NOTES

1. Initial inductance (L_o) is measured at 1 KHz.
2. DC Amps maximum rating is for a 50°C rise.
3. Maximum operating temperature is 130°C.
4. Self-Resonant Frequency is typical and for reference only.
5. Dielectric Withstanding Voltage (winding-to-core) is 1800 VDC, 10 µA MAX leakage per UL1950.
6. All electrical data at 20° ± 5°C with multiple windings in parallel.
7. All mechanical dimensions are in inches with a tolerance of .XXX = ± .010.
8. Clear acrylic resin impregnated.
9. Pins are hot solder dipped.

Contact us for information on other standard or custom chokes and transformers.

See MAGNETIC CIRCUIT ELEMENTS in EEM section 5600 for standard transformers.

MAGNETIC CIRCUIT ELEMENTS ®

1540 MOFFETT STREET, SALINAS, CALIFORNIA 93905

PHONE: (831) 757-8752 FAX: (831) 757-5478 E-MAIL: M_C_E@COMPUSERVE.COM

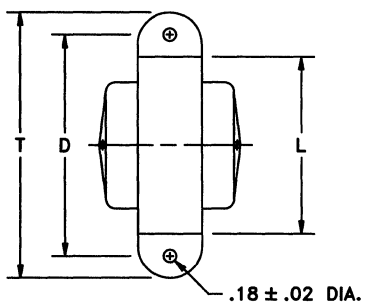
NEW! "E" CORE CHOKES - FERRITE *NEW!*

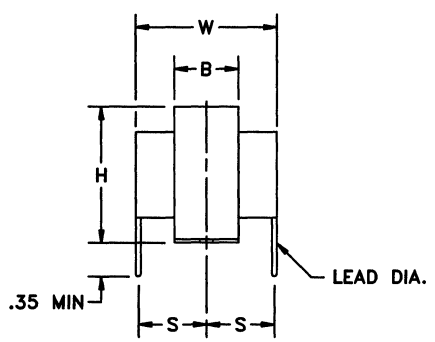
ELECTRICAL SPECIFICATIONS

PART NUMBER	L_O ±15% MILLI-H	DCR ±15% OHMS	DC AMPS MAX	SELF RES. FREQ.-KHZ	LEAD DIA.
OD38BL13	.039	.0083	13	4100	.072
OD38BL14	.062	.013	11	3600	.064
OD38BL15	.10	.021	8.6	2600	.057
OD38BL16	.16	.032	7.0	2100	.051
OD38BL17	.24	.049	5.6	1700	.045
OD38BL18	.39	.077	4.4	1300	.040
OD38BL19	.60	.12	3.6	1000	.036
OD38BL20	.94	.19	2.8	790	.032
OD38BL21	1.5	.30	2.2	650	.029
OD38BL22	2.3	.47	1.8	520	.025
OD38BL23	3.7	.74	1.4	390	.023
OD38BL24	5.9	1.2	1.1	300	.020
OD38BL25	9.2	1.8	.92	240	.018
OD50BL13	.082	.011	13	2800	.072
OD50BL14	.13	.018	10	2100	.064
OD50BL15	.21	.027	8.4	1700	.057
OD50BL16	.34	.043	6.7	1200	.051
OD50BL17	.51	.066	5.4	1000	.045
OD50BL18	.81	.10	4.3	740	.040
OD50BL19	1.3	.16	3.4	610	.036
OD50BL20	2.0	.25	2.7	460	.032
OD50BL21	3.2	.41	2.1	380	.029
OD50BL22	5.1	.65	1.7	300	.025
OD50BL23	8.0	1.0	1.3	230	.023
OD50BL24	13	1.6	1.0	190	.020
OD50BL25	20	2.6	.87	150	.018
OD62BL13	.15	.016	12	1800	.072
OD62BL14	.22	.024	10	1400	.064
OD62BL15	.35	.038	8.2	1000	.057
OD62BL16	.55	.058	6.6	710	.051
OD62BL17	.88	.093	5.2	580	.045
OD62BL18	1.4	.15	4.1	440	.040
OD62BL19	2.2	.23	3.3	370	.036
OD62BL20	3.4	.36	2.6	280	.032
OD62BL21	5.5	.57	2.1	230	.029
OD62BL22	8.7	.91	1.6	190	.025
OD62BL23	14	1.4	1.3	140	.023
OD62BL24	22	2.3	1.0	110	.020
OD62BL25	34	3.6	.85	94	.018
OD75BL10	.085	.0063	24	2000	.100
OD75BL11	.13	.010	19	1700	.091
OD75BL12	.21	.016	15	1400	.081
OD75BL13	.34	.025	12	1000	.072
OD75BL14	.54	.040	9.6	770	.064
OD75BL15	.85	.063	7.6	690	.057
OD75BL16	1.3	.10	6.0	500	.051
OD75BL17	2.1	.16	4.8	410	.045
OD75BL18	3.4	.25	3.8	320	.040
OD75BL19	5.4	.40	3.0	260	.036
OD75BL20	8.5	.63	2.4	200	.032
OD75BL21	13	1.0	1.9	150	.029
OD75BL22	21	1.6	1.5	110	.025
OD75BL23	34	2.5	1.2	94	.023
OD75BL24	54	4.0	.96	72	.020
OD75BL25	85	6.3	.76	56	.018

MECHANICAL SPECIFICATIONS

SIZE	H MAX	W MAX	L MAX	T MAX	B MAX	D ±.03	S ±.03	WT. (g)
OD38	1.28	1.27	1.50	2.12	.50	1.76	.53	70
OD50	1.45	1.40	1.75	2.43	.64	2.00	.59	114
OD62	1.70	1.52	2.00	2.83	.76	2.37	.65	181
OD75	2.02	1.80	2.38	3.30	.90	2.81	.79	304





Also available without a bracket or in a VERTICAL configuration.

NOTES

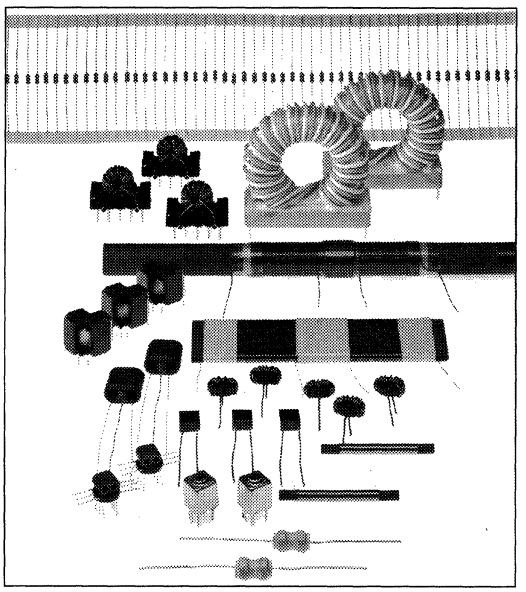
1. Initial inductance (L_O) is measured at 1 KHz.
2. DC Amps maximum rating is for a 50°C rise.
3. Maximum operating temperature is 130°C.
4. Self-Resonant Frequency is typical and for reference only.
5. Dielectric Withstanding Voltage (winding-to-core) is 1800 VDC, 10 µA MAX leakage per UL1950.
6. All electrical data at 20° ± 5°C.
7. All mechanical dimensions are in inches.
8. Clear acrylic resin impregnated.
9. Leads are hot solder dipped.

Contact us for information on other standard or custom chokes and transformers.

See MAGNETIC CIRCUIT ELEMENTS in EEM section 5600 for standard transformers.

MAGNETIC COMPONENT ENGINEERING, INC.

Magnetic Component Engineering has been designing and manufacturing high performance magnetics since 1973. Manufacturing is done with statistical process control at all points in every phase. Our facilities conform to MIL-I-45208A and we have been a continued supplier to the aerospace and defense industry since 1973. When you need quality components on time, MCE will deliver.



INDUCTORS

All types of inductors are designed and manufactured at MCE. These include axial leaded, PC board mountable, tunable, high current, precision inductors, low profile, and small footprint inductors.

COILS

A large cross-section of coils are available both shielded and unshielded. Tunable coils will be designed around your specifications and requirements. The inductance range available with standard hardware is from 50nH to 480mH. Inductance walues outside this range can be custom designed. Our coils offer a wide range of frequencies, high Q and high quality.

CUSTOM WINDING

Our manufacturing facilities have the capabilities for custom winding pot cores, E-cores, RM type cores, antenna bars, antenna rods, toroidal cores and other RF components. With our fully equipped manufacturing facility, all custom gapping of cores is done in-house giving high reliability and fast deliveries. CNC winding equipment ensures consistency and reliability at low cost.

DESIGN AND PROTOTYPING

MCE can custom design any RF magnetic component fast. Prototypes can be quickly manufactured and shipped for approval. All this is possible because we can custom precision grind our cores in-house. If you need to try out your design, use our facilities for a quick turnaround.

FOR FURTHER INFORMATION, QUOTATIONS OR TO PLACE AN ORDER, CALL MCE AT (800) 989-5656 OR FAX US YOUR REQUEST FOR A QUOTE AT (310) 539-4446 AND WE WILL RESPOND PROMPTLY

MAGNETIC COMPONENT ENGINEERING, INC.
23145 Kashiwa Court, Torrance, CA 90505 (800) 989-5656 (310) 539-4000 Fax (310) 539-4446
E-Mail address: sales@magneticcomponent.com

MAGNETIC COMPONENT ENGINEERING, INC.

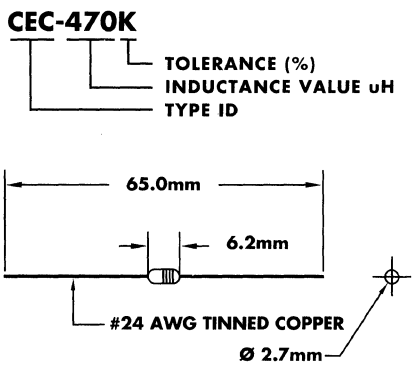
FIXED INDUCTORS

Standard Axial Inductors

These inductors are ideal for cost sensitive applications. Our fixed inductors have the following advantages:

- Available from stock
- Extremely competitively priced for small or large quantities
- Excellent electrical performance–High Q
- Conformally coated
- Excellent resistance to humidity
- Very high reliability
- Tolerances shown are standard. You may special order to tighter tolerances if required
- Available bulk packaged or taped for automatic insertion
- Color coded for easy identification

Engineering Design Kit K-CEC-000 available. The kit contains 250 inductors (25 values x 10 inductors)



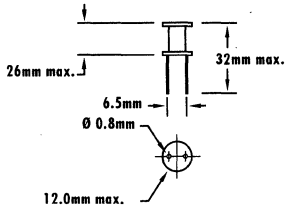
PART NO.	INDUCTANCE (uH)	TOL	Q MIN	TEST FREQ (MHZ)	SRF MIN (MHZ)	DCR MAX (OHM)	DCI MAX (MA)
CEC-R10M	0.10	±20%	60	25.20	255	0.08	1520
CEC-R12M	0.12	±20%	60	25.20	252	0.08	1500
CEC-R15-M	0.15	±20%	60	25.20	250	0.09	1450
CEC-R18-M	0.18	±20%	60	25.20	245	0.09	1400
CEC-R22-M	0.22	±20%	70	25.20	240	0.1	1350
CEC-R27M	0.27	±20%	70	25.20	230	0.1	1300
CEC-R33M	0.33	±20%	70	25.20	235	0.11	1250
CEC-R39M	0.39	±20%	70	25.20	250	0.12	1200
CEC-R47M	0.47	±20%	70	25.20	252	0.12	1100
CEC-R56M	0.56	±20%	70	25.20	254	0.13	1050
CEC-R68M	0.68	±20%	70	25.20	250	0.15	1000
CEC-R82M	0.82	±20%	80	25.20	252	0.19	950
CEC-1R0M	1.00	±20%	80	25.20	254	0.20	880
CEC-1R2M	1.20	±20%	80	7.96	230	0.22	820
CEC-1R5M	1.50	±20%	80	7.96	232	0.23	780
CEC-1R8K	1.80	±10%	80	7.96	220	0.25	730
CEC-2R2K	2.20	±10%	80	7.96	226	0.3	690
CEC-2R7K	2.70	±10%	80	7.96	220	0.35	650
CEC-3R3K	3.30	±10%	80	7.96	98	0.5	630
CEC-3R9K	3.90	±10%	80	7.96	92	0.6	610
CEC-4R7K	4.70	±10%	80	7.96	90	0.8	540
CEC-5R6K	5.60	±10%	80	7.96	95	0.9	520
CEC-6R8K	6.80	±10%	80	7.96	85	1.0	480
CEC-8R2K	8.20	±10%	80	7.96	89	1.0	430
CEC-100K	10.00	±10%	80	7.96	80	1.1	400
CEC-120K	12.00	±10%	70	2.52	37	1.3	380
CEC-150K	15.00	±10%	70	2.52	25	1.5	360
CEC-180K	18.00	±10%	70	2.52	18	1.6	340
CEC-220K	22.00	±10%	70	2.52	16	1.7	300
CEC-270K	27.00	±10%	70	2.52	15	1.9	290
CEC-330K	33.00	±10%	70	2.52	13	2.1	280
CEC-390K	39.00	±10%	70	2.52	13	2.4	260
CEC-470K	47.00	±10%	70	2.52	13	2.6	250
CEC-560K	56.00	±10%	70	2.52	13.5	2.8	240
CEC-680K	68.00	±10%	70	2.52	13	3.0	230
CEC-820K	82.00	±10%	70	2.52	13	3.4	220
CEC-101K	100.00	±10%	70	2.52	13	3.8	200
CEC-121K	120.00	±10%	70	0.796	13	4.5	180
CEC-151K	150.00	±10%	60	0.796	13	5	170
CEC-181K	180.00	±10%	60	0.796	13.5	7.5	160
CEC-221K	220.00	±10%	60	0.796	13	8.8	140
CEC-271K	270.00	±10%	60	0.796	13	9.5	130
CEC-331K	330.00	±10%	60	0.796	10	10.8	110
CEC-391K	390.00	±10%	40	0.796	7.2	17	100
CEC-471K	470.00	±10%	40	0.796	3.8	20	95
CEC-561K	560.00	±10%	40	0.796	3.5	22	80
CEC-681K	680.00	±10%	40	0.796	3.4	23	70
CEC-821K	820.00	±10%	40	0.796	3.2	25	65
CEC-102K	1000.00	±10%	40	0.796	3.0	29	60

MAGNETIC COMPONENT ENGINEERING, INC.
23145 Kashiwa Court, Torrance, CA 90505 (800) 989-5656 (310) 539-4000 Fax (310) 539-4446
E-Mail address: sales@magneticcomponent.com

MAGNETIC COMPONENT ENGINEERING, INC.

CW TYPE

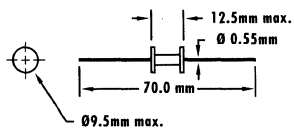
This fixed inductor can be supplied with or without UL tubing on the outside. The vertical package allows for a small footprint. These inductors are widely used in power supplies, radios, and communication devices. The CW series are normally supplied in bulk packaging, but upon request can be supplied on tape for automatic insertion.



TYPE:	CW
INDUCTANCE RANGE:	1uH-100mH
FREQUENCY RANGE:	1KHz-25MHz
MINIMUM Q:	30 @ F>7.9MHZ
MAXIMUM CURRENT:	1.5 A

CWR TYPE

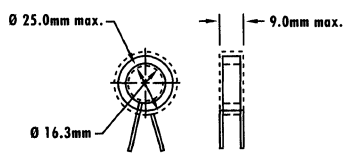
The CWR series fixed inductors give high inductance values in a small package. The inductor can be supplied with or withour UL tubing. These compact inductors are designed for low cost and high reliability applications where a relatively high Q is required. CWR type can be supplied in bulk packaging or on tape and reel for automatic insertion



TYPE:	CWR
INDUCTANCE RANGE:	1uH-100mH
FREQUENCY RANGE:	1KHz-20MHz
MINIMUM Q:	50 @ F>7.9MHZ
MAXIMUM CURRENT:	1.5 A

RI TYPE

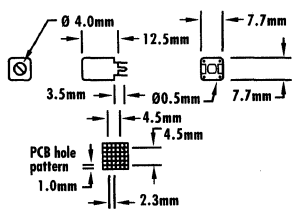
The RI series is a toroidal configuration inductor that performs well under high current applications. These chokes are excellent for EMI/RFI filtering. They are also ideal for use as energy storage inductors in switching power supplies and such.



TYPE:	RI
INDUCTANCE RANGE:	1uH-5mH
FREQUENCY RANGE:	120Hz-1KHz
MINIMUM Q:	5
MAXIMUM CURRENT:	20 A

AH-7 TYPE

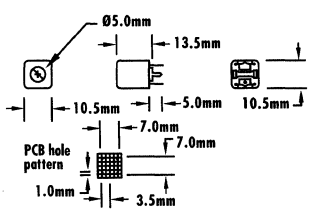
The AH-7 series tunable inductors are provided in an international standard 7mm package. These precision coils can be made to meet your inductance values giving a 10+% tuning range. These are available with or without magnetic shielding. These are ideal for IF coils, oscillators and RF coil applications.



TYPE:	AH-7
INDUCTANCE RANGE:	0.1uH-1.5mH
FREQUENCY RANGE:	10KHz-20MHz
MINIMUM Q:	75
INITIAL CAP:	10pF-430pF

KT-10 TYPE

The KT-10 series tunable coils are provided in an international standard 10mm package. These precision coils can be made to meet your inductance values giving a 10+% tuning range. These are available with or without magnetic shielding and are ideal for many uses including IF coils, oscillators, and RF coil applications.



TYPE:	KT-10
INDUCTANCE RANGE:	1uH-480mH
FREQUENCY RANGE:	10KHz-200MHz
MINIMUM Q:	50
INITIAL CAP:	10pF-1000pF

MAGNETIC COMPONENT ENGINEERING, INC.
23145 Kashiwa Court, Torrance, CA 90505 (800) 989-5656 (310) 539-4000 Fax (310) 539-4446
E-Mail address: sales@magneticcomponent.com

MAGNETIC COMPONENT ENGINEERING, INC.

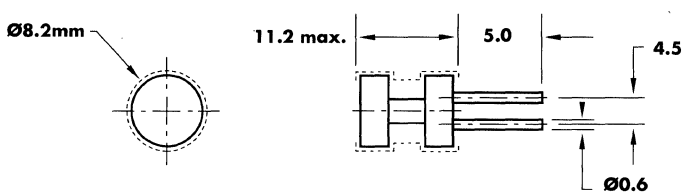
FIXED INDUCTORS

Radial Lead Inductors

These inductors are an ideal design to enable space savings. Our fixed inductors have the following advantages:

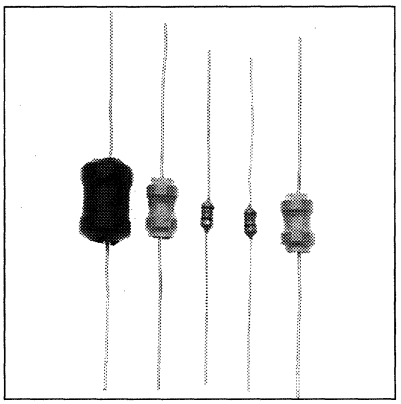
- Very high reliability
- Available with or without UL tubing
- Available bulk packaged or taped for automatic insertion
- Rounded ends for easy PCB insertion
- Extremely competitively priced

MCE PART NO.	Inductance (mH)	Q (min.)	Test Freq. (kHZ)	DC Resistance (Ω) max.	Rated DC Current (mA) max.	Self Resonant Frequency (MHz) min.
8RV-101K	0.10	80	796	2.0	200	5.3
8RV-121K	0.12	80	796	2.0	200	4.5
8RV-151K	0.15	80	796	2.0	200	3.8
8RV-181K	0.18	80	796	3.0	200	3.3
8RV-221K	0.22	80	796	3.0	200	2.9
8RV-271K	0.27	80	796	3.0	200	2.6
8RV-331K	0.33	80	796	4.0	200	2.3
8RV-391K	0.39	80	796	4.0	200	2.1
8RV-471K	0.47	80	796	4.0	200	1.9
8RV-561K	0.56	80	796	4.0	200	1.7
8RV-681K	0.68	80	796	4.0	200	1.6
8RV-821K	0.82	80	796	6.0	200	1.4
8RV-102K	1.0	90	796	6.0	150	1.3
8RV-122K	1.2	90	796	9.0	150	1.2
8RV-152K	1.5	90	796	9.0	150	1.1
8RV-182K	1.8	90	796	9.0	100	1.0
8RV-222K	2.2	90	796	13.0	100	0.9
8RV-272K	2.7	90	796	13.0	100	0.8
8RV-332K	3.3	90	796	13.0	100	0.7
8RV-392K	3.9	90	796	13.0	50	0.7
8RV-472K	4.7	90	796	18.0	50	0.6
8RV-562K	5.6	90	796	18.0	50	0.6
8RV-682K	6.8	90	796	26.0	50	0.5
8RV-822K	8.2	90	796	26.0	50	0.5
8RV-103K	10	100	79.6	40.0	40	0.4
8RV-123K	12	100	79.6	40.0	40	0.4
8RV-153K	15	100	79.6	60.0	40	0.4
8RV-183K	18	100	79.6	60.0	30	0.3
8RV-223K	22	100	79.6	80.0	30	0.3
8RV-273K	27	100	79.6	80.0	30	0.3
8RV-333K	33	100	79.6	80.0	30	0.3

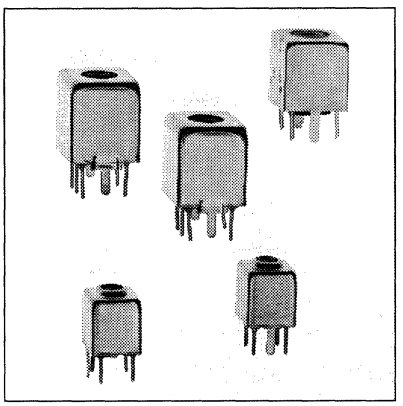


MAGNETIC COMPONENT ENGINEERING, INC.
23145 Kashiwa Court, Torrance, CA 90505 (800) 989-5656 (310) 539-4000 Fax (310) 539-4446
E-Mail address: sales@magneticcomponent.com

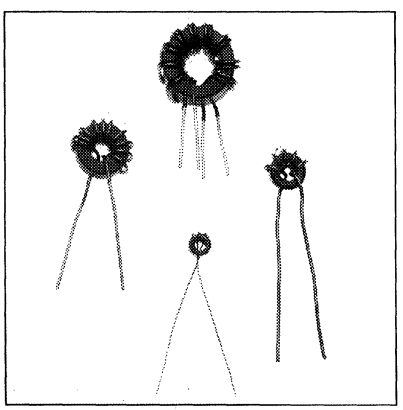
MAGNETIC COMPONENT ENGINEERING, INC.



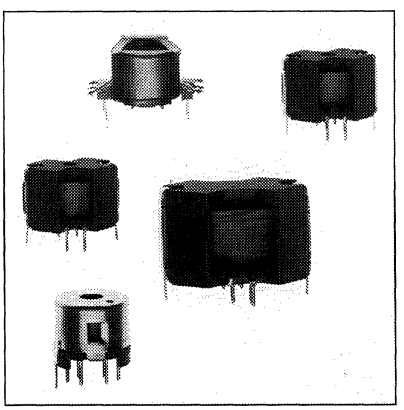
FIXED INDUCTORS
- Axial Leaded
- Conformally coated
- Radial Leaded
- With or without UL tubing
- Bulk packaging or supplied on tape
- Stock available
- Fast deliveries
- Tolerances of ±10% or better upon request



TUNABLE INDUCTORS
- Wide range of frequencies
- Various sizes to fit your application
- Custom design
- Inductance values from less than 1 uH to over 1 mH
- High reliability
- Easily adjustable cores



TOROIDAL INDUCTORS
- Custom wound per your specification
- Standard sizes in various dimensions
- Custom mounts available
- Encapsulation available
- Design facilities



COILS
- Custom winding
- Custom design
- Pot core transformers and inductors
- Prototypes to production
- Ideal for high voltage requirements
- High reliability

MAGNETIC COMPONENT ENGINEERING, INC.
23145 Kashiwa Court, Torrance, CA 90505 (800) 989-5656 (310) 539-4000 Fax (310) 539-4446
E-Mail address: sales@magneticcomponent.com

LODESTONE PACIFIC

Factory Authorized and Supported Distribution

WORLD CLASS DISTRIBUTOR OF MAGNETIC CORE MATERIALS, BOBBINS AND HARDWARE

MANUFACTURER OF TOROID MOUNTS & HEADERS

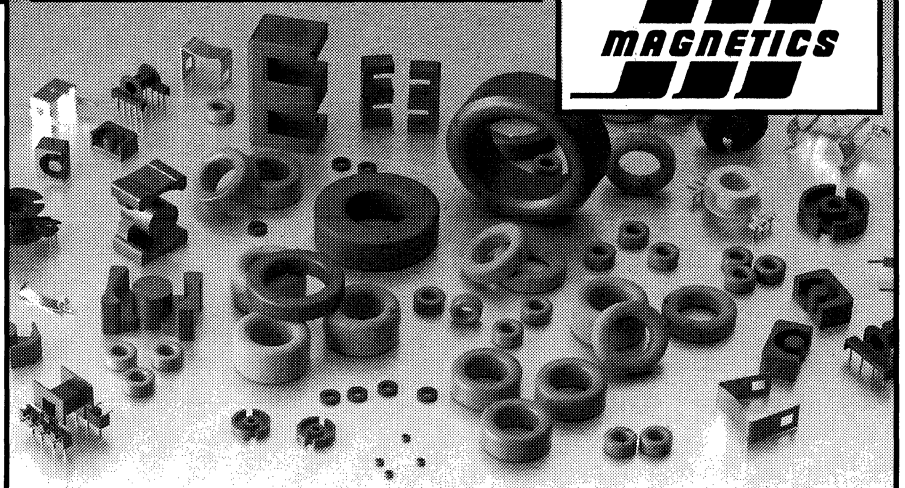
PHONE: (800) 694-8092
Facsimile: (714) 970-0800

E-Mail: sales@lodestonepacific.com
Internet: http://www.lodestonepacific.com

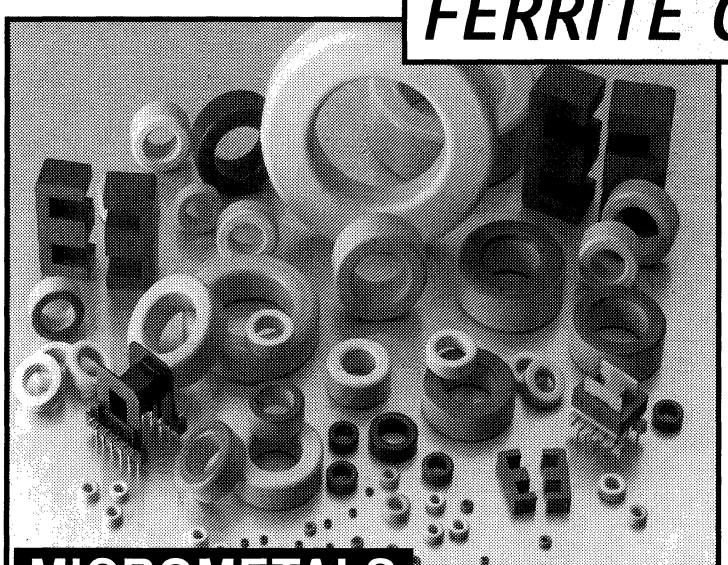
- The Finest Core Materials
- Free Samples the Next Day
- Free Catalogs the Next Day
- Core Grinding & Gapping
- Core Coating & Painting
- In House Technical Support
- In House Cross Reference
- Millions of Cores in Stock
- Closely Scheduled Deliveries

"Finest In The Field"

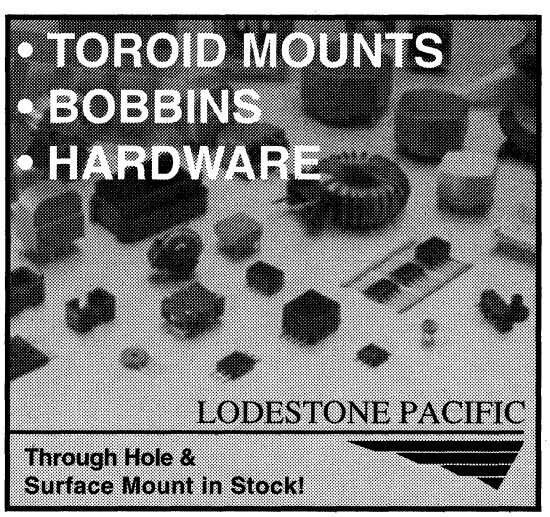
MAGNETICS



FERRITE CORES Factory Authorized and Supported Distribution



MICROMETALS
IRON POWDER CORES Factory Authorized & Supported Distribution



See our Toroid Mount, Bobbin and Hardware Catalog on pages A1235-1239

J.W.Miller MAGNETICS
For More Information Call: Fax Service 800-723-8588
306 E. Alondra Blvd. • Gardena, CA 90247 • 310-515-1720 • To Send a Fax Dial: 310-515-1962

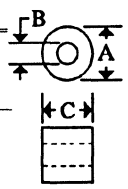
CORES

FERRITE BEADS

Miller Number	Ferrite Material No.	Suggested Frequency Range
FB73-085	73	Up to 40 MHz
FB43-226	43	40 to 200 MHz
FB73-226	73	Up to 40 MHz
FB43-110	43	40 to 200 MHz
FB64-110	64	Above 200 MHz
FB73-110	73	Up to 40 MHz
FB43-422	43	40 to 200 MHz
FB73-422	73	Up to 40 MHz
FB43-287	43	40 to 200 MHz
FB73-287	73	Up to 40 MHz

The addition of a Ferrite Bead to a piece of wire causes the impedance of the lead to increase and acts like a small RF choke at high frequencies. It is possible to dissipate high frequency parasitic signals and attenuate undesirable frequencies that travel on DC circuits by the use of beads.

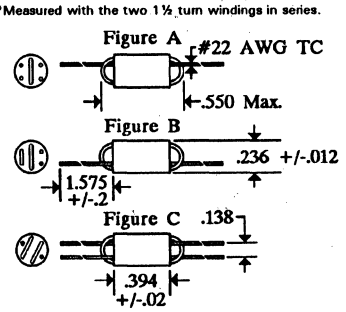
(A) Outside Diameter Min.	Max.	(B) Inside Diameter Min.	Max.	(C) Length Min.	Max.
.052	.056	.027	.031	.085	.095
.123	.153	.040	.060	.221	.251
.125	.155	.040	.060	.221	.251
.125	.155	.040	.060	.113	.143
.123	.153	.040	.060	.098	.138
.123	.153	.040	.060	.113	.143
.19	.210	.057	.067	.422	.452
.185	.215	.050	.070	.412	.462
.281	.311	.084	.104	.282	.312
.291	.301	.089	.099	.287	.307



WIDE-BAND CHOKES

Miller Number	Core Material	No. of Turns	Min. Z (Ω)	Freq. (MHz)	Fig.
FB20009-3B	3B	1½	300	120	A
FB20019-4B	4B	1½	350	250	A
FB20010-3B	3B	2½	600	50	B
FB20020-4B	4B	2½	700	180	B
FB20011-3B	3B	2 x 1½	700*	50	C
FB20021-4B	4B	2 x 1½	800*	110	C

*Measured with the two 1½ turn windings in series.



UNSHIELDED CHIP INDUCTORS

PM20 SERIES

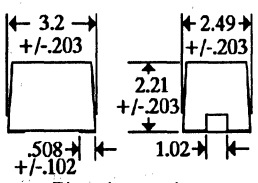
Miller Number	L ± 20% µH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
PM20-R010M	0.010	15	100	2500	0.13	450
PM20-R012M	0.012	17	100	2300	0.14	450
PM20-R015M	0.015	19	100	2100	0.16	450
PM20-R018M	0.018	21	100	1900	0.18	450
PM20-R022M	0.022	23	100	1700	0.20	450
PM20-R027M	0.027	23	100	1500	0.22	450
PM20-R033M	0.033	25	100	1400	0.24	450
PM20-R039M	0.039	25	100	1300	0.27	450
PM20-R047M	0.047	26	100	1200	0.30	450
PM20-R056M	0.056	26	100	1100	0.33	450
PM20-R068M	0.068	27	100	1000	0.36	450
PM20-R082M	0.082	27	100	900	0.40	450
PM20-R10M	0.10	28	100	700	0.44	450
PM20-R12M	0.12	28	25.2	500	0.22	450
PM20-R15M	0.15	28	25.2	450	0.25	450
PM20-R18M	0.18	28	25.2	400	0.28	450
PM20-R22M	0.22	28	25.2	350	0.32	450
PM20-R27M	0.27	28	25.2	320	0.36	450
PM20-R33M	0.33	28	25.2	300	0.40	450
PM20-R39M	0.39	28	25.2	250	0.45	450
PM20-R47M	0.47	28	25.2	220	0.50	450
PM20-R56M	0.56	28	25.2	180	0.55	450
PM20-R68M	0.68	28	25.2	160	0.60	450
PM20-R82M	0.82	28	25.2	140	0.65	450
	L ± 10% µH					
PM20-1R0K	1.0	28	7.96	120	0.70	400
PM20-1R2K	1.2	28	7.96	100	0.75	390
PM20-1R5K	1.5	28	7.96	85	0.85	370
PM20-1R8K	1.8	28	7.96	80	0.90	350
PM20-2R2K	2.2	30	7.96	75	1.0	320
PM20-2R7K	2.7	30	7.96	70	1.1	290
PM20-3R3K	3.3	30	7.96	60	1.2	260
PM20-3R9K	3.9	30	7.96	55	1.3	250
PM20-4R7K	4.7	30	7.96	50	1.7	220
PM20-5R6K	5.6	30	7.96	47	1.8	200

PM20 SERIES *(continued)*

Miller Number	L ± 10% µH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
PM20-6R8K	6.8	30	7.96	43	2.0	180
PM20-8R2K	8.2	30	7.96	40	2.3	170
PM20-100K	10	30	2.52	36	2.5	150
PM20-120K	12	30	2.52	33	2.8	140
PM20-150K	15	30	2.52	30	3.2	130
PM20-180K	18	30	2.52	27	3.6	120
PM20-220K	22	30	2.52	25	4.0	110
PM20-270K	27	30	2.52	20	5.0	80
PM20-330K	33	30	2.52	17	5.6	70
PM20-390K	39	30	2.52	16	6.4	65
PM20-470K	47	30	2.52	15	7.0	60
PM20-560K	56	30	2.52	13	8.0	55
PM20-680K	68	30	2.52	12	9.0	50
PM20-820K	82	30	2.52	11	10	45
PM20-101K	100	20	0.796	10	10	40
PM20-121K	120	20	0.796	10	11	70
PM20-151K	150	20	0.796	8	15	65
PM20-181K	180	20	0.796	7	17	60
PM20-221K	220	20	0.796	7	21	50

PM20 Packaged 2000/reel (Minimum order 1 reel)

PM20 Series Dimensions



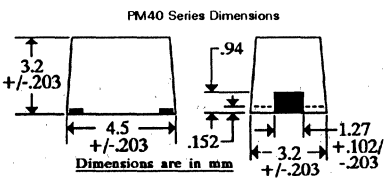
Dimensions are in mm

PM40 SERIES

Miller Number	L ± 20% µH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
PM40-R-10M	0.10	28	25.2	700	0.44	450
PM40-R-12M	0.12	30	25.2	500	0.22	450
PM40-R-15M	0.15	30	25.2	450	0.25	450
PM40-R-18M	0.18	30	25.2	400	0.28	450
PM40-R-22M	0.22	30	25.2	350	0.32	450
PM40-R-27M	0.27	30	25.2	320	0.36	450
PM40-R-33M	0.33	30	25.2	300	0.40	450
PM40-R-39M	0.39	30	25.2	350	0.45	450
PM40-R-47M	0.47	30	25.2	220	0.50	450
PM40-R-56M	0.56	30	25.2	180	0.55	450
PM40-R-68M	0.68	30	25.2	160	0.60	450
PM40-R-82M	0.82	30	25.2	140	0.67	450
	L ± 10% µH					
PM40-1R0K	1.0	50	7.96	100	0.50	450
PM40-1R2K	1.2	50	7.96	80	0.55	430
PM40-1R5K	1.5	50	7.96	70	0.60	410
PM40-1R8K	1.8	50	7.96	60	0.65	390
PM40-2R2K	2.2	50	7.96	55	0.70	380
PM40-2R7K	2.7	50	7.96	50	0.75	370
PM40-3R3K	3.3	50	7.96	45	0.80	355
PM40-3R9K	3.9	50	7.96	40	0.90	330
PM40-4R7K	4.7	50	7.96	35	1.0	315
PM40-5R6K	5.6	50	7.96	33	1.1	300
PM40-6R8K	6.8	50	7.96	27	1.2	285
PM40-8R2K	8.2	50	7.96	25	1.4	270
PM40-100K	10	50	2.52	20	1.6	250
PM40-120K	12	50	2.52	18	2.0	225
PM40-150K	15	50	2.52	17	2.5	200
PM40-180K	18	50	2.52	15	2.8	190
PM40-220K	22	50	2.52	13	3.2	180
PM40-270K	27	50	2.52	12	3.6	170
PM40-330K	33	50	2.52	11	4.0	160
PM40-390K	39	50	2.52	10	4.5	150
PM40-470K	47	50	2.52	10	5.0	140
PM40-560K	56	50	2.52	9.0	5.5	135
PM40-680K	68	50	2.52	9.0	6.0	130
PM40-820K	82	50	2.52	8.0	7.0	120
PM40-101K	100	40	0.796	7.0	8.0	110
PM40-121K	120	40	0.796	6.0	8.0	110
PM40-151K	150	40	0.796	5.0	9.0	105
PM40-181K	180	40	0.796	5.0	9.5	102
PM40-221K	220	40	0.796	4.0	10	100
PM40-271K	270	30	0.796	3.0	18	92
PM40-331K	330	30	0.796	3.0	20	85
PM40-391K	390	30	0.796	3.0	23	80
PM40-471K	470	30	0.796	3.0	26	62
PM40-561K	560	30	0.796	2.0	30	50
PM40-681K	680	30	0.796	2.0	40	50
PM40-821K	820	30	0.796	2.0	45	30
PM40-102K	1000	30	0.796	2.0	50	30

PM40 Packaged 500/reel (Minimum order 1 reel)

PM40 Series Dimensions



Dimensions are in mm

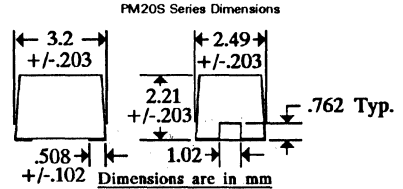
SHIELDED CHIP INDUCTORS AND BEADS

PM20S SERIES

Miller Number	L ± 20% µH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
PM20S-R010M	.010	50	50.0	1000	0.10	810
PM20S-R012M	.012	50	50.0	1000	0.11	750
PM20S-R015M	.015	50	50.0	1000	0.12	720
PM20S-R018M	.018	50	50.0	1000	0.13	690
PM20S-R022M	.022	45	50.0	1000	0.15	640
PM20S-R027M	.027	45	50.0	1000	0.17	610
PM20S-R033M	.033	45	50.0	1000	0.18	585
PM20S-R039M	.039	40	50.0	1000	0.24	530
PM20S-R047M	.047	40	50.0	1000	0.26	495
PM20S-R056M	.056	40	50.0	1000	0.28	485
PM20S-R068M	.068	40	50.0	1000	0.35	475
PM20S-R082M	.082	38	50.0	900	0.45	460
PM20S-R10M	.10	36	50.0	700	0.50	450
PM20S-R12M	.12	40	25.2	500	0.20	630
PM20S-R15M	.15	40	25.2	470	0.20	600
PM20S-R18M	.18	40	25.2	400	0.24	580
PM20S-R22M	.22	40	25.2	330	0.30	565
PM20S-R27M	.27	40	25.2	310	0.33	500
PM20S-R33M	.33	40	25.2	280	0.36	475
PM20S-R39M	.39	40	25.2	230	0.40	465
PM20S-R47M	.47	40	25.2	220	0.44	460
PM20S-R56M	.56	40	25.2	200	0.45	455
PM20S-R68M	.68	40	25.2	180	0.48	450
PM20S-R82M	.82	40	25.2	160	0.50	450
	L ± 10% µH					
PM20S-1R0K	1.0	30	7.96	120	0.60	400
PM20S-1R2K	1.2	30	7.96	110	0.65	390
PM20S-1R5K	1.5	30	7.96	90	0.75	370
PM20S-1R8K	1.8	30	7.96	85	0.85	350
PM20S-2R2K	2.2	30	7.96	65	0.90	320
PM20S-2R7K	2.7	30	7.96	60	1.00	290
PM20S-3R3K	3.3	30	7.96	60	1.10	270
PM20S-3R9K	3.9	30	7.96	58	1.20	250
PM20S-4R7K	4.7	30	7.96	52	1.25	220
PM20S-5R6K	5.6	30	7.96	50	1.40	200
PM20S-6R8K	6.8	30	7.96	40	1.60	205
PM20S-8R2K	8.2	30	7.96	35	1.65	195
PM20S-100K	10	30	2.52	30	2.0	185
PM20S-120K	12	30	2.52	24	2.3	175
PM20S-150K	15	30	2.52	20	2.5	165
PM20S-180K	18	30	2.52	17	2.7	155
PM20S-220K	22	30	2.52	16	3.1	150
PM20S-270K	27	30	2.52	14.5	3.3	125
PM20S-330K	33	30	2.52	14.5	5.1	115
PM20S-390K	39	30	2.52	14	5.9	105
PM20S-470K	47	30	2.52	13	8.0	100
PM20S-560K	56	30	2.52	11.5	10	95
PM20S-680K	68	30	2.52	11	10	90
PM20S-820K	82	30	2.52	11	11	85
PM20S-101K	100	30	.796	8	12	85

PM20S Packaged 2000/reel (Minimum order 1 reel)

PM20S Series Dimensions



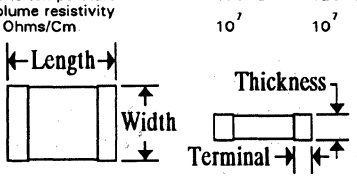
Dimensions are in mm

CHIP BEADS

Miller Number	Z @ 100 MHz Ohms	R,dc Max. Ohms	I,dc Max. mA	Length ± .2 mm	Width ± .2 mm
PMB0805-1	10	.10	600	2.00	1.25
PMB0805-2	15	.10	600	2.00	1.25
PMB1206-1	30	.12	500	3.20	1.60
PMB1206-2	35	.12	500	3.20	1.60
PMB1210-1	65	.15	400	3.20	2.50
PMB1210-2	75	.15	400	3.20	2.50
PMB1806-1	50	.18	300	4.50	1.60
PMB1806-2	60	.18	300	4.50	1.60
PMB1812-1	100	.20	300	4.50	3.20
PMB1812-2	120	.20	300	4.50	3.20

MATERIAL CHARACTERISTICS

Properties	-1 Mat.	-2 Mat.
Initial Permeability	180	400
Saturation flux density @ 10 Oersteds	2950	2500
Curie temperature	170°C	125°C
Volume resistivity in Ohms/Cm	10^7	10^7



J.W.Miller MAGNETICS
For More Information Call: Fax Service 800-723-8588
306 E. Alondra Blvd. • Gardena, CA 90247 • 310-515-1720 • To Send a Fax Dial: 310-515-1962

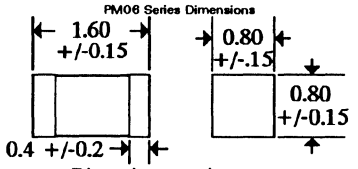
UNSHIELDED CHIP INDUCTORS

PM06 SERIES

Miller Number	L ± 0.3 nH	Typ. Q @ 800 MHz	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
PM06-1N5	1.5	50	100	6000	0.07	500
PM06-1N8	1.8	48	100	6000	0.08	500
PM06-2N2	2.2	38	100	6000	0.09	500
PM06-2N7	2.7	40	100	6000	0.10	500
PM06-3N3	3.3	42	100	5500	0.12	500
	L ± 5% nH					
PM06-3N9J	3.9	42	100	5500	0.15	450
PM06-4N7J	4.7	45	100	4800	0.17	450
PM06-5N6J	5.6	38	100	4600	0.18	430
PM06-6N8J	6.8	50	100	3650	0.20	430
PM06-8N2J	8.2	38	100	3500	0.28	400
PM06-10NJ	10	45	100	2800	0.32	400
PM06-12NJ	12	42	100	2800	0.35	400
PM06-15NJ	15	40	100	2500	0.41	350
PM06-18NJ	18	38	100	2300	0.45	350
PM06-22NJ	22	45	100	2000	0.50	300
PM06-27NJ	27	45	100	2000	0.55	300
PM06-33NJ	33	40	100	1800	0.60	300
PM06-39NJ	39	40	100	1800	0.80	300
PM06-47NJ	47	45	100	1800	0.95	250
PM06-56NJ	56	38	100	1800	1.20	250
PM06-68NJ	68	36	100	1500	1.30	250
PM06-82NJ	82	35	100	1500	1.50	250
PM06-R10J	100	30	100	1300	1.80	200

PM06 Packaged 3000/reel [Minimum order 1 reel]

PM06 Series Dimensions



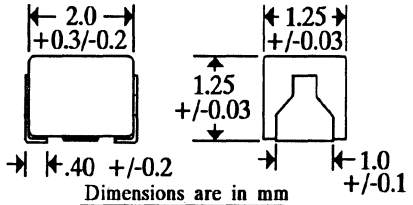
Dimensions are in mm

PM08 SERIES

Miller Number	L ± 20% nH	Test Freq. MHz	Typ. Q*	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
PM08-3N9M	3.9	100	58	6000	.08	540
PM08-4N7M	4.7	100	60	6000	.08	540
PM08-5N6M	5.6	100	60	5500	.10	540
	L ± 10% nH					
PM08-6N8K	6.8	100	60	5500	.12	540
PM08-8N2K	8.2	100	65	4700	.13	540
PM08-10NK	10	100	65	3300	.14	540
PM08-12NK	12	100	65	3300	.18	535
PM08-15NK	15	100	70	3000	.18	520
PM08-18NK	18	100	75	3000	.22	480
PM08-22NK	22	100	75	2600	.22	465
PM08-27NK	27	100	75	2500	.26	455
	L ± 5% µH					
PM08-33NJ	.033	100	80	2050	.30	395
PM08-39NJ	.039	100	70	2000	.31	390
PM08-47NJ	.047	100	70	1650	.35	385
PM08-56NJ	.056	100	60	1550	.39	360
PM08-68NJ	.068	100	28	1450	.44	340
PM08-82NJ	.082	100	28	1100	.48	330
PM08-R10J	.10	25.2	25	800	.66	285
PM08-R12J	.12	25.2	24	600	.76	275
PM08-R15J	.15	25.2	25	600	1.13	230
PM08-R18J	.18	25.2	25	600	1.24	195
PM08-R22J	.22	25.2	25	500	1.41	170
PM08-R27J	.27	25.2	25	300	1.50	165
PM08-R33J	.33	25.2	20	200	1.66	160
PM08-R39J	.39	25.2	20	150	1.82	150
PM08-R47J	.47	25.2	18	150	1.97	145
PM08-R56J	.56	25.2	15	100	2.07	140
PM08-R68J	.68	25.2	10	100	2.32	130
PM08-R82J	.82	25.2	10	80	2.60	125
PM08-1R0J	1.0	25.2	8	80	2.95	120

PM08 Packaged 3000/reel [Minimum order 1 reel]
* 3.9 nH-.056 µH @ 800 MHz, .068 µH-.56 µH @ 100 MHz, .68 µH-1.0 µH 25.2 MHz

PM08 Series Dimensions



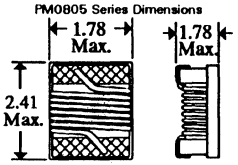
Dimensions are in mm

PM0805 SERIES

Miller Number	L ± 20% nH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
PM0805-2N2M	2.2	15	250	6000	0.05	600
PM0805-3N3M	3.3	15	250	6000	0.08	600
PM0805-6N8M	6.8	15	250	5500	0.10	600
PM0805-8N2M	8.2	15	250	5000	0.10	600
PM0805-12NM	12	30	250	4500	0.10	600
PM0805-15NM	15	30	250	4100	0.10	600
PM0805-18NM	18	30	250	3500	0.13	600
PM0805-22NM	22	40	250	3200	0.13	500
PM0805-27NM	27	40	250	2700	0.13	500
PM0805-33NM	33	40	250	2700	0.16	500
PM0805-39NM	39	40	250	2100	0.20	500
PM0805-47NM	47	40	200	2000	0.22	500
	L ± 10% µH					
PM0805-56NK	.056	40	200	1900	0.25	500
PM0805-68NK	.068	40	150	1700	0.28	500
PM0805-82NK	.082	40	150	1600	0.31	400
PM0805-R10K	.10	40	150	1500	0.35	400
PM0805-R12K	.12	40	150	1300	0.37	400
PM0805-R15K	.15	40	100	1200	0.40	400
PM0805-R18K	.18	40	100	1100	0.45	400
PM0805-R22K	.22	40	100	1000	0.80	400
PM0805-R27K	.27	40	100	950	1.0	285
PM0805-R33K	.33	40	100	890	1.2	260
PM0805-R39K	.39	40	100	830	1.5	200
PM0805-R47K	.47	40	100	750	2.5	170
PM0805-R56K	.56	40	100	700	3.5	170
PM0805-R68K	.68	30	50	650	4.0	170

PM0805 Packaged 3000/reel [Minimum order 1 reel]

PM0805 Series Dimensions



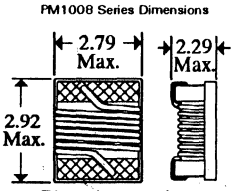
Dimensions are in mm

PM1008 SERIES

Miller Number	L ± 20% nH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
PM1008-10NM	10	30	100	1000	0.05	1850
PM1008-22NM	22	40	100	1000	0.06	1450
PM1008-33NM	33	50	100	1000	0.06	1450
PM1008-39NM	39	50	100	1000	0.075	1300
PM1008-47NM	47	50	100	1000	0.079	1300
	L ± 10% µH					
PM1008-56NK	.056	50	100	1000	0.09	1260
PM1008-68NK	.068	50	100	1000	0.09	1260
PM1008-82NK	.082	50	100	1000	0.15	820
PM1008-R10K	.10	50	100	1000	0.15	820
PM1008-R12K	.12	40	100	1000	0.15	820
PM1008-R15K	.15	40	100	825	0.18	820
PM1008-R18K	.18	40	50	770	0.20	770
PM1008-R22K	.22	40	50	690	0.26	660
PM1008-R27K	.27	40	50	650	0.30	610
PM1008-R33K	.33	40	50	570	0.45	500
PM1008-R39K	.39	35	50	520	0.70	360
PM1008-R47K	.47	35	50	490	0.78	310
PM1008-R56K	.56	35	35	440	1.20	260
PM1008-R68K	.68	35	35	390	2.10	200
PM1008-R82K	.82	35	35	360	2.30	170
PM1008-1R0K	1.0	35	35	330	2.70	170
PM1008-1R2K	1.2	35	35	310	3.00	170
PM1008-1R5K	1.5	25	7.9	240	0.68	370
PM1008-1R8K	1.8	25	7.9	230	0.78	350
PM1008-2R2K	2.2	25	7.9	200	1.15	280
PM1008-2R7K	2.7	25	7.9	180	1.34	280
PM1008-3R3K	3.3	25	7.9	170	1.50	250
PM1008-3R9K	3.9	25	7.9	150	2.40	200
PM1008-4R7K	4.7	25	7.9	140	2.60	180
PM1008-5R6K	5.6	25	7.9	130	2.90	180
PM1008-6R8K	6.8	25	7.9	120	3.70	180
PM1008-8R2K	8.2	25	7.9	110	5.50	130
PM1008-100K	10	25	7.9	95	8.00	130

PM1008 Packaged 2000/reel [Minimum order 1 reel]

PM1008 Series Dimensions



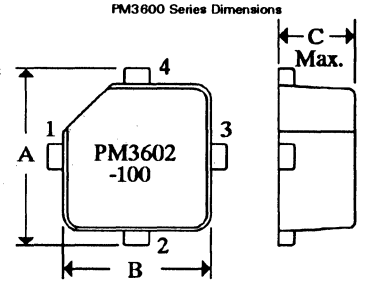
Dimensions are in mm

PM3600 SERIES

Miller Number	Parallel* L ± 20% µH	Rated Idc Amps	Max DCR Ohms	Series* L ± 20% µH	Rated Idc Amps	Max DCR Ohms
PM3602-5	5	2.41	0.023	20	1.20	0.092
PM3602-8	8	1.90	0.037	32	0.95	0.15
PM3602-10	10	1.83	0.04	40	0.92	0.16
PM3602-15	15	1.45	0.063	60	0.73	0.25
PM3602-20	20	1.25	0.086	80	0.63	0.34
PM3602-25	25	1.17	0.098	100	0.59	0.39
PM3602-33	33	0.98	0.14	132	0.49	0.56
PM3602-50	50	0.78	0.22	200	0.38	0.88
PM3602-68	68	0.72	0.26	272	0.36	1.04
PM3602-100	100	0.58	0.40	400	0.29	1.60
PM3602-150	150	0.47	0.60	600	0.24	2.40
PM3602-200	200	0.40	0.84	800	0.20	3.36
PM3602-250	250	0.33	1.19	1000	0.17	4.76
PM3602-300	300	0.32	1.31	1200	0.16	5.24
PM3604-5	5	3.3	0.019	20	1.65	0.076
PM3604-8	8	3.0	0.024	32	1.50	0.096
PM3604-10	10	2.7	0.028	40	1.35	0.11
PM3604-15	15	2.2	0.041	60	1.10	0.16
PM3604-20	20	2.02	0.049	80	1.01	0.20
PM3604-25	25	1.91	0.054	100	0.96	0.22
PM3604-33	33	1.6	0.078	132	0.80	0.31
PM3604-50	50	1.28	0.12	200	0.64	0.48
PM3604-68	68	1.19	0.14	272	0.60	0.56
PM3604-100	100	0.98	0.21	400	0.49	0.84
PM3604-150	150	0.78	0.32	600	0.39	1.28
PM3604-200	200	0.65	0.47	800	0.33	1.88
PM3604-250	250	0.60	0.53	1000	0.30	2.12
PM3604-300	300	0.52	0.73	1200	0.26	2.92

*Series or parallel connections are made at the circuit level (not an internal connection of the device)

PM3600 Series Dimensions



Part #	A	B	C
PM3602	.485	.370	.235
PM3604	.565	.465	.250

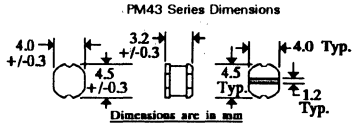
SMT POWER INDUCTORS

PM43 SERIES

Miller Number	L ± 20% µH	Test Freq.	Fo Typ. MHz	R,dc Max. Ohms	I,dc Max. Amps
PM43-1R0M	1.0	7.9 MHz	113.8	0.049	2.56
PM43-1R4M	1.4	7.9 MHz	101.0	0.057	2.52
PM43-1R8M	1.8	7.9 MHz	92.0	0.064	1.95
PM43-2R2M	2.2	7.9 MHz	76.3	0.072	1.75
PM43-2R7M	2.7	7.9 MHz	66.6	0.079	1.58
PM43-3R3M	3.3	7.9 MHz	63.8	0.087	1.44
PM43-3R9M	3.9	7.9 MHz	53.8	0.094	1.33
PM43-4R7M	4.7	7.9 MHz	49.5	0.109	1.15
PM43-5R6M	5.6	7.9 MHz	43.2	0.126	0.99
PM43-6R8M	6.8	7.9 MHz	41.4	0.132	0.95
PM43-8R2M	8.2	7.9 MHz	35.8	0.147	0.84
PM43-100M	10	2.5 MHz	35.8	0.182	1.04
PM43-120M	12	2.5 MHz	32.4	0.210	0.97
PM43-150M	15	2.5 MHz	29.3	0.235	0.85
PM43-180M	18	2.5 MHz	27.5	0.338	0.74
PM43-220M	22	2.5 MHz	24.7	0.378	0.68
PM43-270M	27	2.5 MHz	21.7	0.522	0.62
	L ± 10% µH				
PM43-330K	33	2.5 MHz	19.6	0.540	0.56
PM43-390K	39	2.5 MHz	18.0	0.587	0.52
PM43-470K	47	2.5 MHz	15.6	0.844	0.44
PM43-560K	56	2.5 MHz	14.8	0.937	0.42
PM43-680K	68	2.5 MHz	13.2	1.117	0.37

PM43 Packaged 1500/reel [Minimum order 1 reel]

PM43 Series Dimensions



Dimensions are in mm

J.W.Miller MAGNETICS
For More Information Call: Fax Service 800-723-8588
306 E. Alondra Blvd. • Gardena, CA 90247 • 310-515-1720 • To Send a Fax Dial: 310-515-1962

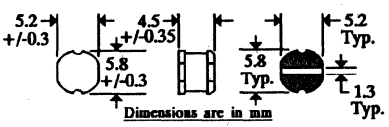
SMT POWER INDUCTORS
(continued)

PM54 SERIES

Miller Number	L ± 20% µH	Test Freq.	Fo Typ. MHz	R,dc Max. Ohms	I,dc Max. Amps
PM54-100M	10	2.5 MHz	30.6	0.10	1.44
PM54-120M	12	2.5 MHz	27.7	0.12	1.40
PM54-150M	15	2.5 MHz	25.9	0.14	1.30
PM54-180M	18	2.5 MHz	23.3	0.15	1.23
PM54-220M	22	2.5 MHz	19.5	0.18	1.11
PM54-270M	27	2.5 MHz	17.5	0.20	0.97
	L ± 15% µH				
PM54-330L	33	2.5 MHz	16.3	0.23	0.88
PM54-390L	39	2.5 MHz	15.8	0.32	0.80
PM54-470L	47	2.5 MHz	13.6	0.37	0.72
	L ± 10% µH				
PM54-560K	56	2.5 MHz	12.1	0.42	0.68
PM54-680K	68	2.5 MHz	11.7	0.46	0.61
PM54-820K	82	2.5 MHz	10.2	0.60	0.58
PM54-101K	100	1 kHz	9.24	0.70	0.52
PM54-121K	120	1 kHz	8.61	0.93	0.48
PM54-151K	150	1 kHz	8.28	1.10	0.40
PM54-181K	180	1 kHz	6.42	1.38	0.38
PM54-221K	220	1 kHz	5.73	1.57	0.35

PM54 Packaged 1500/reel [Minimum order 1 reel]

PM54 Series Dimensions

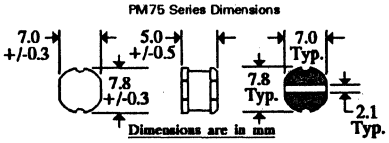


PM75 SERIES

Miller Number	L ± 20% µH	Test Freq.	Fo Typ. MHz	R,dc Max. Ohms	I,dc Max. Amps
PM75-100K	10	2.5 MHz	28.0	0.07	2.30
PM75-120K	12	2.5 MHz	23.0	0.08	2.00
PM75-150K	15	2.5 MHz	22.0	0.09	1.80
PM75-180K	18	2.5 MHz	20.0	0.10	1.60
PM75-220K	22	2.5 MHz	17.0	0.11	1.50
PM75-270K	27	2.5 MHz	15.0	0.12	1.30
PM75-330K	33	2.5 MHz	15.0	0.13	1.20
PM75-390K	39	2.5 MHz	14.0	0.16	1.10
PM75-470K	47	2.5 MHz	13.0	0.18	1.10
PM75-560K	56	2.5 MHz	11.0	0.24	0.94
PM75-680K	68	2.5 MHz	11.0	0.28	0.85
PM75-820K	82	2.5 MHz	10.0	0.37	0.78
PM75-101K	100	1 kHz	9.2	0.43	0.72
PM75-121K	120	1 kHz	7.7	0.47	0.66
PM75-151K	150	1 kHz	6.1	0.64	0.58
PM75-181K	180	1 kHz	5.8	0.71	0.51
PM75-221K	220	1 kHz	5.2	0.96	0.49
PM75-271K	270	1 kHz	4.8	1.11	0.42
PM75-331K	330	1 kHz	4.3	1.26	0.40
PM75-391K	390	1 kHz	4.3	1.77	0.36
PM75-471K	470	1 kHz	3.8	1.96	0.34

PM75 Packaged 500/reel [Minimum order 1 reel]

PM75 Series Dimensions

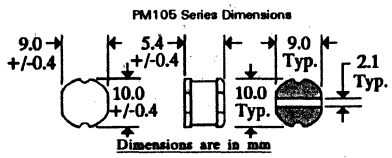


PM105 SERIES

Miller Number	L ± 20% µH	Test Freq.	Fo Typ. MHz	R,dc Max. Ohms	I,dc Max. Amps
PM105-100M	10	2.5 MHz	25.1	0.06	2.60
PM105-120M	12	2.5 MHz	23.1	0.07	2.45
PM105-150M	15	2.5 MHz	19.1	0.08	2.27
PM105-180M	18	2.5 MHz	18.1	0.09	2.15
PM105-220M	22	2.5 MHz	15.9	0.10	1.95
PM105-270M	27	2.5 MHz	14.0	0.11	1.76
PM105-330M	33	2.5 MHz	13.1	0.12	1.50
PM105-390M	39	2.5 MHz	12.2	0.14	1.37
	L ± 10% µH				
PM105-470K	47	2.5 MHz	10.6	0.17	1.28
PM105-560K	56	2.5 MHz	10.2	0.19	1.17
PM105-680K	68	2.5 MHz	9.26	0.22	1.11
PM105-820K	82	2.5 MHz	8.45	0.25	1.00
PM105-101K	100	1 kHz	7.64	0.35	0.97
PM105-121K	120	1 kHz	6.65	0.40	0.89
PM105-151K	150	1 kHz	5.86	0.47	0.78
PM105-181K	180	1 kHz	5.71	0.63	0.72
PM105-221K	220	1 kHz	5.25	0.73	0.66
PM105-271K	270	1 kHz	4.62	0.97	0.57
PM105-331K	330	1 kHz	4.07	1.15	0.52
PM105-391K	390	1 kHz	3.91	1.30	0.48
PM105-471K	470	1 kHz	3.61	1.48	0.42
PM105-561K	560	1 kHz	3.25	1.90	0.33
PM105-681K	680	1 kHz	2.96	2.25	0.28
PM105-821K	820	1 kHz	2.74	2.55	0.24

PM105 Packaged 500/reel [Minimum order 1 reel]

PM105 Series Dimensions



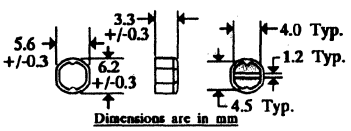
SHIELDED SMT POWER INDUCTORS

PM63S SERIES

Miller Number	L ± 20% µH	Test Freq.	Fo Typ. MHz	R,dc Max. Ohms	I,dc Max. Amps
PM63S-100M	10	2.5 MHz	37.7	0.13	0.80
PM63S-120M	12	2.5 MHz	31.7	0.14	0.74
PM63S-150M	15	2.5 MHz	28.9	0.15	0.70
PM63S-180M	18	2.5 MHz	26.7	0.18	0.64
PM63S-220M	22	2.5 MHz	23.7	0.25	0.62
PM63S-270M	27	2.5 MHz	18.9	0.34	0.57
	L ± 15% µH				
PM63S-330L	33	2.5 MHz	17.0	0.37	0.52
PM63S-390L	39	2.5 MHz	16.6	0.39	0.45
PM63S-470L	47	2.5 MHz	16.2	0.43	0.40
PM63S-560L	56	2.5 MHz	13.8	0.50	0.37
PM63S-680L	68	2.5 MHz	13.1	0.53	0.35
PM63S-820L	82	2.5 MHz	11.8	0.75	0.32
	L ± 10% µH				
PM63S-101K	100	1 kHz	11.1	0.85	0.30

PM63S Packaged 1000/reel [Minimum order 1 reel]

PM63S Series Dimensions

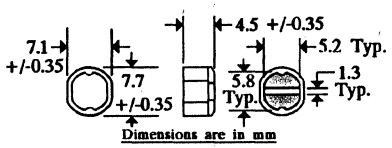


PM74S SERIES

Miller Number	L +25%/-15% µH	Test Freq.	Fo Typ. MHz	R,dc Max. Ohms	I,dc Max. Amps
PM74S-100N	10	2.5 MHz	29.8	0.07	1.64
PM74S-120N	12	2.5 MHz	26.4	0.08	1.50
PM74S-150N	15	2.5 MHz	21.1	0.09	1.34
PM74S-180N	18	2.5 MHz	20.0	0.11	1.22
PM74S-220N	22	2.5 MHz	19.5	0.12	1.10
PM74S-270N	27	2.5 MHz	16.5	0.17	1.00
PM74S-330N	33	2.5 MHz	15.5	0.19	0.90
PM74S-390N	39	2.5 MHz	14.4	0.21	0.83
PM74S-470N	47	2.5 MHz	12.8	0.24	0.75
PM74S-560N	56	2.5 MHz	11.6	0.32	0.69
PM74S-680N	68	2.5 MHz	10.2	0.37	0.63
PM74S-820N	82	2.5 MHz	9.95	0.40	0.57
	L +20/-15% µH				
PM74S-101M	100	1 kHz	8.59	0.54	0.52
PM74S-121M	120	1 kHz	7.53	0.62	0.47
PM74S-151M	150	1 kHz	7.00	0.86	0.42
PM74S-181M	180	1 kHz	6.53	0.97	0.38
PM74S-221M	220	1 kHz	5.07	1.31	0.35
PM74S-271M	270	1 kHz	4.67	1.46	0.31

PM74S Packaged 1000/reel [Minimum order 1 reel]

PM74S Series Dimensions

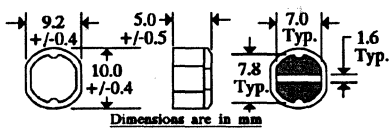


PM105S SERIES

Miller Number	L ± 20% µH	Test Freq.	Fo Typ. MHz	R,dc Max. Ohms	I,dc Max. Amps
PM105S-100M	10	2.5 MHz	31.0	0.06	2.53
PM105S-120M	12	2.5 MHz	27.0	0.06	2.31
PM105S-150M	15	2.5 MHz	27.0	0.07	2.06
PM105S-180M	18	2.5 MHz	26.0	0.08	1.89
PM105S-220M	22	2.5 MHz	21.0	0.09	1.71
PM105S-270M	27	2.5 MHz	18.0	0.11	1.54
PM105S-330M	33	2.5 MHz	16.0	0.12	1.39
PM105S-390M	39	2.5 MHz	15.0	0.16	1.28
PM105S-470M	47	2.5 MHz	14.0	0.18	1.17
PM105S-560M	56	2.5 MHz	12.0	0.19	1.07
PM105S-680M	68	2.5 MHz	11.0	0.22	0.97
PM105S-820M	82	2.5 MHz	10.0	0.28	0.88
PM105S-101M	100	1 kHz	7.0	0.35	0.80
PM105S-121M	120	1 kHz	6.5	0.38	0.73
PM105S-151M	150	1 kHz	5.8	0.45	0.65
PM105S-181M	180	1 kHz	5.3	0.62	0.60
PM105S-221M	220	1 kHz	5.2	0.69	0.54
PM105S-271M	270	1 kHz	4.6	0.78	0.49
PM105S-331M	330	1 kHz	4.2	1.03	0.44
PM105S-391M	390	1 kHz	3.6	1.18	0.41
PM105S-471M	470	1 kHz	3.6	1.60	0.37

PM105S Packaged 500/reel [Minimum order 1 reel]

PM105S Series Dimensions

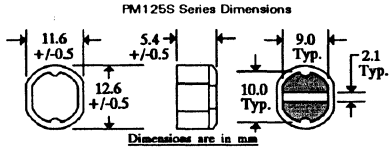


PM125S SERIES

Miller Number	L ± 20% µH	Test Freq.	Fo Typ. MHz	R,dc Max. Ohms	I,dc Max. Amps*
PM125S-100M	10	2.5 MHz	24.2	0.05	2.65
PM125S-120M	12	2.5 MHz	21.2	0.05	2.50
PM125S-150M	15	2.5 MHz	18.9	0.06	2.45
PM125S-180M	18	2.5 MHz	16.1	0.06	2.40
	L +20/-15% µH				
PM125S-220M	22	2.5 MHz	15.2	0.07	2.20
PM125S-270M	27	2.5 MHz	13.9	0.08	2.00
PM125S-330M	33	2.5 MHz	12.8	0.10	1.80
PM125S-390M	39	2.5 MHz	11.6	0.11	1.65
PM125S-470M	47	2.5 MHz	10.4	0.12	1.50
PM125S-560M	56	2.5 MHz	9.12	0.15	1.38
PM125S-680M	68	2.5 MHz	8.50	0.17	1.26
PM125S-820M	82	2.5 MHz	7.85	0.20	1.14
PM125S-101M	100	1 kHz	6.92	0.25	1.05
PM125S-121M	120	1 kHz	6.34	0.28	0.95
PM125S-151M	150	1 kHz	5.55	0.40	0.85
PM125S-181M	180	1 kHz	5.10	0.48	0.77
PM125S-221M	220	1 kHz	4.51	0.52	0.70
PM125S-271M	270	1 kHz	4.37	0.70	0.63
PM125S-331M	330	1 kHz	3.90	0.80	0.57
PM125S-391M	390	1 kHz	3.55	1.08	0.52
PM125S-471M	470	1 kHz	3.25	1.20	0.48
PM125S-561M	560	1 kHz	2.94	1.34	0.44
PM125S-681M	680	1 kHz	2.64	1.78	0.40
PM125S-821M	820	1 kHz	2.42	2.00	0.36

PM125S Packaged 500/reel [Minimum order 1 reel]

PM125S Series Dimensions

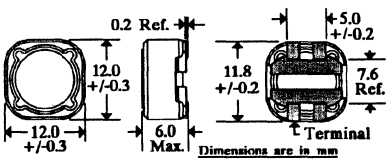


PM125SH SERIES

Miller Number	L ± 20% µH	Test Freq.	R,dc Max. Ohms	I,dc Max. Amps
PM125SH-100M	10	1 kHz	.025	4.0
PM125SH-120M	12	1 kHz	.027	3.5
PM125SH-150M	15	1 kHz	.030	3.3
PM125SH-180M	18	1 kHz	.034	3.0
PM125SH-220M	22	1 kHz	.036	2.8
PM125SH-270M	27	1 kHz	.051	2.3
PM125SH-330M	33	1 kHz	.057	2.1
PM125SH-390M	39	1 kHz	.068	2.0
PM125SH-470M	47	1 kHz	.075	1.8
PM125SH-560M	56	1 kHz	.11	1.7
PM125SH-680M	68	1 kHz	.12	1.5
PM125SH-820M	82	1 kHz	.14	1.4
PM125SH-101M	100	1 kHz	.16	1.3
PM125SH-121M	120	1 kHz	.17	1.1
PM125SH-151M	150	1 kHz	.23	1.0
PM125SH-181M	180	1 kHz	.29	0.90
PM125SH-221M	220	1 kHz	.40	0.80
PM125SH-271M	270	1 kHz	.46	0.75
PM125SH-331M	330	1 kHz	.51	0.68
PM125SH-391M	390	1 kHz	.69	0.65
PM125SH-471M	470	1 kHz	.77	0.58
PM125SH-561M	560	1 kHz	.86	0.54
PM125SH-681M	680	1 kHz	1.20	0.48
PM125SH-821M	820	1 kHz	1.34	0.43
PM125SH-102M	1000	1 kHz	1.53	0.40

PM125SH Packaged 500/reel [Minimum order 1 reel]

PM125SH Series Dimensions



J.W.Miller MAGNETICS
For More Information Call: Fax Service 800-723-8588
306 E. Alondra Blvd. • Gardena, CA 90247 • 310-515-1720 • To Send a Fax Dial: 310-515-1962

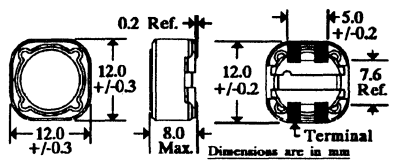
SHIELDED SMT POWER INDUCTORS *(continued)*

PM127SH SERIES

Miller Number	L +40/-20% µH	Test Freq.	R,dc Max. Ohms	I,dc Max. Amps
PM127SH-1R2N	1.2	100 kHz	.007	9.8
PM127SH-2R4N	2.4	100 kHz	.012	8.0
PM127SH-3R5N	3.5	100 kHz	.014	7.5
PM127SH-4R7N	4.7	100 kHz	.016	6.8
PM127SH-6R1N	6.1	100 kHz	.018	6.6
PM127SH-7R6N	7.6	100 kHz	.020	5.9
	L ± 20% µH			
PM127SH-100M	10	1 kHz	.022	5.4
PM127SH-120M	12	1 kHz	.024	4.9
PM127SH-150M	15	1 kHz	.027	4.5
PM127SH-180M	18	1 kHz	.039	3.9
PM127SH-220M	22	1 kHz	.043	3.6
PM127SH-270M	27	1 kHz	.046	3.4
PM127SH-330M	33	1 kHz	.065	3.0
PM127SH-390M	39	1 kHz	.073	2.75
PM127SH-470M	47	1 kHz	.10	2.5

PM127SH Packaged 500/reel (Minimum order 1 reel)

PM127SH Series Dimensions



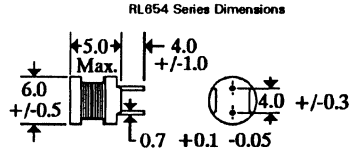
Dimensions are in mm

RADIAL LEAD R F CHOKES

RL654 SERIES

Miller Number	L µH ± 10%	Test Freq.	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
RL654-220K	22	2.52 MHz	24	.18	900
RL654-270K	27	2.52 MHz	23	.21	810
RL654-330K	33	2.52 MHz	19	.27	740
RL654-390K	39	2.52 MHz	18	.29	680
RL654-470K	47	2.52 MHz	16	.34	620
RL654-560K	56	2.52 MHz	15	.42	570
RL654-680K	68	2.52 MHz	14	.48	510
RL654-820K	82	2.52 MHz	12	.55	470
RL654-101K	100	1 kHz	11	.68	420
RL654-121K	120	1 kHz	10	.77	390
RL654-151K	150	1 kHz	9.2	.95	350
RL654-181K	180	1 kHz	7.4	1.15	320
RL654-221K	220	1 kHz	6.8	1.30	290
RL654-271K	270	1 kHz	6.3	1.55	260
RL654-331K	330	1 kHz	5.9	2.18	230
RL654-391K	390	1 kHz	5.4	2.47	210
RL654-471K	470	1 kHz	5.0	2.92	200
RL654-561K	560	1 kHz	4.4	3.97	180
RL654-681K	680	1 kHz	4.0	4.57	160
RL654-821K	820	1 kHz	3.7	5.28	150
RL654-102K	1,000	1 kHz	3.3	7.06	130

RL654 Series Dimensions

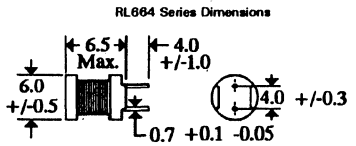


Dimensions are in mm

RL664 SERIES

Miller Number	L µH ± 10%	Test Freq.	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
RL664-220K	22	2.52 MHz	18	.11	1270
RL664-270K	27	2.52 MHz	16	.14	1140
RL664-330K	33	2.52 MHz	15	.17	1030
RL664-390K	39	2.52 MHz	13	.19	950
RL664-470K	47	2.52 MHz	12	.23	870
RL664-560K	56	2.52 MHz	11	.26	800
RL664-680K	68	2.52 MHz	10	.28	720
RL664-820K	82	2.52 MHz	9.3	.39	660
RL664-101K	100	1 kHz	8.4	.43	590
RL664-121K	120	1 kHz	7.0	.54	540
RL664-151K	150	1 kHz	6.2	.64	480
RL664-181K	180	1 kHz	5.7	.74	440
RL664-221K	220	1 kHz	5.4	.96	400
RL664-271K	270	1 kHz	5.1	1.12	360
RL664-331K	330	1 kHz	4.3	1.48	330
RL664-391K	390	1 kHz	4.1	1.66	300
RL664-471K	470	1 kHz	3.8	1.91	270
RL664-561K	560	1 kHz	3.0	2.31	250
RL664-681K	680	1 kHz	2.8	2.67	230
RL664-821K	820	1 kHz	2.6	3.10	210
RL664-102K	1,000	1 kHz	2.5	4.45	190

RL664 Series Dimensions

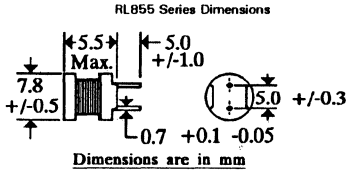


Dimensions are in mm

RL855 SERIES

Miller Number	L µH ± 20%	Test Freq.	R,dc Max. Ohms	I,dc Max. mA
RL855-100M	10	2.52 MHz	.07	2500
RL855-120M	12	2.52 MHz	.08	2400
RL855-150M	15	2.52 MHz	.09	2100
RL855-180M	18	2.52 MHz	.10	2000
	L µH ± 10%			
RL855-220K	22	2.52 MHz	.12	1700
RL855-270K	27	2.52 MHz	.14	1600
RL855-330K	33	2.52 MHz	.17	1400
RL855-390K	39	2.52 MHz	.21	1300
RL855-470K	47	2.52 MHz	.24	1200
RL855-560K	56	2.52 MHz	.31	1100
RL855-680K	68	2.52 MHz	.34	1000
RL855-820K	82	2.52 MHz	.40	930
RL855-101K	100	1 kHz	.52	810
RL855-121K	120	1 kHz	.59	760
RL855-151K	150	1 kHz	.71	670
RL855-181K	180	1 kHz	.89	620
RL855-221K	220	1 kHz	1.04	540
RL855-271K	270	1 kHz	1.28	490
RL855-331K	330	1 kHz	1.47	440
RL855-391K	390	1 kHz	1.67	410
RL855-471K	470	1 kHz	1.95	380
RL855-561K	560	1 kHz	2.83	350
RL855-681K	680	1 kHz	3.25	320
RL855-821K	820	1 kHz	3.82	310
RL855-102K	1,000	1 kHz	5.28	250
RL855-122K	1,200	1 kHz	6.03	230
RL855-152K	1,500	1 kHz	7.15	210
RL855-182K	1,800	1 kHz	8.26	200
RL855-222K	2,200	1 kHz	11.1	180
RL855-272K	2,700	1 kHz	13.1	160
RL855-332K	3,300	1 kHz	15.9	140
RL855-392K	3,900	1 kHz	18.0	130
RL855-472K	4,700	1 kHz	23.9	120
RL855-562K	5,600	1 kHz	26.8	110
RL855-682K	6,800	1 kHz	31.7	98
RL855-822K	8,200	1 kHz	46.5	88
RL855-103K	10,000	1 kHz	55.7	81

RL855 Series Dimensions



Dimensions are in mm

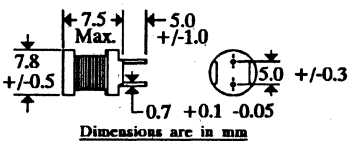
RL875 SERIES

Miller Number	L µH ± 20%	Test Freq.	R,dc Max. Ohms	I,dc Max. mA
RL875-100M	10	2.52 MHz	.05	2900
RL875-120M	12	2.52 MHz	.06	2500
	L µH ± 10%			
RL875-150K	15	2.52 MHz	.07	2200
RL875-180K	18	2.52 MHz	.08	1900
RL875-220K	22	2.52 MHz	.09	1800
RL875-270K	27	2.52 MHz	.11	1700
RL875-330K	33	2.52 MHz	.13	1500
RL875-390K	39	2.52 MHz	.14	1300
RL875-470K	47	2.52 MHz	.15	1300
RL875-560K	56	2.52 MHz	.18	1200
RL875-680K	68	2.52 MHz	.20	1100
RL875-820K	82	2.52 MHz	.24	1000
RL875-101K	100	1 kHz	.28	890
RL875-121K	120	1 kHz	.36	810
RL875-151K	150	1 kHz	.42	720
RL875-181K	180	1 kHz	.57	660
RL875-221K	220	1 kHz	.63	570
RL875-271K	270	1 kHz	.88	510
RL875-331K	330	1 kHz	1.05	460
RL875-391K	390	1 kHz	1.17	440
RL875-471K	470	1 kHz	1.34	410
RL875-561K	560	1 kHz	1.72	360
RL875-681K	680	1 kHz	1.96	330
RL875-821K	820	1 kHz	2.56	300
RL875-102K	1,000	1 kHz	2.94	270
RL875-122K	1,200	1 kHz	4.04	240
RL875-152K	1,500	1 kHz	4.70	220
RL875-182K	1,800	1 kHz	5.05	200
RL875-222K	2,200	1 kHz	6.25	180
RL875-272K	2,700	1 kHz	8.72	160
RL875-332K	3,300	1 kHz	10.6	150
RL875-392K	3,900	1 kHz	14.2	140
RL875-472K	4,700	1 kHz	16.7	120
RL875-562K	5,600	1 kHz	18.7	110

RL875 SERIES *(continued)*

Miller Number	L µH ± 20%	Test Freq.	R,dc Max. Ohms	I,dc Max. mA
RL875-682K	6,800	1 kHz	21.8	100
RL875-822K	8,200	1 kHz	28.7	93
RL875-103K	10,000	1 kHz	33.0	84

RL875 Series Dimensions

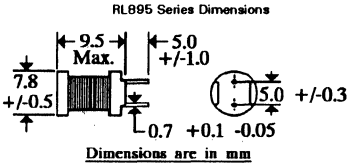


Dimensions are in mm

RL895 SERIES

Miller Number	L µH ± 20%	Test Freq.	R,dc Max. Ohms	I,dc Max. mA
RL895-100M	10	2.52 MHz	.04	2800
RL895-120M	12	2.52 MHz	.04	2600
	L µH ± 10%			
RL895-150K	15	2.52 MHz	.05	2100
RL895-180K	18	2.52 MHz	.05	2000
RL895-220K	22	2.52 MHz	.06	1700
RL895-270K	27	2.52 MHz	.06	1600
RL895-330K	33	2.52 MHz	.07	1400
RL895-390K	39	2.52 MHz	.08	1400
RL895-470K	47	2.52 MHz	.10	1300
RL895-560K	56	2.52 MHz	.11	1200
RL895-680K	68	2.52 MHz	.14	1100
RL895-820K	82	2.52 MHz	.16	1000
RL895-101K	100	1 kHz	.19	900
RL895-121K	120	1 kHz	.22	820
RL895-151K	150	1 kHz	.27	740
RL895-181K	180	1 kHz	.31	710
RL895-221K	220	1 kHz	.38	640
RL895-271K	270	1 kHz	.53	570
RL895-331K	330	1 kHz	.61	510
RL895-391K	390	1 kHz	.69	480
RL895-471K	470	1 kHz	.89	430
RL895-561K	560	1 kHz	1.01	400
RL895-681K	680	1 kHz	1.18	350
RL895-821K	820	1 kHz	1.57	320
RL895-102K	1,000	1 kHz	1.84	300
RL895-122K	1,200	1 kHz	2.10	270
RL895-152K	1,500	1 kHz	2.80	230
RL895-182K	1,800	1 kHz	3.21	210
RL895-222K	2,200	1 kHz	4.21	190
RL895-272K	2,700	1 kHz	4.94	170
RL895-332K	3,300	1 kHz	6.16	150
RL895-392K	3,900	1 kHz	6.84	140
RL895-472K	4,700	1 kHz	7.89	130
RL895-562K	5,600	1 kHz	11.5	120
RL895-682K	6,800	1 kHz	13.2	110
RL895-822K	8,200	1 kHz	15.3	100
RL895-103K	10,000	1 kHz	22.0	89
RL895-123K	12,000	1 kHz	25.0	73
RL895-153K	15,000	1 kHz	29.1	68
RL895-183K	18,000	1 kHz	38.9	66
RL895-223K	22,000	1 kHz	44.9	59
RL895-273K	27,000	1 kHz	55.2	52
RL895-333K	33,000	1 kHz	64.2	48
RL895-393K	39,000	1 kHz	74.2	42
RL895-473K	47,000	1 kHz	96.4	38

RL895 Series Dimensions



Dimensions are in mm

RL106 SERIES

Miller Number	L µH ± 20%	Test Freq.	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
RL106-100M	10	2.52 MHz	31	.040	3600
RL106-120M	12	2.52 MHz	29	.044	3300
RL106-150M	15	2.52 MHz	23	.058	2900
RL106-180M	18	2.52 MHz	22	.064	2700
RL106-220M	22	2.52 MHz	19	.088	2400
RL106-270M	27	2.52 MHz	17	.10	2200
	L µH ± 10%				
RL106-330K	33	2.52 MHz	15	.11	2000
RL106-390K	39	2.52 MHz	13	.14	1800
RL106-470K	47	2.52 MHz	12	.16	1700
RL106-560K	56	2.52 MHz	11	.19	1500
RL106-680K	68	2.52 MHz	10	.22	1400
RL106-820K	82	2.52 MHz	9.6	.29	1300
RL106-101K	100	1 kHz	8.8	.32	1300
RL106-121K	120	1 kHz	8.2	.38	1200
RL106-151K	150	1 kHz	6.9	.50	1000
RL106-181K	180	1 kHz	6.6	.56	840

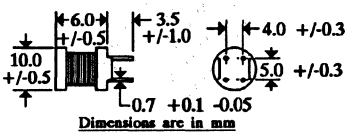
J.W.Miller MAGNETICS
For More Information Call: Fax Service 800-723-8588
306 E. Alondra Blvd. • Gardena, CA 90247 • 310-515-1720 • To Send a Fax Dial: 310-515-1962

RADIAL LEAD R F CHOKES *(continued)*

RL106 SERIES *(continued)*

Miller Number	L µH ± 10%	Test Freq.	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
RL106-221K	220	1 kHz	6.0	.78	760
RL106-271K	270	1 kHz	5.4	.92	690
RL106-331K	330	1 kHz	4.7	1.1	620
RL106-391K	390	1 kHz	4.3	1.3	570
RL106-471K	470	1 kHz	3.9	1.5	520
RL106-561K	560	1 kHz	3.5	1.9	480
RL106-681K	680	1 kHz	3.2	2.2	430
RL106-821K	820	1 kHz	3.0	2.6	400
RL106-102K	1000	1 kHz	3.2	2.4	360

RL106 Series Dimensions

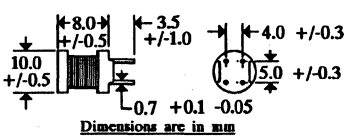


Dimensions are in mm

RL108 SERIES

Miller Number	L µH ± 20%	Test Freq.	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
RL108-100M	10	2.52 MHz	14	.027	4500
RL108-120M	12	2.52 MHz	10	.031	4100
RL108-150M	15	2.52 MHz	9.0	.036	3700
RL108-180M	18	2.52 MHz	17	.049	3400
RL108-220M	22	2.52 MHz	16	.055	3100
RL108-270M	27	2.52 MHz	13	.062	2800
	L µH ± 10%				
RL108-330K	33	2.52 MHz	12	.079	2500
RL108-390K	39	2.52 MHz	11	.087	2300
RL108-470K	47	2.52 MHz	10	.099	2100
RL108-560K	56	2.52 MHz	9.6	.13	1900
RL108-680K	68	2.52 MHz	7.6	.14	1700
RL108-820K	82	2.52 MHz	7.4	.16	1600
RL108-101K	100	1 kHz	6.5	.21	1400
RL108-121K	120	1 kHz	6.2	.24	1300
RL108-151K	150	1 kHz	5.1	.32	1200
RL108-181K	180	1 kHz	4.6	.35	1100
RL108-221K	220	1 kHz	4.3	.45	960
RL108-271K	270	1 kHz	4.0	.61	870
RL108-331K	330	1 kHz	3.7	.69	790
RL108-391K	390	1 kHz	3.2	.78	720
RL108-471K	470	1 kHz	3.0	1.0	660
RL108-561K	560	1 kHz	2.8	1.2	600
RL108-681K	680	1 kHz	2.6	1.4	550
RL108-821K	820	1 kHz	2.3	1.8	500
RL108-102K	1000	1 kHz	2.1	2.1	450

RL108 Series Dimensions



Dimensions are in mm

RADIAL LEAD HIGH CURRENT R F CHOKES

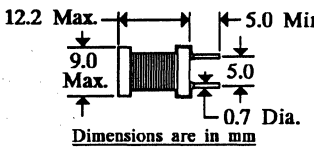
6000 SERIES

Miller Number	L µH ± 20%	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. Amps
6000-1R0M	1.0	20	7.96	150	.013	10
6000-1R5M	1.5	20	7.96	130	.016	8.5
6000-2R2M	2.2	20	7.96	100	.021	6.5
6000-3R3M	3.3	20	7.96	79	.025	5.5
6000-4R7M	4.7	20	7.96	51	.030	4.6
6000-6R8M	6.8	20	7.96	29	.035	4.1
	L µH ± 10%					
6000-100K	10	50	2.52	14	.045	3.4
6000-120K	12	50	2.52	13	.050	3.1
6000-150K	15	50	2.52	12	.056	2.9
6000-180K	18	40	2.52	11	.061	2.66
6000-220K	22	40	2.52	9.2	.070	2.4
6000-270K	27	40	2.52	8.5	.080	2.22
6000-330K	33	30	2.52	7.8	.090	2.05
6000-390K	39	30	2.52	6.9	.10	1.85
6000-470K	47	30	2.52	6.5	.16	1.77
6000-560K	56	30	2.52	5.4	.18	1.48
6000-680K	68	30	2.52	4.9	.21	1.36
6000-820K	82	30	2.52	4.1	.23	1.3
6000-101K	100	20	.796	3.7	.28	1.4
6000-121K	120	20	.796	3.4	.32	1.25
6000-151K	150	20	.796	3.2	.37	1.15
6000-181K	180	20	.796	2.8	.58	1.08
6000-221K	220	20	.796	2.7	.65	1.0
6000-271K	270	20	.796	2.4	.75	.90
6000-331K	330	20	.796	2.3	.85	.78
6000-391K	390	20	.796	2.1	1.0	.74

6000 SERIES *(continued)*

Miller Number	L µH ± 20%	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. Amps
6000-471K	470	20	.796	1.9	1.1	.68
6000-561K	560	20	.796	1.8	1.4	.64
6000-681K	680	20	.796	1.6	1.6	.59
6000-821K	820	20	.796	1.5	1.8	.56
6000-102K	1000	50	.252	1.3	2.9	.51

6000 Series Dimensions



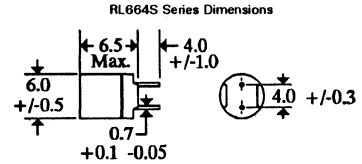
Dimensions are in mm

SHIELDED RADIAL LEAD R F CHOKES

RL664S SERIES

Miller Number	L µH ± 15%	Test Freq.	R,dc Max. Ohms	I,dc Max. mA
RL664S-220L	22	2.52 MHz	.13	960
RL664S-270L	27	2.52 MHz	.18	870
RL664S-330L	33	2.52 MHz	.21	780
RL664S-390L	39	2.52 MHz	.26	720
RL664S-470L	47	2.52 MHz	.29	660
	L µH ± 10%			
RL664S-560K	56	2.52 MHz	.33	600
RL664S-680K	68	2.52 MHz	.36	550
RL664S-820K	82	2.52 MHz	.39	500
RL664S-101K	100	1 kHz	.54	450
RL664S-121K	120	1 kHz	.62	410
RL664S-151K	150	1 kHz	.72	370
RL664S-181K	180	1 kHz	.88	340
RL664S-221K	220	1 kHz	.99	300
RL664S-271K	270	1 kHz	1.52	270
RL664S-331K	330	1 kHz	1.69	250
RL664S-391K	390	1 kHz	1.85	230
RL664S-471K	470	1 kHz	2.85	210
RL664S-561K	560	1 kHz	3.21	190
RL664S-681K	680	1 kHz	3.60	170
RL664S-821K	820	1 kHz	4.87	160
RL664S-102K	1,000	1 kHz	5.56	140

RL664S Series Dimensions

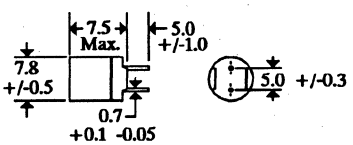


Dimensions are in mm

RL875S SERIES

Miller Number	L µH ± 15%	Test Freq.	R,dc Max. Ohms	I,dc Max. mA
RL875S-220L	22	2.52 MHz	.08	1600
RL875S-270L	27	2.52 MHz	.10	1490
RL875S-330L	33	2.52 MHz	.14	1300
RL875S-390L	39	2.52 MHz	.15	1200
RL875S-470L	47	2.52 MHz	.17	1100
	L µH ± 10%			
RL875S-560K	56	2.52 MHz	.19	990
RL875S-680K	68	2.52 MHz	.21	890
RL875S-820K	82	2.52 MHz	.27	810
RL875S-101K	100	1 kHz	.32	740
RL875S-121K	120	1 kHz	.36	670
RL875S-151K	150	1 kHz	.51	600
RL875S-181K	180	1 kHz	.57	550
RL875S-221K	220	1 kHz	.76	500
RL875S-271K	270	1 kHz	.86	450
RL875S-331K	330	1 kHz	.97	410
RL875S-391K	390	1 kHz	1.28	370
RL875S-471K	470	1 kHz	1.44	340
RL875S-561K	560	1 kHz	1.61	310
RL875S-681K	680	1 kHz	2.07	280
RL875S-821K	820	1 kHz	2.33	260
RL875S-102K	1,000	1 kHz	2.72	230
RL875S-122K	1,200	1 kHz	3.98	210
RL875S-152K	1,500	1 kHz	4.50	190
RL875S-182K	1,800	1 kHz	6.81	170
RL875S-222K	2,200	1 kHz	7.56	160
RL875S-272K	2,700	1 kHz	8.54	140
RL875S-332K	3,300	1 kHz	9.74	130
RL875S-392K	3,900	1 kHz	12.9	120
RL875S-472K	4,700	1 kHz	14.7	110
RL875S-562K	5,600	1 kHz	20.4	99
RL875S-682K	6,800	1 kHz	23.0	89
RL875S-822K	8,200	1 kHz	30.6	81
RL875S-103K	10,000	1 kHz	35.0	74

RL875S Series Dimensions

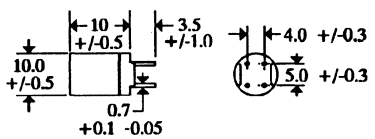


Dimensions are in mm

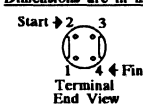
RL110S SERIES

Miller Number	L µH ± 20%	Test Freq.	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
RL110S-100M	10	2.52 MHz	32	.023	3900
RL110S-120M	12	2.52 MHz	26	.024	3600
RL110S-150M	15	2.52 MHz	23	.036	3200
RL110S-180M	18	2.52 MHz	20	.039	2900
RL110S-220M	22	2.52 MHz	14	.042	2600
RL110S-270M	27	2.52 MHz	12	.045	2400
	L µH ± 15%				
RL110S-330L	33	2.52 MHz	10	.057	2100
RL110S-390L	39	2.52 MHz	8.5	.076	2000
RL110S-470L	47	2.52 MHz	8.0	.10	1800
RL110S-560L	56	2.52 MHz	7.5	.11	1600
RL110S-680L	68	2.52 MHz	6.0	.15	1500
RL110S-820L	82	2.52 MHz	4.7	.16	1400
RL110S-101L	100	1 kHz	4.4	.19	1200
RL110S-121L	120	1 kHz	4.2	.21	1100
RL110S-151L	150	1 kHz	3.8	.23	1000
RL110S-181L	180	1 kHz	3.3	.26	920
RL110S-221L	220	1 kHz	3.1	.29	830
RL110S-271L	270	1 kHz	2.9	.36	750
RL110S-331L	330	1 kHz	2.7	.51	680
RL110S-391L	390	1 kHz	2.4	.69	620
RL110S-471L	470	1 kHz	2.2	.98	570
RL110S-561L	560	1 kHz	2.0	1.1	520
RL110S-681L	680	1 kHz	1.8	1.2	470
RL110S-821L	820	1 kHz	1.6	1.3	430
RL110S-102L	1000	1 kHz	1.5	1.5	390

RL110S Series Dimensions



Dimensions are in mm

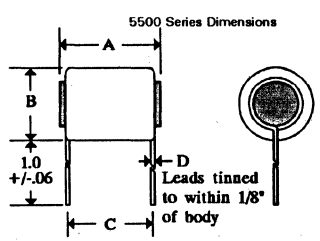


HIGH SATURATION FLUX DENSITY FERRITE RODS & BOBBINS. HIGH CURRENT TOROIDS

5500 SERIES

Miller Number	L µH ± 10% @ 1kHz	R,dc Max. Ohms	I,dc Max. Amps	Dim. A Max.	Dim. B Max.	Dim. C ± .06	Dim. D ± .005
5501	5	.013	10	.88	.63	.50	.042
5502	10	.017	9	1.12	.63	.69	.042
5503	27	.030	7	.88	.81	.44	.042
5504	50	.045	5.6	.88	.81	.75	.042
5505	100	.061	4.9	1.12	.81	.94	.042
5506	150	.069	4.6	1.38	.81	1.06	.042
5507	250	.089	4	1.62	.81	1.31	.042
5508	5	.009	14	.88	.64	.75	.053
5509	10	.012	12	1.12	.64	1.0	.053
5510	27	.022	9	.88	.88	.56	.053
5511	50	.028	8	1.12	.88	.75	.053
5512	68	.034	7.3	1.12	.88	.88	.053
5513	100	.038	6.8	1.38	.88	1.0	.053
5514	150	.046	6.3	1.62	.88	1.25	.053
5515	5	.006	19	1.12	.69	.81	.065
5516	10	.008	16	1.38	.69	1.22	.065
5517	27	.014	12.5	1.12	.94	.69	.065
5518	50	.020	10.5	1.38	.94	.94	.065
5519	68	.023	10	1.38	.94	1.12	.065
5520	100	.027	10	1.62	.94	1.31	.065
5521	5	.004	23	1.38	.72	.94	.082
5522	10	.006	20	1.69	.72	1.50	.082
5523	27	.010	15	1.38	1.0	.94	.082
5524	50	.013	15	1.62	1.0	1.12	.082

5500 Series Dimensions



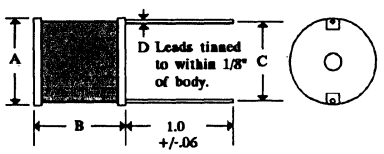
J.W.Miller MAGNETICS
For More Information Call: Fax Service 800-723-8588
306 E. Alondra Blvd. • Gardena, CA 90247 • 310-515-1720 • To Send a Fax Dial: 310-515-1962

HIGH SATURATION FLUX DENSITY FERRITE RODS & BOBBINS. HIGH CURRENT TOROIDS *(continued)*

5600 SERIES

Miller Number	L µH ± 10% @ 1kHz	R,dc Max. Ohms	I,dc Max. Amps	Dim. A Max.	Dim. B Max.	Dim. C ± .06	Dim. D ± .005
5601	5	.007	15	.83	.91	.59	.065
5602	10	.008	14	.83	.91	.60	.065
5603	25	.023	8	.83	.91	.57	.042
5604	50	.034	6.6	.83	.91	.65	.042
5605	100	.072	4.5	.83	.91	.69	.042
5606	250	.173	2.9	.83	.91	.65	.042
5607	500	.378	2	.83	.91	.68	.042
5608	1,000	.801	1.3	.83	.91	.66	.042
5609	2,500	2.04	.85	.83	.91	.71	.042
5610	5	.005	20	1.22	1.11	.94	.062
5611	10	.006	17	1.22	1.11	.95	.082
5612	25	.009	14	1.22	1.11	.93	.082
5613	50	.017	10	1.22	1.11	.99	.065
5614	100	.034	7	1.22	1.11	.85	.053
5615	250	.083	4.6	1.22	1.11	.97	.053
5616	500	.129	3.7	1.22	1.11	1.12	.053
5617	1,000	.279	2.5	1.22	1.11	1.05	.053
5618	2,500	.690	1.6	1.22	1.11	1.05	.053
5619	50	.012	14	1.50	1.11	1.23	.082
5620	100	.025	9.8	1.50	1.11	1.12	.065
5621	250	.059	6.4	1.50	1.11	1.10	.053
5622	500	.090	5	1.50	1.11	1.14	.053
5623	1,000	.195	3.5	1.50	1.11	1.36	.053
5624	2,500	.499	2.2	1.50	1.11	1.32	.053
5625	5,000	1.08	1.5	1.50	1.11	1.27	.053
5626	100	.018	14	1.50	1.50	1.18	.082
5627	250	.040	9	1.50	1.50	1.12	.065
5628	500	.085	6.5	1.50	1.50	1.06	.053
5629	1,000	.183	4.4	1.50	1.50	1.23	.053
5630	2,500	.464	2.8	1.50	1.50	1.21	.053
5631	5,000	.714	2.2	1.50	1.50	1.32	.053
5632	10,000	1.55	1.5	1.50	1.50	1.25	.053

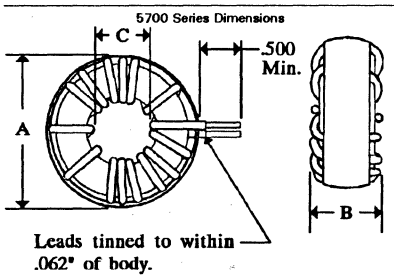
5600 Series Dimensions



5700 SERIES

Miller Number	L µH ± 15% @ 1kHz	I,dc Max. Amps	Min. L µH @ I, dc	R,dc Max. Ohms	Dim. A Max.	Dim. B Max.	Dim. C Min.
5701	10	11.00	5	.008	.875	.437	.187
5702	25	5.50	12	.014	.875	.437	.187
5703	125	2.75	70	.12	.875	.437	.187
5704	275	2.00	150	.24	.875	.437	.187
5705	450	1.50	250	.49	.875	.437	.187
5706	25	9.00	15	.012	1.125	.562	.312
5707	75	5.00	40	.04	1.125	.562	.312
5708	400	2.25	225	.33	1.125	.562	.312
5709	800	1.75	475	.64	1.125	.562	.312
5710	1000	1.50	575	.98	1.125	.562	.312
5711	50	9.50	25	.012	1.250	.625	.375
5712	150	4.75	85	.046	1.250	.625	.375
5713	700	2.25	400	.42	1.250	.625	.375
5714	1250	1.75	750	.85	1.250	.625	.375
5715	1600	1.50	950	1.27	1.250	.625	.375
5716	125	7.75	85	.032	1.812	.750	.750
5717	500	4.00	275	.15	1.812	.750	.750
5718	1100	2.50	650	.33	1.812	.750	.750
5719	2250	1.75	1350	.92	1.812	.750	.750
5720	4500	1.25	2700	2.64	1.812	.750	.750
5721	250	8.00	125	.041	2.125	.937	.625
5722	900	3.75	500	.175	2.125	.937	.625
5723	1800	2.50	1000	.55	2.125	.937	.625
5724	4000	1.75	2100	1.16	2.125	.937	.625
5725	8000	1.00	4500	3.34	2.125	.937	.625
5726	25	2.50	16	.040	.550	.220	.150
5727	35	2.50	29	.035	.700	.320	.150
5728	50	2.50	35	.060	.750	.320	.150
5729	100	2.50	70	.080	.850	.360	.200
5730	70	3.00	50	.050	.850	.360	.200
5731	40	4.00	30	.025	.850	.360	.200

5700 Series Dimensions



RF CHOKES

HASH Chokes

Miller Number	L ± 20% µH	R,dc Max. Ohms	I,dc Max. Amps	Coil Dia. Max.	Form Length	Lead Wire Size
5218	3.35	.01	20	.6	1.25	AWG 12
5219	4.9	.016	15	.6	1.25	AWG 14
5220	8.8	.021	10	.56	1.25	AWG 16
5230	4	.012	8	.38	.875	AWG 20
5240	40	.082	3	.31	1.25	AWG 20
5248	68	.054	5	.56	1.25	AWG 20
5250	100	.216	2	.38	1.25	AWG 20
5252	125	.08	3.5	.5	1.25	AWG 20
5254	250	.17	2.5	.44	1.25	AWG 20
5256	500	.26	2	.56	1.25	AWG 20
5258	1,000	.55	1	.6	1.25	AWG 20

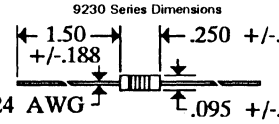
MOLDED RF CHOKES

9230 SERIES

Miller Number	L µH ± 10%	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
9230-94	.10	40	25	690	.07	1100
9230-96	.12	40	25	650	.08	1100
9230-00	.15	38	25	600	.1	1100
9230-02	.18	35	25	550	.12	1010
9230-04	.22	33	25	510	.14	935
9230-06	.27	33	25	430	.16	875
9230-08	.33	30	25	410	.2	780
9230-10	.39	30	25	380	.3	640
9230-12	.47	30	25	340	.35	590
9230-14	.56	30	25	300	.5	495
9230-16	.68	28	25	275	.6	450
9230-18	.82	28	25	250	.85	380
9230-20	1.0	25	25	230	1	350
9230-22	1.2	25	7.9	150	.18	825
9230-24	1.5	26	7.9	140	.22	745
9230-26	1.8	30	7.9	125	.3	640
9230-28	2.2	30	7.9	115	.4	550
9230-30	2.7	37	7.9	100	.5	495
9230-32	3.3	45	7.9	90	.85	380
9230-34	3.9	45	7.9	82	1	350
9230-36	4.7	45	7.9	75	1.2	320
9230-38	5.6	50	7.9	68	1.8	260
9230-40	6.8	50	7.9	60	2	245
9230-42	8.2	55	7.9	55	2.7	210
9230-44	10	55	7.9	50	3.7	180
9230-46	12	45	2.5	40	2.7	210
9230-48	15	45	2.5	35	2.8	205
9230-50	18	50	2.5	32	3.1	195
9230-52	22	50	2.5	25	3.3	190
9230-54	27	50	2.5	22	3.5	185
9230-56	33	45	2.5	24	3.4	187
9230-58	39	45	2.5	22	3.6	180
9230-60	47	45	2.5	20	4.5	165
9230-62	56	45	2.5	18	5.7	145
9230-64	68	50	2.5	15	6.7	135
9230-66	82	50	2.5	14	7.3	130
9230-68	100	50	2.5	13	8	125
9230-70	120	30	.79	12	13	97
9230-72	150	30	.79	11	15	85
9230-74	180	30	.79	10	17	79
9230-76	220	30	.79	9	21	73
9230-78	270	30	.79	8	25	65
9230-80	330	30	.79	7	28	62
9230-82	390	30	.79	6.5	35	55
9230-84	470	30	.79	6	42	50
9230-86	560	30	.79	5	46	48
9230-88	680	30	.79	4.2	60	42
9230-90	820	30	.79	3.8	65	40
9230-92	1000	30	.79	3.4	72	38

Reference: MIL-C-15305, MS 75084 & MS 75085

9230 Series Dimensions



9310 SERIES

Miller Number	MS Type	L µH ± 20%	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
9310-00	18130-1	.15	50	25	525	.03	2450
9310-02	18130-2	.22	50	25	450	.055	1900
9310-04	18130-3	.33	45	25	360	.09	1400
9310-06	18130-4	.47	45	25	310	.12	1225
		L µH ± 10%					
9310-07	18130-5	.56	50	25	280	.135	1220
9310-08	18130-6	.68	50	25	250	.15	1100
9310-10	18130-7	.82	50	25	220	.22	900
9310-12	18130-8	1.0	50	25	200	.29	830
9310-14	18130-9	1.2	33	7.9	180	.42	650
9310-16	18130-10	1.5	33	7.9	160	.5	600
9310-18	18130-11	1.8	33	7.9	150	.65	525
9310-20	18130-12	2.2	33	7.9	135	.95	435
9310-22	18130-13	2.7	33	7.9	120	1.2	385
9310-24	18130-14	3.3	33	7.9	110	2	300
9310-26	18130-15	3.9	33	7.9	100	2.3	280
9310-28	18130-16	4.7	33	7.9	90	2.6	260
9310-30	18130-17	5.6	45	7.9	60	.32	750
9310-32	18130-18	6.8	50	7.9	55	.5	600
9310-34	18130-19	8.2	50	7.9	50	.6	545
9310-36	18130-20	10	55	7.9	45	.9	445
9310-38	18130-21	12	65	2.5	42	1.1	404
9310-40	18130-22	15	65	2.5	40	1.4	370
9310-42	18130-23	18	75	2.5	34	2.25	280
9310-44	18130-24	22	75	2.5	30	2.5	265
9310-46		24	60	2.5	26	2.5	265
9310-48	18130-25	27	60	2.5	25	2.6	260
9310-50		30	65	2.5	19	2.8	255
9310-52	18130-26	33	65	2.5	19	3	250

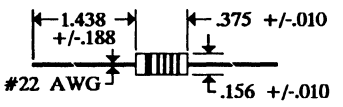
9310 Series Reference: MIL-C-15305, MS 18130, MS14046 & MS 16225

9210 SERIES

Miller Number	MS Type	L µH ± 5%	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
9210-54	90538-01	36	60	2.5	15.5	2.5	180
9210-56	90538-02	39	60	2.5	14.5	2.6	176
9210-58	90538-03	43	60	2.5	13.7	2.7	172
9210-60	90538-04	47	55	2.5	13	2.75	170
9210-62	90538-05	51	55	2.5	12.7	2.85	167
9210-64	90538-06	56	55	2.5	12	3	164
9210-66	90538-07	62	55	2.5	11.5	3.15	160
9210-68	90538-08	68	55	2.5	11	3.3	156
9210-70	90538-09	75	55	2.5	10.5	3.7	147
9210-72	90538-10	82	50	2.5	10.3	3.9	143
9210-74	90538-11	91	50	2.5	10	4.3	136
9210-76	90538-12	100	50	2.5	9.5	4.5	133
9210-78	90538-13	110	60	.79	8.9	4.9	128
9210-80	90538-14	120	65	.79	8.7	5.2	124
9210-82	90538-15	130	65	.79	8.5	5.45	121
9210-84	90538-16	150	65	.79	8	6.05	114
9210-86	90538-17	160	65	.79	7.5	6.4	111
9210-88	90538-18	180	65	.79	7	6.75	108
9210-90	90538-19	200	65	.79	6.5	7.1	106
9210-92	90538-20	220	65	.79	6.2	7.45	103
9210-94	90538-21	240	65	.79	5.9	7.8	101

9210 Series Reference: MIL-C-15305 & MS 90538

9310 Series Dimensions



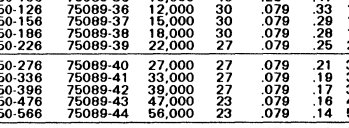
SHIELDED MOLDED R F CHOKES

9250 SERIES

Miller Number	MS Type	L µH' ± 10%	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms
9250-101	75087-1	.10	50	25	250	.025
9250-121	75087-2	.12	51	25	250	.034
9250-151	75087-3	.15	51	25	250	.037
9250-181	75087-4	.18	50	25	250	.047
9250-221	75087-5	.22	49	25	250	.067
9250-271	75087-6	.27	47	25	250	.11
9250-331	75087-7	.33	46	25	250	.13
9250-391	75087-8	.39	44	25	250	.18
9250-471	75087-9	.47	44	25	235	.25
9250-561	75087-10	.56	43	25	210	.33
9250-681	75087-11	.68	42	25	190	.45
9250-821	75087-12	.82	40	25	180	.59
9250-102	75088-1	1.0	44	25	140	.07
9250-122	75088-2	1.2	44	7.9	130	.10
9250-152	75088-3	1.5	44	7.9	115	.12
9250-182	75088-4	1.8	44	7.9	105	.14
9250-222	75088-5	2.2	44	7.9	100	.19
9250-272	75088-6	2.7	44	7.9	92	.28
9250-332	75088-7	3.3	44	7.9	85	.35
9250-392	75088-8	3.9	44	7.9	75	.40
9250-472	75088-9	4.7	44	7.9	70	.55
9250-562	75088-10	5.6	44	7.9	65	.72
9250-682	75088-11	6.8	50	7.9	55	1.02
9250-822	75088-12	8.2	50	7.9	50	1.32
9250-103	75088-13	10	50	7.9	46	1.62
9250-123	75088-14	12	55	2.5	44	2.0
9250-153	75089-1	15	45	2.5	49	.80
9250-183	75089-2	18	45	2.5	45	.89
9250-223	75089-3	22	45	2.5	41	.96
9250-273	75089-4	27	45	2.5	38	1.19
9250-333	75089-5	33	45	2.5	34	1.37
9250-393	75089-6	39	50	2.5	29	1.93
9250-473	75089-7	47	50	2.5	27	2.11
9250-563	75089-8	56	50	2.5	25	2.23
9250-683	75089-9	68	50	2.5	21	2.70
9250-823	75089-10	82	50	2.5	10.5	2.44
9250-104	75089-11	100	50	2.5	10.0	3.12
9250-124	75089-12	120	55	.79	9.7	3.6
9250-154	75089-13	150	55	.79	8.5	4.1
9250-184	75089-14	180	55	.79	8.0	4.4
9250-224	75089-15	220	55	.79	7.5	5.0
9250-274	75089-16	270	55	.79	7.0	5.8
9250-334	75089-17	330	55	.79	6.5	6.4
9250-394	75089-18	390	60	.79	6.2	7.4
9250-474	75089-19	470	60	.79	5.7	9.5
9250-564	75089-20	560	60	.79	4.7	10.5
9250-684	75089-21	680	60	.79	4.5	11.8
9250-824	75089-22	820	60	.79	4.2	13.0
9250-105	75089-23	1,000	60	.79	3.8	17.5
9250-125	75089-24	1,200	45	.25	1.5	22.1
9250-155	75089-25	1,500	45	.25	1.2	26.5
9250-185	75089-26	1,800	45	.25	1.0	29.9
9250-225	75089-27	2,200	45	.25	.97	33.8
9250-275	75089-28	2,700	45	.25	.92	47.3
9250-335	75089-29	3,300	45	.25	.84	53.0
9250-395	75089-30	3,900	45	.25	.80	73.8
9250-475	75089-31	4,700	45	.25	.74	81.6
9250-565	75089-32	5,600	44	.25	.73	98.9
9250-685	75089-33	6,800	40	.25	.66	111
9250-825	75089-34	8,200	40	.25	.54	119
9250-106	75089-35	10,000	40	.25	.47	137
9250-126	75089-36	12,000	30	.079	.33	143
9250-156	75089-37	15,000	30	.079	.29	157
9250-186	75089-38	18,000	30	.079	.28	175
9250-226	75089-39	22,000	27	.079	.25	274
9250-276	75089-40	27,000	27	.079	.21	308
9250-336	75089-41	33,000	27	.079	.19	343
9250-396	75089-42	39,000	27	.079	.17	376
9250-476	75089-43	47,000	23	.079	.16	473
9250-566	75089-44	56,000	23	.079	.14	512
9250-686	75089-45	68,000	23	.079	.13	580
9250-826	75089-46	82,000	21	.079	.12	618
9250-107	75089-47	100,000	18	.079	.11	678

Reference: MIL-C-15305, MS 75087, MS 75088, MS 75089 & MS 90537

9250 Series Dimensions



J.W.Miller MAGNETICS
For More Information Call: Fax Service 800-723-8588
306 E. Alondra Blvd. • Gardena, CA 90247 • 310-515-1720 • To Send a Fax Dial: 310-515-1962

MOLDED R F CHOKES

9220 SERIES

Miller Number	MS Type	L µH ± 5%	Test Q Min.	Fo Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
9220-00	90539-01	270	65	.79	5.6	8.2	110
9220-02	90539-02	300	65	.79	5.3	8.7	107
9220-04	90539-03	330	65	.79	5.0	9.1	105
9220-06	90539-04	360	65	.79	4.7	9.6	102
9220-08	90539-05	390	65	.79	4.5	10	100
9220-10	90539-06	430	65	.79	4.3	10.6	97
9220-12	90539-07	470	65	.79	4.0	11.1	95
9220-14		500	65	.79	3.8	11.6	93
9220-15	90539-08	510	65	.79	3.8	11.6	92
9220-16	90539-09	560	65	.79	3.6	12.3	91
9220-18	90539-10	620	60	.79	3.5	13	88
9220-20	90539-11	680	60	.79	3.4	13.7	85
9220-22	90539-12	750	60	.79	3.3	14.4	83
9220-24	90539-13	820	60	.79	3.1	15.1	81
9220-26	90539-14	910	60	.79	2.9	15.8	79
9220-28	90539-15	1,000	60	.79	2.8	16.5	78

9220 Series Reference: MIL-C-15305, MS 90539, MS 90540 & MS 90541

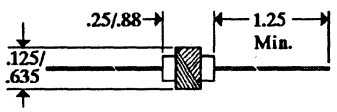
70F SERIES

Miller Number	L ± 20% µH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
70F107AP	.1	49	25	600	.013	3922
70F157AP	.15	52	25	490	.025	2828
70F227AP	.22	48	25	400	.038	2294
70F337AP	.33	47	25	330	.07	1690
70F477AP	.47	46	25	280	.125	1264
70F687AP	.68	48	25	240	.2	1000
70F757AP	.75	48	25	224	.264	870
70F827AP	.82	48	25	216	.29	830
70F106AI	1.0	41	25	118	.048	2041
	L ± 10% µH					
70F126AI	1.2	45	7.9	118	.072	1666
70F156AI	1.5	42	7.9	102	.096	1443
70F186AI	1.8	31	7.9	89	.096	1443
70F226AI	2.2	43	7.9	87	.156	1132
70F276AI	2.7	34	7.9	74	.168	1091
70F336AI	3.3	40	7.9	66	.24	912
70F396AI	3.9	35	7.9	61	.264	870
70F476AI	4.7	43	7.9	53	.457	661
70F566AI	5.6	41	7.9	49	.492	637
70F686AI	6.8	40	7.9	49	.624	566
70F756AI	7.5	32	7.9	44	.624	566
70F826AI	8.2	37	7.9	41	.744	518
70F916AI	9.1	41	7.9	21	1.44	288
70F105AI	10	36	7.9	19	1.56	277
70F125AI	12	52	2.5	19	1.68	267
70F155AI	15	52	2.5	16	1.92	250
	L ± 5% µH					
70F185AI	18	52	2.5	15	2.28	229
70F225AI	22	51	2.5	13	2.28	229
70F255AI	25	48	2.5	13	2.64	213
70F275AI	27	49	2.5	12	2.64	213
70F335AI	33	50	2.5	10	2.76	208
70F395AI	39	48	2.5	9.3	3.36	188
70F475AI	47	44	2.5	9.1	3.36	188
70F565AI	56	45	2.5	8.6	3.84	176
70F685AI	68	42	2.5	8.1	4.2	169
70F755AI	75	38	2.5	7.2	4.56	162
70F825AI	82	41	2.5	6.7	4.8	158
70F915AI	91	41	2.5	6.7	4.92	156
70F104AI	100	25	2.5	3.6	7.68	139
70F124AI	120	40	.79	3.2	8.16	135
70F154AI	150	47	.79	3	8.16	135
70F184AI	180	48	.79	2.8	8.16	135
70F204AI	200	47	.79	2.7	10.3	120
70F224AI	220	46	.79	2.5	11.5	114
70F254AI	250	49	.79	2.5	12.1	111
70F274AI	270	46	.79	2.5	13.2	106
70F304AI	300	46	.79	2.2	13.2	106
70F334AI	330	41	.79	2	13.9	103
70F354AI	350	46	.79	2	14.4	102
70F394AI	390	45	.79	2	15.8	97
70F474AI	470	35	.79	1.8	16.3	95
70F504AI	500	49	.79	1.8	18	91
70F564AI	560	41	.79	1.7	19.2	88
70F684AI	680	37	.79	1.6	19.8	87
70F754AI	750	40	.79	1.6	22.9	80
70F824AI	820	33	.79	1.6	22.9	80
70F914AI	910	32	.79	1.4	24	79
70F103AI	1,000	30	.79	1.4	24	79
70F123AI	1,200	34	.25	1.2	33.6	66
70F153AI	1,500	40	.25	1.1	37.2	63
70F183AI	1,800	40	.25	.96	42	59
70F223AI	2,200	40	.25	.96	45.6	57
70F253AI	2,500	48	.25	.96	45.6	57
70F273AI	2,700	50	.25	.88	45.6	57
70F333AI	3,300	52	.25	.8	51.6	53
70F393AI	3,900	53	.25	.76	57.6	51
70F473AI	4,700	49	.25	.68	64.8	48
70F563AI	5,600	53	.25	.68	69.6	46
70F683AI	6,800	51	.25	.64	78	43
70F753AI	7,500	49	.25	.6	85.2	41
70F823AI	8,200	48	.25	.6	92.4	40
70F913AI	9,100	52	.25	.56	98.4	39
70F102AI	10,000	41	.25	.52	101	38
70F122AI	12,000	46	.079	.36	100	50
70F152AI	15,000	50	.079	.32	113	47
70F182AI	18,000	49	.079	.29	128	44
70F222AI	22,000	50	.079	.27	144	41
70F252AF	25,000	59	.079	.25	115	46
70F272AF	27,000	61	.079	.244	120	45
70F332AF	33,000	61	.079	.232	134	43
70F392AF	39,000	59	.079	.22	147	41
70F472AF	47,000	57	.079	.206	168	38
70F502AF	50,000	57	.079	.196	175	37
70F562AF	56,000	57	.079	.188	189	36
70F682AF	68,000	57	.079	.18	215	34
70F752AF	75,000	53	.079	.174	222	33
70F822AF	82,000	50	.079	.168	238	32
70F912AF	91,000	51	.079	.166	250	31
70F101AF	100,000	48	.079	.157	278	29
70F121AF	120,000	48	.025	.084	268	48
70F151AF	150,000	49	.025	.077	328	44
70F181AF	180,000	51	.025	.075	374	41

70F SERIES *(continued)*

Miller Number	L ± 5% µH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
70F221AF	220,000	51	.025	.07	424	39
70F251AF	250,000	52	.025	.065	468	37
70F271AF	270,000	53	.025	.062	490	36
70F331AF	330,000	54	.025	.06	540	34
70F391AF	390,000	54	.025	.056	617	33
70F471AF	470,000	55	.025	.054	704	30
70F501AF	500,000	53	.025	.052	736	30

70F Series Dimensions

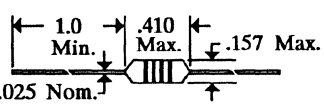


CONFORMAL COATED CHOKES

77F Series

Miller Number	L ± 10% µH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
77F1R0K	1.0	45	25	157	0.17	920
77F1R2K	1.2	50	7.9	144	0.21	880
77F1R5K	1.5	50	7.9	131	0.23	830
77F1R8K	1.8	55	7.9	121	0.25	790
77F2R2K	2.2	55	7.9	110	0.28	750
77F2R7K	2.7	60	7.9	100	0.30	720
77F3R3K	3.3	65	7.9	94	0.34	670
77F3R9K	3.9	65	7.9	86	0.37	640
77F4R7K	4.7	70	7.9	80	0.39	620
77F5R6K	5.6	70	7.9	74	0.43	590
77F6R8K	6.8	75	7.9	68	0.48	550
77F8R2K	8.2	80	7.9	53	0.52	530
77F100K	10	85	7.9	45	0.58	500
77F120K	12	75	2.5	34	0.63	480
77F150K	15	70	2.5	20	0.72	460
77F180K	18	65	2.5	14	0.77	430
77F220K	22	60	2.5	9.9	0.84	410
77F270K	27	55	2.5	7.6	0.94	390
	L ± 5% µH					
77F330J	33	55	2.5	6.3	1.03	370
77F390J	39	50	2.5	6.3	1.12	350
77F470J	47	45	2.5	6.3	1.22	340
77F560J	56	40	2.5	6.2	1.34	320
77F680J	68	40	2.5	5.7	1.47	305
77F820J	82	35	2.5	5.3	1.62	290
77F101J	100	30	2.5	4.8	1.80	275
77F121J	120	70	0.79	3.8	3.70	185
77F151J	150	70	0.79	3.5	4.20	175
77F181J	180	70	0.79	3.3	4.60	165
77F221J	220	70	0.79	3.0	5.10	155
77F271J	270	65	0.79	2.8	5.80	145
77F331J	330	65	0.79	2.6	6.40	137
77F391J	390	65	0.79	2.4	7.00	133
77F471J	470	60	0.79	2.25	7.70	126
77F561J	560	60	0.79	2.1	8.50	120
77F681J	680	55	0.79	1.95	9.40	113
77F821J	820	55	0.79	1.85	10.5	105
77F102J	1000	50	0.79	1.40	14.0	100

77F Series Dimensions



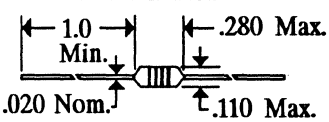
78F SERIES

Miller Number	L ± 20% µH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
78FR10M	0.10	40	25	400	0.06	500
78FR12M	0.12	40	25	400	0.06	500
78FR15M	0.15	40	25	400	0.07	500
78FR18M	0.18	40	25	400	0.08	450
	L ± 10% µH					
78FR22K	0.22	40	25	380	0.08	1025
78FR27K	0.27	40	25	360	0.08	950
78FR33K	0.33	40	25	350	0.08	815
78FR39K	0.39	40	25	320	0.09	700
78FR47K	0.47	40	25	300	0.10	650
78FR56K	0.56	40	25	280	0.11	545
78FR68K	0.68	40	25	250	0.12	495
78FR82K	0.82	40	25	200	0.12	415
78F1R0K	1.0	40	25	180	0.15	385
78F1R2K	1.2	40	7.9	165	0.18	590
78F1R5K	1.5	45	7.9	150	0.20	535
78F1R8K	1.8	50	7.9	125	0.25	455
78F2R2K	2.2	50	7.9	110	0.28	395
78F2R7K	2.7	50	7.9	95	0.30	355
	L ± 5% µH					
78F3R3J	3.3	50	7.9	70	0.34	270
78F3R9J	3.9	45	7.9	65	0.32	250
78F4R7J	4.7	45	7.9	50	0.35	230
78F5R6J	5.6	45	7.9	40	0.40	185
78F6R8J	6.8	40	7.9	30	0.45	175
78F8R2J	8.2	40	7.9	28	0.55	155

78F SERIES *(continued)*

Miller Number	L ± 5% µH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
78F100J	10	40	7.9	22	0.72	130
78F120J	12	45	2.5	20	0.80	155
78F150J	15	50	2.5	16	0.88	150
78F180J	18	50	2.5	15	1.00	145
78F220J	22	50	2.5	13	1.20	140
78F270J	27	50	2.5	11	1.35	135
78F330J	33	50	2.5	10	1.50	193
78F390J	39	50	2.5	9.5	1.70	185
78F470J	47	60	2.5	8.5	2.30	167
78F560J	56	60	2.5	7.5	2.60	150
78F680J	68	60	2.5	6.5	2.90	137
78F820J	82	60	2.5	6.0	3.20	132
78F101J	100	60	2.5	5.5	3.50	125
78F121J	120	60	0.79	5.4	3.80	100
78F151J	150	60	0.79	4.7	4.40	90
78F181J	180	60	0.79	4.3	5.00	84
78F221J	220	60	0.79	4.0	5.70	76
78F271J	270	60	0.79	3.7	6.50	70
78F331J	330	60	0.79	3.4	9.50	65
78F391J	390	60	0.79	2.8	10.5	60
78F471J	470	60	0.79	2.5	11.6	53
78F561J	560	60	0.79	2.3	13.0	51
78F681J	680	60	0.79	2.0	18.0	45
78F821J	820	60	0.79	1.5	23.0	43
78F102J	1000	60	0.79	1.2	26.0	41

78F Series Dimensions



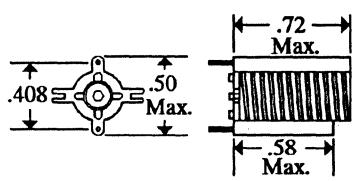
ADJUSTABLE R F COILS

48A SERIES

Miller Number	L µH ± 3% Min.	Q Min.	L µH ± 10% Max.	Q Min.	Test Freq. MHz	No. Turns
48A518MPC	.043	85	.052	93	40	1-1/2
48A778MPC	.061	107	.086	114	40	2-1/2
48A117MPC	.084	121	.128	126	40	3-1/2
48A147MPC	.110	109	.176	129	25	4-1/2
48A187MPC	.137	115	.225	135	25	5-1/2
48A227MPC	.164	124	.264	138	25	6-1/2
48A257MPC	.200	133	.310	140	25	7-1/2
48A287MPC	.242	141	.346	142	25	8-1/2
48A317MPC	.289	150	.384	144	25	9-1/2

Frequency range 30 - 250 MHz Wire size AWG 20 TCW Core 10-32 x 3/8 Carbonyl J May easily be tapped at 1/8, 1/4, 3/8, 5/8, 3/4 or 7/8 turn if desired.

48A Series Dimensions

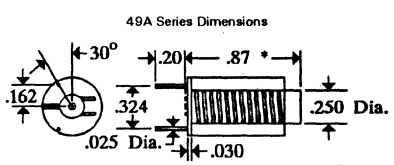


49A SERIES

Miller Number	L µH Min.	L µH Nom.	L µH Max.	Q Min.	Max. I, dc Amps	No. Turns
49A678MPC	.06	.067	.074	100	1.5	2-1/3
49A127MPC	.1	.116	.132	100	1.5	3-1/3
49A167MPC	.134	.164	.194	100	1.5	4-1/3
49A217MPC	.17	.214	.258	100	1.5	5-1/3
49A347MPC	.25	.338	.415	100	1.5	7-1/3
49A537MPC	.393	.525	.657	70	1.5	10-1/3
49A757MPC	.6	.75	.9	70	1.5	14-1/3
49A997MPC	.81	.99	1.16	70	1.5	18-1/3
49A128MPC	.96	1.15	1.34	70	1.5	21-1/3
49A146MPC	1.18	1.36	1.53	70	1.5	24-1/3

Frequency range 10 - 250 MHz Wire size AWG 22 polyurethane coated, with tinned leads. OD at base = .46". Coil OD = .285" Core = 10-32 x 3/8 Carbonyl J.

49A Series Dimensions



* Except 49A146MPC = 1.09

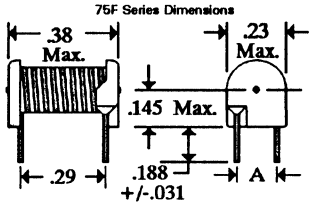
J.W.Miller MAGNETICS
For More Information Call: Fax Service 800-723-8588
306 E. Alondra Blvd. • Gardena, CA 90247 • 310-515-1720 • To Send a Fax Dial: 310-515-1962

PRINTED CIRCUIT R F CHOKES

75F SERIES

Miller Number	L ± 10% µH	Q Ref.	Test Freq. MHz	Turns	A Dim.	Wire Size
75F268MPC	.0264	96	50	1 ½	.148	22 TC
75F238MPC	.032	105	50	2 ½	.148	22 TC
75F328MPC	.039	95	40	3 ½	.148	22 TC
75F518MPC	.049	104	40	4 ½	.148	22 TC
75F608MPC	.060	105	40	5 ½	.148	22 TC
75F768MPC	.078	110	40	6 ½	.148	22 TC
75F908MPC	.090	90	25	7 ½	.148	22 SS
75F117MPC	.108	90	25	9 ½	.148	22 SS
75F137MPC	.128	90	25	9 ½	.148	22 SS
75F157MPC	.142	90	25	10 ½	.148	22 HS
75F197MPC	.186	89	25	11 ½	.150	23 HS
75F237MPC	.230	88	25	12 ½	.153	24 SS
75F257MPC	.252	92	25	13 ½	.153	24 HS
75F277MPC	.275	92	25	14 ½	.153	24 SS
75F397MPC	.364	93	25	15 ½	.158	26 SB
75F407MPC	.400	92	25	16 ½	.158	26 SB
75F477MPC	.490	89	25	17 ½	.159	27 SS
75F557MPC	.550	89	25	18 ½	.159	27 SS
75F597MPC	.670	92	25	19 ½	.159	27 SS
75F667MPC	.660	95	25	20 ½	.160	26 SB

75F Series Dimensions



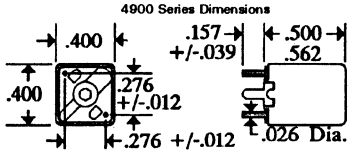
SHIELDED ADJUSTABLE R F COILS

4900 SERIES

Miller Number	L Min. µH	Q Min.@ L Min.	Test Freq. MHz	L Max. µH	Q Min.@ L Max.	Test Freq. MHz
4901-S	.037	90	80	.039	85	80
4902-S	.059	100	75	.071	95	75
4903-S	.086	105	75	.107	90	75
4904-S	.117	90	50	.159	90	50
4905-S	.150	90	45	.208	90	45
4906-S	.184	85	45	.262	70	45
4907-S	.226	85	45	.311	65	45
4908-S	.258	85	45	.363	60	45
4909-S	.296	85	45	.417	55	45
4910-S	.335	80	45	.454	50	45
4901	.041	113	80	.050	136	80
4902	.070	155	75	.100	139	75
4903	.103	147	75	.152	133	75
4904	.148	146	50	.252	162	50
4905	.193	138	45	.337	142	45
4906	.238	137	45	.417	122	45
4907	.286	135	45	.508	105	45
4908	.339	126	45	.600	99	45
4909	.390	132	45	.691	76	45
4910	.460	128	45	.788	72	45

Minimum inductance measured with core removed.

4900 Series Dimensions

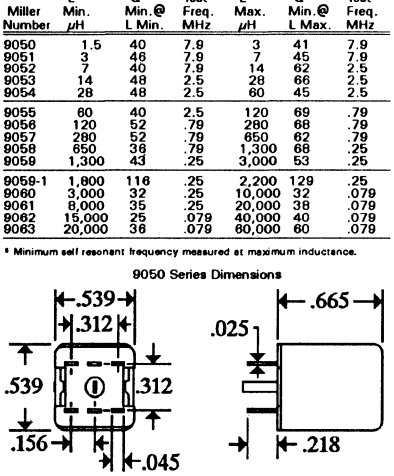


9050 SERIES

Miller Number	L Min. µH	Q Min.@ L Min.	Test Freq. MHz	L Max. µH	Q Min.@ L Max.	Test Freq. MHz
9050	1.5	40	7.9	3	41	7.9
9051	3	46	7.9	7	46	7.9
9052	7	40	7.9	14	62	2.5
9053	14	48	2.5	28	66	2.5
9054	28	48	2.5	60	45	2.5
9055	60	40	2.5	120	69	.79
9056	120	52	.79	280	68	.79
9057	280	52	.79	650	62	.79
9058	650	36	.79	1,300	68	.25
9059	1,300	43	.25	3,000	53	.25
9059-1	1,800	116	.25	2,200	129	.25
9060	3,000	32	.25	10,000	32	.079
9061	8,000	35	.25	20,000	38	.079
9062	15,000	25	.079	40,000	40	.079
9063	20,000	36	.079	60,000	60	.079

* Minimum self resonant frequency measured at maximum inductance.

9050 Series Dimensions

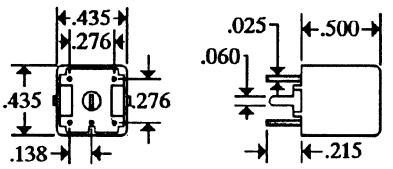


9100 SERIES

Miller Number	L Min. µH	Q Min.@ L Min.	Test Freq. MHz	L Max. µH	Q Min.@ L Max.	Test Freq. MHz
9101	.099	64	25	.134	85	25
9102	.129	70	25	.192	93	25
9103	.165	77	25	.258	100	25
9104	.246	83	25	.418	102	25
9105	.366	88	25	.627	93	25
9106	.588	40	25	.95	60	25
9107	.83	43	25	1.54	50	7.9
9108	1.44	34	7.9	2.94	64	7.9
9109	2.52	40	7.9	5.7	77	7.9
9110	5.35	50	7.9	13.49	60	2.5
9111	12.5	31	2.5	29.45	60	2.5
9112	26.25	35	2.5	71.25	54	2.5
9113	64.57	36	2.5	163	50	.79
9114	147	31	.79	430	52	.79
9115	422	40	.79	1,100	42	.25
9116	1,050	39	.79	3,740	65	.25
9117	3,360	40	.25	11,120	50	.079

* Minimum self resonant frequency measured at maximum inductance.

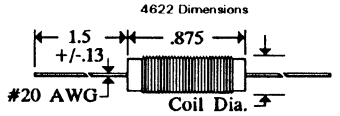
9100 Series Dimensions



VARNISHED AXIAL LEAD CHOKES

Miller Number	L ± 20% µH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
4602	1.0	60	7.9	190	.05	2000
	L ± 10% µH					
4604	1.5	58	7.9	149	.093	1800
4606	2.4	56	7.9	120	.19	1500
4608	3.9	60	7.9	93	.45	1000
4609	5.5	57	7.9	80	.67	850
4610	6.2	57	7.9	76	.83	700
4611	8.2	57	7.9	65	1.2	600
4612	10	36	2.5	61	1.5	500
	L ± 5% µH					
4622	10	69	2.5	40	.11	1500
4624	15	62	2.5	33	.17	1000
4626	24	65	2.5	25	.34	800
4628	39	70	2.5	20	.65	600
4629	55	72	2.5	17	1	500
4630	62	83	2.5	16	1.2	475
4631	82	85	2.5	13	1.9	450
4632	100	107	.79	12	3	400
4642	100	49	.79	11	5.4	160
4644	150	53	.79	8.8	6.5	160
4646	240	56	.79	7.2	8.5	160
4648	390	57	.79	5.6	11	160
4649	550	58	.79	4.8	13	160
4650	620	59	.79	4.5	15	160
4651	750	56	.79	4	16	160
4652	1,000	59	.25	3.7	19	160
	L ± 5% @ 1kHz µH	Q	Test Freq. MHz			
4662	1,000	83	.25	2.6	8.6	160
4664	1,500	82	.25	2.1	11	160
4666	2,400	80	.25	1.7	15	160
4668	3,900	73	.25	1.4	20	160
4669	5,500	69	.25	1.1	25	160
4670	6,200	89	.25	1	37	100
4671	8,200	83	.25	.94	46	100
4672	10,000	68	.079	.82	50	100

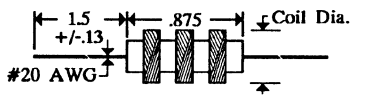
4622 Dimensions



6300 SERIES

Miller Number	L ± 5% @ 1kHz µH	Q Min.	Q Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
6302	2,500	106	.25	1.3	9	160
6304	5,000	91	.25	1	14	160
6306	10,000	108	.079	.71	31	100
6308	25,000	102	.079	.47	82	65
6310	50,000	113	.079	.33	127	65

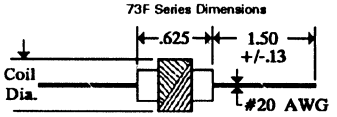
6300 Series Dimensions



73F SERIES

Miller Number	L ± 5% µH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
73F104AF	100	140	.79	7.7	2	250
73F124AF	120	140	.79	7	2.2	250
73F154AF	150	160	.79	6.3	2.5	250
73F184AF	180	160	.79	6	2.9	250
73F224AF	220	160	.79	5.6	3.2	250
73F274AF	270	160	.79	5.1	3.6	250
73F334AF	330	160	.79	4.8	3.8	250
73F394AF	390	160	.79	4.4	4.2	225
73F474AF	470	160	.79	3.9	4.8	200
73F564AF	560	160	.79	3.6	5.3	200
73F684AF	680	160	.79	3.4	6	200
73F824AF	820	150	.79	3.1	6.8	200
73F103AF	1,000	140	.79	2.8	7.5	150
73F123AF	1,200	140	.25	2.2	7.8	150
73F153AF	1,500	140	.25	2	8.8	150
73F183AF	1,800	140	.25	1.8	11	150
73F223AF	2,200	100	.25	1.5	12	150
73F273AF	2,700	100	.25	1.4	13.5	125
73F333AF	3,300	100	.25	1.3	15.1	125
73F393AF	3,900	95	.25	1.2	18	125
73F473AF	4,700	95	.25	1	21.5	100
73F563AF	5,600	95	.25	1	25	80
73F683AF	6,800	95	.25	.9	29	80
73F823AF	8,200	70	.25	.91	30	80
73F102AF	10,000	65	.25	.85	34	80

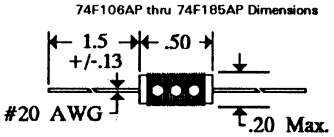
73F Series Dimensions



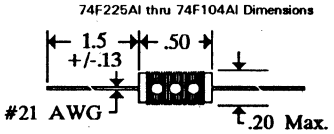
74F SERIES

Miller Number	L ± 20% µH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
74F106AP	1	45	7.9	190	.2	1000
74F126AP	1.2	45	7.9	174	.22	950
74F156AP	1.5	45	7.9	160	.25	900
74F186AP	1.8	45	7.9	144	.28	850
74F226AP	2.2	45	7.9	132	.3	800
	L ± 10% µH					
74F276AP	2.7	45	7.9	119	.5	700
74F336AP	3.3	45	7.9	108	.7	600
74F396AP	3.9	45	7.9	101	.8	500
74F476AP	4.7	50	7.9	91	1	400
74F566AP	5.6	50	7.9	83	1.8	350
74F686AP	6.8	50	7.9	75	1.85	300
74F826AP	8.2	50	7.9	68	1.9	275
74F105AP	10	50	7.9	62	3	250
74F125AP	12	30	2.5	57	3.6	200
74F155AP	15	30	2.5	51	6	150
74F185AP	18	30	2.5	46	7.5	100
74F225AI	22	85	2.5	28	2	500
74F275AI	27	80	2.5	26	1.85	450
74F335AI	33	80	2.5	24	2	450
74F395AI	39	90	2.5	21	2.6	400
74F475AI	47	90	2.5	19	3.5	350
74F565AI	56	90	2.5	18	3.75	300
74F685AI	68	90	2.5	17	4	250
74F825AI	82	100	2.5	15	5.1	200
74F104AI	100	100	2.5	14	6	150

74F106AP thru 74F185AP Dimensions



74F225AI thru 74F104AI Dimensions

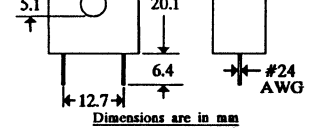


CURRENT SENSE TRANSFORMERS

7200 SERIES

Miller Number	Current Range Amps	Freq. Range kHz	Load Res. Ohms	Sec. Turns	Sec. L (mH) Min.	Sec. DCR Ohms
7201	2 - 10	5 - 50	50	50	5	.7
7202	2 - 20	5 - 50	100	100	20	1.4
7203	2 - 35	1 - 100	200	200	80	3.8

7200 Series Dimensions



Dimensions are in mm

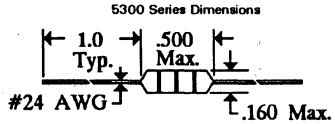
J.W.Miller MAGNETICS
For More Information Call: Fax Service 800-723-8588
306 E. Alondra Blvd. • Gardena, CA 90247 • 310-515-1720 • To Send a Fax Dial: 310-515-1962

MINIATURE HIGH CURRENT CONFORMAL COATED R F CHOKES

5300 SERIES

Miller Number	L (µH) ± 10% @ 0 DC	R,dc Max. Ohms	Fo Min. MHz	Rated I,dc mA	Incr I mA
5300-01	1.0	.018	190	3300	3000
5300-02	1.2	.019	170	3200	2700
5300-03	1.5	.020	160	3100	2500
5300-04	1.8	.023	150	2900	2100
5300-05	2.2	.031	130	2600	2000
5300-06	2.7	.033	120	2500	1900
5300-07	3.3	.054	110	1900	1700
5300-08	3.9	.060	100	1800	1500
5300-09	4.7	.068	86	1700	1400
5300-10	5.6	.074	64	1600	1300
5300-11	6.8	.080	44	1600	1200
5300-12	8.2	.087	32	1500	1100
5300-13	10	.095	25	1500	970
5300-14	12	.11	17	1400	880
5300-15	15	.15	13	1200	790
5300-16	18	.16	10	1100	710
5300-17	22	.19	8.4	1000	640
5300-18	27	.22	8.0	950	580
5300-19	33	.24	7.6	910	530
5300-20	39	.26	7.1	880	480
5300-21	47	.35	6.0	760	430
5300-22	56	.47	5.8	650	400
5300-23	68	.53	4.3	610	370
5300-24	82	.60	4.1	580	330
5300-25	100	.67	3.9	550	300
5300-26	120	.90	3.6	470	270
5300-27	150	1.2	3.2	410	250
5300-28	180	1.4	2.8	380	220
5300-29	220	1.9	2.3	320	200
5300-30	270	2.1	2.1	310	180
5300-31	330	2.4	1.9	290	170
5300-32	390	3.0	1.7	260	150
5300-33	470	3.4	1.4	240	140
5300-34	560	4.7	1.3	210	130
5300-35	680	6.4	1.2	190	110
5300-36	820	7.1	1.1	170	100
5300-37	1,000	7.9	1.0	160	95
5300-38	1,200	9.0	.94	150	87
5300-39	1,500	12	.76	130	78
5300-40	1,800	14	.72	120	71
5300-41	2,200	19	.64	100	64
5300-42	2,700	25	.56	90	58
5300-43	3,300	29	.53	83	52
5300-44	3,900	34	.48	77	48
5300-45	4,700	37	.45	74	44
5300-46	5,600	50	.40	63	40
5300-47	6,800	58	.36	59	36
5300-48	8,200	68	.29	54	33
5300-49	10,000	75	.27	52	30

5300 Series Dimensions



HIGH CURRENT R F CHOKES

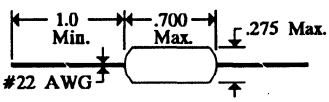
5800 SERIES

Miller Number	L (µH) ± 10% @ 0 DC	R,dc Max. Ohms @ +20°C	Saturation Current (DC Amps)	Suggested Rated Current(AC)
5800-3R9	3.9	.019	7.3	1.28
5800-4R7	4.7	.022	6.3	1.28
5800-5R6	5.6	.024	5.6	1.28
5800-6R8	6.8	.026	5.3	1.28
5800-8R2	8.2	.028	4.5	1.28
5800-100	10	.033	4.1	1.28
5800-120	12	.037	3.6	1.28
5800-150	15	.040	3.3	1.28
5800-180	18	.044	3.0	1.28
5800-220	22	.050	2.7	1.28
5800-270	27	.058	2.5	1.28
5800-330	33	.075	2.2	1.008
5800-390	39	.094	2.0	0.804
5800-470	47	.109	1.8	0.804
5800-560	56	.140	1.7	0.804
5800-680	68	.145	1.5	0.804
5800-820	82	.152	1.4	0.804
5800-101	100	.208	1.2	0.632
5800-121	120	.283	1.1	0.508
5800-151	150	.340	1.0	0.508
5800-181	180	.362	.95	0.508
5800-221	220	.430	.86	0.508
5800-271	270	.557	.77	0.400
5800-331	330	.665	.70	0.400
5800-391	390	.772	.64	0.400
5800-471	470	1.15	.59	0.315
5800-561	560	1.27	.54	0.315
5800-681	680	1.61	.49	0.250
5800-821	820	1.96	.44	0.200
5800-102	1,000	2.30	.40	0.200
5800-122	1,200	2.65	.35	0.200
5800-152	1,500	3.45	.33	0.158
5800-182	1,800	4.03	.29	0.158
5800-222	2,200	4.48	.27	0.158
5800-272	2,700	5.90	.24	0.125
5800-332	3,300	6.56	.22	0.125
5800-392	3,900	8.63	.20	0.100
5800-472	4,700	10.5	.18	0.100
5800-562	5,600	13.9	.166	0.082
5800-682	6,800	16.3	.151	0.082

5800 SERIES *(continued)*

Miller Number	L (µH) ± 10% @ 0 DC	R,dc Max. Ohms @ +20°C	Saturation Current (DC Amps)	Suggested Rated Current(AC)
5800-822	8,200	20.8	.136	0.065
5800-103	10,000	26.4	.125	0.050
5800-123	12,000	29.9	.114	0.050
5800-153	15,000	42.5	.098	0.039
5800-183	18,000	48.3	.091	0.039

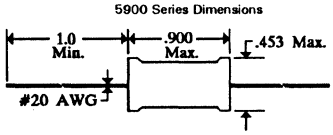
5800 Series Dimensions



5900 SERIES

Miller Number	L (µH) ± 10% @0 DC	R,dc Max. Ohms Ω @ +20°C	Saturation Current (DC Amps)	Suggested Rated Current(AC)
5900-3R9	3.9	.007	15.5	4.0
5900-4R7	4.7	.008	13.9	4.0
5900-5R6	5.6	.011	12.6	4.0
5900-6R8	6.8	.011	11.6	4.0
5900-8R2	8.2	.013	9.89	4.0
5900-100	10	.017	8.70	4.0
5900-120	12	.019	8.21	4.0
5900-150	15	.022	7.34	4.0
5900-180	18	.023	6.64	4.0
5900-220	22	.026	6.07	4.0
5900-270	27	.027	5.36	4.0
5900-330	33	.032	4.82	4.0
5900-390	39	.033	4.36	4.0
5900-470	47	.035	3.98	4.0
5900-560	56	.037	3.66	3.2
5900-680	68	.047	3.31	2.5
5900-820	82	.060	3.10	2.0
5900-101	100	.090	2.79	1.6
5900-121	120	.113	2.54	1.6
5900-151	150	.129	2.22	1.6
5900-181	180	.150	1.98	1.6
5900-221	220	.162	1.89	1.6
5900-271	270	.208	1.63	1.6
5900-331	330	.212	1.51	1.6
5900-391	390	.281	1.39	1.6
5900-471	470	.380	1.24	1.2
5900-561	560	.420	1.17	1.0
5900-681	680	.548	1.05	1.0
5900-821	820	.655	.97	0.8
5900-102	1,000	.844	.87	0.8
5900-122	1,200	1.04	.79	0.6
5900-152	1,500	1.18	.70	0.6
5900-182	1,800	1.56	.64	0.6
5900-222	2,200	2.00	.58	0.5
5900-272	2,700	2.06	.53	0.4
5900-332	3,300	2.53	.47	0.4
5900-392	3,900	2.75	.43	0.4
5900-472	4,700	3.19	.39	0.4
5900-562	5,600	3.92	.359	0.315
5900-682	6,800	5.69	.322	0.250
5900-822	8,200	6.32	.293	0.250
5900-103	10,000	7.30	.266	0.250
5900-123	12,000	9.21	.241	0.200
5900-153	15,000	10.5	.214	0.200
5900-183	18,000	14.8	.198	0.158
5900-223	22,000	21.8	.180	0.125
5900-273	27,000	22.7	.162	0.125
5900-333	33,000	25.7	.146	0.125
5900-393	39,000	31.8	.135	0.100
5900-473	47,000	36.1	.122	0.100
5900-563	56,000	40.9	.112	0.100
5900-683	68,000	57.3	.101	0.082
5900-823	82,000	79.3	.090	0.065
5900-104	100,000	89.7	.081	0.065

5900 Series Dimensions



(LOW COST) MOLDED R F CHOKES

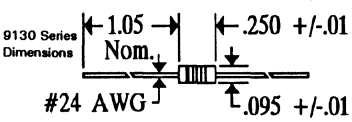
9130 SERIES

Miller Number	L ± 10% µH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
9130-94	0.10	40	25	680	0.08	1100
9130-96	0.12	40	25	640	0.09	1100
9130-00	0.15	38	25	600	0.10	1100
9130-02	0.18	35	25	560	0.12	1010
9130-04	0.22	33	25	510	0.14	935
9130-06	0.27	33	25	430	0.16	875
9130-08	0.33	30	25	410	0.22	80
9130-10	0.39	30	25	365	0.30	640
9130-12	0.47	30	25	330	0.35	590
9130-14	0.56	30	25	300	0.50	495
9130-16	0.68	28	25	275	0.60	450
9130-18	0.82	28	25	250	0.85	380
9130-20	1.0	25	25	230	1.00	350

9130 SERIES

Miller Number	L ± 10% µH	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA
9130-22	1.2	25	7.9	150	0.18	825
9130-24	1.5	28	7.9	140	0.22	745
9130-26	1.8	30	7.9	125	0.30	640
9130-28	2.2	30	7.9	115	0.40	550
9130-30	2.7	37	7.9	100	0.55	495
9130-32	3.3	45	7.9	90	0.85	380
9130-34	3.9	45	7.9	80	1.0	350
9130-36	4.7	45	7.9	75	1.2	320
9130-38	5.6	50	7.9	65	1.8	260
9130-40	6.8	50	7.9	60	2.0	245
9130-42	8.2	55	7.9	55	2.7	210
9130-44	10	55	7.9	50	3.7	180
9130-46	12	45	2.5	40	2.7	210
9130-48	15	40	2.5	35	2.8	205
9130-50	18	50	2.5	30	3.1	195
9130-52	22	50	2.5	25	3.3	190
9130-54	27	50	2.5	20	3.5	185
9130-56	33	45	2.5	24	3.4	187
9130-58	39	45	2.5	22	3.6	180
9130-60	47	45	2.5	20	4.5	165
9130-62	56	45	2.5	18	5.7	145
9130-64	68	50	2.5	15	6.7	135
9130-66	82	50	2.5	14	7.3	130
9130-68	100	50	2.5	13	8.0	125
9130-70	120	30	0.7	12	13	97
9130-72	150	30	0.7	11	15	85
9130-74	180	30	0.7	10	17	79
9130-76	220	30	0.79	9	21	73
9130-78	270	30	0.79	8	25	65
9130-80	330	30	0.79	7	28	62
9130-82	390	30	0.79	6.5	35	55
9130-84	470	30	0.79	6	42	50
9130-86	560	30	0.79	5	46	48
9130-88	680	30	0.79	4	60	42
9130-90	820	30	0.79	3.8	65	40
9130-92	1000	30	0.79	3.4	72	38

9130 Series Dimensions

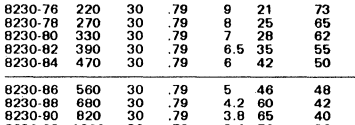


CONFORMAL COATED R F CHOKES

8230 SERIES

Miller Number	L µH ± 10%	Q Min.	Test Freq. MHz	Fo Min. MHz	R,dc Max. Ohms	I,dc Max. mA	Core Material
8230-94	.10	40	25	690	.07	1100	Phenolic
8230-96	.12	40	25	650	.08	1100	Phenolic
8230-00	.15	38	25	600	.1	1100	Phenolic
8230-02	.18	35	25	550	.12	1010	Phenolic
8230-04	.22	33	25	510	.14	935	Phenolic
8230-06	.27	33	25	430	.16	875	Phenolic
8230-08	.33	30	25	410	.2	780	Phenolic
8230-10	.39	30	25	380	.3	640	Phenolic
8230-12	.47	30	25	340	.35	590	Phenolic
8230-14	.56	30	25	300	.5	495	Phenolic
8230-16	.68	28	25	275	.6	450	Phenolic
8230-18	.82	28	25	250	.85	380	Phenolic
8230-20	1.0	25	25	230	1	350	Phenolic
8230-22	1.2	25	7.9	150	.18	825	Iron
8230-24	1.5	28	7.9	140	.22	745	Iron
8230-26	1.8	30	7.9	125	.3	640	Iron
8230-28	2.2	30	7.9	115	.4	550	Iron
8230-30	2.7	37	7.9	100	.5	495	Iron
8230-32	3.3	45	7.9	90	.85	380	Iron
8230-34	3.9	45	7.9	82	1	350	Iron
8230-36	4.7	45	7.9	75	1.2	320	Iron
8230-38	5.6	50	7.9	68	1.8	260	Iron
8230-40	6.8	50	7.9	60	2	245	Iron
8230-42	8.2	55	7.9	55	2.7	210	Iron
8230-44	10	55	7.9	50	3.7	180	Iron
8230-46	12	45	2.5	40	2.7	210	Iron
8230-48	15	45	2.5	35	2.8	205	Iron
8230-50	18	50	2.5	32	3.1	195	Iron
8230-52	22	50	2.5	25	3.3	190	Iron
8230-54	27	50	2.5	22	3.5	185	Iron
8230-56	33	45	2.5	24	3.4	187	Ferrite
8230-58	39	45	2.5	22	3.6	180	Ferrite
8230-60	47	45	2.5	20	4.5	165	Ferrite
8230-62	56	45	2.5	18	5.7	145	Ferrite
8230-64	68	50	2.5	15	6.7	135	Ferrite
8230-66	82	50	2.5	14	7.3	130	Ferrite
8230-68	100	50	2.5	13	8	125	Ferrite
8230-70	120	30	.79	12	13	97	Ferrite
8230-72	150	30	.79	11	15	85	Ferrite
8230-74	180	30	.79	10	17	79	Ferrite
8230-76	220	30	.79	9	21	73	Ferrite
8230-78	270	30	.79	8	25	65	Ferrite
8230-80	330	30	.79	7	28	62	Ferrite
8230-82	390	30	.79	6.5	35	55	Ferrite
8230-84	470	30	.79	6	42	50	Ferrite
8230-86	560	30	.79	5	46	48	Ferrite
8230-88	680	30	.79	4.2	60	42	Ferrite
8230-90	820	30	.79	3.8	65	40	Ferrite
8230-92	1000	30	.79	3.4	72	38	Ferrite

8230 Series Dimensions



J.W.Miller MAGNETICS
For More Information Call: Fax Service 800-723-8588
306 E. Alondra Blvd. • Gardena, CA 90247 • 310-515-1720 • To Send a Fax Dial: 310-515-1962

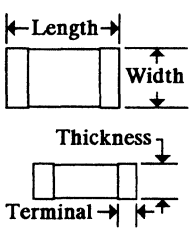
EMI SUPPRESSION CHIP BEADS

PMC Series

Miller Number	Z @ ± 5% 100 MHz Ohms	R,dc Max. Ohms	I,dc Max. mA	Length ± .2 mm	Width ± .2 mm	Thick ± .3 mm	Term ± .3 mm
PMC0603-300	30	.30	400	1.60	0.80	0.80	0.50
PMC0603-600	60	.40	300	1.60	0.80	0.80	0.50
PMC0603-101	100	.70	200	1.60	0.80	0.80	0.50
PMC0603-151	150	.90	200	1.60	0.80	0.80	0.50
PMC0603-301	300	1.20	150	1.60	0.80	0.80	0.50
PMC0603-601	600	1.80	150	1.60	0.80	0.80	0.50
PMC0603-102	1000	2.00	100	1.60	0.80	0.80	0.50
PMC0805-300	30	.10	600	2.00	1.25	0.90	0.50
PMC0805-600	60	.20	400	2.00	1.25	0.90	0.50
PMC0805-101	100	.20	400	2.00	1.25	0.90	0.50
PMC0805-151	150	.30	300	2.00	1.25	0.90	0.50
PMC0805-301	300	.30	200	2.00	1.25	0.90	0.50
PMC0805-102	1000	.80	150	2.00	1.25	0.90	0.50
PMC0805-152	1500	1.0	100	2.00	1.25	0.90	0.50
PMC1206-300	30	.10	600	3.20	1.60	1.10	0.50
PMC1206-600	60	.20	500	3.20	1.60	1.10	0.50
PMC1206-101	100	.20	400	3.20	1.60	1.10	0.50
PMC1206-151	150	.30	300	3.20	1.60	1.10	0.50
PMC1206-301	300	.40	300	3.20	1.60	1.10	0.50
PMC1206-601	600	.50	200	3.20	1.60	1.10	0.50
PMC1206-102	1000	.70	150	3.20	1.60	1.10	0.50
PMC1206-152	1500	.90	100	3.20	1.60	1.10	0.50
PMC1806-600	60	.10	700	4.50	1.60	1.60	0.50
PMC1806-101	100	.10	600	4.50	1.60	1.60	0.50
PMC1806-151	150	.20	500	4.50	1.60	1.60	0.50
PMC1806-301	300	.20	300	4.50	1.60	1.60	0.50
PMC1806-601	600	.30	300	4.50	1.60	1.60	0.50
PMC1806-102	1000	.50	200	4.50	1.60	1.60	0.50
PMC1806-152	1500	.60	200	4.50	1.60	1.60	0.50

Packaged 3000/reel (min. order 1 reel)

PMC Series Dimensions



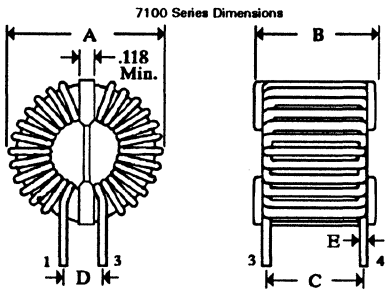
COMMON MODE EMI SUPPRESSION INDUCTORS

7100 SERIES

Miller Number	L mH * ± 15% @ 1kHz	R,dc * Max. Ohms	I,dc * Max. Amps	Dim. A Max.	Dim. B Max.	Dim. C Aprox.	Dim. D Aprox.
7101	.6	.040	1.0	.600	.450	.400	.200
7102	1.0	.060	1.0	.600	.450	.400	.200
7103	2.0	.070	1.0	.600	.450	.400	.200
7104	3.0	.100	1.0	.600	.450	.400	.200
7105	5.0	.125	1.0	.600	.450	.400	.200
7106	0.6	.030	2.0	.600	.450	.400	.200
7107	1.0	.040	2.0	.600	.450	.400	.200
7108	2.0	.060	2.0	.600	.450	.400	.200
7109	3.0	.075	2.0	.600	.450	.400	.200
7110	.6	.020	3.0	.600	.450	.400	.200
7111	1.0	.030	3.0	.600	.450	.400	.200
7112	1.0	.050	2.0	.800	.550	.500	.300
7113	2.0	.075	2.0	.800	.550	.500	.300
7114	3.0	.085	2.0	.800	.550	.500	.300
7115	5.0	.110	2.0	.800	.550	.500	.300
7116	8.0	.200	2.0	.800	.550	.500	.300
7117	1.0	.035	5.0	.800	.550	.500	.300
7118	2.0	.040	5.0	1.20	.800	.700	.400
7119	5.0	.046	4.0	1.20	.800	.700	.400
7120	8.0	.060	4.0	1.20	.800	.700	.400
7121	50.0	.200	2.0	1.20	.800	.700	.400
7122	30.0	.130	4.0	1.20	.800	.700	.400
7123	11.0	.072	5.0	1.20	.800	.700	.400
7124	3.0	.020	10.0	1.20	.800	.700	.400

* Readings are for each winding.

7100 Series Dimensions



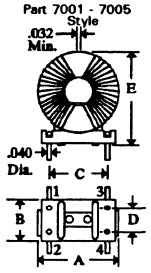
DIFFERENTIAL MODE EMI SUPPRESSION INDUCTORS

7000 SERIES

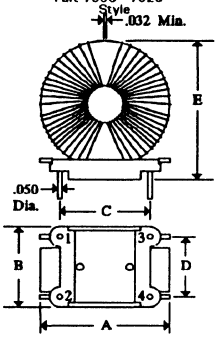
Miller Number	L µH* ± 15% @ 1kHz	R,dc* Max. Ohms	I,dc* Max. Amps	L @* Rated I dc	Dim. A Max.	Dim. B Max.	Dim. C ± .015
7001	2.5	.004	11	1.25	.875	.425	.600
7002	6.0	.007	5.5	3.0	.875	.425	.600
7003	31.25	.060	2.75	17.5	.875	.425	.600
7004	68.75	.120	2.0	37.5	.875	.425	.600
7005	112.5	.245	1.5	62.5	.875	.425	.600
7006	6.25	.006	9.0	3.75	1.125	.600	.800
7007	18.75	.020	5.0	10	1.125	.600	.800
7008	100	.165	2.25	56.25	1.125	.600	.800
7009	200	.320	1.75	118.75	1.125	.600	.800
7010	250	.470	1.50	143.75	1.125	.600	.800
7011	12.5	.008	9.50	6.25	1.25	.800	.900
7012	37.5	.023	4.75	21.25	1.25	.800	.900
7013	175	.210	2.25	100	1.25	.800	.900
7014	312.5	.430	1.75	187.5	1.25	.800	.900
7015	400	.640	1.50	237.5	1.25	.800	.900
7016	31.25	.016	7.75	16.25	1.812	.900	1.20
7017	125	.075	4.0	68.75	1.812	.900	1.20
7018	275	.165	2.5	162.5	1.812	.900	1.20
7019	562.5	.460	1.75	281.25	1.812	.900	1.20
7020	1125	1.32	1.25	562.5	1.812	.900	1.20
7021	62.5	.021	8.0	31.75	2.125	1.10	1.50
7022	225	.088	3.75	125	2.125	1.10	1.50
7023	450	.240	2.5	250	2.125	1.10	1.50
7024	1000	.580	1.75	525	2.125	1.10	1.50
7025	2000	1.67	1.00	1125	2.125	1.10	1.50

* Readings are for each winding.

Part 7001 - 7005 Style



Part 7006 - 7025 Style



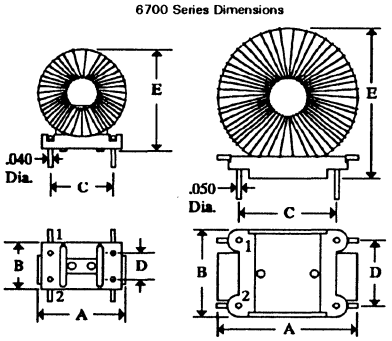
HIGH CURRENT TOROIDS

6700 SERIES

Miller Number	L µH* ± 15% @ 1kHz	I,dc Max. Amps	Min. L µH @ I, dc	R,dc Max. Ohms	Dim. A Max.	Dim. B Max.	Dim. C ± .015
6701	10	11.00	5	.008	.875	.424	.600
6702	25	5.50	12	.014	.875	.425	.600
6703	125	2.75	70	.12	.875	.425	.600
6704	275	2.00	150	.24	.875	.425	.600
6705	450	1.50	250	.49	.875	.425	.600
6706	25	9.00	15	.012	1.125	.600	.800
6707	75	5.00	40	.04	1.125	.600	.800
6708	400	2.25	225	.33	1.125	.600	.800
6709	800	1.75	475	.64	1.125	.600	.800
6710	1000	1.50	575	.98	1.125	.600	.800
6711	50	9.50	25	.012	1.250	.800	.900
6712	150	4.75	85	.046	1.250	.800	.900
6713	700	2.25	400	.42	1.250	.800	.900
6714	1250	1.75	750	.85	1.250	.800	.900
6715	1600	1.50	950	1.27	1.250	.800	.900
6716	125	7.75	65	.032	1.812	.900	1.200
6717	500	4.00	275	.15	1.812	.900	1.20
6718	1100	2.50	650	.33	1.812	.900	1.20
6719	2250	1.75	1350	.92	1.812	.900	1.20
6720	4500	1.25	2700	2.64	1.812	.900	1.20
6721	250	8.00	125	.041	2.125	1.10	1.50
6722	900	3.75	500	.175	2.125	1.10	1.50
6723	1800	2.50	1000	.55	2.125	1.10	1.50
6724	4000	1.75	2100	1.16	2.125	1.10	1.50
6725	8000	1.00	4500	3.34	2.125	1.10	1.50
6726	25	2.50	16	.040	.550	.425	.600
6727	35	2.50	29	.035	.700	.425	.600
6728	50	2.50	35	.060	.750	.425	.600
6729	100	2.50	70	.080	.850	.425	.600
6730	70	3.00	50	.050	.850	.425	.600
6731	40	4.00	30	.025	.850	.425	.600

* @ 0 Amps DC.

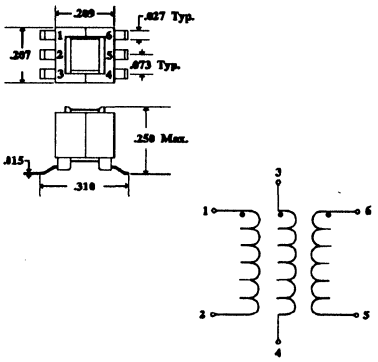
6700 Series Dimensions



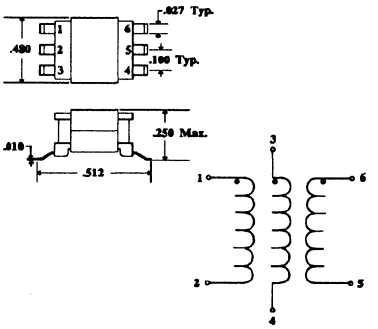
LOW PROFILE SURFACE MOUNT TRANSFORMERS/INDUCTORS

6100 SERIES

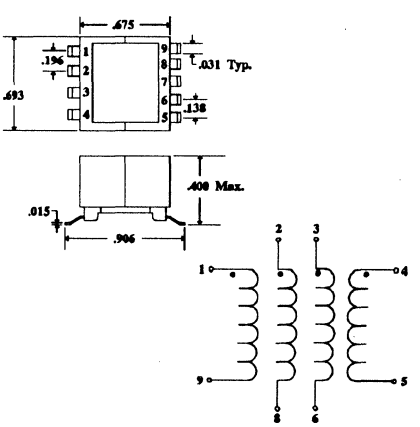
Part Number 6100-20
Inductance: 120 µH Minimum
Turns Ratio: 1:1:1 ± 1%
Resistance: 0.6 Ω each winding
Voltsecond product: 20 V µsec Min.
Leakage Inductance: 1 µH Max.
Operating temperature range: -34° C to + 85° C
Dielectric withstanding voltage 1000 VDC.
Recommended frequency 200 kHz.



Part Number 6100-120
Inductance: 620 µH Minimum
Turns Ratio: 1:1:1 ± 1%
Resistance: 0.5 Ω Max. each winding
Voltsecond product: 120 V µsec Min.
Leakage Inductance: 1 µH Max.
Operating temperature range: -34° C to + 85° C
Dielectric withstanding voltage 1000 VDC.
Recommended frequency 100 kHz - 200 kHz.



Part Number 6100-650
Inductance: 500 µH Minimum
Turns Ratio: 1:1:1:1 ± 1%
Resistance: 0.3 Ω Max. each winding
Voltsecond product: 650 V µsec Min.
Leakage Inductance: 1 µH Max.
Operating temperature range: -34° C to + 85° C
Dielectric withstanding voltage 1000 VDC.
Recommended frequency 25 kHz - 100 kHz.



MTE® CORPORATION

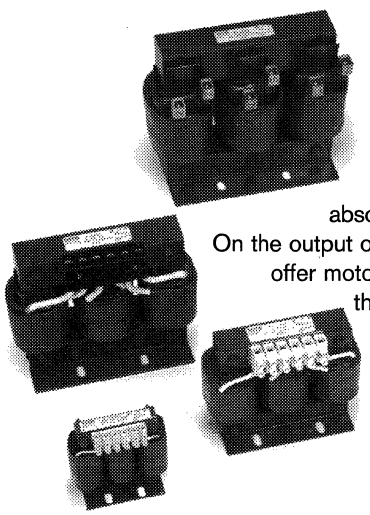
www.mtecorp.com
1-800-455-4MTE

Your Power Quality and Magnetics Resource

MTE Corporation offers a wide variety of power quality solutions to improve the reliability and performance of variable speed drive systems and to minimize their interference with other equipment. In addition, we offer a full range of industrial transformers for use in either power, control or sensing circuits. With a worldwide network of distributors and sales representatives, MTE has the knowhow to serve all your power quality and electrical needs from your complete industrial facility down to your desktop computing equipment.

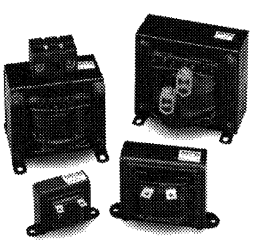
Power Quality Products

AC Line/Load Reactors



Increase variable speed motor drive reliability and performance. On the input side of a drive they reduce harmonic distortion while absorbing power line spikes. On the output of a drive (load side) they offer motor protection by reducing the flow of high frequency currents, reducing peak voltage (long lead applications) and reducing dv/dt rates. Available as open or NEMA 1 enclosed.

DC Reactors



MTE's DC Reactors offer filtering on either the DC BUS (AC voltage source inverters) or on the output of a DC Drive. Standard offerings up to 1,000 amps and 1,000 Volts DC. Customs available to 5,000 volts.

Reactor Master Software

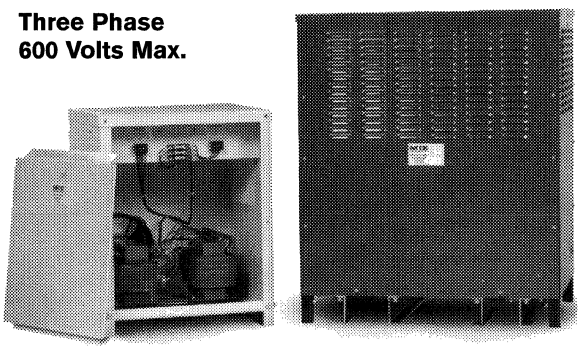
This easy-to-use software computes reactor specifications for virtually any adjustable speed drive application. It is capable of making computations for any operating frequency, for both input and output applications, and for any desired impedance.

Reactor Master Software is compatible with any DOS system and runs on color or monochrome monitors. It is available on either 3.5" or 5.25" inch floppy disks.

Description	Catalog No.
3 1/2" Floppy Disk	RMS-3
5 1/4" Floppy Disk	RMS-5

Broad-Band Harmonic Filters

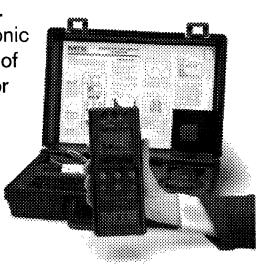
Three Phase
600 Volts Max.



Broad Band Harmonic Filters solve harmonic distortion problems and offer guaranteed results. They help to meet IEEE-519, BS G5/3, AS-2279 and IEC-1800 without creating harmonic resonance with your power system and without importing harmonics from other equipment. The Broad Band Harmonic Filter improves power factor and minimizes Telephone Interference Factor (TIF).

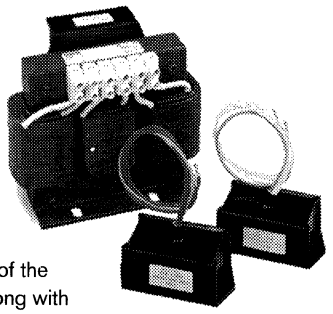
Hand-Held Harmonic Distortion Analyzer

Perform Harmonic Analysis easily with the hand-held EZ-900 and EZ-901 analyzers.
Simplify electrical system harmonic analysis by putting the power of a sophisticated analyzer into a low cost, hand-held portable instrument.
The EZ-900 or EZ-901 Harmonic Analyzers provide a snapshot of electrical system conditions for on-the-spot trouble-shooting and analysis.
View actual voltage and current waveforms,harmonic spectra and read true RMS values of current and voltage.



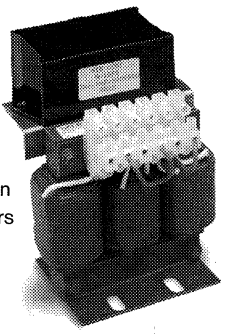
EZ-901 downloads stored data into your computer for easy analysis and print-out.

Reactor with MOV Module



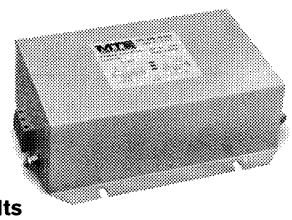
Combines the surge and spike capability of reactors with the voltage clamping ability of MOV's to offer enhanced transient spike and surge protection for variable speed drive systems. Get all of the benefits of an input reactor along with the enhanced spike protection offered by the combination of reactor and mov.

Motor Protection Filters (LC)



Convert PWM output to a near sinusoidal waveform using simple "LC" low pass filter technique. Offers low cost solution to applications involving IGBT inverters with long lead lengths to the motor. Protects motor from failure due to high peak voltage or fast dv/dt rate.

RFI/EMI Filters

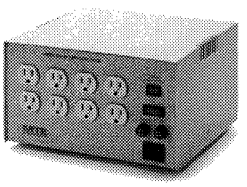


Use the "CE" Series filters to minimize conducted emissions of RFI/EMI and to help meet international directives such as EMC, FCC, etc.

3-Phase ratings up to 600 volts and up to 280 amps.

Single-Phase filters also available.

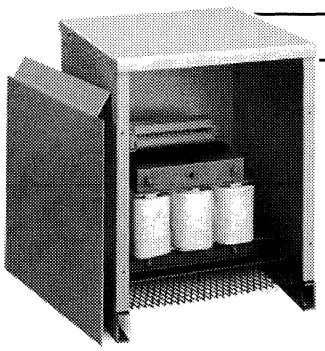
3rd Harmonic Filters



Single Phase with Surge Protection

3rd Harmonic Filters minimize 3rd harmonic currents caused by switching power supplies while reducing the 5th-9th harmonic also. They offer spike and surge protection and are available as either plug-in or hard-wire versions. Use these filters to reduce unwanted neutral currents which are caused by triplen harmonics. Panel mount (hardwire) version also available.

TRANSFORMERS



Drive Isolation Transformers

Complete range from 1KVA to 1.5 MVA are available. Standards or customs for 600 Volt class up to 5,000 Volt class. Electro-static shield is offered on standard units. K-ratings are available for non-linear load applications.

12- Pulse Transformers

Phase Shifting Transformers provide a 30° phase shifted output for 12-pulse rectifier applications.

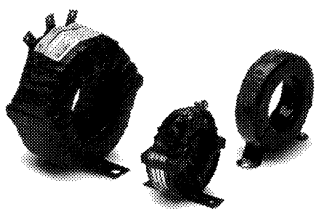
Available as an isolation type with separate delta and wye configuration secondaries, or as an auto-transformer type with single 30° phase shifted output.

Current Transformers

Standard and customized toroidal current transformers for industrial applications.

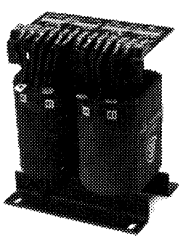
600 Volt class or medium voltage class are available, as are special terminations or mounting methods.

Encapsulation is available for moisture resistant applications.



Power Transformers

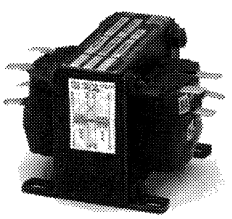
Three Phase Power Transformers through 1.5 MVA. 600 Volt class to 5KV class are designed and built for industrial (indoor) applications. **Single Phase** Power Transformers are also available.



Control Transformers

Control Transformers are available in any VA and frequency rating.

Customized to fit your needs, (terminal block, 50/60 HZ, flying leads, screw terminals or encapsulation. Both 600 Volt class and medium voltage are available.)



1-800-455-4MTE http//www.mtecorp.com

MTE® CORPORATION

USA Headquarters
W147 N9525 Held Drive
Menomonee Falls, WI 53051 USA
Telephone: 414-253-8200
Fax: 414-253-8222
e-mail:custsvc@mtecorp.com

MTE Canada
P.O. Box 172
Kleinburg, Ontario L0J 1C0
Telephone: 905-893-3705
Fax: 905-893-3757
e-mail: mtecan@interlog.com

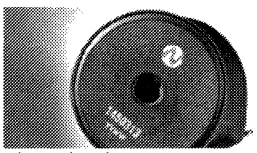
MTE Europe
P.O. Box 127
Great Yarmouth, Norfolk NR31 OQT U.K.
Telephone: (+44) 01493 604 444
Fax: (+44) 01493 604 455
email: JBH_MTE_CORP_EU@compuserve.com

Newport Components, Inc.
8917 Glenwood Ave. • Raleigh, NC 27612
(919) 571-9405 • (919) 571-9262 FAX

INDUCTORS AND TRANSFORMERS

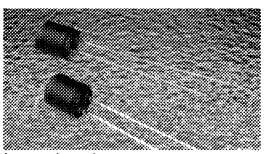
INDUCTORS

Bobbin Inductors **NEWPORT 1400**



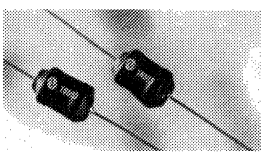
- Radial Format
- -40°C to 85°C Operating Temp
- Up to 13A Idc
- 10µH to 47mH
- Low DC Resistance
- Fully Tinned Leads

Radial Lead Inductors **NEWPORT 1700**



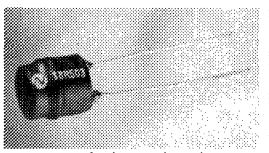
- Radial Format
- Up to 1.8A Idc
- 10µH to 2.2mH
- Low DC Resistance
- Miniature Size
- PCB Mounting

Axial Lead Inductors **NEWPORT 1800**



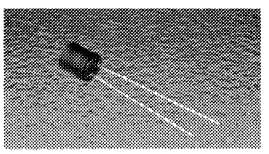
- Axial Format
- Up to 5.35A Idc
- 4.7µH to 10mH
- Low DC Resistance
- Compact Size
- Fully Tinned Leads

Radial Lead Inductors **NEWPORT 1800R**



- Radial Format
- Up to 5.35A Idc
- 4.7µH to 10mH
- Low DC Resistance
- Compact Size
- Fully Tinned Leads

Miniature Radial Lead Inductors **NEWPORT 2200R**

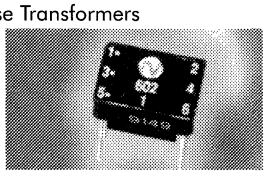


- Miniature Size
- Current handling up to 1.5A
- Inductance Range 10µH to 68mH
- Low cost
- General Purpose
- Flame Retardant Sleeve

Series	Inductance		DC Current		Temperature		Pckg.	Height	Diam.
Units	µH	mH	A	A	°C	°C		mm	mm
	Min	Max	Min	Max	Min	Max		h	d
1400	10.0	47.0	0.4	13.0	-40	85	Bobbin	14.0	26.4
1700	10.0	2.2	0.1	1.8	0	70	Radial	8.2	7.2
1800	4.7	10.0	0.1	5.3	0	70	Axial	18.3	13.7
1800R	4.7	10.0	0.1	5.3	0	70	Radial	15.9	13.7
2200R	10.0	68.0	0.1	1.5	-25	70	Radial	8.2	7.2

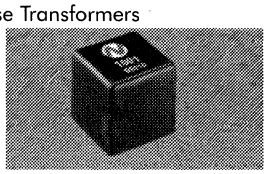
TRANSFORMERS

Pulse Transformers **NEWPORT 766**



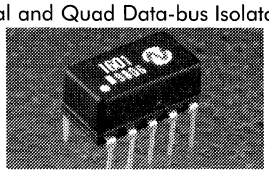
- 6 Configurations
- Inductance to 11mH
- Toroidal Construction
- Up to 50 VµS E_T
- Fully Encapsulated
- PCB Mounting

Pulse Transformers **NEWPORT 1000**



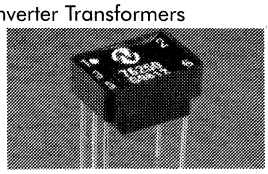
- 500Vrms Working
- UL 94V-0 Package Material
- Isolation to 2kVrms
- Industry Standard Pinout
- Inductance to 12mH
- Up to 400 VµS E_T

Dual and Quad Data-bus Isolators **NEWPORT 1600**



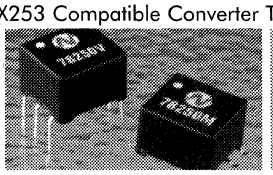
- Logic Translation
- Bi-Directional
- Invert/Non-Invert
- TTL-CMOS Convert
- 3V-5V Convert
- Toroidal Construction

Converter Transformers **NEWPORT 76250**



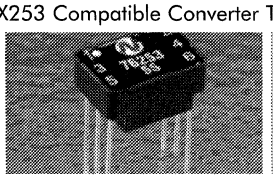
- Maxim Compatible
- BS EN 60950 Approved
- Isolation to 6kV
- Toroidal Construction
- Standard Pinout
- UL 94V-0 Package Material

MAX253 Compatible Converter Transformers **78250**



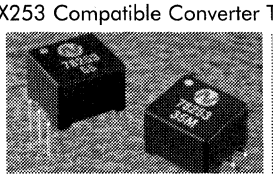
- Maxim Compatible
- BS EN 60950 Approved
- 3.3V and 5V Versions
- Isolation to 6kVDC
- Frequency Range to 500kHZ
- Toroidal Construction

MAX253 Compatible Converter Transformers **76253**



- Maxim Compatible
- Surface Mount Options
- Isolation to 4kVDC
- Toroidal Construction
- Standard Pinout
- UL 94V-0 Package Material

MAX253 Compatible Converter Transformers **78253**



- Maxim Compatible
- Surface Mount Options
- 3.3V and 5V Versions
- Isolation to 4kVDC
- Toroidal Construction
- Industry Standard Pinout

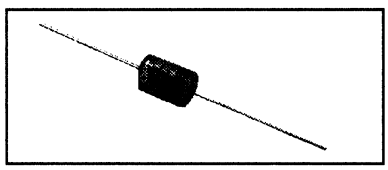
Series	Description
766	General Purpose
1000	Wideband and pulse operations
1600	Dual and quad data bus Isolators
76250	Designed for use with Maxim chipsets
78250	Designed for use with Maxim chipsets, with SMD option
76253	Designed for use with Maxim MAX253 chip set
78253	Designed for use with Maxim MAX253, with SMD option

FREE product data available in book and CD-ROM format

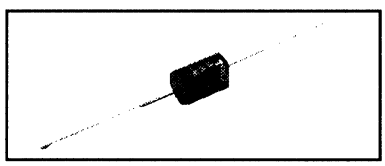
Call us TOLL FREE at
1-877-DCDC NOW
(323-2669)
or visit our web site
www.newport-comps.com/eem

AXIAL LEAD INDUCTOR & SURFACE MOUNT INDUCTORS

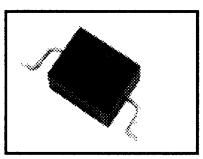
LL, CLL, SMLL SERIES



LL (QPL)



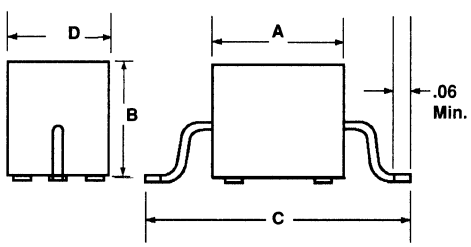
CLL (Commercial)



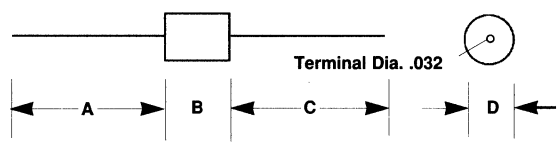
SMLL
(Surface Mount)

- Switchmode and Power Filtering Applications
- Smallest Size Possible
- LL Series QPL Listed M27/286
- Operating Temperature -55°C to +130°C
- Operating Frequency Up to 50KHz
- Axial & Surface Mount Packages
- All Inductors manufactured to MIL-T-27 Standards
- Custom Inductance Values Available

TYPE	A	B	C	D
LL	1.25 Min.	.500 Max.	1.25 Min.	.375 Max.
CLL	1.25 Min.	.510 Max.	1.25 Min.	.410 Max
SMLL	.500	.440 Max	1.00	.400
All dimensions are in inches				



SMLL Series



LL & CLL Series

Military Type Number	Commercial Type Number	Surface Mount Type Number	Inductance (µH) at 1V, 20 KHz +30%/-5%	Max DCR Ω	Rated Adc†
LL30	CLL30	SMLL30	30	.035	3.00
LL50	CLL50	SMLL50	50	.056	2.50
*LL75	CLL75	SMLL75	75	.086	2.00
LL120	CLL120	SMLL120	120	0.14	1.60
*LL220	CLL220	SMLL220	220	0.24	1.20
LL300	CLL300	SMLL300	300	0.35	1.00
*LL400	CLL400	SMLL400	400	0.50	0.82
LL500	CLL500	SMLL500	500	0.56	0.75
*LL750	CLL750	SMLL750	750	0.85	0.62
LL1200	CLL1200	SMLL1200	1200	1.40	0.50
*LL2200	CLL2200	SMLL2200	2200	2.10	0.36
LL3000	CLL3000	SMLL3000	3000	3.50	0.30
*LL4000	CLL4000	SMLL4000	4000	4.50	0.27
LL5000	CLL5000	SMLL5000	5000	5.60	0.25

*Qualified by simillarity. † For 20% maximum drop in rated inductance & approx. a 40°C temp rise at 20KHz.

OPT Industries, Inc. 300 Red School Lane, Phillipsburg, NJ 08865 • Phone: (908)454-2600 • FAX: (908)454-3742
Web: www.optind.com • E-mail: sales@optind.com • Faxback: 1-800-950-2892

COMMONLY USED ELECTRICAL/ELECTRONIC ABBREVIATIONS AND ACRONYMS

A
A/D acrylonitrile butadiene-styrene
A/D analog to digital
ADC analog to digital converter
ADP automatic data processing
AFC audio frequency control
AFT automatic filter test
ALGOL algorithmic language
AM a logical operator
AQL acceptable quality level
ASCII American national standard code for information interchange
ASIC application specific IC
ATE automatic test equipment
ATG automatic test generation
AWG American wire gauge

B
BALUN balanced to unbalanced
BASIC beginners' all-purpose symbolic instruction
BCD binary-coded decimal
BNC baby "N" connector
BUS basic utility syste

C
CAD computer-aided design
CAE computer-aided engineering
CAM computer-aided manufacture
CAMAC computer-automated measurement and control
CAPP computer-aided process planning
CAT computer-aided test
CATV cable television or community antenna television
CCC (leaded) ceramic chip carriers
CCD computer-controlled display
CERMET ceramic metal element
CIE computer-integrated engineering
CIM computer-integrated manufacturing
CLCC ceramic leadless chip carriers
CMOS complementary metal-oxide semiconductor
Comm. communications
CPS characters per second
CPU central processing unit

D
D/A digital to analog
DAC digital to analog converter
DBMS data base management system
DC direct current
DFT design for testability
DIAC bidirectional trigger diode
DIL dual in-line
DIN Deutsche Industrie Normenausschuss
DIP dual in-line package
DPM digital panel meter
DRAM dynamic RAM
DTL diode transistor logic

E
EDA electronic design automation
EDP electronic data processing
EBCDIC extended binary coded decimal interchange code
EEPROM electrically erasable PROM
EIA Electronic Industries Association
EMC electromagnetic compatibility
EMI electromagnetic interference
EMP electromagnetic pulse
EPROM erasable programmable ROM
ESR equivalent series resistance

F
FEP fluorinated ethylene propylene Copolymar, 200° Teflon
FET field-effect transistor
FM frequency modulation
FORTRAN formula translator

G
GaAsFET gallium arsenide FET
CMIP commn management information protocol
GPIB general purpose interface bus
GPS global positioning system

H
HF high frequency (3 to 30 MHz)
HIPOT test, measurement, and diagnostic equipment
HLL high level language
HV high voltage
Hz Hertz

I
IAB Internet Activities Board
IC integrated circuit
IDC insulation displacement contact
IF intermediate frequency
IO input/output (devices)
IR insulation resistance (or) infrared
ISDN integrated services digital network
ISO International Standards Organization

J
JEDEC Joint Electronic Device Engineering Council
JFET junction FET
JMOS junction MOS

K
kHz kilohertz (10^3 hertz)
KSR keyboard send /receive

L
LAN local area network
LC (filters) inductance/capacitance
LCC leaded chip carrier
LCD liquid crystal display
LED light-emitting diode
LF low frequency (30 to 300 kHz)
LIF low insertion force
LNA low noise amplifier
LNB low noise band
LSI large scale integration
LVDT linear velocity displacement transformer

M
MASER microwave amplification by stimulated emission of radiation
MATV master antenna television
µF microfarad
MHz megahertz
MIC microwave IC
MIPS million instructions per second
MIB microcomputer interface board
MOS metal oxide semiconductor
MOSFET metal oxide semiconductor FET
MOSIGT metal oxide semiconductor insulated-gate transistor
MOV metal oxide varistor
MPU microprocessor unit
MSI medium scale integration

N
NBS National Bureau of Standards
NEMP nuclear electromagnetic pulse
NIM national instrumentation module
NOR not OR
NTC negative temperature coefficient

O
OCR optical character reader
OEM original equipment manufacturer
OR a logical operator
OSI open systems interconnection

P
PAL programmable array logic
PC printed circuit
PCB printed circuit board
PCM pulse code modulation
PCS plastic clad silica
pF picofarad
PGA pin grid array
PIN positive-intrinsic-negative (transistor)
PLA programmable logic array
PLCC plastic leaded chip carrier
PLL phased lock loop
PPI plan position indicator
PROM programmable ROM
PTC positive temperature coefficient
PUT programmable unijunction transistor

Q
QAM quadrature amplitude modulation
Q (meter) quality-factor meter

R
RAM random access memory
RC resistance-capacitance
RFI radio frequency interference
RMS root mean square
ROM read only memory
RF radio frequency
RFC radio-frequency choke
RFI radio-frequency interference
RTD resistance-temperature detector
RTL resistor transistor logic
RTV room temperature vulcanizing
RW read/write

S
SAS silicon asymmetrical switch
SBC single board (micro) computer
SBS silicon bilateral switch
SCR silicon-controlled rectifier
SCS silicon-controlled switch
SDA source & detector assemblies
SGMP simple gateway monitoring protocol
SIDAC bidirectional voltage-triggered switch
SIMM single in-line memory module
SIP single in-line package
SMD surface mount device
SMT surface mount technology
SNMP simpole network management protocol
SO small outline
SOIC small outline IC
SOT small outline transistor
SSI small scale integration
SSR solid-state relay
STL Schottky transistor logic
SUS silicon unilateral switch

T
TC temperature coefficient
TCE thermal coefficient of expansion
TXCO temperature compensated crystal oscillator
TFE tetrafluoride ethylene propylene Copolymer, 250° Teflon
TRIAC bidirectional AC switch
TTL transistor-transistor logic
TTY teletypewriter

U
UHF ultra high frequency (300 MHz to 3 GHz)
UJT silicon unijunction transistor
UL Underwriters Laboratory
UPS uninterruptible power supply

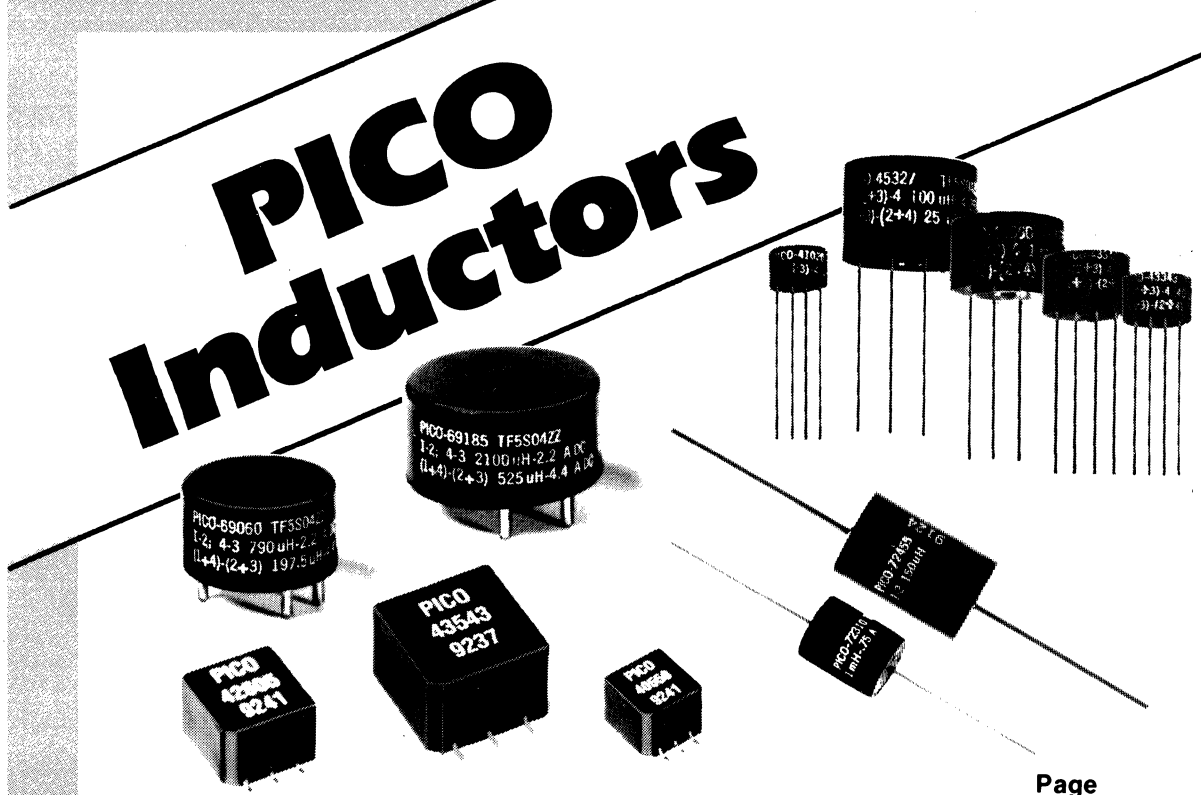
V
VAC volts (of) alternating current
VAN value-added network
VAR volt-ampere reactive
VCR video cassette recorder
VDC volts (of) direct current
VHF very high frequency (30 kHz to 300 MHz)
VHSIC very high speed integrated circuit
VLF very low frequency (3 to 30 kHz)
VLSI very large scale integration
VME virtual machine environment
VRM voice recognition module
VTVM vacuum tube volt meter
VU volume unit
VSWR voltage standing wave ratio

W
WPS word processing software

Y
YIG yttrium iron garnet

Z
ZIF zero insertion force

PICO Inductors



	Page
SURFACE MOUNT LOW PROFILE POWER INDUCTORS	A•1266-67
SURFACE MOUNT MINIATURIZED POWER INDUCTORS	A•1268
SURFACE MOUNT EMI COMMON MODE SUPPRESSION INDUCTORS	A•1269
LARGE TRANSIENT DC CURRENTS POWER INDUCTORS	A•1270-71
MINIATURIZED POWER INDUCTORS; ***MIL-T-27/356 01 thru MIL-T-27/356-63***	A•1272
MINIATURIZED POWER INDUCTORS; ***Axial Leads/Shielded Construction***	A•1273
EMI COMMON MODE SUPPRESSION INDUCTORS; ***Plug-in***	A•1274
ULTRA MINIATURE AND MINIATURE HIGH "Q" INDUCTORS	A•1275-77
RECOMMENDED LAND PATTERN DIMENSIONS FOR SURFACE MOUNT INDUCTORS	A•1278

See Section A•2251-A•2301 for PICO Surface Mount, Plug-in Transformers

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

FAX: 914-738-8225

Delivery: Stock to one week

PICO Electronics, Inc.

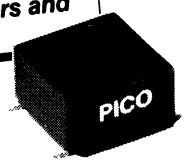
143 Sparks Ave., Pelham, NY 10803-1837

Internet: ***http://www.picoelectronics.com***

E-mail: ***HLSC73A@prodigy.com***

Low Profile Surface Mount Power Inductors

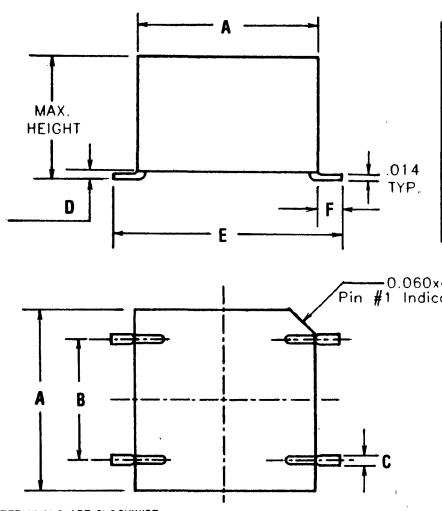
These inductors utilize special techniques to minimize cross coupling and give the utmost in shielding efficiency. They are ideal for Noise, Spike and Power Filtering Applications in Power Supplies, DC-DC Converters and Switching Regulators



SURFACE MOUNT
PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.

- **Handle large transient DC currents**
- **Minimum possible size**
- **Manufactured to MIL-T-27 (TF5S04ZZ)**
- **Large selection of sizes available**
- **Special high frequency core material to insure low losses**

Size	Max. Height	A	B	C	D	E	F
00	.180 (4.57)	.380 (9.65)	.280 (7.11)	.025 (.64)	.015 (.38)	.500 (12.70)	.060 (1.52)
0	.210 (4.83)	.450 (11.43)	.300 (7.62)	.025 (.64)	.020 (.51)	.570 (14.48)	.060 (1.52)
1	.305 (7.75)	.450 (11.43)	.300 (7.62)	.025 (.64)	.020 (.51)	.570 (14.48)	.060 (1.52)
2	.360 (9.14)	.550 (14.00)	.400 (10.16)	.030 (.76)	.025 (.64)	.670 (17.02)	.060 (1.52)
3	.360 (9.14)	.650 (16.51)	.500 (12.70)	.030 (.76)	.025 (.64)	.770 (19.56)	.060 (1.52)
4	.455 (11.56)	.850 (21.59)	.600 (15.24)	.055 (1.40)	.025 (.64)	1.050 (26.67)	.100 (2.54)



For Land Pattern Dimensions See Pg. A•1278
Fig.1 (size #00)
Fig.2 (size #0 & 1)
Fig.3 (size #2)
Fig.4 (size #3)
Fig.5 (size #4)

SIZE 00

LODC MICROHY (μH)	IDC FOR 10% DROP in L AMPS	IDC FOR 20% DROP in L AMPS	IDC FOR 30% DROP in L AMPS	RDC OHMS	SRF MHz	PICO PART NUMBER	PRICE (1-9)
2	3.84	5.56	7.0	.005	24.7	73905	22.50
3.5	2.9	4.2	5.3	.009	18.7	73910	22.50
5	2.43	3.5	4.43	.0128	15.7	73915	22.50
8	1.92	2.78	3.5	.0206	12.4	73920	22.50
10	1.72	2.49	3.13	.026	11.1	73925	22.50
15	1.4	2.03	2.56	.039	9.04	73930	22.50
20	1.22	1.76	2.21	.051	7.83	73935	22.50
25	1.09	1.57	1.98	.064	7	73940	22.50
30	.99	1.44	1.81	.077	6.4	73945	22.50
35	.92	1.33	1.67	.090	5.92	73950	22.50
40	.86	1.24	1.57	.103	5.53	73955	22.50
45	.81	1.17	1.48	.116	5.22	73960	22.50
50	.77	1.11	1.4	.129	4.95	73965	22.50

SIZE 0

LODC MICROHY (μH)	IDC for 10% DROP in L AMPS	IDC for 20% DROP in L AMPS	IDC for 30% DROP in L AMPS	RDC OHMS	SRF MHz	PICO PART NUMBER	PRICE (1-9)
5	3.35	4.47	5.59	.012	10	73796	22.50
10	2.37	3.16	3.95	.024	7.07	73797	22.50
15	1.93	2.58	3.23	.036	5.77	73798	22.50
20	1.68	2.24	2.80	.048	5	73799	22.50
25	1.5	2.0	2.5	.06	4.5	73800	22.50
50	1.06	1.4	1.7	.12	3.3	73805	22.50
75	.85	1.1	1.4	.18	2.7	73810	22.50
100	.75	1.0	1.2	.24	2.3	73815	22.50
150	.61	.81	.97	.36	2.0	73820	22.50
200	.53	.70	.84	.48	1.7	73825	22.50
250	.47	.60	.79	.60	1.5	73830	22.50
500	.33	.42	.55	1.2	1.0	73832	22.50
750	.27	.36	.45	1.80	.80	73835	22.50
1000	.23	.31	.39	2.40	.70	73840	22.50
1500	.19	.25	.32	3.60	.60	73845	22.50
2000	.16	.22	.26	4.80	.55	73850	22.50
2500	.15	.20	.25	6.0	.50	73855	22.50
5000	.10	.14	.17	12.0	.30	73860	22.50

SIZE 1

LODC MICROHY (μH)	IDC for 10% DROP in L AMPS	IDC for 20% DROP in L AMPS	IDC for 30% DROP in L AMPS	RDC OHMS	SRF MHz	PICO PART NUMBER	PRICE (1-9)
5	4.25	5.8	7.38	.0064	10	73001	22.50
10	3	4.1	5.22	.0128	7.07	73002	22.50
15	2.45	3.35	4.26	.0192	5.77	73003	22.50
20	2.13	2.9	3.69	.0256	5	73004	22.50
25	1.9	2.6	3.3	.032	4.5	73005	22.50
50	1.34	1.84	2.33	.064	3.3	73010	22.50
75	1.10	1.50	1.91	.098	2.7	73015	22.50
100	0.95	1.30	1.65	.128	2.25	73020	22.50
150	.77	1.0	1.30	.192	1.9	73022	22.50
200	.67	0.91	1.10	.256	1.3	73023	22.50
250	0.60	0.82	1.04	.32	1.5	73025	22.50
500	.42	.57	.73	.64	1.0	73027	22.50
750	0.35	0.47	0.60	.96	.85	73030	22.50
1000	0.30	0.41	0.52	1.28	.73	73035	22.50
1500	0.25	0.34	0.43	1.92	.6	73040	22.50
2000	0.21	0.29	0.36	2.56	.52	73042	22.50
2500	0.19	0.26	0.33	3.2	.45	73045	22.50
5000	0.13	0.18	0.23	6.4	.33	73050	22.50

*For immediate engineering assistance or to place an order—**Call Toll Free 800-228-9747***

Delivery—stock to one week

PICO Electronics, Inc.

143 Sparks Avenue, Pelham, NY 10803-1837 • 914-738-1400 • FAX 914-738-8225
Internet: http://www.picoelectronics.com • E-Mail: HLSC73A@prodigy.com

- **Handle large transient DC currents**
- **Minimum possible size**
- **Manufactured to MIL-T-27 (TF5S04ZZ)**
- **Special high frequency core material to insure low losses**
- **Large selection of sizes available**

Low Profile Surface Mount Power Inductors

SIZE 2

LODC MICROHY (μH)	IDC for 10% DROP in L AMPS	IDC for 20% DROP in L AMPS	IDC for 30% DROP in L AMPS	RDC OHMS	SRF MHz	PICO PART NUMBER	PRICE (1-9)
5	5.6	8.27	10.5	.004	10	73111	22.50
10	3.96	5.86	7.42	.008	7.07	73112	22.50
15	3.23	4.77	6.06	.012	5.77	73113	22.50
20	2.8	4.14	5.25	.016	5	73114	22.50
25	2.5	3.7	4.7	.020	4.5	73115	22.50
50	1.77	2.61	3.30	0.040	3.3	73120	22.50
75	1.44	2.14	2.71	0.060	2.7	73125	22.50
100	1.25	1.85	2.35	0.080	2.25	73130	22.50
150	1.0	1.50	1.90	0.12	1.9	73132	22.50
200	0.88	1.30	1.60	0.16	1.3	73133	22.50
250	0.79	1.17	1.49	0.20	1.5	73135	22.50
500	.55	.82	1.0	.40	1.0	73137	22.50
750	0.46	0.68	0.86	0.60	.85	73140	22.50
1000	0.40	0.59	0.74	0.80	.73	73145	22.50
1500	0.32	0.48	0.61	1.20	.6	73150	22.50
2000	0.28	0.41	0.50	1.60	.52	73152	22.50
2500	0.25	0.37	0.47	2.00	.45	73155	22.50
5000	0.18	0.26	0.33	4.00	.33	73160	22.50

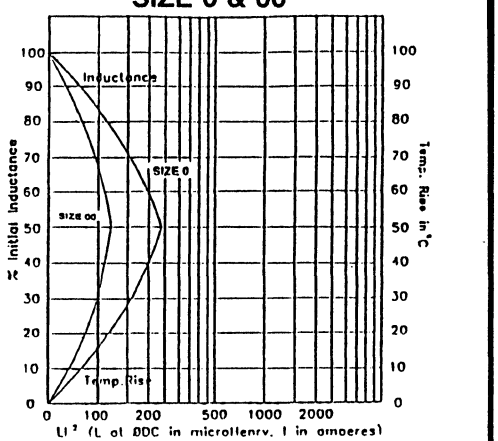
SIZE 3

LODC MICROHY (μH)	IDC for 10% DROP in L AMPS	IDC for 20% DROP in L AMPS	IDC for 30% DROP in L AMPS	RDC OHMS	SRF MHz	PICO PART NUMBER	PRICE (1-9)
5	6.7	9.84	12.5	.003	8.9	73201	22.50
10	4.74	6.96	8.84	.006	6.29	73202	22.50
15	3.87	5.68	7.22	.009	5.14	73203	22.50
20	3.35	4.92	6.25	.012	4.45	73204	22.50
25	3.0	4.4	5.6	.015	4.0	73205	22.50
50	2.12	3.11	4.00	0.03	3.0	73210	22.50
75	1.73	2.54	3.23	0.05	2.4	73215	22.50
100	1.50	2.20	2.80	0.06	2.0	73220	22.50
150	1.20	1.70	2.20	.09	1.5	73222	22.50
200	1.00	1.50	1.90	0.12	1.0	73223	22.50
250	0.95	1.39	1.77	0.15	1.3	73225	22.50
500	.67	.98	1.25	.30	1.0	73227	22.50
750	0.55	0.80	1.02	0.45	.75	73230	22.50
1000	0.47	0.70	0.89	0.60	.65	73235	22.50
1500	0.39	0.57	0.72	0.90	.55	73240	22.50
2000	0.33	0.49	0.62	1.20	.46	73242	22.50
2500	0.30	0.44	0.56	1.50	.40	73245	22.50
5000	0.21	0.31	0.40	3.00	.30	73250	22.50

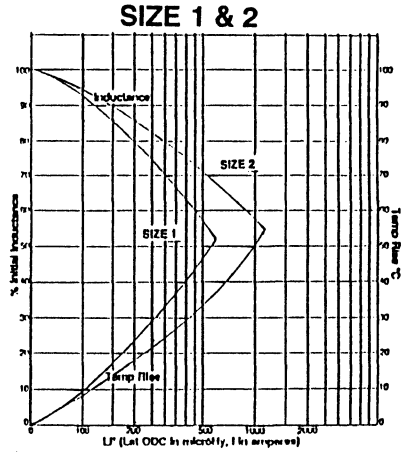
SIZE 4

LODC MICROHY (μH)	IDC for 10% DROP in L AMPS	IDC for 20% DROP in L AMPS	IDC for 30% DROP in L AMPS	RDC OHMS	SRF MHz	PICO PART NUMBER	PRICE (1-9)
5	14	22	28.4	.0024	8.9	73301	22.50
10	9.9	15.56	20	.0048	6.29	73302	22.50
15	8.1	12.7	16.4	.0072	5.14	73303	22.50
20	7	11	14.2	.0096	4.45	73304	22.50
25	6.3	9.8	12.7	.012	4.0	73305	22.50
50	4.5	7	9	.024	3.0	73310	22.50
75	3.6	5.7	7.3	.036	2.4	73315	22.50
100	3.1	4.9	6.3	.048	2.0	73320	22.50
150	2.5	4	5.1	.072	1.7	73325	22.50
200	2.2	3.4	4.5	.096	1.5	73330	22.50
250	2	3.1	4	.12	1.3	73335	22.50
500	1.4	2.2	2.8	.24	1.0	73337	22.50
750	1.15	1.79	2.3	.36	.75	73340	22.50
1000	1	1.55	2	.48	.65	73345	22.50
1500	.81	1.27	1.64	.72	.55	73350	22.50
2000	.7	1.1	1.42	.96	.47	73355	22.50
2500	.63	.98	1.27	1.2	.40	73360	22.50
5000	.45	.69	.9	2.4	.30	73365	22.50

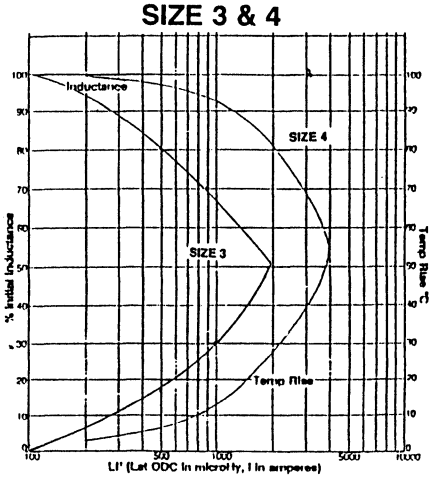
SIZE 0 & 00



SIZE 1 & 2



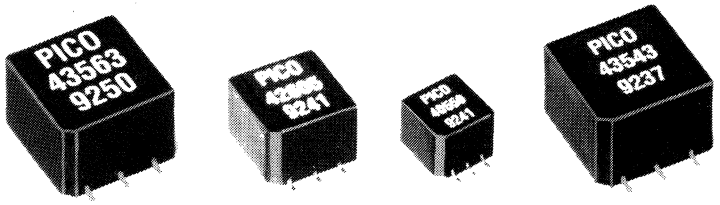
SIZE 3 & 4



Internet:http://www.picoelectronics.com • E-Mail:HLSC73A@prodigy.com • Call Toll free: 800-228-9747 • Fax: 914-738-8225

PICO's Miniaturized Power Inductors

PICO Surface Mount Power Inductors are ideal for Noise, Spike and Power Filtering Applications in Power Supplies, DC-DC Converters and Switching Regulators



SURFACE MOUNT
PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.

- Minimum possible size
- Manufactured to MIL-T-27 (TF5S04ZZ)
- Special high frequency core material to insure low losses
- All units have split windings
- Large selection of sizes available

All inductors have split windings—ratings shown in table are for series connection. Parallel connection will have ¼ inductance at twice the DC current and ¼ the DC resistance, ie. parallel connection of PICO-41320will have 5 millihenry at .12 Amps DC with DC resistance of 13.5 Ohms

SURFACE MOUNT

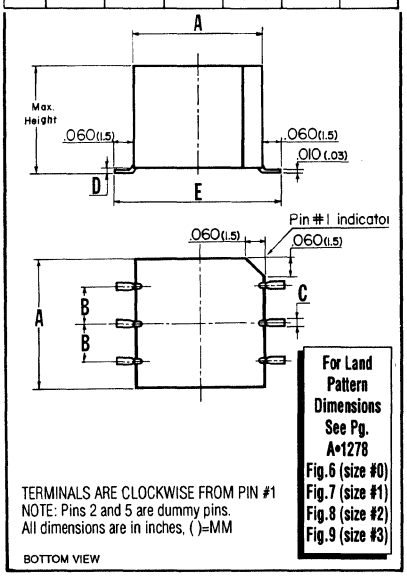
Inductance	I_{DC} (Amps)	R_{DC} (Ohms)	SRF MHz	Size	Model Number	*** Price 1–9
20 Milli-Henry	.06	54	0.275	1	41320	20.87
	.10	29	0.207	2	42405	20.87
	.14	20	0.230	3	43403	20.87
15 Milli-Henry	.07	40.5	0.320	1	41340	20.87
	.12	22	0.240	2	42425	20.87
	.16	15	0.235	3	43423	20.87
10 Milli-Henry	.05	75	0.400	0	40350	20.87
	.08	27	0.380	1	41360	20.87
	.14	14.6	0.390	2	42445	20.87
	.20	10	0.340	3	43443	20.87
7.5 Milli-Henry	.058	56	0.500	0	40370	20.87
	.10	20.3	0.450	1	41380	20.87
	.17	11	0.430	2	42465	20.87
	.24	7.5	0.390	3	43463	20.87
5 Milli-Henry	.071	38	0.650	0	40390	20.87
	.12	13.5	0.600	1	41400	20.87
	.21	7.3	0.490	2	42485	20.87
	.30	5	0.550	3	43483	20.87
3 Milli-Henry	.091	22	0.800	0	40410	20.87
	.16	8.1	0.710	1	41420	20.87
	.27	4.4	0.650	2	42505	20.87
	.38	3	0.570	3	43503	20.87

SURFACE MOUNT

Inductance	I_{DC} (Amps)	R_{DC} (Ohms)	SRF MHz	Size	Model Number	*** Price 1–9
2 Milli-Henry	.112	18	1.000	0	40430	20.87
	.19	5.4	0.950	1	41440	20.87
	.33	2.9	0.850	2	42525	20.87
	.47	2	0.800	3	43523	20.87
1 Milli-Henry	.158	8	1.650	0	40450	20.87
	.27	2.7	1.500	1	41460	20.87
	.47	1.5	1.200	2	42545	20.87
	.66	1	1.100	3	43543	20.87
750 Micro-Henry	.182	6	1.700	0	40470	20.87
	.31	2	1.550	1	41480	20.87
	.54	1	1.400	2	42565	20.87
	.76	.75	1.400	3	43563	20.87
500 Micro-Henry	.224	5	2.300	0	40490	20.87
	.38	1.3	2.100	1	41500	20.87
	.66	.66	1.900	2	42585	20.87
	.93	.5	1.600	3	43583	20.87
250 Micro-Henry	.316	1.9	3.300	0	40510	20.87
	.53	.66	3.000	1	41520	20.87
	.93	.33	2.500	2	42605	20.87
	1.3	.25	2.400	3	43603	20.87
100 Micro-Henry	.50	.75	4.500	0	40530	20.87
	.78	.300	4.000	1	41540	20.87
	1.35	.170	3.900	2	42625	20.87
	1.95	.110	3.500	3	43623	20.87
40 Micro-Henry	.79	.4	5.500	0	40550	20.87
	1.18	.141	5.000	1	41560	20.87
	2.03	.070	4.500	2	42645	20.87
	2.68	.060	4.500	3	43643	20.87

SURFACE MOUNT

Size	Max. Height	A	B	C	D	E
0	.280 (7.11)	.325 (8.26)	.085 (2.16)	.020 (.51)	.012 (.30)	.445 (11.30)
1	.310 (7.87)	.400 (10.16)	.115 (2.92)	.020 (.51)	.012 (.30)	.520 (13.21)
2	.365 (9.27)	.495 (12.57)	.140 (3.56)	.027 (.69)	.015 (.38)	.615 (15.62)
3	.460 (11.68)	.615 (15.62)	.185 (4.70)	.027 (.69)	.020 (.51)	.735 (18.66)



TERMINALS ARE CLOCKWISE FROM PIN #1
NOTE: Pins 2 and 5 are dummy pins.
All dimensions are in inches, ( )=MM
BOTTOM VIEW

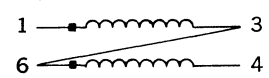
For Land Pattern Dimensions See Pg. A•1278
Fig.6 (size #0)
Fig.7 (size #1)
Fig.8 (size #2)
Fig.9 (size #3)

SPECIFICATIONS:

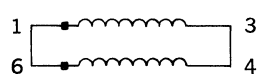
- All units manufactured to MIL-T-27 and are type TF5S04ZZ
- Inductance measured at 0.1V RMS –10 KHz with zero DC current. Tolerance $^{+10\%}_{-5\%}$
- Temperature rise at rated D.C. current is less than 30°C
- Maximum ambient is 100°C

*** Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

SURFACE MOUNT TERMINAL ARRANGEMENT SERIES CONNECTION



SURFACE MOUNT PARALLEL CONNECTION



Delivery— stock to one week

For immediate engineering assistance or to place an order—
Call Toll free: 800-228-9747 • Fax: 914-738-8225

PICO Electronics, Inc.
143 Sparks Ave., Pelham, NY 10803-1837
Internet: *http://www.picoelectronics.com*
E-mail: *HLSC73A@prodigy.com*

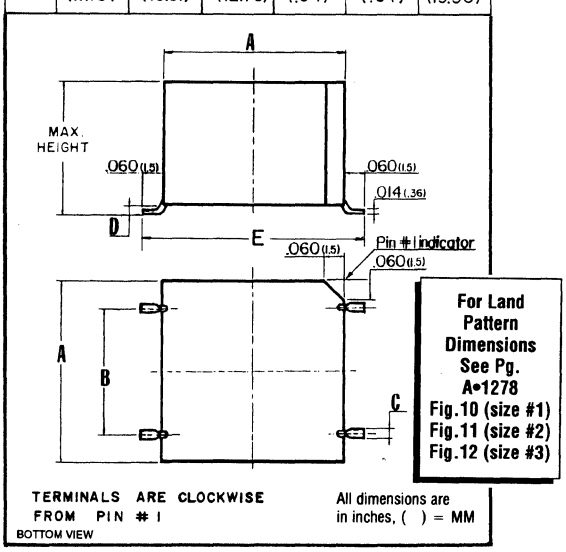
EMI Common Mode Suppression Inductors

SURFACE MOUNT
PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.

SURFACE MOUNT
Delivery-stock to one week

These Inductors are well suited for use in Switching Regulators, DC to DC Power Supplies and all types of Electrical Equipment where the elimination of line transmitted Electromagnetic Interference is important. Electrical equipment will generate noise due to switching operations of transistors, SCR's, relays, triacs, etc. By using these Inductors, noise being fed back to the power line is minimized to an acceptable level and this noise will not interfere with other equipment operating on the same power line.

Size	Max. Height	A	B	C	D	E
1	.305 (7.75)	.450 (11.43)	.300 (7.62)	.027 (.69)	.020 (.51)	.570 (14.48)
2	.360 (9.14)	.550 (13.97)	.400 (10.16)	.037 (.94)	.025 (.64)	.670 (17.02)
3	.440 (11.18)	.650 (16.51)	.500 (12.70)	.037 (.94)	.025 (.64)	.770 (19.56)

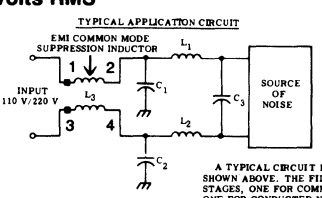


For Land Pattern Dimensions See Pg. A•1278
Fig.10 (size #1)
Fig.11 (size #2)
Fig.12 (size #3)

SPECIFICATIONS

- All units manufactured to MIL-T-27 and are type TF5S04ZZ
- Dielectric Strength .... 1500 Volts RMS
- Windings Balanced ± 1%
- Maximum ambient plus temp. rise limited to 130°C

TYPICAL APPLICATION CIRCUIT



A TYPICAL CIRCUIT FOR THE ELIMINATION OF NOISE IS SHOWN ABOVE. THE FILTER CONTAINS TWO STAGES, ONE FOR COMMON MODE NOISE (L_3, C_1, C_2) AND ONE FOR CONDUCTED NOISE (L_1, L_2, AND C_3).

- Minimum possible size
- 130°C operation (Ambient + Temp. Rise)
- Windings Balance ± 1%
- Dielectric Strength .... 1500 Volts RMS

INDUCTANCE	IRMS (AMPS) TEMP. RISE 60°C	TEMP. RISE 40°C	TEMP. RISE 25°C	RDC. (OHMS) EACH WDG.	APPROX. LEAKAGE INDUCTANCE (MICRO-HENRY)	SIZE	MODEL NUMBER	PRICE 1-9
50	3.4	2.8	2.6	.0125	.40	1	46470	20.37
µH-	6.0	5.2	4.4	.0063	.34	2	47570	20.37
	9.9	8.2	7.2	.0033	.29	3	48670	22.40
75	2.6	2.1	1.9	.0212	.60	1	46465	20.37
µH	4.8	4.2	3.6	.0094	.54	2	47565	20.37
	8.0	6.7	5.9	.0049	.43	3	48665	22.40
100	2.3	1.8	1.7	.0288	.80	1	46460	20.37
µH	4.2	3.7	3.1	.0125	.68	2	47560	20.37
	6.9	5.7	5.0	.0066	.58	3	48660	22.40
250	1.4	1.1	1.1	.070	2.0	1	46455	20.37
µH	2.6	2.3	1.9	.0313	1.7	2	47555	20.37
	4.4	3.7	3.3	.0163	1.4	3	48655	22.40
500	1.1	.9	.8	.1250	4.0	1	46450	20.37
µH	1.8	1.7	1.4	.0625	3.4	2	47550	20.37
	3.1	2.6	2.3	.0325	2.9	3	48650	22.40
750	.8	.7	.6	.2125	6.0	1	46445	20.37
µH	1.5	1.3	1.1	.0938	5.1	2	47545	20.37
	2.6	2.1	1.8	.0488	4.3	3	48645	22.40
1.0	0.81	0.66	0.61	0.23	8.0	1	46440	20.37
mH	1.5	1.3	1.1	0.1	6.8	2	47540	20.37
	2.5	2.1	1.8	0.0530	5.750	3	48640	22.40
2.5	0.52	0.42	0.39	0.56	20	1	46435	20.37
mH	0.96	0.84	0.71	0.25	17	2	47535	20.37
	1.6	1.3	1.2	0.1310	14.400	3	48635	22.40
5.0	0.37	0.3	0.28	1.1	40	1	46430	20.37
mH	0.68	0.59	0.5	0.5	34	2	47530	20.37
	1.1	0.9	0.82	0.2630	28.800	3	48630	22.40
7.5	0.3	0.24	0.22	1.7	60	1	46425	20.37
mH	0.55	0.48	0.41	0.75	51	2	47525	20.37
	0.9	0.8	0.67	0.3940	43.100	3	48625	22.40
10	0.26	0.21	0.19	2.3	80.0	1	46420	20.37
mH	0.48	0.42	0.35	1.0	68.0	2	47520	20.37
	0.8	0.7	0.57	0.5300	57.5	3	48620	22.40
15	0.21	0.17	0.16	3.4	120	1	46415	20.37
mH	0.39	0.34	0.29	1.5	102	2	47515	20.37
	0.64	0.53	0.47	0.7900	86	3	48615	22.40
17.5	0.2	0.16	0.15	3.94	140	1	46410	20.37
mH	0.36	0.32	0.27	1.75	119	2	47510	20.37
	0.59	0.49	0.44	0.9190	101	3	48610	22.40
20	0.18	0.15	0.14	4.5	160	1	46405	20.37
mH	0.34	0.30	0.25	2.0	136	2	47505	20.37
	0.56	0.46	0.41	1.0500	115	3	48605	22.40

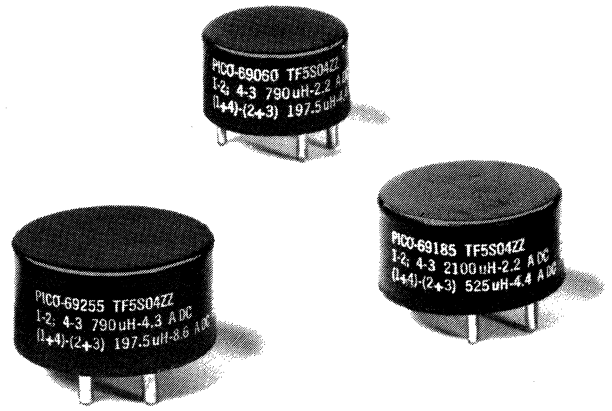
For immediate engineering assistance or to place an order—

Call Toll free: 800-228-9747 • Fax: 914-738-8225

Delivery— stock to one week

PICO Electronics, Inc.
143 Sparks Ave., Pelham, NY 10803-1837
Internet: ***http://www.picoelectronics.com*** **E-mail:** ***HLSC73A@prodigy.com***

PICO's POWER INDUCTORS

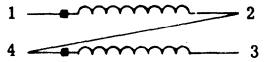


FOR MULTIPLE OUTPUT REGULATORS WE CAN SUPPLY ALL NECESSARY INDUCTANCE VALUES ON ONE CORE This technique provides minimum possible size and gives excellent dynamic and DC cross-regulation . . . *Contact factory for these special inductors.*

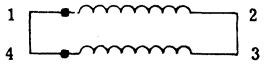
- **Handle large transient DC currents**
- **Minimum possible size**
- **Manufactured to MIL-T-27 (TF5S04ZZ)**
- **Special high frequency core material to insure low losses**
- **All units have split windings**
- **Large selection of sizes available**
- **All units are magnetically shielded**

All inductors have split windings (except size AA)— ratings shown in table are for series connection. Parallel connection will have ¼ inductance at twice the DC current and ¼ the DC resistance, ie. parallel connection of PICO-69010 will have 32.5 microhenry with DC resistance of .015 Ohms at 6 Amps DC current (10% drop in L)

TERMINAL ARRANGEMENT SERIES CONNECTION



PARALLEL CONNECTION



SIZE AA

LODC MICROHY (μH)	IDC for 10% DROP in L AMPS	IDC for 20% DROP in L AMPS	IDC for 30% DROP in L AMPS	RDC OHMS	SRF MHz	PICO PART NUMBER	PRICE (1-9)
25	3.53	4.80	5.94	.012	4.0	69410	26.27
50	2.5	3.4	4:2	.024	3.0	69420	26.27
75	2.04	2.78	3.43	.036	2.4	69430	26.27
100	1.77	2.4	2.99	.048	2.0	69440	26.27
250	1.12	1.52	1.88	.12	1.3	69450	26.27
750	.65	.88	1.08	.36	.75	69460	26.27
1000	.56	.76	.94	.48	.65	69470	26.27
1500	.46	.62	.77	.72	.55	69480	26.27
2500	.35	.48	.59	1.2	.4	69490	26.27
5000	.25	.34	.42	2.4	.3	69500	26.27

SIZE A

130	3.0	4.5	5.5	.060	1.7	69010	26.27
210	2.5	3.5	4.5	.11	1.4	69020	26.27
260	2.2	3.2	3.9	.14	1.25	69030	26.27
315	2.0	2.9	3.5	.17	1.14	69040	26.27
525	1.6	2.2	2.7	.28	0.9	69050	26.27
790	1.2	1.8	2.2	.42	0.7	69060	26.27
1050	1	1.6	1.9	.56	0.6	69070	26.27
1300	.95	1.4	1.7	.7	0.4	69080	26.27

SIZE B

228	3.5	5.2	6.8	.070	1.1	69105	28.91
323	2.7	4.0	5.0	.105	0.9	69115	28.91
460	2.5	3.7	4.8	.15	0.8	69125	28.91
787	1.9	2.8	3.7	.26	0.6	69135	28.91
1050	1.6	2.4	3.2	.34	0.5	69145	28.91
1310	1.5	2.2	2.8	.43	0.45	69155	28.91
1600	1.3	2.0	2.6	.52	0.4	69165	28.91
1840	1.2	1.8	2.4	.60	0.38	69175	28.91
2100	1.1	1.7	2.2	.70	0.33	69185	28.91

SIZE C

165	5.0	7.0	9.5	.040	1.4	69205	31.76
191	4.7	7.0	8.8	.050	1.3	69215	31.76
262	4.0	5.6	7.5	.07	1.1	69225	31.76
390	3.3	4.6	6.2	.10	0.9	69235	31.76
525	2.8	4.0	5.3	.14	0.8	69245	31.76
790	2.3	3.2	4.3	.20	0.6	69255	31.76
1050	2.0	2.8	3.8	.27	0.55	69265	31.76
1310	1.8	2.5	3.4	.34	0.5	69275	31.76
1580	1.6	2.3	3.0	.41	0.45	69285	31.76
1838	1.5	2.1	2.8	.48	0.4	69295	31.76

SIZE D

150	6.35	9.23	11.5	.027	1.4	69310	34.95
250	4.9	7.15	9	.045	1.2	69320	34.95
500	3.5	5	6.32	.09	.8	69330	34.95
750	2.8	4.13	5.16	.135	.65	69340	34.95
1000	2.5	3.6	4.5	.18	.55	69350	34.95
2500	1.55	2.26	2.8	.45	.35	69360	34.95
5000	1.1	1.6	2	.9	.25	69370	34.95

SIZE E

1500	2.6	4.5	6.0	.13	.4	69605	37.95
2000	2.25	3.9	5.2	.17	.35	69615	37.95
3000	1.85	3.2	4.25	.26	.3	69625	37.95
4000	1.6	2.8	3.7	.35	.25	69635	37.95
5000	1.45	2.5	3.3	.45	.2	69645	37.95
7500	1.15	2.0	2.7	.65	.18	69655	37.95
10000	1.0	1.75	2.35	.85	.15	69665	37.95

For immediate engineering assistance or to place an order—

Call Toll free: 800-228-9747 • Fax: 914-738-8225

Delivery— stock to one week

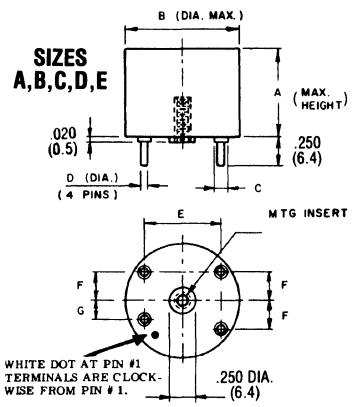
PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837

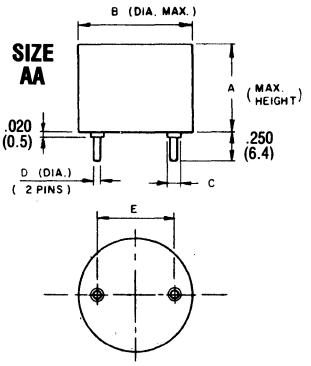
Internet: ***http://www.picoelectronics.com*** **E-mail:** ***HLSC73A@prodigy.com***

These PICO Power Inductors Can Handle Large Transient DC Currents

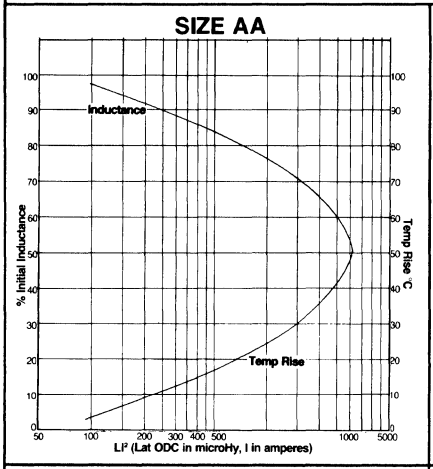
They are ideal for Noise, Spike and Power Filtering Applications in Power Supplies, DC-DC Converters and Switching Regulators

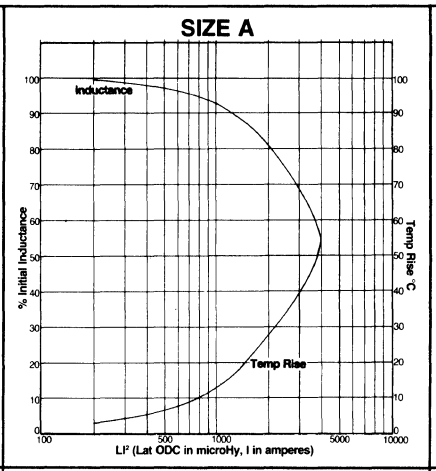


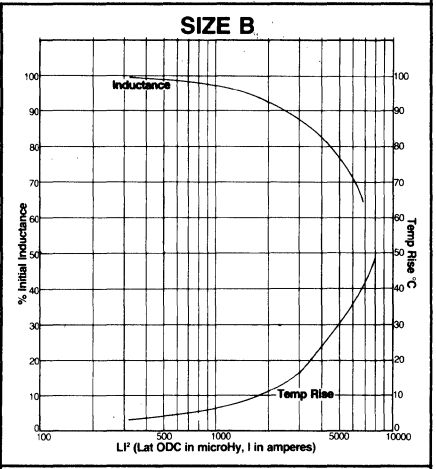
Size	A Max. Height	B Max. Dia.	C	D Terminal Dia.	E	F	G	Mfg. Insert	Wt. Nominal Grams
AA	.45" (11.4)	.75 (19.1)	.1 (2.54)	.07 (1.78)	.5" (12.7)	—	—	—	10
A	.56 (14.2)	.96 (24)	.1 (2.54)	.07 (1.78)	.6 (15.2)	.2 (5.1)	.1 (2.5)	4-40 UNC 5 Threads Deep	23
B	.635 (16.1)	1.215 (30.9)	.1 (2.54)	.07 (1.78)	.8 (20.3)	.25 (6.4)	.15 (3.8)	4-40 UNC 5 Threads Deep	44
C	.72 (18.3)	1.33 (33.8)	.125 (3.2)	.094 (2.4)	.9 (22.9)	.25 (6.4)	.15 (3.8)	6-32 UNC 6 Threads min.	60
D	.76 (19.3)	1.5 (38.1)	.125 (3.2)	.094 (2.4)	1.1 (27.9)	.3 (7.6)	.2 (5.1)	6-32 UNC 6 Threads min.	80
E	1.1 (27.9)	2.150 (54.6)	.15 (3.8)	.125 (3.2)	1.7 (43.2)	.4 (10.2)	.3 (7.6)	6-32 UNC 6 Threads min.	170

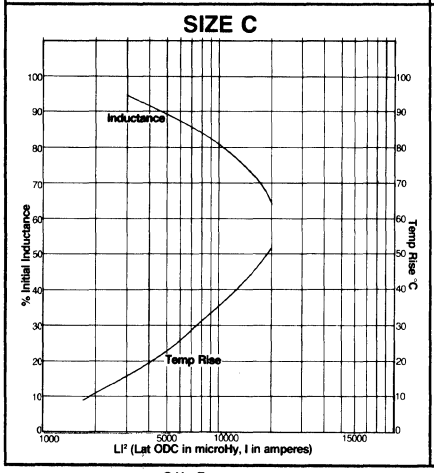


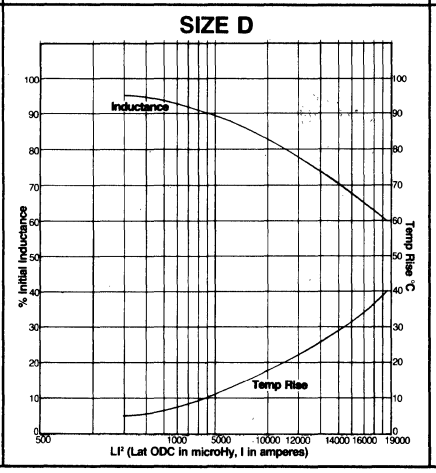
All dimensions are in inches, ( ) = MM

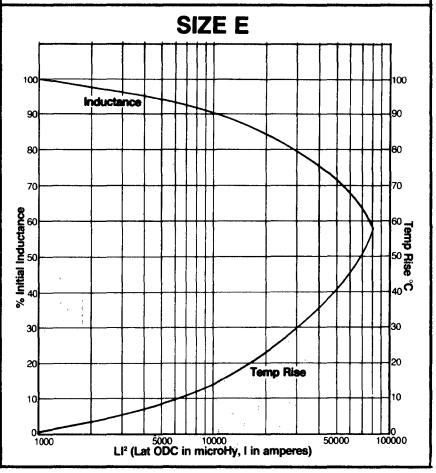


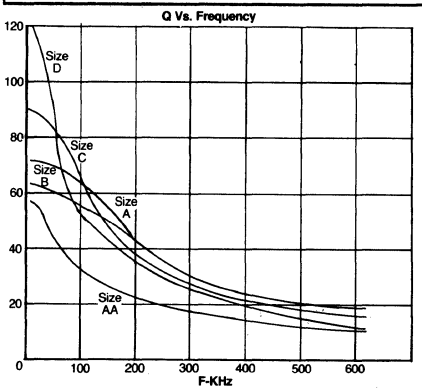












For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

FAX 914-738-8225

Delivery: Stock to one week

PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837

Internet: ***http://www.picoelectronics.com***

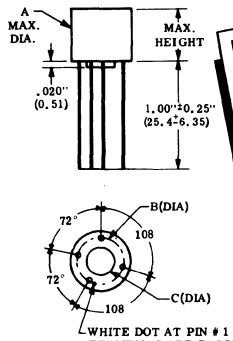
E-mail: ***HLSC73A@prodigy.com***

PICO's Miniaturized Power Inductors

PLUG-IN

Size	Max. Height	A Max. Dia.	B Bolt Circle	C Stand-Off	Terminal Dia.
0	.250 (6.35)	.320 (8.13)	.21 (5.33)	.13 (3.30)	.012 (.31)
1	.280 (7.11)	.410 (10.41)	.260 (6.6)	.160 (4.06)	.012 (.31)
2	.340 (8.63)	.500 (12.7)	.350 (8.89)	.250 (6.35)	.012 (.31)
3	.415 (10.54)	.630 (16.0)	.440 (11.17)	.340 (8.64)	.016 (.41)

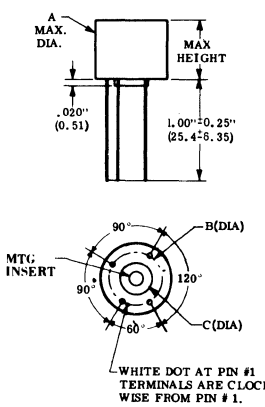
ALL DIMENSIONS ARE IN INCHES, ( ) = MM



PLUG-IN

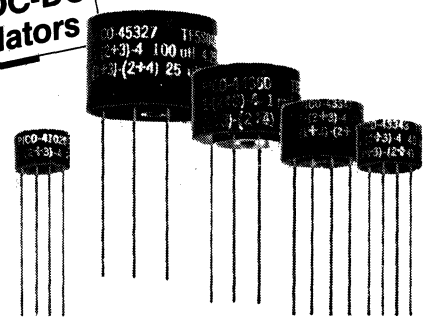
Size	Max. Height	A Max. Dia.	B Bolt Circle	C Stand-Off	Mtg. Insert	Terminal Dia.
4	.500 (12.7)	.800 (20.32)	.560 (14.22)	.460 (11.68)	—	.016 (.41)
5	.650 (16.51)	.950 (24.13)	.670 (17.0)	.570 (14.48)	6-32 UNC 8 Threads Deep	.020 (.51)

ALL DIMENSIONS ARE IN INCHES, ( ) = MM



PICO Plug-In Inductors are ideal for Noise, Spike and Power Filtering Applications in Power Supplies, DC-DC Converters and Switching Regulators

Plug-in units can be manufactured and tested to MIL-T-27/356. Contact Factory for price and delivery information and appropriate part numbers (MIL-T-27/356-01 thru MIL-T-27/356-63).



All inductors have split windings—ratings shown in table are for series connection. Parallel connection will have ¼ inductance at twice the DC current and ¼ the DC resistance, ie. parallel connection of PICO-41020 will have 5 millihenry at .12 Amps DC with DC resistance of 13.5 Ohms

PLUG-IN

Inductance	I_{DC} (Amps)	R_{DC} (Ohms)	SRF MHz	Size	Model Number	Price 1–9
20 Milli-Henry	.06	54	0.275	1	41020	18.97
	.10	29	0.207	2	42105	18.97
	.14	20	0.230	3	43103	18.97
	.22	12.4	0.210	4	44500	22.70
	.29	10.2	0.180	5	45107	22.70
15 Milli-Henry	.07	40.5	0.320	1	41040	18.97
	.12	22	0.240	2	42125	18.97
	.16	15	0.235	3	43123	18.97
	.23	9.3	0.280	4	44520	22.70
	.33	7.7	0.245	5	45127	22.70
10 Milli-Henry	.05	75	0.400	0	40050	18.97
	.08	27	0.380	1	41060	18.97
	.14	14.6	0.390	2	42145	18.97
	.20	10	0.340	3	43143	18.97
	.31	6.2	0.290	4	44560	22.70
	.40	5.1	0.300	5	45147	22.70
7.5 Milli-Henry	.058	56	0.500	0	40070	18.97
	.10	20.3	0.450	1	41080	18.97
	.17	11	0.430	2	42165	18.97
	.24	7.5	0.390	3	43163	18.97
	.38	4.7	0.350	4	44580	22.70
	.49	3.8	0.340	5	45167	22.70
5 Milli-Henry	.071	38	0.650	0	40090	18.97
	.12	13.5	0.600	1	41100	18.97
	.21	7.3	0.490	2	42185	18.97
	.30	5	0.550	3	43183	18.97
	.47	3.1	0.460	4	44600	22.70
	.6	2.6	0.410	5	45187	22.70
3 Milli-Henry	.091	22	0.800	0	40110	18.97
	.16	8.1	0.710	1	41120	18.97
	.27	4.4	0.650	2	42205	18.97
	.38	3	0.570	3	43203	18.97
	.6	1.9	0.600	4	44620	22.70
	.78	1.5	0.550	5	45207	22.70

*** Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%, 50-99 less 23%; 100-499 less 30%

PLUG-IN

Inductance	I_{DC} (Amps)	R_{DC} (Ohms)	SRF MHz	Size	Model Number	Price 1–9
2 Milli-Henry	.112	18	1.000	0	40130	18.97
	.19	5.4	0.950	1	41140	18.97
	.33	2.9	0.850	2	42225	18.97
	.47	2	0.800	3	43223	18.97
	.74	1.3	0.700	4	44640	22.70
	.95	1	0.650	5	45227	22.70
1 Milli-Henry	.158	8	1.650	0	40150	18.97
	.27	2.7	1.500	1	41160	18.97
	.47	1.5	1.200	2	42245	18.97
	.66	1	1.100	3	43243	18.97
	1	.62	1.050	4	44660	22.70
	1.3	.5	1.000	5	45247	22.70
750 Micro-Henry	.182	6	1.700	0	40170	18.97
	.31	2	1.550	1	41180	18.97
	.54	1	1.400	2	42265	18.97
	.76	.75	1.400	3	43263	18.97
	1.2	.47	1.200	4	44680	22.70
	1.6	.38	1.150	5	45267	22.70
500 Micro-Henry	.224	5	2.300	0	40190	18.97
	.38	1.3	2.100	1	41200	18.97
	.66	.66	1.900	2	42285	18.97
	.93	.5	1.600	3	43283	18.97
	1.47	.31	1.500	4	44700	22.70
	1.9	.25	1.450	5	45287	22.70
250 Micro-Henry	.316	1.9	3.300	0	40210	18.97
	.53	.66	3.000	1	41220	18.97
	.93	.33	2.500	2	42305	18.97
	1.3	.25	2.400	3	43303	18.97
	2.08	.16	2.100	4	44720	22.70
	2.7	.13	2.010	5	45307	22.70
100 Micro-Henry	.50	.75	4.500	0	40230	18.97
	.78	.300	4.000	1	41240	18.97
	1.35	.170	3.900	2	42325	18.97
	1.95	.110	3.500	3	43323	18.97
	3.08	.070	3.300	4	44740	22.70
	3.88	.060	3.200	5	45327	22.70
40 Micro-Henry	.79	.4	5.500	0	40250	18.97
	1.18	.141	5.000	1	41260	18.97
	2.03	.070	4.500	2	42345	18.97
	2.68	.060	4.500	3	43343	18.97

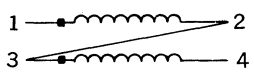
*** Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum.
Net 30 days F.O.B. Pelham, New York

SPECIFICATIONS:

- All units manufactured to MIL-T-27 and are type TF5S04ZZ
- Inductance measured at 0.1V RMS –10 KHz with zero DC current. Tolerance +10% –5%
- Temperature rise at rated D.C. current is less than 30°C
- Maximum ambient is 100°C
- Unit has magnetic shield

Delivery– stock to one week

TERMINAL ARRANGEMENT SERIES CONNECTION



PARALLEL CONNECTION

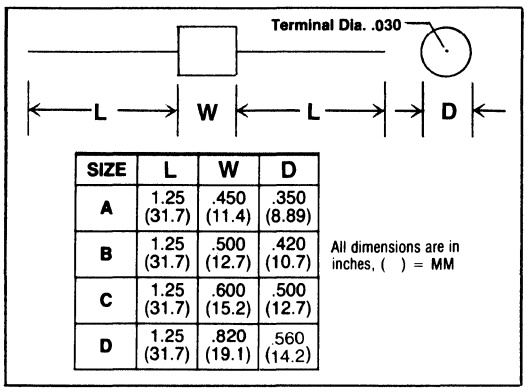
For immediate engineering assistance or to place an order– **Call Toll free: 800-228-9747 • Fax: 914-738-8225**

Internet: *http://www.picoelectronics.com* **E-mail: *HLSC73A@prodigy.com***

Miniaturized Power Inductors with Axial Leads, Shielded Construction

These inductors utilize special techniques to minimize cross coupling and give the utmost in shielding efficiency. They are ideal for Noise, Spike and Power Filtering Applications in Power Supplies, DC-DC Converters and Switching Regulators

- **Minimum possible size**
- **Shielded construction**
- **Mountable through PC board or to posts**
- **Manufactured to MIL-T-27 (TF5S04ZZ)**
- **Suitable for reel-mounted assembly**
- **Low losses**



SIZE	L	W	D
A	1.25 (31.7)	.450 (11.4)	.350 (8.89)
B	1.25 (31.7)	.500 (12.7)	.420 (10.7)
C	1.25 (31.7)	.600 (15.2)	.500 (12.7)
D	1.25 (31.7)	.820 (19.1)	.560 (14.2)

All dimensions are in inches, ( ) = MM

SPECIFICATIONS

- **Inductance measured at 0.1VRMS–100KHz**
- **Maximum ambient plus temp. rise limited to 130°C**
  (i.e. temp. rise for 72205 at .425 AMPS will be 12°C, ambient should be limited to 118°C –at .64AMPS temp. rise is 30°C, ambient should be limited to 100°C)

SIZE A

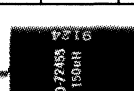
LODC MICROHY (μH)	IDC FOR 10% DROP in L AMPS	IDC FOR 20% DROP in L AMPS	IDC FOR 30% DROP in L AMPS	RDC OHMS	SRF MHz	Q @ 100KHz	PICO PART NUMBER	PRICE (1–9)
500	.425	.640	.848	.74	1.4	25	72205	17.12
375	.490	.740	.98	.55	1.6	25	72215	17.12
250	.600	.906	1.2	.36	2.0	25	72225	17.12
150	.775	1.17	1.55	.22	2.5	25	72235	17.12
100	.950	1.43	1.90	.15	3.0	25	72245	17.12
75	1.01	1.65	2.2	.11	3.6	25	72255	17.12
50	1.34	2.02	2.7	.075	4.4	25	72265	17.12

SIZE B

1000	0.450	0.600	0.750	0.85	0.9	25	72310	17.12
750	0.52	0.693	0.866	0.64	1.04	25	72320	17.12
500	0.63	0.848	1.06	0.43	1.3	25	72330	17.12
375	0.73	0.980	1.22	0.32	1.5	25	72340	17.12
250	0.90	1.20	1.5	0.22	1.8	25	72350	17.12
150	1.16	1.550	1.93	0.13	2.3	25	72360	17.12
100	1.42	1.9	2.37	.110	2.8	25	72370	17.12
75	1.64	2.2	2.73	0.064	3.3	25	72380	17.12
50	2.0	2.7	3.35	0.043	4.0	25	72390	17.12

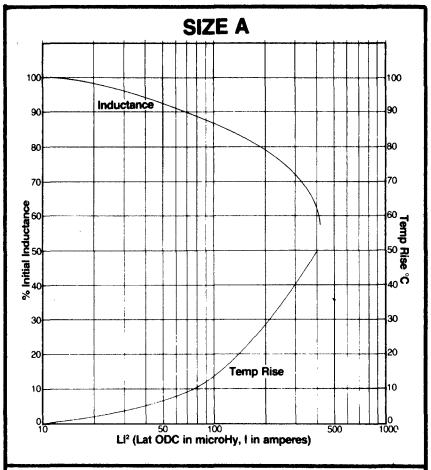
SIZE C

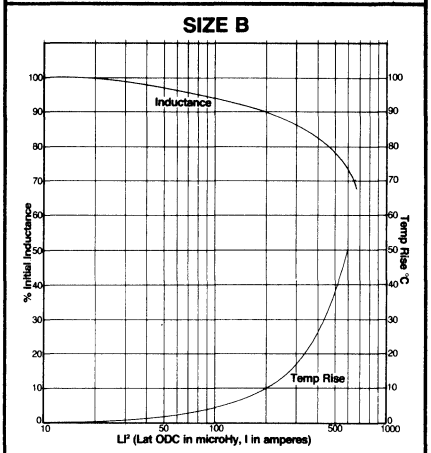
1000	0.500	0.750	1.0	.700	.85	25	72405	17.12
750	0.580	0.866	1.15	.520	1.0	25	72415	17.12
500	0.707	1.06	1.41	.350	1.2	25	72425	17.12
375	0.816	1.22	1.63	.260	1.4	25	72435	17.12
250	1.0	1.50	2.0	.175	1.7	25	72445	17.12
150	1.29	1.93	2.58	.105	2.2	25	72455	17.12
100	1.58	2.37	3.16	.070	2.7	25	72465	17.12
75	1.82	2.73	3.65	.053	3.1	25	72475	17.12
50	2.25	3.35	4.5	.035	4.0	25	72485	17.12

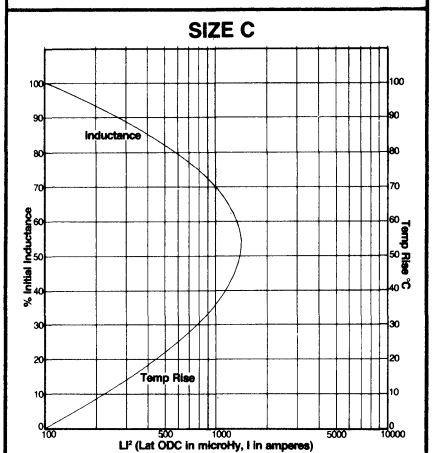


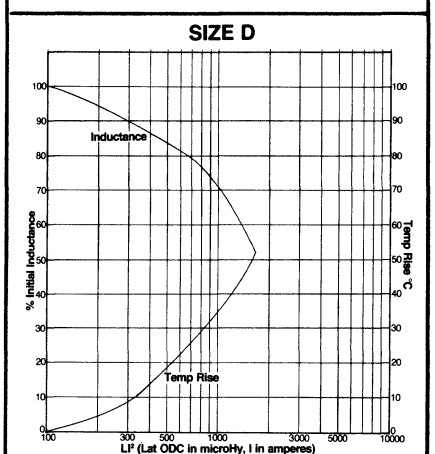
SIZE D

200	1.4	2.14	2.76	.107	1.7	35	72500	18.83
175	1.5	2.29	2.95	.093	2.0	35	72510	18.83
150	1.6	2.47	3.18	.08	2.2	35	72520	18.83
125	1.78	2.7	3.49	.066	2.5	35	72530	18.83
100	1.99	3.03	3.9	.053	2.7	35	72540	18.83
75	2.3	3.5	4.5	.040	3.1	35	72550	18.83
50	2.8	4.3	5.5	.027	4.0	35	2560	18.83
25	3.98	6.06	7.79	.014	4.5	35	72570	18.83
15	5.14	7.82	10	.007	5.1	35	72580	18.83









Call Toll free: 800-228-9747
Fax: 914-738-8225

PICO
Electronics, Inc.

143 Sparks Ave.,
Pelham, NY 10803-1837
Internet:
http://www.picoelectronics.com
E-mail: ***HLSC73A@prodigy.com***

Delivery— stock to one week

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

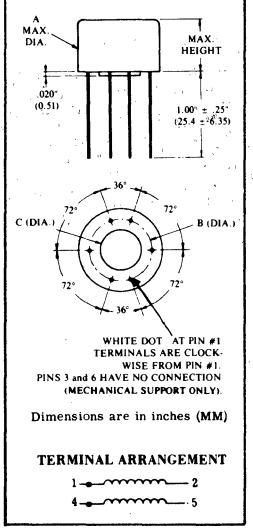
PLUG-IN
Delivery-Stock to 1 week
For Surface Mount see page 27

Common EMI Mode Suppression Inductors

- **Minimum possible size**
- **130°C operation (Ambient + Temp. Rise)**
- **Windings Balance ± 1%**
- **Dielectric Strength .... 1500 Volts RMS**
- **All units are magnetically shielded**

These Inductors are well suited for use in Switching Regulators, DC to DC Power Supplies and all types of Electrical Equipment where the elimination of line transmitted Electromagnetic Interference is important. Electrical equipment will generate noise due to switching operations of transistors, SCR's, relays, triacs, etc. By using these Inductors, noise being fed back to the power line is minimized to an acceptable level and this noise will not interfere with other equipment operating on the same power line.

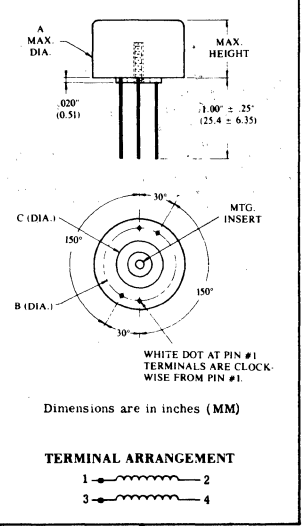
Size	Max. Height	A Max. Dia.	B Bolt Circle	C Stand-Off	Terminal Dia.
1	.280 (7.11)	.410 (10.41)	.260 (6.6)	.160 (4.06)	.012 (.31)
2	.340 (8.63)	.500 (12.7)	.350 (8.89)	.250 (6.35)	.012 (.31)
3	.415 (10.54)	.630 (16.0)	.440 (11.17)	.340 (8.64)	.016 (.41)



Dimensions are in inches (MM)

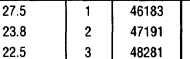
TERMINAL ARRANGEMENT

Size	Max. Height	A Max. Dia.	B Bolt Circle	C Stand-Off	Mtg. Insert	Terminal Dia.
4	.500 (12.7)	.800 (20.32)	.560 (14.22)	.460 (11.68)	2-56 UNC 6 Threads min.	.016 (.41)
5	.650 (16.51)	.950 (24.13)	.670 (17.0)	.570 (14.48)	6-32 UNC 6 Threads min.	.020 (.51)
6	.745 (18.92)	1.125 (28.57)	.800 (20.32)	.700 (17.78)	6-32 UNC 6 Threads min.	.020 (.51)



Dimensions are in inches (MM)

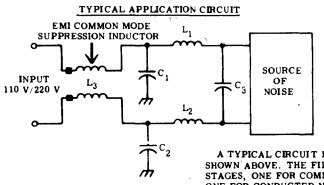
TERMINAL ARRANGEMENT



SPECIFICATIONS

- **All units manufactured to MIL-T-27 and are type TF5S04ZZ**
- **Inductance measured at 0.1VRMS-10kHz**
- **Unit has magnetic shield**
- **Dielectric Strength .... 1500 Volts RMS**
- **Windings Balanced ± 1%**
- **Maximum ambient plus temp. rise limited to 130°C (ie maximum ambient of part no. 46283 would be 105°C if I_{RMS} is 1.29 AMPS)**

TYPICAL APPLICATION CIRCUIT



A TYPICAL CIRCUIT FOR THE ELIMINATION OF NOISE IS SHOWN ABOVE. THE FILTER CONTAINS TWO STAGES, ONE FOR COMMON MODE NOISE (L_3, C_1, C_2) AND ONE FOR CONDUCTED NOISE (L_1, L_2, AND C_3).

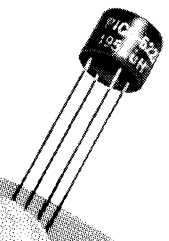
INDUCTANCE	IRMS (AMPS) TEMP. RISE 60°C	TEMP. RISE 40°C	TEMP. RISE 25°C	RDC. (OHMS) EACH WDG.	APPROX. LEAKAGE INDUCTANCE (MICRO-HENRY)	SIZE	MODEL NUMBER	PRICE 1-9
75	1.95	1.57	1.29	.051	3.5	1	46283	24.17
MICRO-	2.57	2.20	1.90	.033	3.5	2	47291	24.17
HENRY	4.43	3.79	3.23	.015	4	3	48381	29.01
	1.25	1.00	.959	.125	5	1	46263	24.17
185	1.61	1.39	1.19	.083	5	2	47271	24.17
MICRO-	2.80	2.39	2.04	.038	4.5	3	48361	29.01
HENRY	4.58	3.83	3.06	.019	4.5	4	49461	29.01
	.862	.691	.572	.263	9	1	46243	24.17
375	1.14	.986	.851	.163	8	2	47251	24.17
MICRO-	1.98	1.70	1.44	.075	8	3	48341	29.01
HENRY	3.23	2.70	2.16	.037	7.5	4	49441	29.01
	4.70	4.18	3.04	.021	6.5	5	50241	29.01
	.711	.568	.472	.31	10.3	1	46223	24.17
550	.924	.792	.686	.20	8.9	2	47231	24.17
MICRO-	1.62	1.38	1.18	.09	8.4	3	48321	29.01
HENRY	2.64	2.20	1.77	.045	7.7	4	49421	29.01
	3.80	3.39	2.46	.026	7.5	5	50221	29.01
	.619	.495	.410	.41	13.8	1	46203	24.17
	.814	.694	.601	.26	11.9	2	47211	24.17
750	1.40	1.20	1.02	.12	11.3	3	48301	24.17
MICRO-	2.29	1.91	1.53	.06	10.3	4	49401	29.01
HENRY	3.33	2.96	2.15	.034	10.0	5	50201	29.01
	5.10	4.23	3.77	.022	9.4	6	51303	31.85
	.437	.349	.290	.82	27.5	1	46183	24.17
	.575	.491	.425	.52	23.8	2	47191	24.17
1.5	.986	.847	.722	.24	22.5	3	48281	24.17
MILLI-	1.61	1.36	1.08	.12	20.6	4	49381	29.01
HENRY	2.31	2.06	1.50	.07	20	5	50181	29.01
	3.78	3.14	2.80	.04	18.8	6	51283	31.85
	.308	.246	.204	1.65	55	1	46163	24.17
	.405	.345	.299	1.05	47.5	2	47171	24.17
3	.708	.605	.516	.47	45.0	3	48261	24.17
MILLI-	1.14	.959	.766	.24	41.3	4	49361	29.01
HENRY	1.64	1.45	1.06	.14	40.0	5	50161	29.01
	2.53	2.09	1.86	.09	37.5	6	51263	31.85
	.205	.165	.136	3.71	123.8	1	46143	24.17
	.270	.231	.200	2.36	106.9	2	47151	24.17
6.75	.468	.401	.342	1.07	101.3	3	48241	24.17
MILLI-	.769	.643	.516	.53	92.8	4	49341	29.01
HENRY	1.10	.977	.711	.31	90.0	5	50141	29.01
	1.69	1.41	1.25	.20	84.4	6	51243	31.85
	.154	.123	.101	6.6	220	1	46123	24.17
12	.202	.172	.150	4.2	190	2	47131	24.17
MILLI-	.352	.299	.255	1.9	180	3	48221	24.17
HENRY	.572	.480	.378	.95	165	4	49321	29.01
	.827	.730	.528	.55	160	5	50121	29.01
	1.28	1.06	.942	.35	150	6	51223	31.85

Delivery— stock to one week

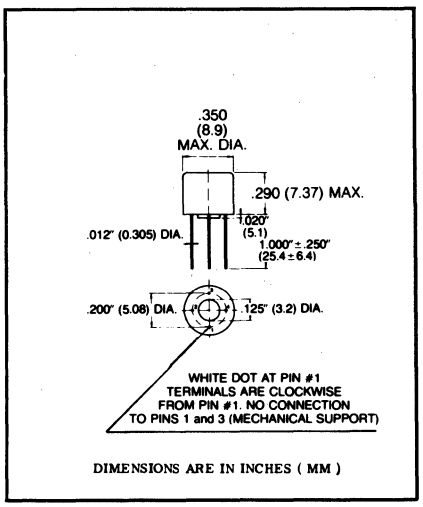
For immediate engineering assistance or to place an order—
Call Toll free: 800-228-9747 • Fax: 914-738-8225

PICO Electronics, Inc.
143 Sparks Ave., Pelham, NY 10803-1837
Internet: ***http://www.picoelectronics.com*** **E-mail:** ***HLSC73A@prodigy.com***

PICO's ultra-miniature HIGH "Q" INDUCTORS



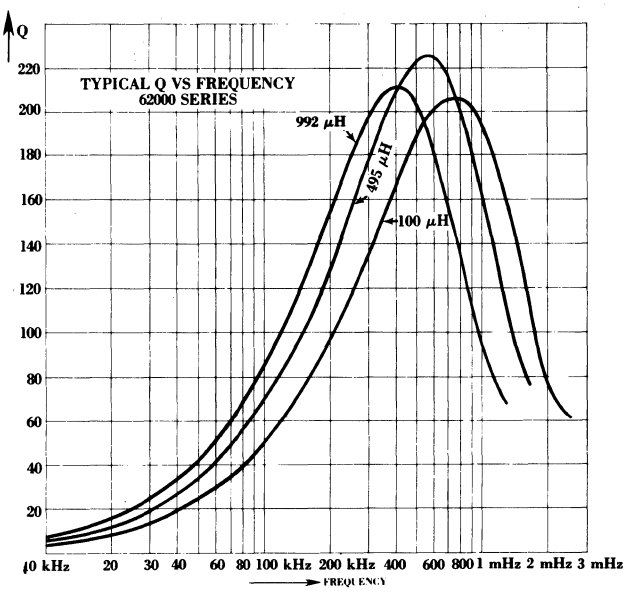
- ± 2% inductance stability vs temperature
- Smallest possible size
- Extreme resistance to thermal shock
- Manufactured to Mil-T-27 (TF5R20ZZ)
- All units are magnetically shielded
- Non-standard inductance values available at 10% higher cost than nearest standard inductor.



Delivery— stock to one week

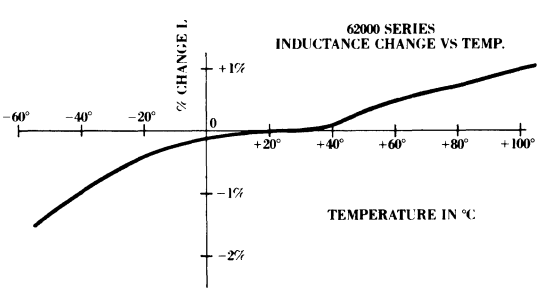
"62000" SERIES

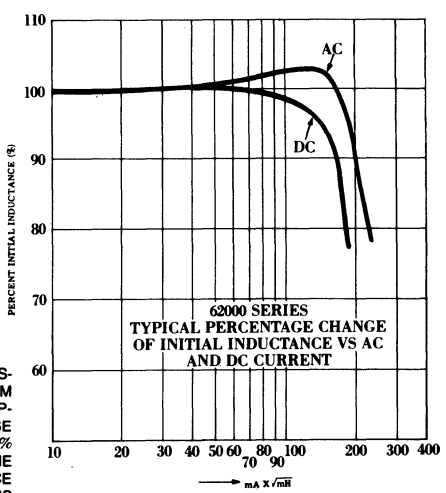
PART NUMBER	INDUCTANCE (MICRO-HENRYS)	D.C. RESISTANCE (OHMS)	APPROXIMATE SELF RESONANT FREQUENCY (MHz)	MAXIMUM DC CURRENT (mA)	MINIMUM Q	PRICE (1-9)
62112	2500	18	1.15	80	130 at (400 kHz)	31.90
62132	1500	10	1.5	100	130 at (400 kHz)	31.90
62152	992	7	1.8	125	160 at (400 kHz)	31.90
62172	900	6.5	1.9	130	160 at (400 kHz)	31.90
62192	800	6.0	2.1	140	160 at (400 kHz)	31.90
62212	742	5.7	2.3	150	150 at (500 kHz)	31.90
62232	702	5.5	2.5	155	150 at (500 kHz)	31.90
62252	700	5.0	2.7	160	160 at (500 kHz)	31.90
62272	695	4.5	3	170	160 at (500 kHz)	31.90
62292	400	3.7	3.3	185	160 at (500 kHz)	31.90
62312	298	2.8	3.8	215	170 at (500 kHz)	31.90
62332	248	2.3	4.2	235	170 at (500 kHz)	31.90
62352	196	1.8	4.75	265	160 at (500 kHz)	31.90
62372	150	1.4	5.5	300	160 at (500 kHz)	31.90
62392	100	1.2	6.8	330	140 at (400 kHz)	31.90



SPECIFICATIONS

- INDUCTANCE TOLERANCE ±4% AT 0.1V-100KHZ
- INDUCTANCE STABILITY VS TEMPERATURE ±2% -55°C to 105°C
- MANUFACTURED TO MIL-T-27 TF5R20ZZ
- WEIGHT 2 GRAMS
- THERMAL SHOCK 100 CYCLES, METHOD 107D MIL-STD 202E TEST CONDITION A3
- UNIT HAS MAGNETIC SHIELD





ALL INDUCTORS ARE MEASURED AT 0 DC. THE MAXIMUM DC LISTINGS ARE FOR APPROXIMATELY 30°C HEAT RISE AND APPROXIMATELY 2% DROP IN INDUCTANCE. THE CHANGE OF INDUCTANCE WITH AC OR DC CURRENTS IS ILLUSTRATED BY THE CURVES. THE EXCITATION IS PLOTTED IN mA $\times\sqrt{mHy}$. FOR EXAMPLE THE 0.495 mH INDUCTOR (62272) WITH 170 mA DC FLOWING WILL HAVE AN EXCITATION OF mA $\times\sqrt{mHy}$ = 120, AND THE INDUCTANCE WILL DROP FROM 495 uH to 485 uH. IF THE 170 mA WAS AC, THE INDUCTANCE WOULD BE 510 uH.

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837

Call Toll free: 800-228-9747 • Fax: 914-738-8225

Internet: *http://www.picoelectronics.com*

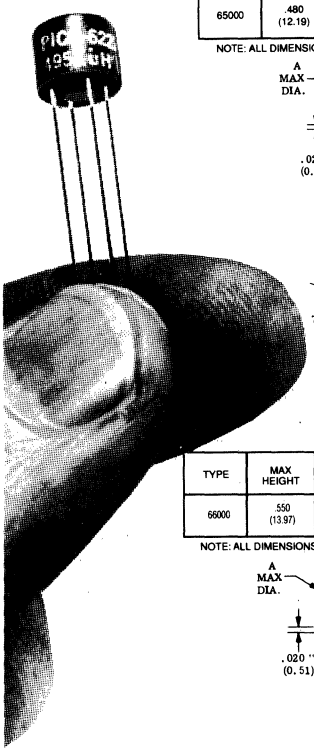
E-mail: *HLSC73A@prodigy.com*

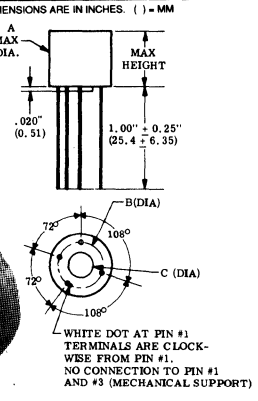
PICO's miniature HIGH "Q" INDUCTORS

- ± 1% inductance stability vs temperature
- Smallest possible size
- Extreme resistance to thermal shock
- Manufactured to Mil-T-27 (TF5R20ZZ)
- All units are magnetically shielded

TYPE	MAX HEIGHT	A MAX. DIA.	B BOLT CIRCLE	C STAND-OFF
63000	.325 (7.87)	.430 (10.69)	.260 (6.6)	.160 (4.06)
64000	.360 (8.89)	.530 (13.5)	.350 (8.89)	.250 (6.35)
65000	.480 (12.19)	.670 (17.0)	.440 (11.17)	.340 (8.64)

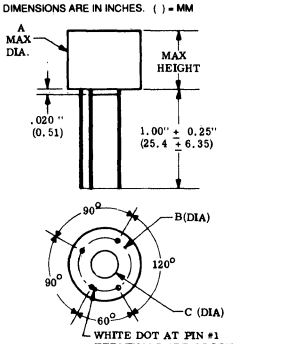
NOTE: ALL DIMENSIONS ARE IN INCHES. ( ) = MM





TYPE	MAX HEIGHT	A MAX DIA	B BOLT CIRCLE	C STAND-OFF
66000	.550 (13.97)	.840 (21.34)	.560 (14.22)	.460 (11.68)

NOTE: ALL DIMENSIONS ARE IN INCHES. ( ) = MM



ALL INDUCTORS ARE MEASURED AT 0 DC. THE MAXIMUM DC LISTINGS ARE FOR APPROXIMATELY 5% DROP IN INDUCTANCE AND NEGLIGIBLE HEAT RISE. THE CHANGE OF INDUCTANCE WITH AC OR DC CURRENTS IS ILLUSTRATED BY THE CURVES SHOWN FOR EACH INDUCTOR TYPE. THE EXCITATION IS PLOTTED IN mA X $\sqrt{mHy}$. FOR EXAMPLE THE 10 mH INDUCTOR (64314) WITH 79 mA DC FLOWING WILL HAVE AN EXCITATION OF mA X $\sqrt{mH}$ = 79 X $\sqrt{10}$ = 250 AND THE INDUCTANCE WILL DROP FROM 10 mH TO 9mH. IF THE 79 mA WAS AC THE INDUCTANCE WOULD BE 9.65 mH.

For immediate engineering assistance or to place an order–

Call Toll Free 800-228-9747

PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837

800-228-9747 • Fax: 914-738-8225

"63000" SERIES

PART NUMBER	INDUCTANCE	D.C. RESISTANCE (OHMS)	APPROXIMATE SELF RESONANT FREQUENCY (KHz)	MAXIMUM DC CURRENT (mA)	MINIMUM Q	*** PRICE (1-9)
63120	1 Hy	1840	47	5.7	30 at (15 kHz)	35.88
63140	750 mH	1380	54	6.6	30 at (15 kHz)	34.63
63160	500 mH	920	66	8	30 at (15 kHz)	32.62
63180	200 mH	368	105	12.5	60 at (25 kHz)	32.62
63200	100 mH	185	148	18	60 at (25 kHz)	32.62
63220	75 mH	140	172	20.8	100 at (50 kHz)	32.62
63240	50 mH	90	210	25.5	100 at (50 kHz)	32.62
63260	30 mH	55	270	33	100 at (50 kHz)	32.62
63280	20 mH	37	332	40	100 at (50 kHz)	32.62
63300	15 mH	28	383	46	100 at (50 kHz)	32.62
63320	10 mH	18.5	470	57	100 at (50 kHz)	32.62
63340	5 mH	10	665	80	100 at (50 kHz)	32.62
63360	1 mH	2	1480	180	100 at (50 kHz)	35.88

"64000" SERIES

PART NUMBER	INDUCTANCE	D.C. RESISTANCE (OHMS)	APPROXIMATE SELF RESONANT FREQUENCY (KHz)	MAXIMUM DC CURRENT (mA)	MINIMUM Q	*** PRICE (1-9)
64114	5 Hy	3000	17	2.8	15 at (4 kHz)	39.05
64134	3 Hy	1800	22	3.6	30 at (6 kHz)	37.66
64154	2 Hy	1200	27	4.4	30 at (6 kHz)	35.88
64174	1 Hy	600	38	6.3	30 at (6 kHz)	32.62
64194	750 mH	450	44	7.3	30 at (6 kHz)	32.62
64214	500 mH	300	54	9	30 at (6 kHz)	32.62
64234	250 mH	150	76	13	65 at (15 kHz)	32.62
64254	100 mH	60	120	20	65 at (15 kHz)	32.62
64274	75 mH	45	139	23	120 at (25 kHz)	32.62
64294	50 mH	30	170	28	120 at (25 kHz)	32.62
64314	10 mH	6	380	63	200 at (50 kHz)	32.62
64334	5 mH	3	537	89	200 at (50 kHz)	32.62
64354	1 mH	.6	1200	200	200 at (50 kHz)	35.88

"65000" SERIES

PART NUMBER	INDUCTANCE	D.C. RESISTANCE (OHMS)	APPROXIMATE SELF RESONANT FREQUENCY (KHz)	MAXIMUM DC CURRENT (mA)	MINIMUM Q	*** PRICE (1-9)
65413	10 Hy	3800	11.7	2.8	28 at (4 kHz)	39.05
65433	5 Hy	1900	16.5	3.9	28 at (4 kHz)	37.66
65453	3 Hy	1140	21	5.1	28 at (4 kHz)	35.88
65473	2 Hy	760	26	6.3	56 at (6 kHz)	35.88
65493	1 Hy	380	37	8.8	56 at (6 kHz)	32.62
65513	500 mH	190	52	12.5	56 at (6 kHz)	32.62
65533	250 mH	95	74	17.7	140 at (15 kHz)	32.62
65553	100 mH	38	117	28	140 at (15 kHz)	32.62
65573	50 mH	19	165	39.6	240 at (25 kHz)	32.62
65593	10 mH	3.8	370	88.5	240 at (25 kHz)	32.62

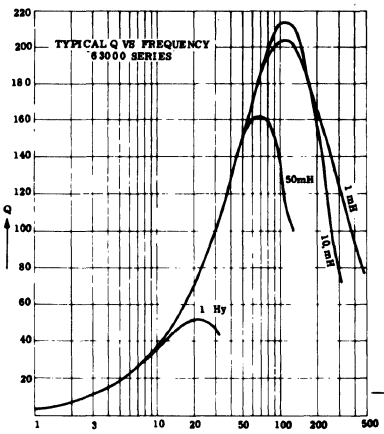
"66000" SERIES

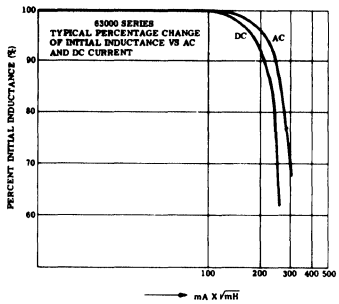
PART NUMBER	INDUCTANCE	D.C. RESISTANCE (OHMS)	APPROXIMATE SELF RESONANT FREQUENCY (KHz)	MAXIMUM DC CURRENT (mA)	MINIMUM Q	*** PRICE (1-9)
66218	10 Hy	2200	11	4.2	40 at (4 kHz)	39.05
66238	5 Hy	1100	15.7	6	40 at (4 kHz)	37.66
66258	3 Hy	660	20	7.7	70 at (6 kHz)	37.66
66278	2 Hy	440	25	9.4	70 at (6 kHz)	32.66
66298	1 Hy	220	35	13	70 at (6 kHz)	32.66
66318	500 mH	110	49	18.8	70 at (6 kHz)	32.66
66338	250 mH	55	70	26.6	200 at (15 kHz)	32.66
66358	100 mH	22	110	42	200 at (15 kHz)	32.66
66378	50 mH	11	156	59	200 at (15 kHz)	32.66
66398	10 mH	2.2	350	133	200 at (15 kHz)	32.66

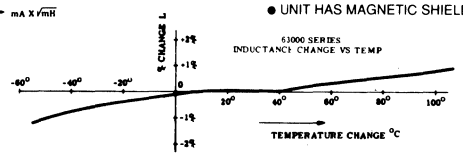
***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

Internet: *http://www.picoelectronics.com*

E-mail: *HLSC73A@prodigy.com*

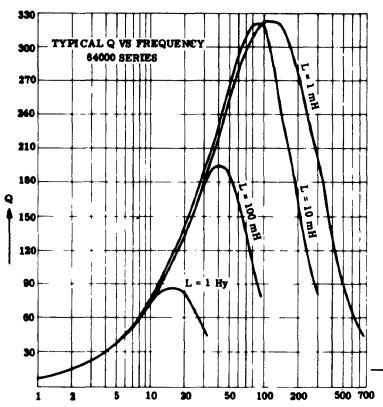


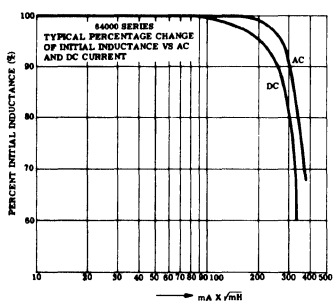


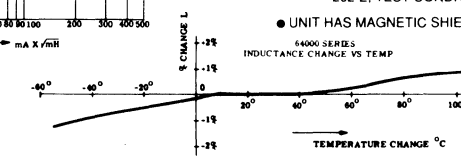


SPECIFICATIONS: **"63000" SERIES**

- INDUCTANCE TOLERANCE ±5% AT .IV-4kHz.
- INDUCTANCE STABILITY VS TEMP. ± 1% - 30° TO + 105°C + 1% - 55°C To + 105°C - 2%
- MANUFACTURED TO MIL-T-27 (MIL TYPE TF5R20ZZ)
- WEIGHT 3.5 GRAMS
- THERMAL SHOCK: 100 CYCLES, METHOD 107D, MIL-STD 202 E, TEST CONDITION A-3
- UNIT HAS MAGNETIC SHIELD

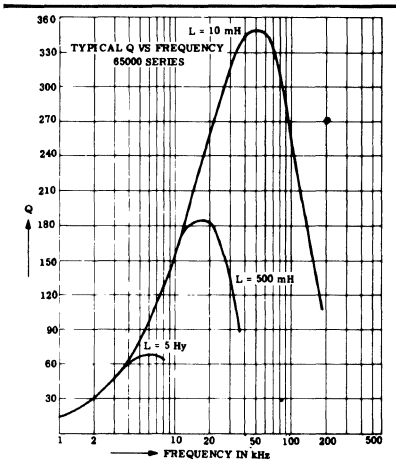


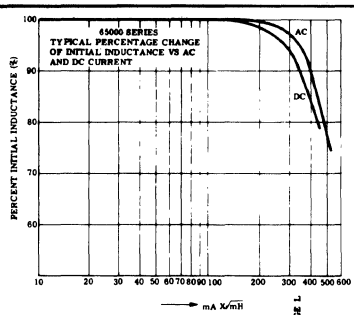


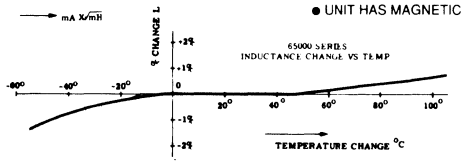


SPECIFICATIONS: **"64000" SERIES**

- INDUCTANCE TOLERANCE ±5% AT .IV-2kHz.
- INDUCTANCE STABILITY VS TEMP. ± 1% - 30° TO + 105°C + 1% - 55°C TO + 105°C - 2%
- MANUFACTURED TO MIL-T-27 (MIL TYPE TF5R20ZZ)
- WEIGHT 6 GRAMS
- THERMAL SHOCK: 100 CYCLES, METHOD 107D, MIL-STD 202 E, TEST CONDITION A-3
- UNIT HAS MAGNETIC SHIELD

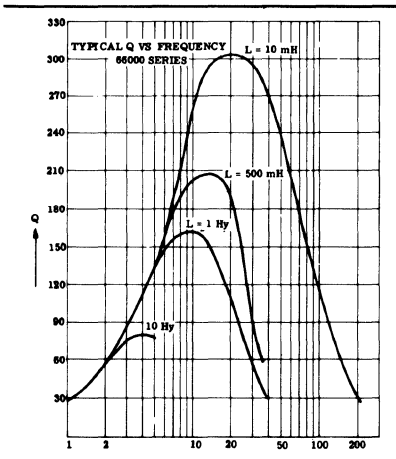


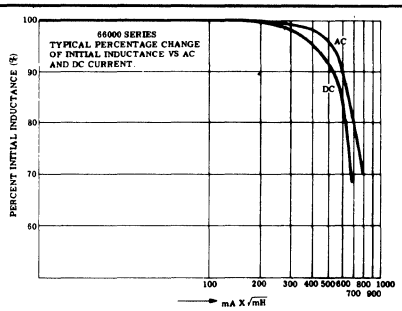


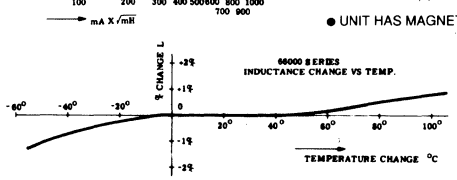


SPECIFICATIONS: **"65000" SERIES**

- INDUCTANCE TOLERANCE ±5% AT .IV-1kHz.
- INDUCTANCE STABILITY VS TEMP. ± 1% - 30° TO + 105°C + 1% - 55°C TO + 105°C - 2%
- MANUFACTURED TO MIL-T-27 (MIL TYPE TF5R20ZZ)
- WEIGHT 12 GRAMS
- THERMAL SHOCK: 100 CYCLES, METHOD 107D, MIL-STD 202 E, TEST CONDITION A-3
- UNIT HAS MAGNETIC SHIELD







SPECIFICATIONS: **"66000" SERIES**

- INDUCTANCE TOLERANCE ±5% AT .IV-4kHz.
- INDUCTANCE STABILITY VS TEMP. ± 1% - 30° TO + 105°C + 1% - 55°C TO + 105°C - 2%
- MANUFACTURED TO MIL-T-27 (MIL TYPE TF5R20ZZ)
- WEIGHT 22 GRAMS
- THERMAL SHOCK: 100 CYCLES, METHOD 107D, MIL-STD 202 E, TEST CONDITION A-3
- UNIT HAS MAGNETIC SHIELD

Internet:http://www.picoelectronics.com • E-Mail:HLSC73A@prodigy.com • Call Toll free: 800-228-9747 • Fax: 914-738-8225

Recommended Land Pattern Dimensions For Surface Mount Inductors

Note: All dimensions are inches

PICO 73000 Series, Size #00

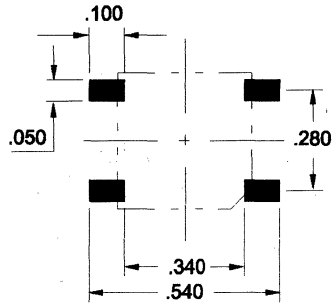


Fig. 1

PICO 73000 Series, Size #0 & #1

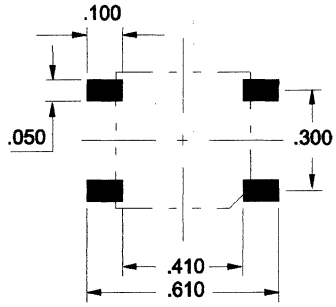


Fig. 2

PICO 73000 Series, Size #2

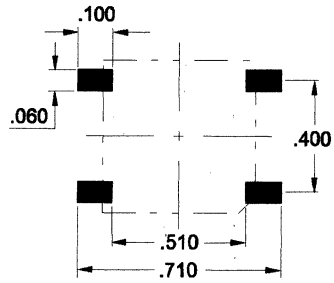


Fig. 3

PICO 73000 Series, Size #3

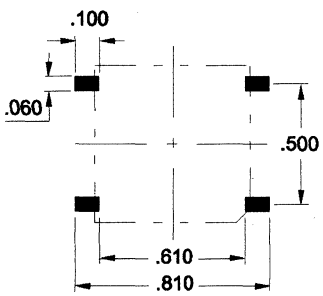


Fig. 4

PICO 73000 Series, Size #4

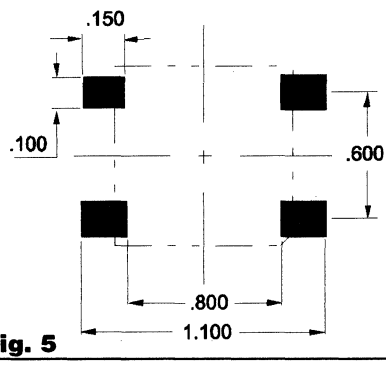


Fig. 5

PICO 40000 Series, Size #0

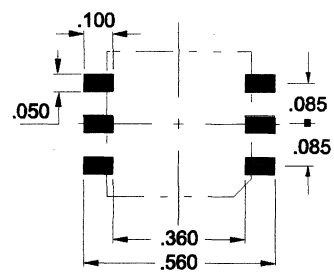


Fig. 6

PICO 41000 Series, Size #1

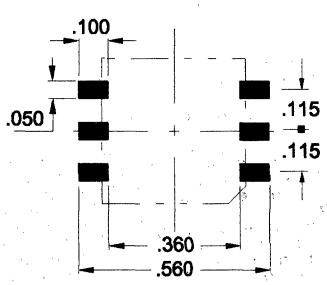


Fig. 7

PICO 42000 Series, Size #2

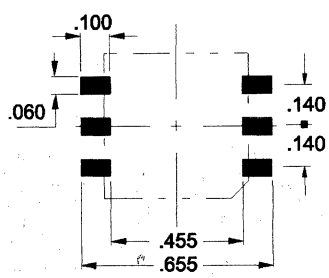


Fig. 8

PICO 43000 Series, Size #3

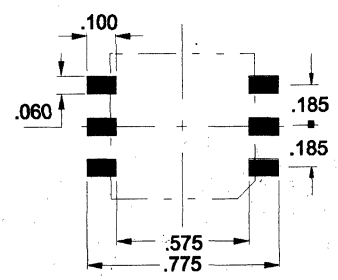


Fig. 9

PICO 46000 Series, Size #1

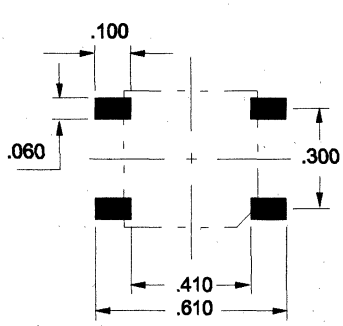


Fig. 10

PICO 47000 Series, Size #2

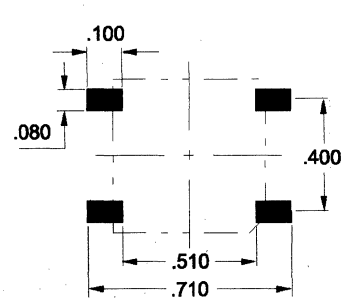


Fig. 11

PICO 48000 Series, Size #3

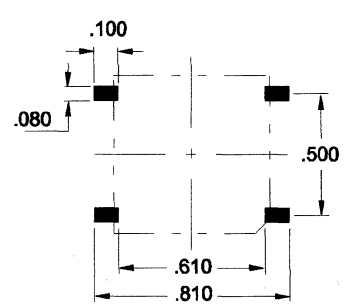


Fig. 12

Internet:http://www.picoelectronics.com • E-Mail:HLSC73A@prodigy.com • Call Toll free: 800-228-9747 • Fax: 914-738-8225

PRODUCT SELECTION GUIDES

TECHNICAL INFORMATION

WHERE TO FIND THEM IN THE 1999 EDITION OF EEM

Batteries, Product Selection Guide **D•1313**
Cabinets, Enclosures, Racks & Chassis, Product Selection Guide **C•1003**
Capacitors, Product Selection Guide **A•1003**
Coils, Chokes, Inductors, Product Selection Guide **A•1153**
Connectors & Sockets, Product Selection Guide **C•1127**
Cores, Magnets & Ferrites **A•1349**
Crystals, Oscillators, Crystal & Piezoelectric Filters, Product Selection Guide **A•1365**
Data Acquisition/Handling Systems & Accessories **D•1139**
DC-DC Converters **D•1879**
Delay Lines, Product SelectionGuide **A•1545**
Discrete Semiconductors, Product Selection Guide **A•2049**
Displays, Readouts, & CRTs, Product Selection Guide **B•1006**
Fans, Blowers, Cooling Equipment, & Heat Exchangers, Product Selection Guide **C•1470**
Fiber Optics, Product Selection Guide **B•1163**
Filters, Power, Product Selection Guide **A•1577**
Filters, Signal, Product Selection Guide **A•1615**
Instruments, Test & Measuring, Product Selection Guide **D•1178**
Keyboards, Keypads & Membrane Switches, Product Selection Guide **B•1613**
Lamps, Lights, & Indicators, Product Selection Guide **B•1089**
LAN Products **B•1002**
Microwave Components, Product Selection Guide **A•1671**
Motors, Drives, & Rotating Components, Product Selection Guide **B•1169**
Oscilloscopes, Product Selection Guide **D•1309**
Panel Hardware, Product Selection Guide **C•1446**
Panel Meters, Analog & Digital, Product Selection Guide **D•1273**
Potentiometers, Trimmers, Controls, & Rheostats, Product Selection Guide **A•2010**
Power Supplies, AC, Product Selection Guide **D•2147**
Power Supplies, DC, Product Selection Guide **D•1379**
Protective Components (Fuses, Circuit Breakers, etc.) Product Selection Guide **B•1231**
Relays, Product Selection Guide **B•1285**
Resistors, Product Selection Guide **A•1857**
Solenoids, Product Selection Guide **B•1450**
Switches, Product Selection Guide **B•1467**
Terminal Blocks **C•1383**
Test Accessories **D•1270**
Thermal Components, Product Selection Guide **B•1667**
Transducers & Encoders, Product Selection Guide **B•1736**
Transformers, Product Selection Guide **A•2079**
Wire & Cable, Product Selection Guide **C•1581**

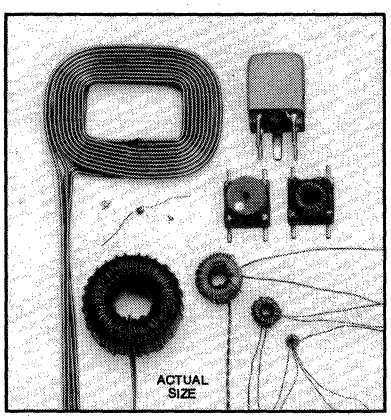
POLARA

QUALITY ▪ PRECISION ▪ RELIABILITY
STANDARD & SPECIAL MAGNETIC COMPONENTS

INQUIRE BY PHONE (714) 521-0900 OR FAX (714) 522-8001

View our home page on the internet at **http://www.polara.com**

CUSTOM MAGNETIC COMPONENTS

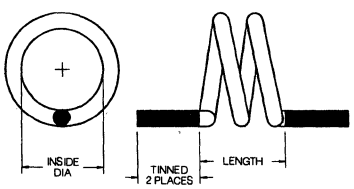


Depicted in the adjacent, actual-size photograph are a few of the many custom and special magnetic components supplied by Polara to meet a wide span of customer needs. Some of the criteria Polara designs regularly meet are subminiature and miniature sizes, special shapes and packages, and high-reliability requirements.

Electrical specifications are also diverse, with inductances from 10nH to 100mH, operating frequencies to the gigahertz range, and Q figures as high as 250. Applications are correspondingly varied, ranging from aerospace and communications systems to computers and medical technology.

TYPICAL CUSTOM COMPONENTS

MICROMINIATURE AIR-CORE INDUCTORS



Inductance range: 2nH - 1µH
Operating temperature: - 65°C to +130°C
Materials: JW 1177/9B wire, Class 130, Type SUN
Leads: Surface mount (shown) or radials, tinned two places
Inside diameter: .020 and larger
Wire sizes: AWG 24 to 40
Coil length: .015 and larger

TUNED INDUCTORS

Range of inductance: 0.35 - 2.0 µH
Resonant frequency range: 20-100 MHz (Measured by Cp and Rp)
Q: 50 minimum
Rated current: 300 - 600 ma
Core material: Carbonyl iron
Enclosure: Epoxy

SMALL RF TOROIDS

Core sizes (O.D.): 0.050 - 0.20 inch
Range of inductance: 0.004 to 3.0 µH
Operating frequency range: 10 - 200 MHz
Q: 50 minimum
Core material: Carbonyl iron
Leads: Tinned or untinned
Can be supplies with taps, and in commercial or military versions

SHIELDED VARIABLE INDUCTORS

Range of inductance: 0.40 - 100 µH
Operating requency range: 10 KHz - 500 MHz
Temperature coefficient: ± 35 ppm/ °C (typical)
Q: 25 - 35
Core material: Carbonyl iron
Enclosure: Tin-plated brass for magnetic and electrostatic shielding
Tuning adjustment: Top or bottom, optional

RESPONSE FAX

For fast action on your information needs, check off the items of interest, photocopy this EEM page, and fax to Polara at (714) 522-8001. Or call (714) 521-0900.

INDUCTORS

- ☐ Microminiature/miniature size
- ☐ Toroidal inductors
- ☐ Linear inductors
- ☐ Variable inductors
- ☐ Tuned inductors
- ☐ RF/IF inductors
- ☐ Filtering inductors
- ☐ High Q
- ☐ Mil-spec models
- ☐ Standard models

PULSE TRANSFORMERS

- ☐ Miniature size
- ☐ Data communications
- ☐ Impedance matching
- ☐ SCR triggering
- ☐ Line conversion
- ☐ Surface mount
- ☐ Hermetic packages
- ☐ Mil-spec models
- ☐ Standard models

Name_____
Title_____
Company_____
Address_____
City_____
St_____ Zip_____
Phone_____ (Area) _____ (Number)
Fax_____ (Area) _____ (Number)

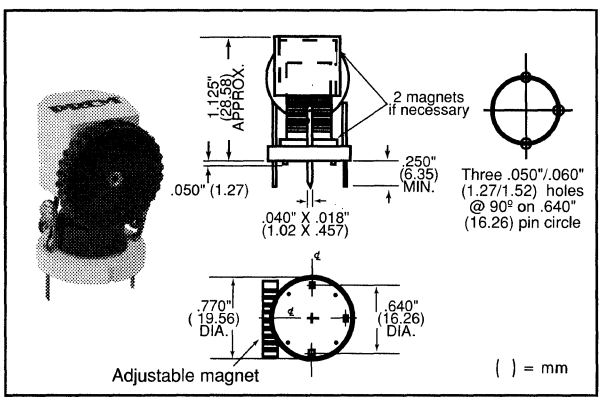
POLARA ENGINEERING, INC.

4115 Artesia Avenue • Fullerton, California 92833 • (714) 521-0900 • FAX: (714) 522-8001

CRT Display Products

Adjustable Linearity Coil

- Magnetically-biased linearity coil is fingertip adjustable to compensate for standard manufactured material tolerances and other components. Typical units can be adjusted to cover ranges indicated on graph.
- Typical space requirement: .8" (20.32mm) diameter by 1.25" (31.75mm) high
- Meets all Flammability Requirements of U.L. 94V-2 or better



Electronically Adjustable Dynamic Linearity Coils

- Specifically designed for multi-scan rate monitors utilizing frequencies to 90kHz
- Hook Up Information:

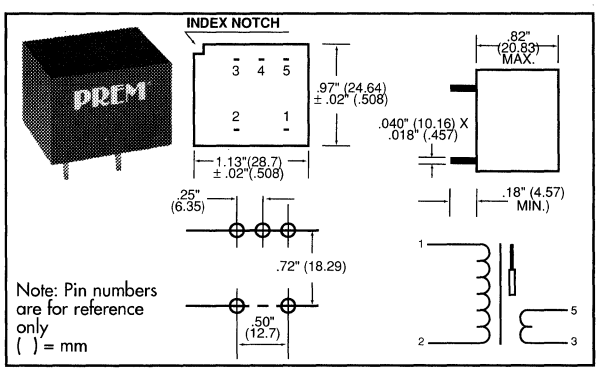
  Function Winding (term 1:2)

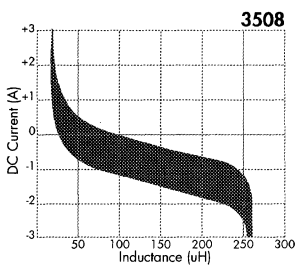
  With a negative current applied to terminal #1, inductance will increase as shown on graph.

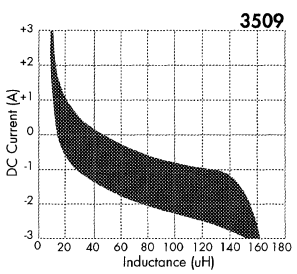
  Control Winding (term 3:5)

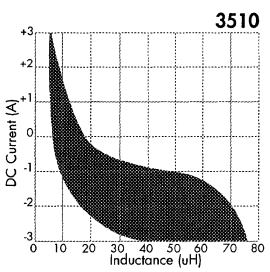
  Apply a positive DC current to terminal #3 for bias adjustment (required DC current: 0 - 400 mA)

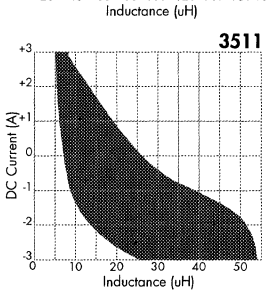
  DCR (control winding): 3.4Ω - 6.0Ω

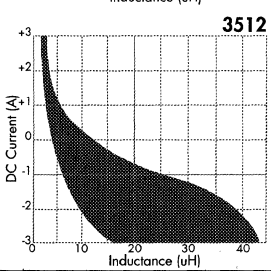


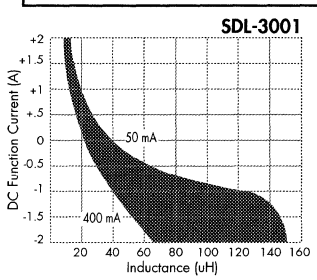


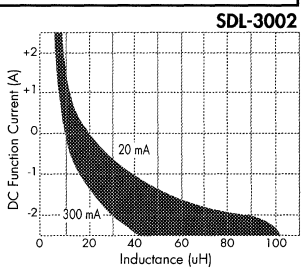


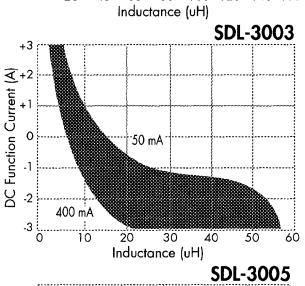


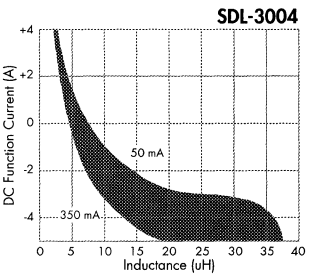


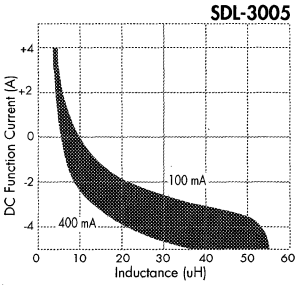












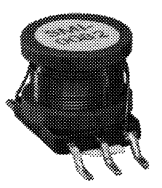
PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

Inductors

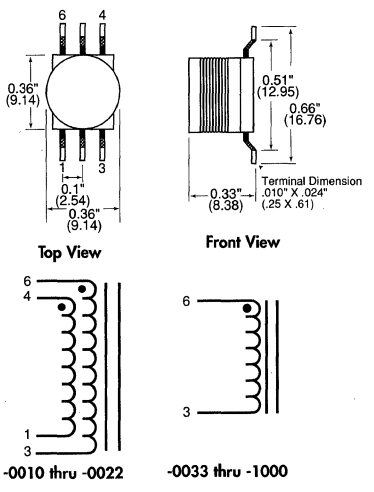
Economy Inductor Series for SMPS and RF Applications

SMI Series Surface Mount and Thru-Hole Mount

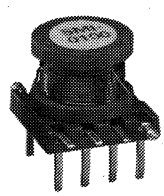
- Excellent performance in a small package
- Low above board height (.350"/8.89mm) maximum
- Wide range of inductance values
- High current ratings



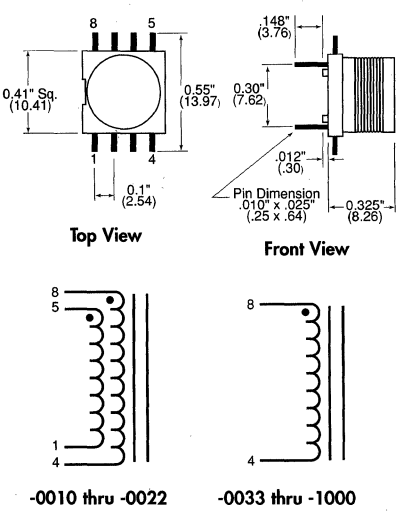
SMI-XXXX-S



( ) = mm



SMI-XXXX-T



( ) = mm

PREM PART NUMBER	L	I MAXIMUM	NOM. DCR Ω
SMI-0010	10uH	2.10A	0.057
SMI-0015	15uH	1.74A	0.083
SMI-0022	22uH	1.42A	0.123
SMI-0033	33uH	1.27A	0.156
SMI-0047	47uH	1.09A	0.237
SMI-0056	56uH	0.95A	0.303
SMI-0068	68uH	0.90A	0.342
SMI-0082	82uH	0.85A	0.380
SMI-0100	100uH	0.73A	0.522
SMI-0150	150uH	0.60A	0.786
SMI-0180	180uH	0.56A	0.885
SMI-0220	220uH	0.53A	1.005
SMI-0270	270uH	0.45A	1.374
SMI-0330	330uH	0.42A	1.594
SMI-0390	390uH	0.37A	2.041
SMI-0470	470uH	0.35A	2.324
SMI-0560	560uH	0.33A	2.562
SMI-0680	680uH	0.28A	3.522
SMI-0820	820uH	0.26A	3.954
SMI-1000	1000uH	0.23A	5.336

-S denotes Surface Mount -T denotes Thru-Hole Mount

Call Us Anytime for Technical Assistance!

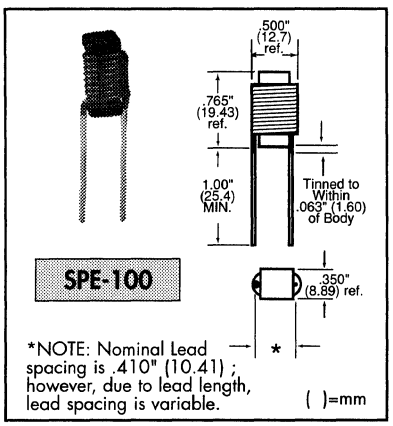
MasterCard VISA

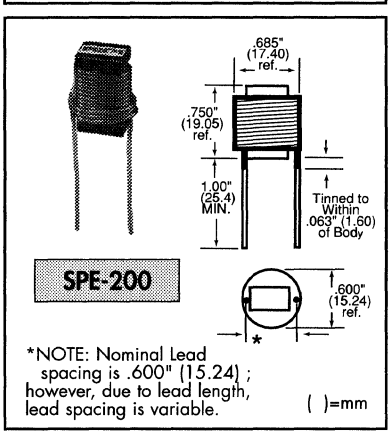
BUY PREM DIRECT
(815) 385-2700
Fax: (815) 385-8578
E-Mail: sales@premmag.com
Visit our Website:
http://www.premmag.com

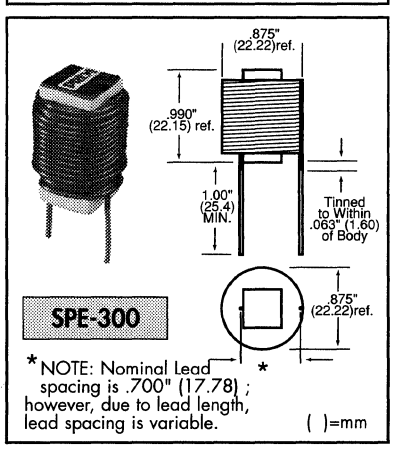
PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

Inductors

Economy High Current Inductors







PREM Part Numbers	LμHY	DC AMPS	NOM DCR Ω	NOM LEAD DIA.
	SPE-100 Series			
SPE-100-*	1.5	12	.003	.064
SPE-101-*	2	10	.004	.057
SPE-102-*	3	8.5	.005	.051
SPE-103-*	3.5	7.0	.006	.045
SPE-104-*	4.2	5.5	.007	.040
SPE-105-*	10	4.3	.010	.036
SPE-106-*	20	4.3	.017	.036
SPE-107-*	28	3.4	.024	.032
SPE-108-*	34	2.6	.031	.029
SPE-109-*	50	2.1	.046	.050
SPE-110-*	100	2.1	.069	.050
SPE-111-*	125	1.7	.090	.045
SPE-112-*	160	1.35	.120	.040
SPE-113-*	250	1.0	.189	.035
SPE-114-*	350	1.0	.235	.035
SPE-115-*	500	.850	.392	.032
SPE-116-*	600	.670	.453	.030
SPE-117-*	750	.530	.641	.025
SPE-118-*	1000	.420	.890	.025
SPE-119-*	0.9	13	.003 max.	.64

PREM Part Numbers	LμHY	DC AMPS	NOM. DCR Ω	NOM.LEAD DIA.
	SPE-200 Series			
SPE-200-*	27	5.5	.020	.040
SPE-201-*	33	5.5	.022	.040
SPE-202-*	39	5.5	.025	.040
SPE-203-*	47	5.0	.030	.040
SPE-204-*	56	4.8	.036	.036
SPE-205-*	68	4.4	.040	.036
SPE-206-*	82	4.0	.052	.032
† SPE-207-*	100	3.8	.061	.032
† SPE-208-*	120	3.5	.066	.032
† SPE-209-*	150	3.0	.075	.032
† SPE-210-*	180	2.8	.100	.029
SPE-211-*	220	2.35	.110	.029
SPE-212-*	270	2.0	.150	.026

† - Option E not available (SPE-200 series)

PREM Part Numbers	LμHY	DC AMPS	NOM. DCR Ω	NOM. LEAD DIA.
	SPE-300 Series			
† SPE-300-*	47	9.0	.019	.057
SPE-301-*	56	8.0	.024	.050
SPE-302-*	68	6.0	.031	.045
SPE-303-*	82	6.0	.034	.045
SPE-304-*	100	6.0	.039	.045
SPE-305-*	120	5.0	.048	.040
SPE-306-*	150	5.0	.054	.040
SPE-307-*	180	4.3	.072	.036
SPE-308-*	220	4.3	.081	.036
SPE-309-*	270	4.3	.091	.036
SPE-310-*	330	3.4	.120	.032
SPE-311-*	390	3.4	.134	.032
† SPE-312-*	470	3.4	.153	.032
SPE-313-*	560	2.7	.196	.028
SPE-314-*	680	2.5	.228	.028
SPE-315-*	820	2.5	.300	.050
SPE-316-*	1000	2.0	.332	.050
SPE-317-*	1200	2.0	.383	.050
SPE-318-*	1500	1.5	.510	.045

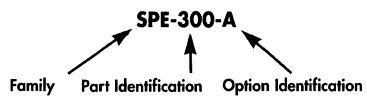
† - Option C not available (SPE-300 series)

* Options Available A-B-C-D-E-O Option Table

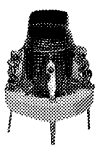
- **A.** Plastic dip coating
- **B.** Mounted on 94 V-0base, 3 terminals (2 used). Base dia. .780" (19.81) max.
- **C.** Shield can supplied with unit.
- **D.** Mounted on 94 V-0 base and shield can supplied with unit.
- **E.** For high voltage applications.
- **O.** No options. Plain self leads as shown.

Notes: 1. Shield can will reduce "L" up to a maximum of 15% on the 100 and 200 series, and up to 30% on the 300 series of the specified value depending upon which series is being evaluated.
2. Options O, B & D not available on SPE-300 series units.
3. All SPE-300 units incoporate option E.

Ordering Information Example:



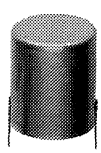
Base Mount Option-B



Base Option B

- Base diameter .780" (19.81) max.
- 3 terminals on .640" (16.25) dia. circle @ 90°
- .050" (1.27) ref. standoffs above board
- Base height above board = .190" (4.83) max.

Shield Can Option C



Aluminum Shield Can Option C for EMI Suppression

- Can height above board 1.09" (27.69) max.
- Can diameter = .900" (22.86) max.
- Can lug mounting .895" ± .010" (22.73 ± .254) between centers
- Can lugs .060 (1.52) wide X .016 (.406) thick
- Can standoff above board .030 (.762)

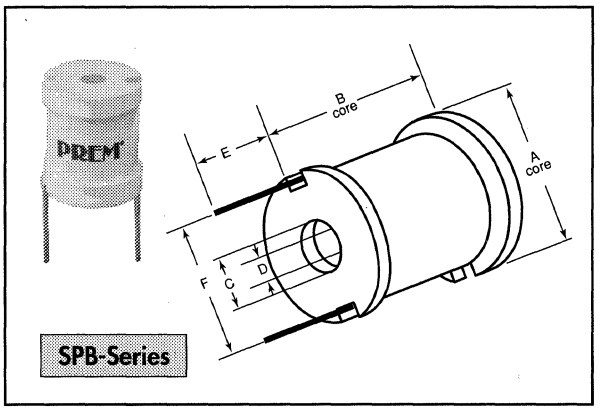
( ) = mm

PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

Inductors

Drum Core Type

Standard component ferrite core power inductors rated up to 12 amps DC for switch mode power supplies and other applications. Leads are tinned to within .063"(1.6mm) of the core.



SPB-100 SERIES (2 μ HY-800 μ HY)

PREM PART NO.	Inductance	DC AMPS	NOM DCR Ω	Lead Size
SPB-100	2 μ HY	12.0	.005	14 gauge
SPB-101	3 μ HY	10.0	.007	15 gauge
SPB-102	4 μ HY	8.5	.010	16 gauge
SPB-103	8 μ HY	7.0	.012	17 gauge
SPB-104	18 μ HY	7.0	.013	17 gauge
SPB-105	22 μ HY	5.5	.016	18 gauge
SPB-106	30 μ HY	4.3	.021	19 gauge
SPB-107	37 μ HY	3.4	.032	20 gauge
SPB-108	50 μ HY	2.6	.042	20 gauge
SPB-109	80 μ HY	2.6	.059	20 gauge
SPB-110	100 μ HY	2.1	.080	20 gauge
SPB-111	135 μ HY	2.1	.093	20 gauge
SPB-112	160 μ HY	1.7	.126	20 gauge
SPB-113	220 μ HY	1.7	.154	20 gauge
SPB-114	300 μ HY	1.7	.183	20 gauge
SPB-115	380 μ HY	1.35	.252	20 gauge
SPB-116	450 μ HY	1.35	.286	20 gauge
SPB-117	600 μ HY	1.07	.406	20 gauge
SPB-118	800 μ HY	1.07	.470	20 gauge

Dimensions

A .560 (14.22) ref.
B .810 (20.57) ref.
C .187 (4.74) ref.
D .126 (3.20) ref.
E .6875/.8125 (17.46)/(20.63)
F SPB-100 - 107 .510 (12.95) ref.
SPB-108 - 118 .560 (14.22) ref.
Mounts using a non-metallic #4 screw

( ) = mm

SPB-300 SERIES (40 μ HY-2.5 mH)

PREM PART NO.	Inductance	DC AMPS	NOM DCR Ω	Lead Size
SPB-300	40 μ HY	12.0	.013	14 gauge
SPB-301	60 μ HY	10.0	.019	15 gauge
SPB-302	80 μ HY	10.0	.022	15 gauge
SPB-303	120 μ HY	8.5	.032	16 gauge
SPB-304	150 μ HY	8.5	.038	16 gauge
SPB-305	175 μ HY	7.0	.046	17 gauge
SPB-306	200 μ HY	7.0	.049	17 gauge
SPB-307	300 μ HY	5.5	.073	18 gauge
SPB-308	400 μ HY	5.5	.086	18 gauge
SPB-309	475 μ HY	4.3	.110	19 gauge
SPB-310	550 μ HY	4.3	.120	19 gauge
SPB-311	700 μ HY	3.4	.165	20 gauge
SPB-312	825 μ HY	3.4	.183	20 gauge
SPB-313	900 μ HY	3.4	.195	20 gauge
SPB-314	1.2 mH	2.6	.281	20 gauge
SPB-315	1.5 mH	2.6	.323	20 gauge
SPB-316	1.7 mH	2.6	.343	20 gauge
SPB-317	2.0 mH	2.1	.440	20 gauge
SPB-318	2.5 mH	2.1	.525	20 gauge

Dimensions

A .955 (24.26) ref.
B .975 (24.77) ref.
C .187 (4.74) ref.
D .126 (3.20) ref.
E .6875/.8125 (17.46)/(20.63)
F SPB-300 - 313 .775 (19.69) ref.
SPB-314 - 318 .940 (23.87) ref.
Mounts using a non-metallic #4 screw

( ) = mm

SPB-200 SERIES (4 μ HY-1.8 mH)

PREM PART NO.	Inductance	DC AMPS	NOM DCR Ω	Lead Size
SPB-200	4 μ HY	12.0	.006	14 gauge
SPB-201	5 μ HY	10.0	.008	15 gauge
SPB-202	20 μ HY	8.5	.013	16 gauge
SPB-203	30 μ HY	7.0	.019	17 gauge
SPB-204	40 μ HY	5.5	.025	18 gauge
SPB-205	75 μ HY	4.3	.042	19 gauge
SPB-206	120 μ HY	4.3	.053	19 gauge
SPB-207	150 μ HY	3.4	.072	20 gauge
SPB-208	200 μ HY	2.6	.105	20 gauge
SPB-209	300 μ HY	2.1	.158	20 gauge
SPB-210	400 μ HY	2.1	.181	20 gauge
SPB-211	600 μ HY	1.7	.272	20 gauge
SPB-212	800 μ HY	1.7	.322	20 gauge
SPB-213	950 μ HY	1.35	.433	20 gauge
SPB-214	1.5 mH	1.07	.683	20 gauge
SPB-215	1.8 mH	1.07	.760	20 gauge

Dimensions

A .720 (18.28) ref.
B .900 (22.86) ref.
C .187 (4.74) ref.
D .126 (3.20) ref.
E .6875 /.8125 (17.46)/(20.63)
F SPB-200 - 207 .625 (15.87) ref.
SPB-208 - 215 .700 (17.78) ref.
Mounts using a non-metallic #4 screw

( ) = mm

SPB-400 SERIES (100 μ HY - 3.0 mH)

PREM PART NO.	Inductance	DC AMPS	NOM DCR Ω	Lead Size
SPB-400	100 μ HY	12.0	.022	14 gauge
SPB-401	150 μ HY	10.0	.034	15 gauge
SPB-402	200 μ HY	10.0	.038	15 gauge
SPB-403	300 μ HY	8.5	.056	16 gauge
SPB-404	375 μ HY	8.5	.065	16 gauge
SPB-405	450 μ HY	8.5	.070	16 gauge
SPB-406	500 μ HY	7.0	.089	17 gauge
SPB-407	600 μ HY	7.0	.098	17 gauge
SPB-408	700 μ HY	5.5	.130	18 gauge
SPB-409	850 μ HY	5.5	.145	18 gauge
SPB-410	1.0 mH	5.5	.166	18 gauge
SPB-411	1.3 mH	4.3	.218	19 gauge
SPB-412	1.6 mH	4.3	.250	19 gauge
SPB-413	2.0 mH	3.4	.340	20 gauge
SPB-414	3.0 mH	3.4	.433	20 gauge

Dimensions

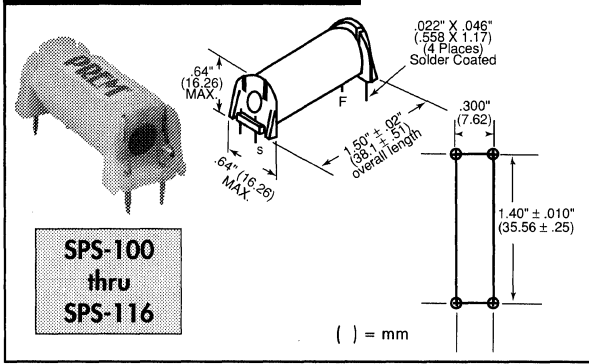
A 1.400 (35.56) ref.
B 1.04 (26.42) ref.
C .288 (7.31) max.
D .170 (4.37) min.
E .6875/.8125 (17.46)/(20.63)
F 1.14 (28.96) ref.
Mounts using a non-metallic #8 screw

( ) = mm

PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

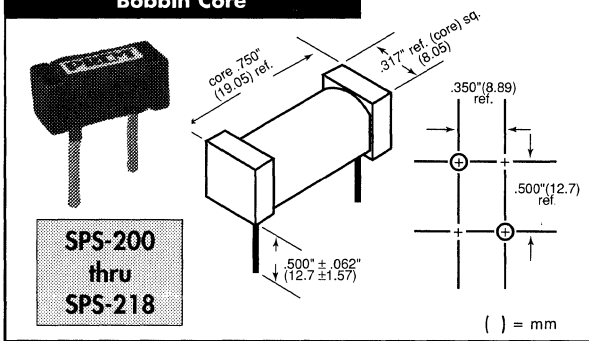
Inductors

Slug Core PC Mounting



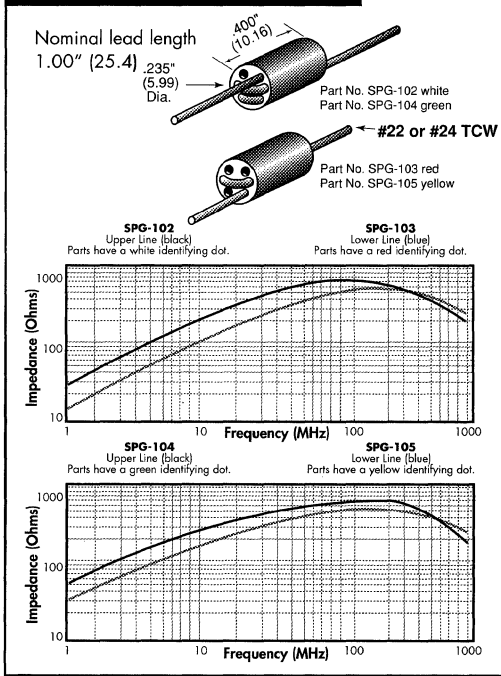
SPS-100 thru SPS-116

Bobbin Core



SPS-200 thru SPS-218

Wide Band Shield Bead Ferrite Chokes



PREM Part No.	SPS-100 Series (110uHy - 100mHy) Inductance	DC AMPS	NOM DCR
SPS-100	110 µ HY	4.9	.055
SPS-101	140 µ HY	4.3	.075
SPS-102	300 µ HY	3.0	.143
SPS-103	420 µ HY	2.5	.210
SPS-104	600 mH	2.1	.310
SPS-105	1.0 mH	1.6	.500
SPS-106	1.3 mH	1.35	.700
SPS-107	1.9 mH	1.2	.900
SPS-108	3.0 mH	.96	1.40
SPS-109	5.0 mH	.75	2.35
SPS-110	8.0 mH	.59	3.70
SPS-111	10.0 mH	.52	5.20
SPS-112	18.0 mH	.39	8.70
SPS-113	28.0 mH	.31	13.7
SPS-114	45.0 mH	.25	22.0
SPS-115	60.0 mH	.21	31.0
SPS-116	100.0 mH	.16	52.0

PREM Part No.	SPS-200 Series (1.5uHy - 1.0mHy) Inductance	DC AMPS	NOM DCR	Lead Size (in.)
SPS-200	1.5 µ HY	12.0	.003	.065
SPS-201	2.0 µ HY	10.0	.004	.057
SPS-202	3.0 µ HY	8.5	.005	.051
SPS-203	3.5 µ HY	7.0	.006	.045
SPS-204	4.2 µ HY	5.5	.007	.040
SPS-205	10.0 µ HY	4.3	.011	.036
SPS-206	20.0 µ HY	4.3	.017	.036
SPS-207	28.0 µ HY	3.4	.024	.032
SPS-208	34.0 µ HY	2.6	.031	.032
SPS-209	50.0 µ HY	2.1	.046	.032
SPS-210	100.0 µ HY	2.1	.069	.032
SPS-211	125.0 µ HY	1.7	.090	.032
SPS-212	160.0 µ HY	1.35	.124	.032
SPS-213	250.0 µ HY	1.0	.189	.032
SPS-214	350.0 µ HY	1.0	.235	.032
SPS-215	500.0 µ HY	.85	.392	.032
SPS-216	600.0 µ HY	.67	.453	.032
SPS-217	750.0 µ HY	.53	.641	.032
SPS-218	1.0 mH	.42	.890	.032

* Prem offers a complete line of shield bead chokes for use in attenuating EMI and other unwanted signals in a circuit without contributing to power losses at lower frequencies or DC. **Impedances from 10 to 600 OHMS are available over frequency ranges from 1 MHz to 500 MHz**

Call Us Anytime for Technical Assistance!
BUY PREM DIRECT
(815) 385-2700
MasterCard VISA
Fax: (815) 385-8578
E-Mail: sales@premmag.com
Visit our Website:
http://www.premmag.com

PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

Inductors & Common Mode Chokes

Pulse
A TECHNITROL COMPANY

RF Inductors

1008CX SERIES

Pulse Part Number	Inductance (nH)	Standard Tolerance	Optional Tolerance	Test Freq. (MHz)
PE-1008CX040MTT	4.7	±20%	±10%	50
PE-1008CX080MTT	8.2	±20%	—	50
PE-1008CX100MTT	10.0	±20%	±10%	50
PE-1008CX120MTT	12.0	±20%	±10%	50
PE-1008CX150MTT	15.0	±20%	±10%	50
PE-1008CX180MTT	18.0	±20%	±10%	50
PE-1008CX220MTT	22.0	±20%	±10%	50
PE-1008CX270KTT	27.0	±10%	—	50
PE-1008CX330KTT	33.0	±10%	±5%	50
PE-1008CX390KTT	39.0	±10%	±5%	50
PE-1008CX470KTT	47.0	±10%	±5%	50
PE-1008CX560KTT	56.0	±10%	—	50
PE-1008CX680KTT	68.0	±10%	±5%	50
PE-1008CX820KTT	82.0	±10%	±5%	50
PE-1008CX101KTT	100.0	±10%	±5%	25
PE-1008CX121KTT	120.0	±10%	—	25
PE-1008CX151KTT	150.0	±10%	±5%	25
PE-1008CX181KTT	180.0	±10%	±5%	25
PE-1008CX221KTT	220.0	±10%	±5%	25
PE-1008CX271KTT	270.0	±10%	±5%	25
PE-1008CX331KTT	330.0	±10%	±5%	25
PE-1008CX391KTT	390.0	±10%	±5%	25
PE-1008CX471KTT	470.0	±10%	±5%	25
PE-1008CX561KTT	560.0	±10%	±5%	25
PE-1008CX621KTT	620.0	±10%	±5%	25
PE-1008CX681KTT	680.0	±10%	—	25
PE-1008CX751KTT	750.0	±10%	±5%	25
PE-1008CX821KTT	820.0	±10%	±5%	25
PE-1008CX911KTT	910.0	±10%	±5%	25
PE-1008CX102KTT	1000.0	±10%	±5%	25
PE-1008CX122KTT	1200.0	±10%	±5%	10
PE-1008CX152KTT	1500.0	±10%	±5%	10
PE-1008CX182KTT	1800.0	±10%	±5%	10
PE-1008CX222KTT	2200.0	±10%	±5%	10
PE-1008CX272KTT	2700.0	±10%	±5%	10
PE-1008CX332KTT	3300.0	±10%	±5%	10
PE-1008CX392KTT	3900.0	±10%	—	10
PE-1008CX472KTT	4700.0	±10%	±5%	10

0805CX SERIES

Pulse Part Number	Inductance (nH)	Standard Tolerance	Optional Tolerance	Test Freq. (MHz)
PE-0805CX030KTT	3.3	±10%	±5%	250
PE-0805CX060KTT	6.8	±10%	±5%	250
PE-0805CX080KTT	8.2	±10%	±5%	250
PE-0805CX120KTT	12.0	±10%	—	250
PE-0805CX150KTT	15.0	±10%	±5%	250
PE-0805CX180KTT	18.0	±10%	—	250
PE-0805CX220KTT	22.0	±10%	±5%	250
PE-0805CX270KTT	27.0	±10%	—	250
PE-0805CX330KTT	33.0	±10%	±5%	250
PE-0805CX390KTT	39.0	±10%	±5%	250
PE-0805CX470KTT	47.0	±10%	±5%	200
PE-0805CX560KTT	56.0	±10%	±5%	200
PE-0805CX680KTT	68.0	±10%	±5%	200
PE-0805CX820KTT	82.0	±10%	±5%	150
PE-0805CX101KTT	100.0	±10%	±5%	150
PE-0805CX121KTT	120.0	±10%	—	150
PE-0805CX151KTT	150.0	±10%	±5%	100
PE-0805CX181KTT	180.0	±10%	—	100
PE-0805CX221KTT	220.0	±10%	±5%	100
PE-0805CX271KTT	270.0	±10%	±5%	100
PE-0805CX331KTT	330.0	±10%	±5%	100
PE-0805CX391KTT	390.0	±10%	±5%	100
PE-0805CX471KTT	470.0	±10%	±5%	100
PE-0805CX561KTT	560.0	±10%	±5%	100
PE-0805CX681KTT	680.0	±10%	±5%	50

1008CX Series

Part size is based on standard 1008 (2520) format. Sold in quantities of 1600 per reel. Please refer to Pulse data sheet **W701** for specific electrical and mechanical information.

0805CX Series

Part size is based on standard 0805 (2012) format. Sold in quantities of 2000 per reel. Please refer to Pulse data sheet **W702** for specific electrical and mechanical information.

S-parameters and Q & inductance vs. frequency information available on 3.5" disk. Please request Application Note AN944-1.

Common Mode Chokes

Common Mode Chokes for LAN and Telecom

Part Number	No. of Lines	Inductance OCL (µH min)	Package L/W/H (in.)*	Data Sheet
Through Hole Package				
PE-65944	2	24.0	.500 / .350 / .250	G002
23Z107	2	68.0	.230 / .340 / .250	G002
PE-67531	2	140.0	.400 / .200 / .350	G002
23Z87	3	69.0	.300 / .340 / 250	G002
PE-67501	4	50.0	.500 / .500 / .375	G002
PE-65554	4	24.0	.595 / .480 / .300	G002
42Z4000	4	36.0	.500 / .400 / .250	G002
PE-68002	4	68.0	.400 / .400 / .300	G002
23Z104	4	68.0	.450 / .340 / .250	G002
PE-67539	4	140.0	.500 / .500 / .375	G002
PE-65542	4	1000.0	.558 / .558 / .400	G002
PE-68613	4	3290.0	.505 / .400 / .500	G002
PE-65950	4	4700.0	.558 / .558 / .400	G002
PE-65541	4	6000.0	.558 / .558 / .400	G002
PE-64683	6	25.0	.685 / .480 / .300	G002
23Z106	6	68.0	.800 / .340 / .250	G002
Surface Mount Package				
PE-68624**	2	47.0	.260 / .360 / .098	G002
R0003	3	20.0	.260 / .360 / .098	G002
23Z87SM	3	69.0	.230 / .360 / .215	G002
PE-65857	4	22.5	.475 / .600 / .340	G002
PE-68627	4	24.0	.355 / .345 / .207	G002
T8003	4	33.0	.450 / .360 / .215	G002
23Z4000SMD	4	36.0	.600 / .500 / .270	G002
PE-65738	4	37.0	.500 / .370 / .200	G002
PE-65854**	4	47.0	.360 / .340 / .098	G002

Common Mode Chokes for LAN and Telecom

Part Number	No. of Lines	Inductance OCL (µH min)	Package L/W/H (in.)*	Data Sheet
Surface Mount Package (continued)				
23Z104SM	4	68.0	.230 / .360 / .215	G002
PE-67540	4	100.0	.475 / .600 / .340	G002
PE-65853	4	4700.0	.720 / .550 / .390	G002
PE-68602	6	21.0	.500 / .370 / .200	G002
23Z106SM	6	68.0	.450 / .360 / .215	G002
PE-69011	8	36.0	.500 / .370 / .200	G002
23Z105SM	8	68.0	.450 / .360 / .215	G002
23Z109SM	10	7.5	.600 / .420 / .215	G002

Self-Leaded Surface Mount Common Mode Chokes

Part Number*	Rated Current For 55°C Rise (Amps)	Inductance (mH ±25%)	DCR (mW max)	Package L/W/H (in.)**	Data[1] Sheet
P0354	1.22	1.170	200	.500 / .500/ .215	P512
P0473	1.63	0.884	110	.500 / .500/ .215	P512
P0351	2.80	1.590	80	.670 / .770 / .390	P512
P0420	3.30	1.320	60	.670 / .770 / .390	P512
P0421	3.30	0.225	60	.670 / .770 / .390	P512
P0422	4.70	0.768	40	.670 / .770 / .390	P512
P0353	5.60	0.590	20	.670 / .770 / .390	P512
P0527	7.20	1.080	15	1.000 / 1.110 / .390	P512
P0429	9.70	0.809	14	1.000 / 1.210 / .500	P512
P0469	11.60	0.630	10	1.000 / 1.210 / .500	P512
P0502	14.00	0.473	8	1.000 / 1.210 / .500	P512

1. Preliminary data sheet.

12220 WORLD TRADE DRIVE • SAN DIEGO, CA 92128 • TEL: 619/674/8100 • FAX: 619/674/8262 • QUICK-FACTS: 619/674/9672 • WEB: http://www.pulseeng.com

Inductors & Common Mode Chokes

Pulse
A TECHNITROL COMPANY

Through Hole Inductors - Power Products

Standard Low Power Inductors

Part Number	Inductance Typical (µH)	I_{DC} (Amps)	Inductance No D.C. (µH -12%, +20%)	Package L/W/H (in.)	Data Sheet
LOW PROFILE PACKAGE – THT					
PE-52631	1000	.50	975	.710 / .710 / .460	PC503
PE-52630	820	.75	780	.710 / .710 / .460	PC503
PE-52629	680	.85	690	.710 / .710 / .460	PC503
PE-52628	470	.90	480	.710 / .710 / .460	PC503
PE-52627	330	1.00	316	.710 / .710 / .460	PC503
PE-52626	220	1.50	226	.710 / .710 / .460	PC503
PE-52625	150	1.70	145	.710 / .710 / .460	PC503
VERTICAL PACKAGE – THT					
PE-52651	1000	.50	975	.710 / .510 / .710	PC503
PE-52650	820	.75	780	.710 / .510 / .710	PC503
PE-52649	680	.85	690	.710 / .510 / .710	PC503
PE-52648	470	.90	480	.710 / .510 / .710	PC503
PE-52647	330	1.00	316	.710 / .510 / .710	PC503
PE-52646	220	1.50	226	.710 / .510 / .710	PC503
PE-52645	150	1.70	145	.710 / .510 / .710	PC503

High Current Toroidal Inductors

Part Number	Inductance Typical (µH)	I_{DC} (Amps)	Inductance No D.C. (µH -12%, +20%)	Package L/W/H (in.)	Data Sheet
THT					
PE-51520	400.0	3.6	688.0	1.600 / .800 / 1.720	PC503
PE-51516	98.0	6.0	188.0	1.600 / .800 / 1.720	PC503
PE-51517	175.0	6.0	315.0	1.950 / .910 / 2.000	PC503
PE-51518	335.0	6.0	571.0	2.300 / 1.110 / 2.300	PC503
PE-51514	32.0	6.5	60.5	1.200 / .600/ 1.200	PC503
PE-51515	52.0	7.0	92.0	1.440 / .800 / 1.440	PC503
PE-51509	14.0	10.0	28.5	1.200 / .600/ 1.200	PC503
PE-51511	43.0	10.0	85.5	1.600 / .800/ 1.720	PC503
PE-51512	90.0	10.0	158.0	1.950 / .910/ 2.000	PC503
PE-51513	144.0	10.0	262.0	2.300 / 1.110 / 2.300	PC503
PE-51510	23.0	11.0	43.5	1.440 / .800/ 1.440	PC503
PE-51507	32.0	16.0	70.7	1.950 / .910 / 2.000	PC503
PE-51508	60.0	16.0	120.0	2.300 / 1.110 / 2.30	PC503
PE-51506	17.0	17.0	40.0	1.600 / .800/ 1.720	PC503

High Inductance Toroidal Inductors

Part Number	Inductance Typical (mH)	I_{DC} (Amps)	Inductance No D.C. (mH -12%, +20%)	Package (In.) Dia. / Width	Data Sheet
THT					
PE-50502	2.0	0.25	2.88	0.754 / 0.400	PC503
PE-50501	1.0	0.35	1.51	0.754 / 0.400	PC503
PE-50500	0.5	0.60	0.72	0.754 / 0.400	PC503
PE-50508	2.0	1.50	2.70	1.416 / 0.850	PC503
PE-50503	0.5	1.75	0.72	1.140 / 0.665	PC503
PE-50506	0.5	2.75	0.75	1.416 / 0.850	PC503

****(K) KlipMount package dimensions — see catalog PC503*
THT — Through Hole Package

Low Cost Inductors

Part Number	Klip*** Mount Option	Inductance Typical (µH)	I_{DC} (Amps)	Inductance No D.C. (µH -12%, +20%)	Package L/W/H (in.)**	Data Sheet
BARE COIL VERTICAL MOUNT – THT						
PE-51591		20	2.0	32.8	0.64 / 0.28	PC503
PE-92100	K	25	2.6	20.7	0.55 / 0.25	PC503
PE-92101	K	50	2.6	45.7	0.70 / 0.38	PC503
PE-92102	K	100	2.6	94.1	0.85 / 0.41	PC503
PE-92103	K	35	2.6	28.4	0.70 / 0.38	PC503
PE-92104	K	70	3.0	61.0	0.85 / 0.41	PC503
PE-92105	K	145	3.0	141.8	1.05 / 0.55	PC503
PE-92106	K	285	3.0	264.1	1.40 / 0.70	PC503
PE-92107		450	3.0	436.3	1.65 / 0.70	PC503
PE-92108	K	100	3.6	90.7	1.05 / 0.55	PC503
PE-92109	K	165	4.0	152.0	1.40 / 0.70	PC503
PE-92110		270	4.0	263.9	1.65 / 0.70	PC503
PE-92111	K	40	4.0	37.9	0.85 / 0.41	PC503
PE-51590		22	5.0	20.3	0.85 / 0.33	PC503
PE-92112	K	100	5.0	90.7	1.40 / 0.70	PC503
PE-92113		170	5.0	159.7	1.65 / 0.70	PC503
PE-92114	K	55	5.0	54.9	1.05 / 0.55	PC503
PE-92115		95	7.0	96.0	1.65 / 0.70	PC503
PE-92116	K	55	7.0	49.1	1.40 / 0.70	PC503
PE-92117		55	10.0	55.9	1.65 / 0.70	PC503
BARE COIL LOW PROFILE PACKAGE – THT						
PE-92401		50	2.6	45.7	0.70 / 0.38	PC503
PE-92402		100	2.6	94.1	0.85 / 0.41	PC503
PE-92404		70	3.0	61.0	0.85 / 0.41	PC503
PE-92405		145	3.0	141.8	1.05 / 0.55	PC503
PE-92408		100	3.6	90.7	1.05 / 0.55	PC503
PE-92412		100	5.0	90.7	1.40 / 0.70	PC503
PE-92414		55	5.0	54.9	1.05 / 0.55	PC503
PE-92416		55	7.0	49.1	1.40 / 0.70	PC503

Current Sense Inductors

Part Number*	Secondary Turns	Secondary Inductance	Ipeak (Amps)	Package L / W / H (in.)	Data Sheet
INDUCTOR WITHOUT PRIMARY – THT					
PE-51686	50	5.0 µH	20	.670 / .390 / .800	PC503
PE-51687	100	20.0 µH	20	.670 / .390 / .800	PC503
PE-51688	200	80.0 µH	20	.670 / .390 / .800	PC503
PE-51717	50CT	5.0 µH	20	.670 / .390 / .800	PC503
PE-51718	100CT	20.0 µH	20	.670 / .390 / .800	PC503
PE-51719	200CT	80.0 µH	20	.670 / .390 / .800	PC503
500 KHz – THT					
PE-52876	10	150.0 mH	20	.550 / .325 / .580	PC503
PE-52877	20	600.0 mH	20	.550 / .325 / .580	PC503
PE-52878	50	4000.0 mH	20	.550 / .325 / .580	PC503

*NOTE: See **Section 5600 – Transformers** for Current Sense Transformer Products.*

Surface Mount Inductors - Power Products

Surface Mount HCCI, LCCI, & PGF Inductors

Part Number	Inductance Typical (µH)	I_{DC} (Amps)	Inductance No D.C. (µH ±15%)	Package L/W/H (in.)**	Data Sheet
HIGH CURRENT COUPLED INDUCTORS (HCCI) – SMT					
PE-53362	1.10	21.0	2.10	.910 / .800 / .390	PC503
PE-53363	2.10	22.4	4.00	1.110 / 1.00 / .390	PC503
PE-53361	0.53	23.8	0.88	.865 / .715 / .390	PC503
LOW CURRENT COUPLED INDUCTORS (LCCI) – SMT					
PE-53717	43.60	1.1	77.0	.645 / .560 / .350	PC503
PE-53718	21.90	2.7	39.5	.715 / .590 / .390	PC503
PE-53719	4.02	6.4	6.6	.770 / .670 / .390	PC503
SELF-LEADED PGF INDUCTORS – SMT					
PE-53974	1.75	15	3.2	.773 / 753 / .300	PC503
PE-53975	3.50	10	6.7	.773 / 753 / .300	PC503

***L/W/H is measured on surface mount parts tip to tip (height includes the wash area).*

Low Profile Self-Leaded Inductors

Part Number*	Inductance Typical (µH)	I_{DC} (Amps)	Inductance No D.C. (µH ±20%)	Package L/W/H (in.)**	Data Sheet
LOW PROFILE SELF-LEADED INDUCTORS – SMT					
P0153	439.0	0.53	472.0	.500 / .500 / .215	P503
P0152	305.0	0.65	331.0	.500 / .500 / .215	P503
P0151	200.0	0.81	220.0	.500 / .500 / .215	P503
P0150	137.0	0.99	152.0	.500 / .500 / .215	P503
P0149	90.0	1.23	100.0	.500 / .500 / .215	P503
P0148	75.0	1.35	83.0	.500 / .500 / .215	P503
P0147	50.0	1.65	56.0	.500 / .500 / .215	P503
P0146	23.0	2.43	25.0	.500 / .500 / .215	P503
P0145	13.3	3.13	14.6	.500 / .500 / .215	P503
P0144	9.4	3.80	10.4	.500 / .500 / .215	P503

** Add "T" suffix to surface mount part number to indicate Tape & Reel packaging.*

12220 WORLD TRADE DRIVE • SAN DIEGO, CA 92128 • TEL: 619/674/8100 • FAX: 619/674/8262 • QUICK-FACTS: 619/674/9672 • WEB: http://www.pulseeng.com

Inductors & Common Mode Chokes

Pulse A TECHNITROL COMPANY

Surface Mount Inductors - Power Products (continued)

Surface Mount Self-Leaded Inductors (SLIC)

Part Number*	Inductance Typical (µH)	I_{DC} (Amps)	Inductance No D.C. (µH ±20%)	Package L/W/H (in.)**	Data Sheet
PE-53600	6.20	1.40	7.00	.340 / .340 / .270	PC503
PE-53601	17.60	1.00	22.70	.340 / .340 / .270	PC503
PE-53602	29.70	1.40	35.30	.435 / .440 / .360	PC503
PE-53604	58.10	1.30	73.00	.560 / .565 / .360	PC503
PE-53606	114.00	0.94	167.00	.435 / .440 / .360	PC503
PE-53608	192.00	0.90	292.00	.560 / .565 / .360	PC503
PE-53611	383.00	0.72	672.00	.560 / .565 / .360	PC503
PE-53613	645.00	0.74	1134.00	.590 / .615 / .390	PC503
PE-53614	1070.00	0.71	1950.00	.670 / .700 / .390	PC503
PE-53630	1.01	3.40	1.10	.340 / .340 / .270	PC503
PE-53631	9.40	2.80	12.30	.435 / .440 / .360	PC503
PE-53632	16.20	2.70	21.90	.560 / .565 / .360	PC503
PE-53633	29.10	2.70	40.50	.590 / .615 / .390	PC503
PE-53634	50.00	2.60	72.90	.670 / .700 / .390	PC503
PE-53650	3.80	4.80	5.20	.435 / .440 / .360	PC503
PE-53651	5.10	5.40	7.50	.560 / .565 / .360	PC503
PE-53652	9.00	5.50	14.00	.590 / .615 / .390	PC503
PE-53653	16.10	5.10	25.90	.670 / .700 / .390	PC503
PE-53661	2.50	8.00	3.80	.560 / .565 / .360	PC503
PE-53662	4.90	7.80	7.90	.590 / .615 / .390	PC503
PE-53663	9.30.	7.20	16.00	.670 / .700 / .390	PC503
PE-53680	1.32	11.50	2.10	.615 / .600 / .370	PC503
PE-53681	2.50	11.40	4.20	.665 / .665 / .390	PC503
PE-53682	4.70	10.40	8.40	.740 / .740 / .390	PC503
PE-53683	9.40	10.90	17.60	.940 / .940 / .390	PC503
PE-53690	0.81	14.30	1.25	.615 / .600 / .370	PC503
PE-53691	1.68	13.90	2.80	.665 / .665 / .390	PC503
PE-53692	3.50	12.40	6.50	.740 / .740 / .390	PC503
PE-53700	5.20	15.40	10.50	.940 / .940 / .390	PC503

Surface Mount Low Profile, Self-Leaded Dual Inductors

Part Number*	Hookup	I_{DC} (Amps)	L@ DC L_{DC} (µH)	Package L / W / H**	Data Sheet
P0183	Series	0.61	336.7	.500 / .500 / .215	P508
P0182	Series	0.74	245.3	.500 / .500 / .215	P508
P0181	Series	0.90	170.3	.500 / .500 / .215	P508
P0180	Series	1.08	117.3	.500 / .500 / .215	P508
P0183	Parallel	1.22	84.2	.500 / .500 / .215	P508
P0179	Series	1.32	79.0	.500 / .500 / .215	P508
P0182	Parallel	1.48	61.3	.500 / .500 / .215	P508
P0178	Series	1.56	56.2	.500 / .500 / .215	P508
P0181	Parallel	1.80	42.6	.500 / .500 / .215	P508
P0177	Series	1.92	37.3	.500 / .500 / .215	P508
P0180	Parallel	2.16	29.3	.500 / .500 / .215	P508
P0176	Series	2.60	20.0	.500 / .500 / .215	P508
P0179	Parallel	2.64	19.7	.500 / .500 / .215	P508
P0178	Parallel	3.12	14.1	.500 / .500 / .215	P508
P0175	Series	3.60	9.6	.500 / .500 / .215	P508
P0177	Parallel	3.84	9.3	.500 / .500 / .215	P508
P0174	Series	4.15	7.8	.500 / .500 / .215	P508
P0176	Parallel	5.20	5.0	.500 / .500 / .215	P508
P0175	Parallel	7.20	2.4	.500 / .500 / .215	P508
P0174	Parallel	8.30	2.0	.500 / .500 / .215	P508
P0403	Series	1.50	139.1	.600 / .590 / .300	P510[1]
P0402	Series	1.77	108.0	.600 / .590 / .300	P510[1]
P0401	Series	2.20	72.0	.600 / .590 / .300	P510[1]
P0400	Series	2.70	48.5	.600 / .590 / .300	P510[1]
P0399	Series	2.85	30.6	.600 / .590 / .300	P510[1]
P0403	Parallel	3.00	34.8	.600 / .590 / .300	P510[1]
P0398	Series	3.40	23.1	.600 / .590 / .300	P510[1]
P0402	Parallel	3.54	27.0	.600 / .590 / .300	P510[1]
P0397	Series	4.10	17.0	.600 / .590 / .300	P510[1]
P0401	Parallel	4.40	18.0	.600 / .590 / .300	P510[1]
P0400	Parallel	5.40	12.1	.600 / .590 / .300	P510[1]
P0396	Series	5.60	9.7	.600 / .590 / .300	P510[1]
P0399	Parallel	5.70	7.6	.600 / .590 / .300	P510[1]
P0398	Parallel	6.80	5.8	.600 / .590 / .300	P510[1]
P0395	Series	7.20	6.1	.600 / .590 / .300	P510[1]
P0397	Parallel	8.20	4.2	.600 / .590 / .300	P510[1]
P0396	Parallel	11.20	2.4	.600 / .590 / .300	P510[1]
P0395	Parallel	14.40	1.5	.600 / .590 / .300	P510[1]

1. Preliminary data sheet.

Surface Mount Miniature Power Inductors

Part Number*	Inductance Typical (µH)	I_{DC} (Amps)	Inductance No D.C. (µH ±20%)	Package L/W/H (in.)**	Data Sheet
Ros 1					
P0430T	0.6	2.00	0.7	.360 / .210 / .125	PC503
P0431T	0.9	1.90	1.1	.360 / .210 / .125	PC503
P0432T	1.0	1.50	1.1	.360 / .210 / .125	PC503
P0433T	1.7	1.20	1.9	.360 / .210 / .125	PC503
P0434T	2.2	1.20	2.6	.360 / .210 / .125	PC503
P0435T	3.2	1.00	3.9	.360 / .210 / .125	PC503
P0436T	5.1	0.70	6.0	.360 / .210 / .125	PC503
P0437T	6.3	0.60	7.1	.360 / .210 / .125	PC503
P0438T	10.4	0.50	12.2	.360 / .210 / .125	PC503
P0439T	12.7	0.45	14.7	.360 / .210 / .125	PC503
P0440T	20.7	0.34	23.8	.360 / .210 / .125	PC503
P0441T	30.0	0.29	33.8	.360 / .210 / .125	PC503
P0442T	42.2	0.24	49.0	.360 / .210 / .125	PC503
P0443T	62.0	0.20	72.0	.360 / .210 / .125	PC503
P0444T	93.0	0.17	110.0	.360 / .210 / .125	PC503
P0445T	104.0	0.16	122.0	.360 / .210 / .125	PC503
P0446T	150.0	0.14	179.0	.360 / .210 / .125	PC503
Ros 2					
P0450T	0.60	5.00	0.64	.550 / .400 / .210	PC503
P0451T	0.79	5.00	0.86	.550 / .400 / .210	PC503
P0452T	1.29	5.00	1.50	.550 / .400 / .210	PC503
P0453T	1.8	5.00	2.30	.550 / .400 / .210	PC503
P0454T	2.1	3.00	2.30	.550 / .400 / .210	PC503
P0455T	4.4	2.50	5.13	.550 / .400 / .210	PC503
P0456T	5.6	2.00	6.30	.550 / .400 / .210	PC503
P0457T	6.6	1.80	7.50	.550 / .400 / .210	PC503
P0458T	10.7	1.50	13.20	.550 / .400 / .210	PC503
P0459T	13.5	1.30	15.50	.550 / .400 / .210	PC503
P0460T	27.0	1.00	34.00	.550 / .400 / .210	PC503
P0461T	46.0	0.90	57.20	.550 / .400 / .210	PC503
P0462T	48.0	0.80	62.50	.550 / .400 / .210	PC503
P0463T	82.0	0.60	100.00	.550 / .400 / .210	PC503
P0464T	90.0	0.50	103.00	.550 / .400 / .210	PC503
P0465T	162.0	0.40	180.00	.550 / .400 / .210	PC503
P0466T	215.0	0.35	254.00	.550 / .400 / .210	PC503
P0467T	320.0	0.30	380.00	.550 / .400 / .210	PC503
P0468T	420.0	0.25	500.00	.550 / .400 / .210	PC503

Low Profile Surface Mount Self-Leaded Power Inductors for PCMCIA

Part Number*	Hookup	I_{DC} (Amps)	L@ DC L_{DC} (µH)	Package L/W/H (in.)**	Data Sheet
P0108	Series	0.27	122.6	.430 / .380 / .098	PC503
P0107	Series	0.33	88.5	.430 / .380 / .098	PC503
P0106	Series	0.40	60.1	.430 / .380 / .098	PC503
P0116	Series	0.44	43.6	.430 / .380 / .098	PC503
P0108	Parallel	0.54	30.7	.430 / .380 / .098	PC503
P0105	Series	0.62	20.1	.430 / .380 / .098	PC503
P0107	Parallel	0.66	22.1	.430 / .380 / .098	PC503
P0104	Series	0.73	15.7	.430 / .380 / .098	PC503
P0106	Parallel	0.80	15.0	.430 / .380 / .098	PC503
P0103	Series	0.86	12.1	.430 / .380 / .098	PC503
P0116	Parallel	0.88	10.9	.430 / .380 / .098	PC503
P0102	Series	1.03	9.0	.430 / .380 / .098	PC503
P0101	Series	1.23	6.4	.430 / .380 / .098	PC503
P0105	Parallel	1.24	5.0	.430 / .380 / .098	PC503
P0100	Series	1.41	5.2	.430 / .380 / .098	PC503
P0104	Parallel	1.46	3.9	.430 / .380 / .098	PC503
P0103	Parallel	1.72	3.0	.430 / .380 / .098	PC503
P0102	Parallel	2.06	2.2	.430 / .380 / .098	PC503
P0101	Parallel	2.46	1.6	.430 / .380 / .098	PC503
P0100	Parallel	2.82	1.3	.430 / .380 / .098	PC503

Surface Mount Inductors Designed for Harris Semiconductor™

HIP 5020 EVAL 1

Part Number	Inductance Typical (µH)	I_{DC} (Amps)	Inductance No D.C. (µH ±20%)	Package L/W/H (in.)**	Data Sheet
P0119	7.4	4.96	12.7	.565 / .570 /.360	PC503

** Add "T" suffix to surface mount part number to indicate Tape & Reel packaging.*
***L/W/H is measured on surface mount parts tip to tip (height includes the wash area).*

12220 WORLD TRADE DRIVE • SAN DIEGO, CA 92128 • TEL: 619/674/8100 • FAX: 619/674/8262 • QUICK-FACTS: 619/674/9672 • WEB: http://www.pulseeng.com

Inductors & Common Mode Chokes

Pulse
A TECHNITROL COMPANY

Inductors for National's Simple Switchers®

GENERAL PURPOSE INDUCTORS APPROVED FOR NATIONAL'S 150 KHz SIMPLE SWITCHERS®

Part Number THT	Part Number SMT*	Inductance Nominal (µH)	Rated Current (Amps)	Nominal DCR (mΩ)	Data Sheet
PE-53801	PE-53801S	259	0.13	3.40	PC503
PE-53802	PE-53802S	178	0.16	2.80	PC503
PE-53803	PE-53803S	118	0.20	1.80	PC503
PE-53804	PE-53804S	79	0.25	1.50	PC503
PE-53805	PE-53805S	55	0.30	1.00	PC503
PE-53806	PE-53806S	39	0.34	0.80	PC503
PE-53807	PE-53807S	26	0.45	0.62	PC503
PE-53808	PE-53808S	374	0.20	2.70	PC503
PE-53809	PE-53809S	256	0.25	2.20	PC503
PE-53810	PE-53810S	176	0.30	1.40	PC503
PE-53811	PE-53811S	118	0.38	1.20	PC503
PE-53812	PE-53812S	78	0.46	0.80	PC503
PE-53813	PE-53813S	55	0.56	0.50	PC503
PE-53814	PE-53814S	39	0.68	0.30	PC503
PE-53815	PE-53815S	26	0.84	0.20	PC503
PE-53816	PE-53816S	17	1.02	0.10	PC503
PE-53817	PE-53817S	375	0.36	1.30	PC503
PE-53818	PE-53818S	252	0.44	0.90	PC503
PE-53819	PE-53819S	173	0.54	0.60	PC503
PE-53820	PE-53820S	115	0.67	0.40	PC503
PE-53821	PE-53821S	78	0.82	0.30	PC503
PE-53822	PE-53822S	54	1.00	0.20	PC503
PE-53823	PE-53823S	38	1.20	0.10	PC503
PE-53824	PE-53824S	26	1.48	0.10	PC503
PE-53825	PE-53825S	18	1.81	0.06	PC503
PE-53826	PE-53826S	377	0.68	1.00	PC503
PE-53827	PE-53827S	248	0.83	0.60	PC503
PE-53828	PE-53828S	168	1.02	0.40	PC503
PE-53829	PE-53829S	112	1.26	0.30	PC503
PE-53830	PE-53830S	77	1.54	0.20	PC503
PE-53831	PE-53831S	53	1.87	0.13	PC503
PE-53932	PE-53932S	37	2.24	0.10	PC503
PE-53933	PE-53933S	24	2.74	0.07	PC503
PE-53934	PE-53934S	17	3.00	0.05	PC503
PE-53935	PE-53935S	250	1.50	0.23	PC503
PE-54036	PE-54036S	168	1.81	0.18	PC503
PE-54037	PE-54037S	114	2.22	0.10	PC503

GENERAL PURPOSE INDUCTORS APPROVED FOR NATIONAL'S 150 KHz SIMPLE SWITCHERS®

Part Number THT	Part Number SMT*	Inductance Nominal (µH)	Rated Current (Amps)	Nominal DCR (mΩ)	Data Sheet
PE-54038	PE-54038S	77	2.70	0.09	PC503
PE-54039	PE-54039S	53	3.00	0.08	PC503
PE-54040	PE-54040S	38	3.00	0.05	PC503
PE-54041	PE-54041S	25	3.00	0.04	PC503
PE-54042	—	167	2.50	0.14	PC503
PE-54043	—	110	3.00	0.09	PC503
PE-54044	PE-54044S	77	3.00	0.08	PC503
PE-53900	—	19	4.50	0.02	PC503

GENERAL PURPOSE INDUCTORS APPROVED FOR NATIONAL'S 50 KHz SIMPLE SWITCHER® LM2574, LM2575 & LM2576

Part Number	Inductance Typical (µH)	I_{DC} (Amps)	Inductance No D.C. (µH ± 20%)	Package L/W/H (in.)**	Data Sheet
THT					
PE-53122	2200	0.42	1730	1.44 / 0.80 / 1.44	PC503
PE-53121	1500	0.62	1150	1.44 / 0.80 / 1.44	PC503
PE-53114	470	0.64	426	0.95 / 0.60 / 1.00	PC503
PE-52629	680	0.85	657	0.71 / 0.71 / 0.46	PC503
PE-53146	330	0.90	267	0.83 / 0.45 / 0.95	PC503
PE-52627	330	0.90	302	0.71 / 0.71 / 0.46	PC503
PE-53120	1000	0.95	762	1.30 / 0.70 / 1.40	PC503
SMT					
PE-53119	680	1.30	562	1.30 / 0.70 / 1.40	PC503
PE-53145	220	1.40	176	0.83 / 0.45 / 0.95	PC503
PE-52626	220	1.40	230	0.71 / 0.71 / 0.46	PC503
PE-53113	150	2.00	130	0.95 / 0.60 / 1.00	PC503
PE-53118	470	2.00	369	1.30 / 0.70 / 1.40	PC503
PE-53112	47	3.00	38	0.65/ 0.45 / 0.70	PC503
PE-53115	150	3.00	136	0.95 / 0.60 / 1.00	PC503
PE-53116	220	3.00	167	1.30 / 0.70 / 1.40	PC503
PE-53117	330	3.00	292	1.30 / 0.70 / 1.40	PC503
PE-92114K	68	3.00	55	0.95 / 0.60 / 1.00	PC503
PE-92108K	100	3.00	91	0.95 / 0.60 / 1.00	PC503

Common Mode EMI Suppression

COMMON MODE EMI SUPPRESSION INDUCTORS

Part Number	Rated Current (Amps)	Inductance (mH min)	DCR Each Winding (max Ω)	Package L/W/H (in.)	Data Sheet
HORIZONTAL MOUNT – THT					
PE-62891	1.8	10.0	0.240	1.250 / 1.25 / .600	PC503
PE-62894	2.6	16.0	0.160	1.500 / 1.50 / .800	PC503
PE-62895	3.2	8.0	0.120	1.500 / 1.50 / .800	PC503
PE-62892	3.5	3.0	0.060	1.250 / 1.25 / .600	PC503
PE-62896	5.2	4.0	0.040	1.500 / 1.50 / .800	PC503
PE-62893	6.0	1.0	0.020	1.250 / 1.25 / .600	PC503
PE-62897	7.5	2.0	0.020	1.500 / 1.50 / .800	PC503
VERTICAL MOUNT – THT					
PE-62911	1.8	10.0	0.240	1.15 / .550 / 1.15	PC503
PE-62914	2.6	16.0	0.160	1.44 / .800 / 1.50	PC503
PE-62915	3.2	8.0	0.120	1.44 / .800 / 1.50	PC503
PE-62912	3.5	3.0	0.060	1.15 / .550 / 1.15	PC503
PE-62916	5.2	4.0	0.040	1.44 / .800 / 1.50	PC503
PE-62913	6.0	1.0	0.020	1.15 / .550 / 1.15	PC503
PE-62917	7.5	2.0	0.020	1.44 / .800 / 1.50	PC503

COMMON MODE EMI SUPPRESSION INDUCTORS

Part Number	Rated Current (Amps)	Inductance (mH ± 30%)	Package L/W/H (in.)	Data Sheet
500 KHz – THT				
PE-96161	0.50	33.0	1.100 / 1.07 / .650	PC503
PE-96166	1.00	5.6	1.100 / 1.07 / .650	PC503
PE-96165	1.00	18.0	1.300 / .720 / 1.50	PC503
PE-96168	2.00	15.0	1.300 / .720 / 1.50	PC503
PE-96178	3.15	1.2	1.100 / 1.07 / .650	PC503
PE-96179	3.15	1.2	.910 / .615 / 1.10	PC503
PE-96177	3.15	2.2	1.100 / 1.07 / .650	PC503
PE-96175	3.15	3.3	1.100 / 1.07 / .650	PC503
PE-96173	3.15	5.6	1.300 / .720 / 1.50	PC503
PE-96181	5.00	3.9	1.300 / .720 / 1.50	PC503
PE-96186	6.30	2.7	1.300 / .720 / 1.50	PC503
PE-96187	8.00	3.3	DIA = 1.685 / 1.065	PC503
PE-96188	10.00	1.8	DIA = 1.685 / 1.065	PC503
PE-96189	12.50	1.5	DIA = 1.685 / 1.065	PC503
PE-96190	15.00	1.0	DIA = 1.685 / 1.065	PC503

ADSL Inductors & Common Mode Chokes

Through Hole Inductors for Use in ADSL POTS Low Pass Filters

Part Number	Inductance (mH) ±5%	Resistance (Ω MAX)	Isolation Voltage (Vrms)	Mounting	Data Sheet
B2023	6.0	4.0	1500	THT	B902
B2024	4.0	3.0	1500	THT	B902
B2025	3.0	2.5	1500	THT	B902
B2026	10.0	6.0	1500	THT	B902

** Add "T" suffix to surface mount part number to indicate Tape & Reel packaging.*

Common Mode Chokes for Use in ADSL POTS Low Pass Filters

Part Number	Inductance (mH) ±30%	Resistance (W MAX)	Isolation Voltage (Vrms)	Mounting	Data Sheet
THT					
B2005	9.0	0.6	1500	THT	B902
SMT					
B2013	9.0	0.6	1500	SMT	B902

12220 WORLD TRADE DRIVE • SAN DIEGO, CA 92128 • TEL: 619/674/8100 • FAX: 619/674/8262 • QUICK-FACTS: 619/674/9672 • WEB: http://www.pulseeng.com

RCD inductors...the low cost of high quality.
Prices starting below $.05 each! Now in stock.

Inductor Chokes: 0.05µH to 100mH

AL02–Microminiature!
Ultra-miniature conformal coated inductors are the smallest in the industry, only ⅛" long! 0.1µH to 470µH, 5% and 10% tolerance.

AL03–Low Cost!
Miniature conformal coated inductor choke (¼" long). Available from 0.1µH to 1000µH in 5%, 10%, 20% tolerance.

AL05–Delivery from Stock!
Conformal coated inductors offer performance similar to molded types at half the cost. Available from 0.1µH to 2200µH in 5%, 10%, 20% tolerance. Body size is .135″ dia. × .35″ long.

P0206–Miniature Molded
Molded construction offers performance per MIL-C-15305 at low cost due to automated production. Available from 0.1µH to 1000µH in 3%, 5%, 10%, 20% tolerance. Body size is .095″ dia. x .250″ long.

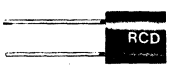
P0410–MIL Grade,
Delivery from Stock!
Molded inductor per MIL-C-15305 offer excellent stability. Available from 0.15µH to 1000µH, in 3%, 5%, 10%, 20% tolerance. Body is .155″ dia. x .375″ long.

R0608, R0908, R1014–Radial Lead
Radial design enables significant space savings. Available from 1µH to 100mH, 5% and 10%. R0608 is .220" dia. x .300" high, R0908 is .335 x .320, R1014 is .400 x .550.

Shielded Inductor Chokes: 0.1µH to 120mH

PFC0410–Economy
Conformal coated construction offers shielded performance equivalent to molded parts at a reduced cost. Wide inductance range from 0.1µH to 10mH, in tolerances of 5%-20%. Body size is .177" dia. x .440".

PF0410–Molded,
Delivery from Stock!
Molded shielded construction per MIL-C-15305 offers excellent performance, wide inductance range from 0.22µH to 10mH, in tolerances of 5%-20%. Body size is .162″ dia. x .410″ long.



RS1014–Radial Lead
Shielded inductor in a radial lead version offers significant space savings. Wide inductance range from 10µH to 120mH, in tolerances of 5%-10%. Body size is .400″ dia. x .55″ high.

High Current Filter Chokes: 1 Amp to 20 Amp

CA–Axial Lead
High-current power chokes are available with 1A-5A ratings, in values 5µH to 680µH, 10% tol. Available with shrink tube insulation.

CH–Radial Lead
High-current power chokes offer space savings in 3A-20A ratings, 5µH to 270µH, 10% tol. Available with shrink tube insulation.

CV–Vertical Mount
High-current power chokes require minimal PCB space due to vertical design. 1A-5A, 5µH to 680µH, 10% tol.

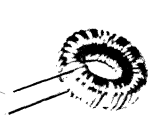
Surface Mount, Shielded and Unshielded: .003µH to 1000µH

CI–World's Smallest!
Available in 3 sizes (0603, 0805, 1008), in values .003µH to 10µH, 5% and 10%. Available on Tape & Reel.

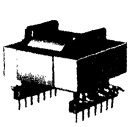
MCI–Molded, MSI–Shielded
Molded chip inductors offer superior performance, 0.05µH to 1000µH, 5%-20%. Available in 1008, 1210 or 1812 size.

SMD Power Chokes–to 4A
MCI8127: Molded, .1uH to 47mH
SD: Economy, Drum Core, 10uH to 1mH
SDG: Gull Wing Drum Core, 10uH to 1mH

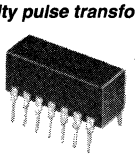
Custom Magnetics - *Contact RCD Engineering for specialty pulse transformers, bead chokes, filters, telephone coils, etc.*



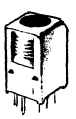
Toroids



Transformers



Lan Networks



Variable RF Coils

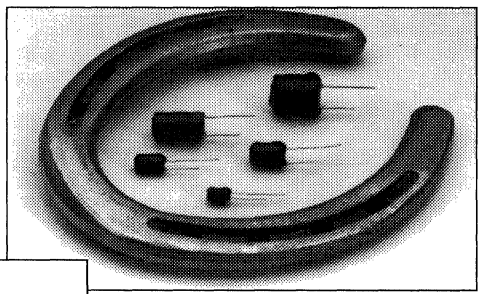
Refer to EEM section 2350 for RCD delay lines, and to section 4700 for RCD resistors, networks, and hybrids.

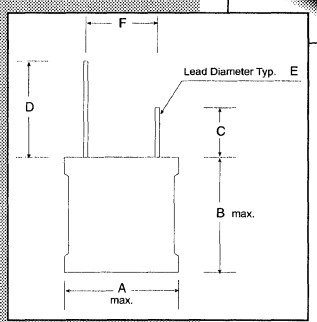
RCD Components Inc. ***Resistors • Coils • Delay Lines***
520 E. Industrial Park Dr., Manchester, N.H. 03109 USA TEL (603) 669-0054 FAX (603) 669-5455
www: http//www.rcd-comp.com email: rcdcompinc@aol.com

MINI-DRUM INDUCTORS
RL5480 259 Values

SINCE 1955

For Over 40 YEARS SHIPPED WORLDWIDE





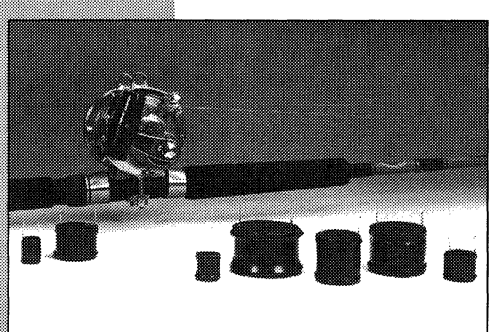
PART NO.	A*	B	C	D	E	F
RL-5480-1	.225	.290	.500	.750	.020	.080
RL-5480-2	.275	.365	.500	.750	.025	.138
RL-5480-3	.375	.450	.500	.750	.025	.197
RL-5480-4	.450	.710	.500	.750	.032	.290
RL-5480-5	.625	.700	.500	.750	.040	.300

* Where leads exit over flange to termination points add .050" total to Max. A Dimension.

RL-5480-1
Inductance: 3.9µH to 22mH
Max. DCR: .030 to 110.0 Ohms
Max. Rated Current: .015 to .800 Amps
RL5480-2
Inductance: 3.9µH to 33mH
Max DCR: .020 to 100.0 Ohms
Max Rated Current: .030 to 1.30 Amps
RL-5480-3
Inductance: 3.9µH to 68mH
Max. DCR: .022 to 115.0 Ohms
Max Rated Current: .036 to 1.60 Amps
RL-5480-4
Inductance: 3.9µH to 100mH
Max. DCR: .016 to 130.0 Ohms
Max. Rated Current: .046 to 2.60 Amps
RL-5480-5
Inductance: 3.9µH to 270mH
Max. DCR: .009 to 174.0 Ohms
Max. Rated Current: .060 to 4.0 Amps

POWER LINE CHOKES
RL1256 315 Values

SINCE 1955



Available in 315 standard values. High saturation flux density material makes these coils ideal wherever high current choke values in a small physical size are needed.

DIM(IN)	A	B	C	D
RL-1256-1	0.660	0.84	0.195	Clearance Hole for 4/40 Screw
RL-1256-2	0.825	0.84	0.195	
RL-1256-3	1.1	0.84	0.290	
RL-1256-4	1.6	1.10	0.195	Clearance Hole for 8/32 Screw With Washer
RL-1256-5	1.6	1.45	0.290	
RL-1256-6	2.0	1.50	0.320	
RL-1256-7	2.4	1.50	0.425	

Series RL-1256-1 (34 values):
Inductance: 1.0 to 560.0 µH
Max DCR: 0.003 to 0.696 Ohms
Saturation current: 87.0 to 2.9 DC Amps
Sugg. Rated current: 9.0 to 0.8 AC Amps
Dimension "E": 0.406 to 0.550

Series RL-1256-2 (41values):
Inductance: 1.0 to 2200.0 µH
Max DCR: 0.003 to 1.54 Ohms
Saturation current: 108.0 to 2.90 DC Amps
Sugg. Rated current: 11.4 to 0.8 AC Amps
Dimension "E": 0.590 to 0.671

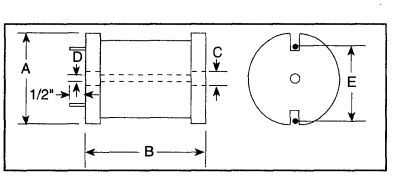
Series RL-1256-3 (45 values):
Inductance: 1.0 to 4700.0 µH
Max DCR: 0.003 to 1.86 Ohms
Saturation current: 116.0 to 1.7 DC Amps
Sugg. Rated current: 21.0 to 1.0 AC Amps
Dimension "E": 0.750 to 0.800

Series RL-1256-4 (48 values):
Inductance: 0.002 to 3.39 µH
Max DCR: 150.0 to 1.5 Ohms
Saturation current: 27.0 to1.3 DC Amps
Sugg. Rated current: 2.1 to 1.0 AC Amps
Dimension "E": 0.750 to 0.800

Series RL-1256-5 (48 values):
Inductance: 1.8to 15000.0 µH
Max DCR: 0.002 to 2.17 Ohms
Saturation current: 155.0 to 1.5 DC Amps
Sugg. Rated current: 35.0 to 2.0 AC Amps
Dimension "E": 1.11 to 1.28

Series RL-1256-6 (49 values):
Inductance: 4.7 to 4700.0 µH
Max DCR: 0.002 to 6.19 Ohms
Saturation current: 14.9 to 1.2 DC Amps
Sugg. Rated current: 35.0 to 1.4 AC Amps
Dimension "E": 1.60 to 1.85

Series RL-1256-7 (50 values):
Inductance:5.6 to 68000.0 µH
Max DCR: .0018 to 5.220 Ohms
Saturation current: 200.0 to1.5 DC Amps
ISugg. Rated current: 45.0 to 2.0 AC Amps
Dimension "E": 1.60 to 1.85



INDUCTORS/CHOKES

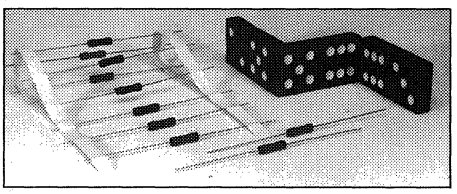
SINCE 1955
RENCO ELECTRONICS, INC. 60 E Jefryn Boulevard Deer Park, NY 11729 USA
1-516-586-5566 • TOLL-FREE ENGINEERING HOT LINE 1-800-645-5828
NEW WEB SITE http://www.rencousa.com
FAX DIRECT FOR FREE SAMPLES: 1-516-586-5562

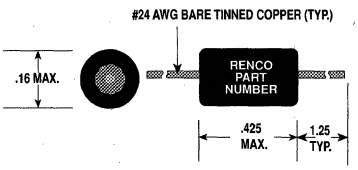
INDUCTORS/CHOKES

MINIATURE POWER LINE CHOKES
RL1288 49 Values

SINCE 1955

For Over 40 YEARS SHIPPED WORLDWIDE





The RL-1288 Series of Power Line Chokes has 49 standard values from which to choose. Inductances range from 1.0µH to 10,000µH with saturation currents available from .03 to 3 Amps.

The use of high saturation material makes these coils ideal for use in switching regulated power supply type applications. The size of the coils make them easy to incorporate in equipment

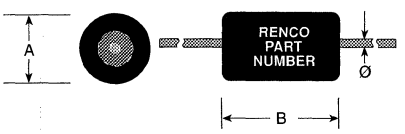
LOW COST POWER LINE CHOKES
RL1283 / RL1284 99 Values

SINCE 1955

Series RL-1283 (54 values):
Inductance: 3.9 to 10000.0 µH
Max DCR: 0.007 to 89.7 Ohms
Saturation current: 15.5 to 0.81 DC Amps
Sugg. Rated current: 4.0 to 0.65 AC Amps

Series RL-1284 (45 values):
Inductance: 3.9 to 18000.0 µH
Max DCR: 0.008 to 48.3 Ohms
Saturation current: 7.3 to 0.091 DC Amps
Sugg. Rated current: 1.28 to 0.039 AC Amps

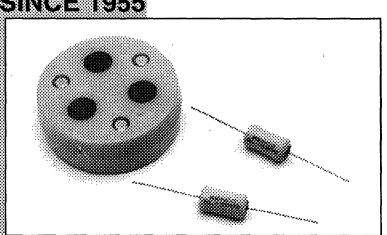
Available Tape & Reel



MAXIMUM PHYSICAL DIMENSIONS			
	A MAX	B MAX	Ø
RL-1283	.453	.900	.032
RL-1284	.260	.700	.032

HIGH VOLTAGE POWER LINE INDUCTOR RL5900 49 Values

SINCE 1955



NEW

Special Features:
- Distinctive yellow sleeving
- Encapsulated ends
- Highly reliable design

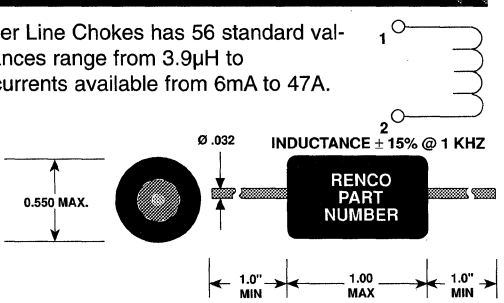
The RL-5900 series of inductors has 49 standard values to choose from. Inductance range from 10µH to 100mH with saturation currents available from .095 Amps to 9.6 Amps. The use of high resistiveity ferrite core material makes these coils ideal for high voltage applications up to 3,000 volts.

POWER LINE CHOKES
RL1282 56 Values

SINCE 1955

For applications over 24V, verify operation with sample in actual circuit.

The RL-1282 Series of Power Line Chokes has 56 standard values to choose from. Inductances range from 3.9µH to 150,000µH with saturation currents available from 6mA to 47A. The use of high saturation material make these coils ideal for use in switching regulated power supply type applications. The size of the coils make them easy to incorporate in equipment.



SINCE 1955

RENCO ELECTRONICS, INC. 60 E Jefryn Boulevard Deer Park, NY 11729 USA
1-516-586-5566 • TOLL-FREE ENGINEERING HOT LINE 1-800-645-5828
NEW WEB SITE http://www.rencousa.com

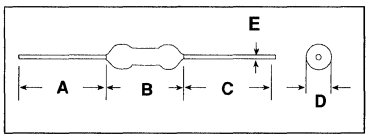
FAX DIRECT FOR FREE SAMPLES: 1-516-586-5562

INDUCTORS/CHOKES

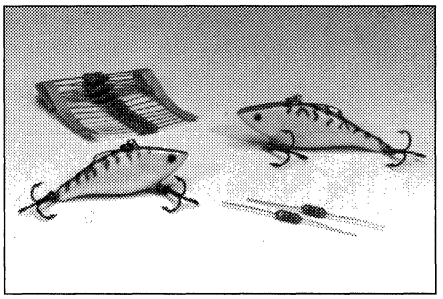
SUB MINI INDUCTOR RL1505/ RL1506/RL1507 106 Values

SINCE 1955

For Over 40 YEARS SHIPPED WORLDWIDE



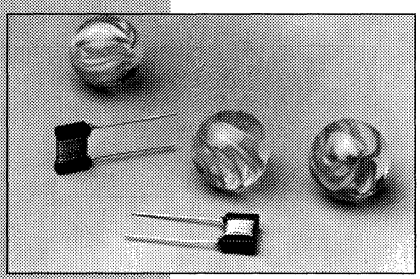
PART NO.	A MIN.	B MAX.	C MIN	D Ø MAX	E Ø
RL-1505	0.91	0.87	0.71	0.22	.026
RL-1506	0.75	0.41	0.75	0.16	.026
RL-1507	0.85	0.28	0.85	0.10	.02



These rugged coils exhibit high Q and very low distributed capacity, all concentrated in an amazingly small package. Ideal where weight, space, Hi Q and auto insertion are involved. Temperature range -25º to +85ºC. Coils identified with industry standard color code.

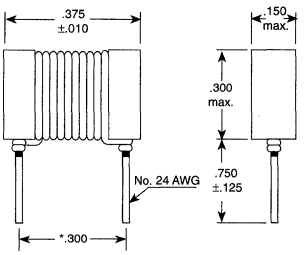
FLAT COILS RL1160
45 values

SINCE 1955



Unique flat coil configuration ideally suited to high density PCBs. Twice the inductance and Q values than axial lead inductors occupying the same space. Wide range of inductance and Q values for use at radio as well as audio frequencies.

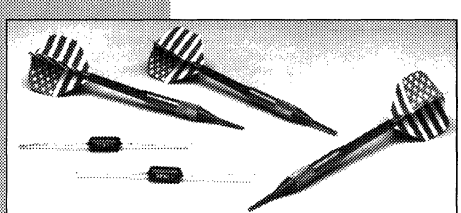
- Inductance: 1.0 to 4700 µH
- Test Frequency: 7.9 MHz to 250.0 KHz
- Min. Q: 37.0 to 63.0
- Max. DCR: 0.010 to 29.9 Ohms
- Saturation current: 7.0 to 0.11 DC Amps
- Suggested rated current: 2.25 to .027 AC Amps



* Easily Formable to .300

SHIELDED INDUCTORS RL1123 / RL1124 172 Values

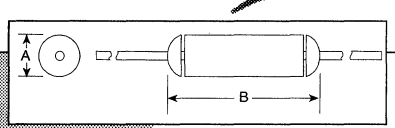
SINCE 1955



Series RL-1123 (96 values) Inductance: 1.0 µH to 47.0 H
Max. DCR: 0.0066 to 5170.0 Ohms
Suggested rated current: 1.5 to 0.0054 AC Amps

Series RL-1124 (80 values) Inductance: 1.0 µH to 4.7. H
Max. DCR: 0.011 to 1700.0 Ohms
Suggested rated current: 0.707 to 0.0054 AC Amps

Low cost, miniature shielded coils, extremely useful in compact audio filters, tone control circuits, amplifiers and wherever high inductance coils are needed. Excellent, low cost alternatives to fixed pot cores.



PART NO.	A	B	WT. GM. MAX
RL-1123	.500	.950	15
RL-1124	.260	.700	5

Leads #20 tinned copper 1 1/4" long min.

CAUTION:
Not recommended for DC applications (DC Saturation Currents very low)

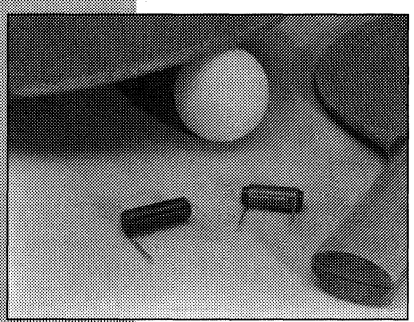
SINCE 1955
RENCO ELECTRONICS, INC. 60 E Jefryn Boulevard Deer Park, NY 11729 USA
1-516-586-5566 • TOLL-FREE ENGINEERING HOT LINE 1-800-645-5828
NEW WEB SITE http://www.rencousa.com
FAX DIRECT FOR FREE SAMPLES: 1-516-586-5562

INDUCTORS/CHOKES

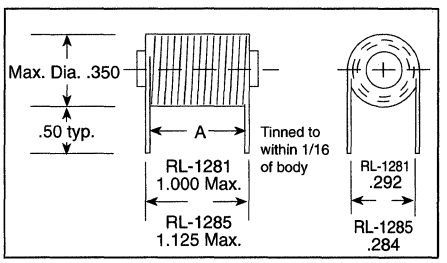
SINCE 1955

LOW COST POWER LINE CHOKES
RL1281 / 1285 42 Values

For Over 40 YEARS SHIPPED WORLDWIDE



These heavy duty, general purpose inductors use ferrite cores and offer a wide range of inductance values. Their compact size and pretinned leads make them easy to use in printed circuit boards.

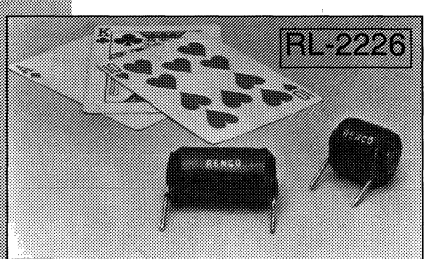


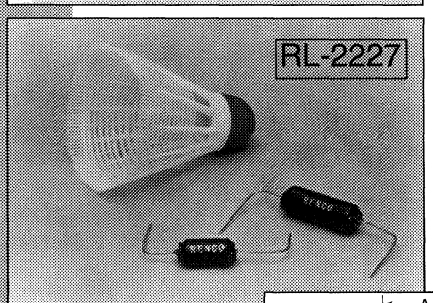
Series RL-1281: (23 Values)
- Max. current: 4 Amps
- Inductance (± 15%): 0.22 to 12.50µH
- Max DCR: 0.003 to 0.025 Ohms
- Dimension "A": 0.187 to 0.875

Series RL-1285: (19 Values)
- Max current: 6 Amps
- Inductance (± 15%): 0.22 to 10.20 µH
- Max DCR: 0.002 to 0.015 Ohms
- Dimension "A": 0.125 to 0.883

SINCE 1955

High Current Filter Inductors
RL2226 / RL2227 44 Values





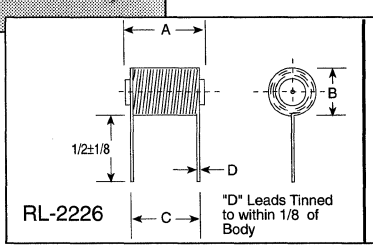
High performance, compact, low cost filter inductors available with radial or axial leads. High current capability makes them suitable for switching power supplies, filter networks, SCR and triac control circuits. Outer windings insulated and protected with PVC sleeve.

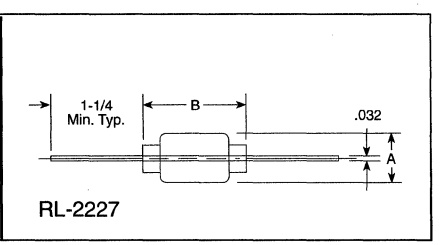
Series RL-2226 (24 values):
Inductance: 5 to 250 µH
Max DCR: 0.008 to 0.090 Ohms
Max rated current: 3 to 15 A.
Incremental current: 3 - 20 A.

Dimensions RL-2226:
A (Max) 0.875 to 1.625
B (Max) 0.625 to 1.000
C (±.062) 0.500 to 1.125
D (±.005) .042 to .082

Series RL-2227 (20 values):
Inductance: 5 to1000 µH
Max DCR: 0.015 to 0.600 Ohms
Max rated current: 1 to 5 A.

Dimensions RL-2227:
A (Max) .475 to .700
B (Max) .800 to1.300





SINCE 1955

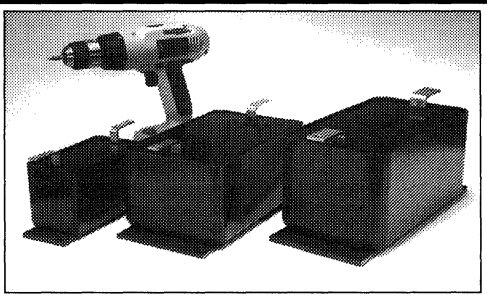
RENCO ELECTRONICS, INC. 60 E Jefryn Boulevard Deer Park, NY 11729 USA
1-516-586-5566 • TOLL-FREE ENGINEERING HOT LINE 1-800-645-5828
NEW WEB SITE http://www.rencousa.com

FAX DIRECT FOR FREE SAMPLES: 1-516-586-5562

SINCE 1955

For Over 40 YEARS SHIPPED WORLDWIDE

RL6000 POWERDUCTOR™ 6 Values, 3 Sizes



- Current Range: 30A - 225A
- Inductance Range: 65µH to 600µH
- Frequency Range: DC to 60Hz*
- Maximum Operating Temperature Range - 55°C to +125°C
- All Materials UL Recognized
- Flammability Rating 94V-O
- Auxiliary Cooling Not Required
- Mounting Plate Predrilled for Easy Mounting
- All Connections Suitable for Copper or Aluminum Wire

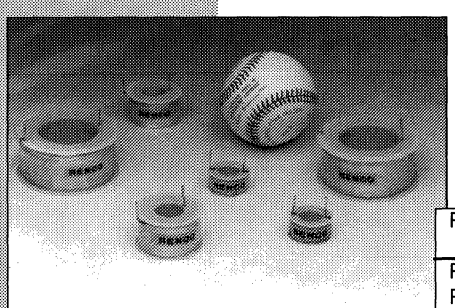
* Custom Designs Available for Higher Frequency

Typical Applications:

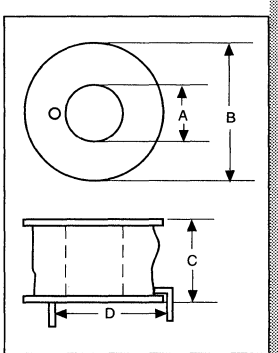
- Power Conditioners
- UPS Filters
- Electric Vehicles
- Power Line Filtering
- Harmonic Filters
- High Current Switching Power Supplies
- Motor Controls
- EMI Filters

SINCE 1955

AIR CORE INDUCTORS RL1233/RL1238/RL1239 137 Values



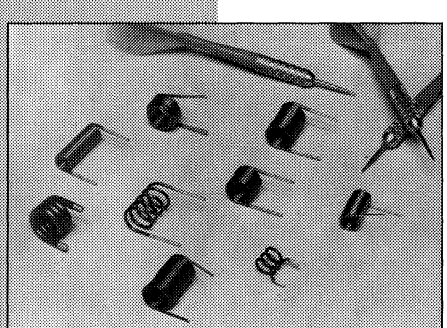
- Current range: 800mA to 13A
- Inductance range: .56µH to 33mH
- Frequency range DC to microwave



PART NO.	A	B	C	D "DIM" Ref. (in)
RL-1233	5/8	1 5/32	9/16	.823 TO .957
RL-1238	3/4	1 3/4	15/16	1.313
RL-1239	1 11/16	3	1 1/4	2.25

SINCE 1955

AIR CORE INDUCTORS



Low cost, self-supporting, air core inductors for use in a wide range of high frequency applications wound to your specifications.

APPLICATIONS:

- Satellite Communication Systems
- Microwave Equipment
- Television Circuits
- AM/FM Radio Receivers/Transmitters
- Test Equipment
- Band Pass Filters

SPECIFICATIONS:

- Frequency: Up to 1000MHz
- Current: Up to 50 Amps*
- Operating Temperatures: Up to 220°

MECHANICAL:

- Windings: Clockwise, Counter Clockwise, Variable Pitch and Length
- Leads: Pretinned, Formed Leads, Terminals*
- Wire Gauge: #8 to #32
- Coil Length: To Customer Specification

*Depending on wire gauge

SINCE 1955

RENCO ELECTRONICS, INC. 60 E Jefryn Boulevard Deer Park, NY 11729 USA

1-516-586-5566 • TOLL-FREE ENGINEERING HOT LINE 1-800-645-5828

NEW WEB SITE http://www.rencousa.com

FAX DIRECT FOR FREE SAMPLES: 1-516-586-5562

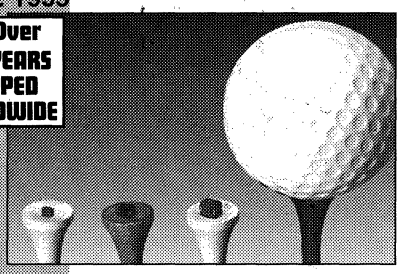
INDUCTORS/COILS

SMT INDUCTORS

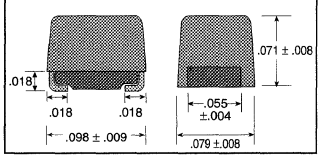
SINCE 1955

CHIPDUCTOR SURFACE MOUNT INDUCTORS 72 Values 3 Sizes

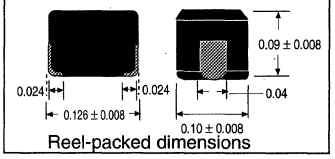
For Over 40 YEARS SHIPPED WORLDWIDE



RL-2505 EIA size 1008



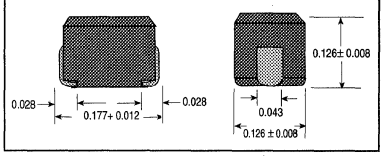
RL-2515 EIA size 1210



Reel-packed dimensions

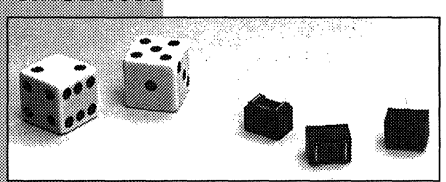
The RL-2505, RL-2525 and RL-2525 CHIPDUCTOR™ Series offers over a hundred standard values of miniature inductors that are designed specifically for compact assemblies requiring surface mount components. They can be supplied on reels for automated assemblies or in bulk packaging.

RL-2525 EIA size 1812



SINCE 1955

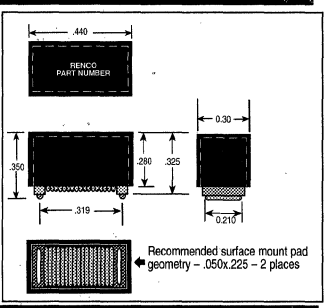
SURFACE MOUNT INDUCTORS RL1500 47 Values



INDUCTANCE:
1.0µH - 10µH
12µH - 100µH
120µH -1000µH
1200µH - 6800µH

Q METER FREQUENCY:
7.90 MHz
2.50 MHz
790 kHz
250 kHz

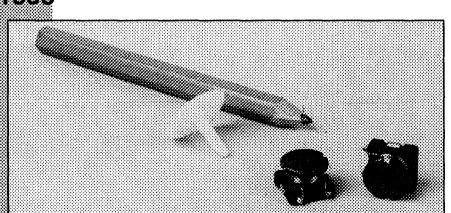
The RL-1500 Series offers over 45 standard high Q inductive values covering a range of 1.0µH to 6800µH with rated currents of up to 1.8 Amps AC. They are ideal for surface mount assembly using vapor phase or infrared soldering. This series uses a nonconductive high volume resistivity, low loss ferrite material.



Recommended surface mount pad geometry – .050x.225 – 2 places

SINCE 1955

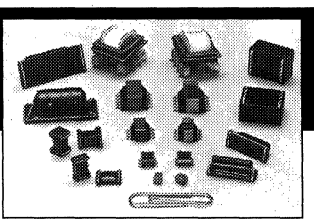
NEW SURFACE MOUNT POWER INDUCTOR RL6050 26 Values



The RL-6050 Series are high current, surface mount inductors offering 26 standard values ranging from 10µH to 1200µH. Specifically designed for high density surface mount applications including switching regulators, power amplifiers, power supplies and noise/EMI/RFI filtering. These components utilize extremely rugged mounting pads with outstanding solderability and solder heat resistance. They are ideal for solder flow, reflow and wave soldering applications.

SINCE 1955

SURFACE MOUNT TECHNOLOGY



- Open frame SMT Platforms and encapsulated SMT Modules allow standard and custom
- Renco chokes, inductors and transformers to be used in surface mount assemblies.
- SMT Modules and SMT Platforms with multiple inductors can be provided.
- Ideal for automated assembly..
- Open frame SMT Platforms can be supplied with conformal or open construction components.
- All terminals including gull wing, J hook and butt joint available.
- Fully compatible with infrared and vapor phase reflow soldering.
- Flexible SMT Module and SMT Platform configurations

SINCE 1955

RENCO ELECTRONICS, INC. 60 E Jefryn Boulevard Deer Park, NY 11729 USA

1-516-586-5566 • TOLL-FREE ENGINEERING HOT LINE 1-800-645-5828

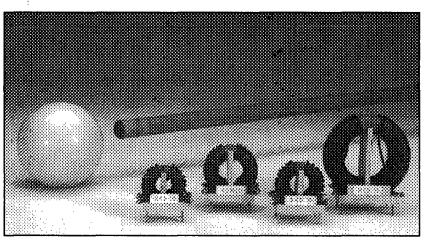
NEW WEB SITE http://www.rencousa.com

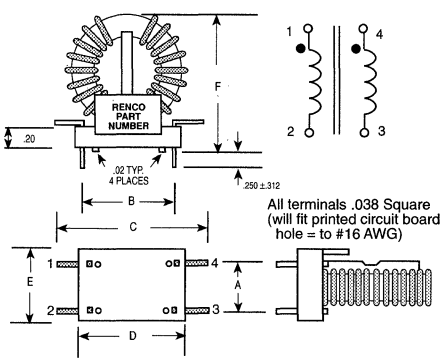
FAX DIRECT FOR FREE SAMPLES: 1-516-586-5562

SINCE 1955

For Over 40 YEARS SHIPPED WORLDWIDE

COMMON MODE TOROIDS RL5011/ RL5012/RL5013/RL5014 63 Values

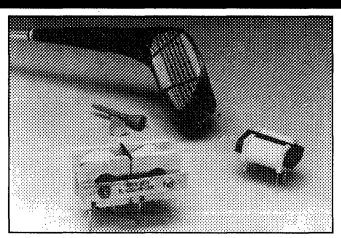




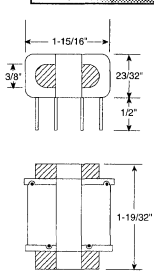
PART NO.	A	B	C	D	E	F MAX.
RL-5011	.40	.80	1.35	1.00	0.70	1.550
RL-5012	.60	.90	1.45	1.10	0.90	1.300
RL-5013	.70	1.20	1.75	1.40	1.00	1.760
RL-5014	.90	1.50	2.05	1.70	1.20	2.280

SINCE 1955

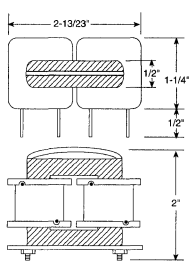
COMMON MODE CHOKES RL1328 / RL1329 206 Values



Placed at the inputs of electrical equipment, these chokes help meet U.S. and international requirements for safety and EMI. These low priced Common Mode Chokes are available in a wide range of standard inductances, with current ratings to 35 Amps.



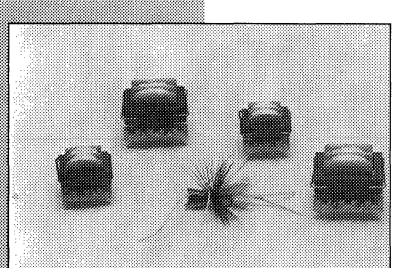
Series RL-1328 (120 values):
Inductance: 47.0 to 39000.0 µH
Max DCR: 0.002 to 0.555 Ohms
Max. Leakage Inductance: 5.0 to 3080.0 µH
Max.interwinding capacitance:: 2.0 to 13.5 pF
Hipot Winding to winding and winding to core: 2500 VAC
Suggested Rated current: 3 to 35 AC Amps



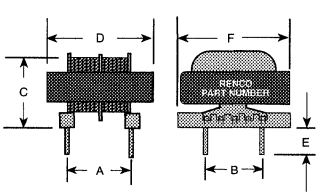
Series RL-1329 (86 values):
Inductance: 6.8 to 22000.0 µH
Max DCR: .0028 to 0.555 Ohms
Max. Leakage Inductance: 1.5 to 1430.0 µH
Max.interwinding capacitance:: 1.5 to 20 pF
Hipot Winding to winding and winding to core: 2500 VAC
Suggested Rated current: 2 to 22 AC Amps

SINCE 1955

COMMON MODE CHOKES RL1361-1 / RL1361-2 82 Values



Placed at the inputs of electrical equipment, these chokes help meet U.S. and international requirements for safety and EMI. Low-priced, they're available in a wide range of inductances and current ratings from 100 mA to 5.5 Amps. PC mounting. Low profile. Varnish impregnated. Mat'l Used Class B 130ºC. MIL spec and encapsulation available.



STYLE NUMBER	TYPICAL DIMENSIONS						TERMINAL	
	A	B	C	D	E	F	SIZE	NO.
RL-1361-1	.515	.200	.670	0.900	.175	0.880	.025 SQ.	4
RL-1361-2	.630	.400	.830	1.062	.175	1.100	.025 SQ.	4

SINCE 1955

RENCO ELECTRONICS, INC. 60 E Jefryn Boulevard Deer Park, NY 11729 USA
1-516-586-5566 • TOLL-FREE ENGINEERING HOT LINE 1-800-645-5828
NEW WEB SITE http://www.rencousa.com

FAX DIRECT FOR FREE SAMPLES: 1-516-586-5562

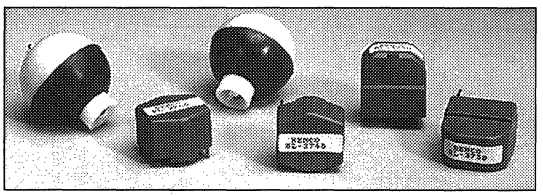
COMMON MODE CHOKES

TOROID INDUCTORS

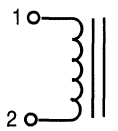
SINCE 1955

For Over 40 YEARS SHIPPED WORLDWIDE

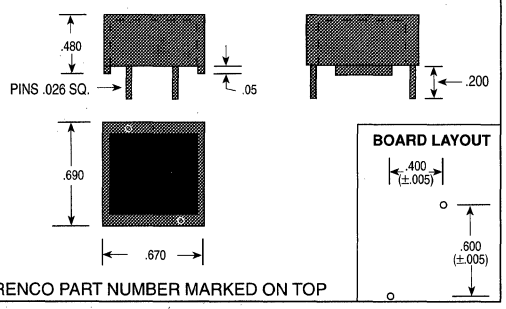
RL3745/RL3750 TOROIDAL LOW POWER INDUCTORS 14 Values 2 Sizes



- Current range 500mA to 1.7A
- Inductance range 150µH to 1 mH
- Frequency range DC to RF
- Radial leads for easy PC mount

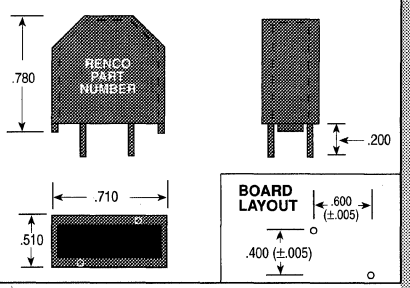


HORIZONTAL RL-3745



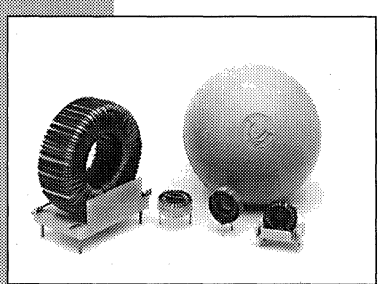
RENCO PART NUMBER MARKED ON TOP

VERTICAL RL-3750



SINCE 1955

TOROIDAL POWER INDUCTORS RL6100 25 Values 23 Sizes



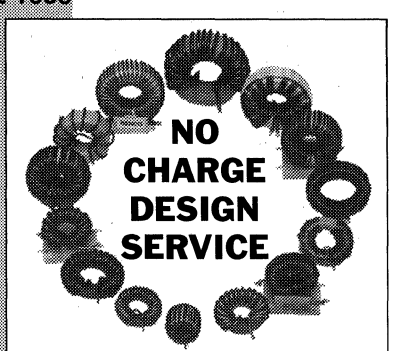
NEW

Three mounting styles available:
- Self-Leaded, Vertical
- Self-Leaded, Horizontal
- Vertical Base Mounted

This new series of power toroids is designed for switching power supply applications. They will operate efficiently up to 200KHZ switching frequencies. The use of linear, low loss core material make these inductors also suited for many other applications requiring a toroid.

SINCE 1955

CUSTOM TOROIDS AT STANDARD PRICES



Due to our high speed winding equipment, use of robotics and high efficiency production techniques Renco Electronics can now offer CUSTOM WOUND TOROID COILS AT STANDARD PRICES.

Renco can wind toroids with 8 gauge to 50 gauge wire on any size toroid core made of:
- Ferrite • Powdered Iron • Moly Permalloy • Tape Wound
- Steel Ring • Kool Mu™

Your toroid coils can be supplied any way you want, such as:
- Encapsulated • Epoxy Coated • Hermetically Sealed
- Vacuum Varnish Impregnated • Taped

SINCE 1955

RENCO ELECTRONICS, INC. 60 E Jefryn Boulevard Deer Park, NY 11729 USA
1-516-586-5566 • TOLL-FREE ENGINEERING HOT LINE 1-800-645-5828
NEW WEB SITE http://www.rencousa.com

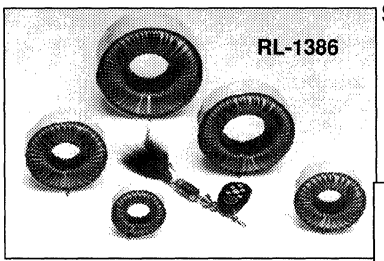
FAX DIRECT FOR FREE SAMPLES: 1-516-586-5562

TOROID INDUCTORS

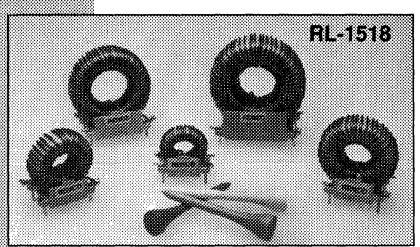
SWINGDUCTOR®
RL1386 / RL1518 149 Values, 5 Sizes

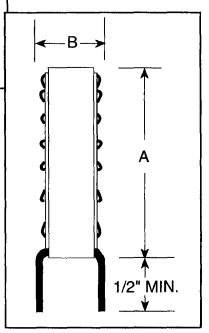
SINCE 1955

For Over 40 YEARS SHIPPED WORLDWIDE



Special core material allows "controlled saturation" so that a specific inductance value is repeatable at a specific current.



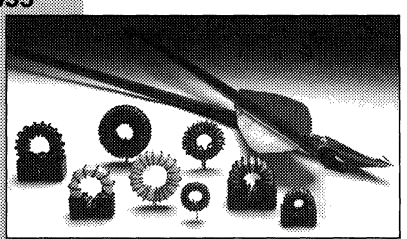


- Current range: 1.2A to 22A
- Inductance: 1.1µH to 5.6mH
- Frequency range DC to RF

DIM. (IN)	"A" (MAX. DIA.)	"B" (MAX. WIDTH)
RL1386-1	1.10	0.500
RL1386-2	1.45	0.874
RL1386-3	1.80	0.900
RL1386-4	2.00	1.100
RL1386-5	2.60	1.500

LOW COST TOROIDS
RL3435 / RL4435 33 Values, 5 Sizes

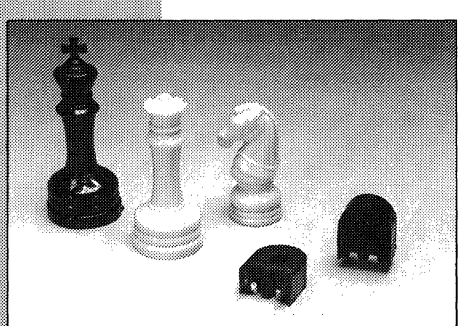
SINCE 1955



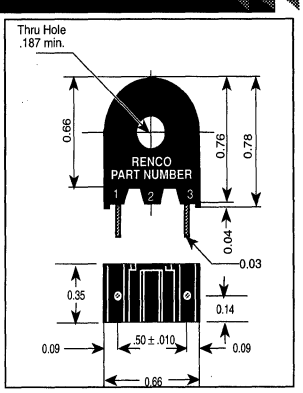
- Current Range 2 A to 10 A
- Inductance Range 20 µH to 450µH
- Rugged Construction
- Single Layer Design
- Frequency Range DC to RF
- Radial Leads (RL-3435) or Rugged Base Mount (Clip-mount package RL-4435)

CURRENT SENSORS
RL3410/RL3420/RL3430 3 Values

SINCE 1955



- Current range: 1A to 35A
- Inductance range: 50mH to 80mH
- Frequency range 1KHz to 100KHz
- Radial leads for easy PCB mounting



SINCE 1955

RENCO ELECTRONICS, INC. 60 E Jefryn Boulevard Deer Park, NY 11729 USA

1-516-586-5566 • TOLL-FREE ENGINEERING HOT LINE 1-800-645-5828

NEW WEB SITE http://www.rencousa.com

FAX DIRECT FOR FREE SAMPLES: 1-516-586-5562

RFE INTERNATIONAL

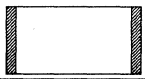
FIXED INDUCTOR PRODUCTS

Surface Mount

Bead

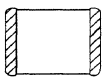
Series	Size	Impedance	DC Current	DC Resistance
IM1608	0603	68~1000	50~100mA	0.4~1.2Ω
IB—2012	0805	7~1000	50~600mA	0.1~0.6Ω
IB—3216	1206	19~1500	80~3000mA	0.03~0.5Ω

Bead



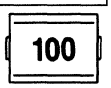
Series	Size	Impedance	DC Current	DC Resistance
IB—3225	1210	40~90	200~400mA	0.2~0.3Ω
IB—4516	1806	60~100	200mA	0.5Ω
IB—4532	1812	70~150	200mA	0.2~0.1Ω

Multilayer Inductor



Series	Size	Inductance	Q	DC Current	DC Resistance
II1608	0603	0.047~12μh	10~35	50~5ma	0.3~2.75Ω
II2012	0805	0.047~33μh	15~30	300~5ma	0.2~1.25Ω
II3116	1206	0.047~33μh	20~35	300~5ma	0.15~1.05Ω

Wirewound Inductor



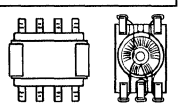
Series	Size	Inductance	Q	DC Current	DC Resistance
IW2012	0805	.022~22μh	50~60	600~400ma	.06~1.2Ω
IW2520	1008	.01~180μh	28~65	1000~300ma	0.8~2.6Ω
IW3225	1210	0.12~220μh	30~20	450~50ma	0.22~21Ω
IW4532	1812	0.1~1000μh	35~50	800~30ma	0.18~40Ω

Power Choke

Series	Size	Inductance	DC Current	DC Resistance
IC0805	0.31"dia.	10~470μh	2.3~0.34A	0.07~1.96Ω
IC1006	0.39"	10~820μh	2.6~0.24A	0.06~2.55Ω
IC0906	0.41"	10~1200μh	2.1~0.20A	0.09~4.0Ω

*Shielded versions of surface mount inductors are also available.

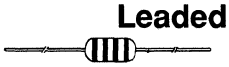
Transformer & Line Filters



Series	Size	Type
TB0303	0.15x0.20"	Balun
TB0604	0.24x0.25	Balun
TEE	0.30x0.33	EE Type
TPT	.28x.28	Pot Type
TER	42x.50	ER Type
TLF0602	3.75mm x 6.5mm	Line Filter
TLF0905	9.5mm x 6.5mm	Line Filter

Leaded Inductors

Axial Lead

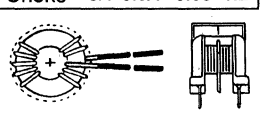


Series	Size (inch)	Inductance (μh)	Q min	SRF MHz	IDC MAX(ma)	RDC MAX(Ω)
IA0204	0.09x0.13	0.1~470	35~40	300~3.5	700~24	0.06~20
IA0307	0.12x0.30	0.1~1000	45~50	480~1.4	1400~60	0.06~26
IA0410	0.16x0.41	0.1~1000	40~50	25.2~1.2	1700~85	0.06~20

Axial or Radial

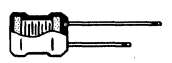
IPA0618	0.24x0.71	10~1000	Power Choke	2A~0.2A	0.075~3
IPA1226	.48x1.03	10~1000	Power Choke	5A~0.6A	0.03~1.2

Toroid & Transformer



Series	Size (inch)	Wire Dia. (mm)	Inductance (μh)	I DC Rated (A)	R DC (mΩ)
TOROID					
TR 0806	0.47x.24	0.4	10	1	45
TR1307	0.53x0.3	0.4	25	2	85
TR1711	0.67x0.43	0.6	26~72	2	55~85
TR1714	0.63x0.55	0.6	45~125	3	75~100
TR2313	0.19x0.51	0.8	40~110	3	40~70
TR2616	1.1x0.63	1	35~100	5	30~50
TR3217	1.3x0.67	1	45~140	5	40~70
FILTER					
UU1022V	0.75x0.67x0.91	Line Filter, Choke	1mH~10mH	1.6Aac~0.4Aac	0.2~2.5
UU1024V4	0.75x0.67x0.91		0.8mH~8.0mH	1.6Aac~0.4Aac	0.2~2.4
UU1527V	0.75x0.51x0.91		1.5mH~20mH	1.8Aac~0.5Aac	0.15~2.0
UU1527V4	0.75x0.51x0.91		1.5mH~20mH	1.8Aac~0.5Aac	0.15~2.0

Radial Lead



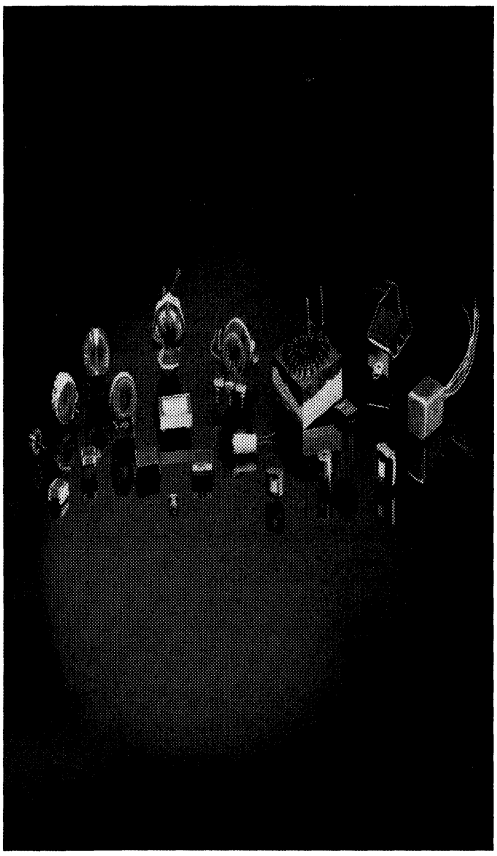
Series	Size (inch)	Inductance (μh)	Q min	SRF MHz	IDC MAX(ma)	RDC MAX(Ω)
IR0608	0.24x.034	1~1000	60~55	105~1.8	1030~100	0.1~11.5
IR0812	0.32x0.48	47~47000	30~60	6.0~0.1	450~16	0.4~162
IR1014	0.40x0.55	100~100000	45~30	3.2~0.1	350~12	0.85~300
IR0712	0.3x0.48	10~560	20	16~2	1100~150	0.07~1.8
IR0912	0.4x0.48	1.5~1000	25~60	78~1.9	5.4A~0.2A	0.008~4.3
IR0914	0.4x0.55	3.3~1000	20~50	70~1.3	3.6A~0.3A	0.027~2.1
IR1314	0.51x0.55	3.3~15000	30~140	59~0.41	5.6A~0.082A	0.008~15
*ISR1013	0.41x0.51	1.0~47	20~50	740~110KHz	150~25	4.0~205
IPR1620	0.63x0.79	10~1000	Power Choke		5.0A~0.7A	0.024~.08
IPR1823	0.71x0.91	10~1000	Power Choke		8.0A~1.0A	0.009~0.6
IPR2023	0.8x0.91	10~2000	Power Choke		10.0A~0.8	0.008~1.2

* Shielded

Bead & Wide Band Choke

Series	Size (Inch)	Impedance (Ω)	Test Freq.(MHz)	Turns
BEAD				
BDC0305	0.14x0.19	36~50	100	NA
BDC0306	0.14x0.24	40~55	100	NA
BDC0309	0.14x0.36	60~85	100	NA
WIDE BAND CHOKE				
WB0610	0.24x0.39	350	250	1.5
WB0610	0.24x0.39	300	120	1.5
WB0610	0.24x0.39	700	180	2.5
WB0610	0.24x0.39	600	50	2.5
WB0610	0.24x0.39	600	20	2.5
WB0610	0.24x0.39	800	110	1.5+1.5
WB0610	0.24x0.39	700	50	1.5+1.5

RFE INTERNATIONAL
RFE International Inc. • 20432 Barents Sea Circle, Lake Forest, CA 92630
Tel:(949)583-0808 • Fax:(949)583-9898 • E-Mail: rfeint@Compuserve.com



Magnetics

SAE Power Inc. can expedite your design cycle with technical and manufacturing support In the following broad areas:

- Magnetic components for switching power supplies.
- High-frequency ferrite transformers of toroid, pot-core and other geometry's.
- Inductors of powdered iron, nickel iron, MPP or NI core material.

- Bobbin Coils.
- Power transformers, 50/60 Hz, laminated steel core.
- Power chokes, 50/60 Hz, laminated steel core.

- Audio transformers.
- Ferro resonant transformers.
- Solenoidal coils.

- High voltage transformers.
- Magnetic Amplifiers.
- Three phase transformers.

- Air core magnetics
- Surface mount inductors and transformers
- Common mode and differential mode inductors for EMI filters

Flexible manufacturing capabilities, and is responsive to customer needs.

Technical expertise to assist with design parameters.

Quick turnaround time, constrained only by raw material availability.

Complete turnkey, parts purchasing, PCB stuffing and wave soldering of thru-hole components.

Quality built in at every level of the process.

TÜV CERT
DIN ISO 9002 / EN 29002
Certificate 09 100 5871

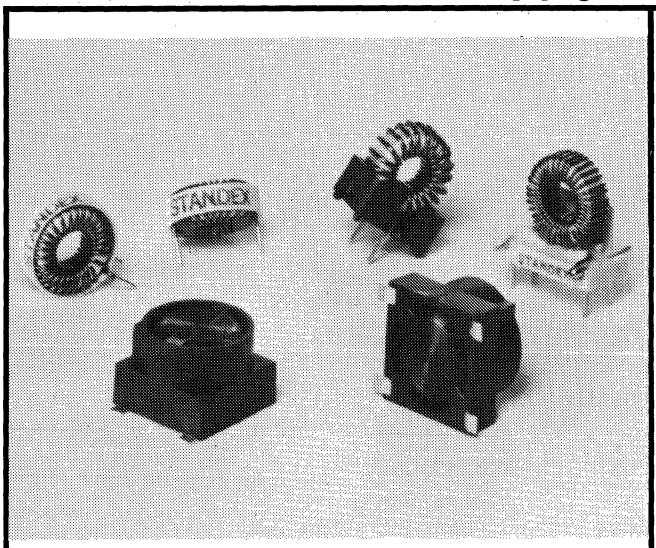
SAE Power Inc.

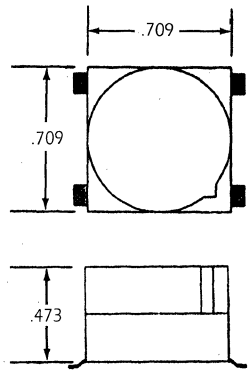
280 Martin Ave. #5
Santa Clara, CA 95050

telephone: (408) 987-2700
fax: (408) 986-8529

www.saepower.com

Inductors for Power Supply and EMI/RFI Filter Applications





NEW! Surface Mount Toroidal Power Inductors

Style "G" Surface Mount

Available for series CIE and CJE only

Standex Surface Mount Toroidal Inductors are economically over molded in high temperature plastic to withstand severe surface mount soldering procedures. This completely encapsulated molded package is more rugged and economical than assembled or potted configurations and shields the coil against physical damage and moisture penetration. Please call for more information.

Build Your Own Standard Part Number!

To order, please specify the series, inductance, current rating, and mounting style desired per the part number breakdown shown. For the most economical part, you may choose any inductance desired subject to the maximum shown from the tables below for a given series and current rating.

The maximum inductances shown represent the most economical configuration. Higher inductances may be available for a given package size. Please call Standex to discuss your specific requirements.

CIL 35 U E U

- Series
- Inductance (A decimal point is represented as an 'R')
- Inductance Unit: U = Micro Henry, M = Milli Henry
- Nominal Current Rating: C = .5 amp, D = 1 amp, E = 2 amps, F = 3 amps, G = 5 amps
- Mounting Style (See options above and below)

CI series inductors are designed primarily for switching power supply applications up to 75 KHz

Series	Nominal current*	.5 Amps (C)	1 Amp (D)	2 Amps (E)	3 Amps (F)	5 Amps (G)
	Maximum current*	1 Amp	1.8 Amps	2.5 Amps	4.9 Amps	7 Amps
CIE	Minimum Inductance Typical part number	40 uH CIE40UCU	20 uH CIE20UDU	6 uH CIE6UEU	1 uH CIE1UFU	1 uH CIE1UGU
	Maximum Inductance Typical part number	150 uH CIE150UCU	80 uH CIE80UDU	40 uH CIE40UEU	6 uH CIE6UFU	2 uH CIE2UGU
CIL	Maximum Inductance Typical part number	500 uH CIL500UCU	300 uH CIL300UDU	100 uH CIL100UEU	20 uH CIL20UFU	8 uH CIL8UGU
CIN	Maximum Inductance Typical part number	2 mH CIN2MCU	500 uH CIN500UDU	350 uH CIN350UEU	65 uH CIN65UFU	35 uH CIN35UGU
CIR	Maximum Inductance Typical part number	4.7 mH CIR4R7MCU	1.2 mH CIR1R2MDU	500 uH CIR500UEU	100 uH CIR100UFU	50 uH CIR50UGU
CIT	Maximum Inductance Typical part number	5.mH CIT5MCU	1.5 mH CIT1R5MDU	1 mH CIT1MEU	350 uH CIT350UFU	200 uH CIT200UGU

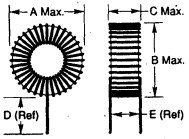
CJ series inductors are designed primarily for higher frequency switching power supply applications from 50 to 500Khz

Series	Nominal current*	.5 Amps (C)	1 Amp (D)	2 Amps (E)	3 Amps (F)	5 Amps (G)
	Maximum current*	1 Amp	1.8 Amps	2.5 Amps	4.9 Amps	7 Amps
CJE	Minimum Inductance Typical part number	40 uH CJE40UCU	20 uH CJE20UDU	6 uH CJE6UEU	1 uH CJE1UFU	1 uH CJE1UGU
	Maximum Inductance Typical part number	150 uH CJE150UCU	80 uH CJE80UDU	40 uH CJE40UEU	6 uH CJE6UFU	2 uH CJE2UGU
CJL	Maximum Inductance Typical part number	500 uH CJL500UCU	300 uH CJL300UDU	100 uH CJL100UEU	20 uH CJL20UFU	8 uH CJL8UGU
CJN	Maximum Inductance Typical part number	2 mH CJN2MCU	500 uH CJN500UDU	350 uH CJN350UEU	65 uH CJN65UFU	35 uH CJN35UGU
CJR	Maximum Inductance Typical part number	4.7 mH CJR4R7MCU	1.2 mH CJR1R2MDU	500 uH CJR500UEU	100 uH CJR100UFU	50 uH CJR50UGU
CJT	Maximum Inductance Typical part number	5 mH CJT5MCU	1.5 mH CJT1R5MDU	1 mH CJT1MEU	350 uH CJT350UFU	200 uH CJT200UGU

* Nominal current carrying capability is the typical use DC current. Maximum current is the maximum DC current that the component can withstand continuously with a less than 40°C. temperature rise at .1 amp A.C. and 20 KHz. Note: A.C. current affects temperature rise in higher inductance parts.

Inductance tolerance is ±20%. Dimensions are in inches.

Style "U" Vertical P.C. Board Mount

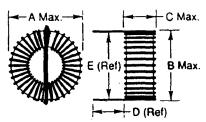


	CIE/CJE	CIL/CJL	CIN/CJN	CIR/CJR	CIT/CJT
A	.650	.900	1.025	1.500	1.800
B	.650	.900	1.025	1.500	1.800
C	.325	.425	.600	.625	.750
D	.187	.187	.187	.187	.187
E	.250	.300	.500	.600	.750

Nominal Current Rating in Amps

Lead Diameter	.5 (C)	1 (D)	2 (E)	3 (F)	5 (G)
	.020	.025	.032	.040	.050

Style "H" Horizontal P.C. Board Mount

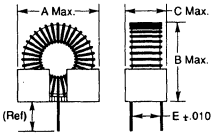


	CIE/CJE	CIL/CJL	CIN/CJN	CIR/CJR	CIT/CJT
A	.650	.900	1.025	1.500	1.800
B	.650	.900	1.025	1.500	1.800
C	.325	.425	.600	.625	.750
D	.187	.187	.187	.187	.187
E	.600	.750	.900	1.100	1.650

Nominal Current Rating in Amps

Lead Diameter	.5 (C)	1 (D)	2 (E)	3 (F)	5 (G)
	.020	.025	.032	.040	.050

Style "K" Vertical P.C. Board Klip Mount



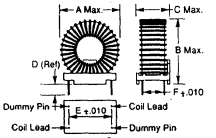
	CIE/CJE	CIL/CJL	CIN/CJN	CIR/CJR
A	.687	.900	.975	1.500
B	.700	.950	1.125	1.550
C	.500	.500	.625	.750
D	.187	.187	.187	.187
E	.300	.300	.450	.500

Style K not available for 5 amp or CIT coils

Nominal Current Rating in Amps

Lead Diameter	.5 (C)	1 (D)	2 (E)	3 (F)
	.020	.025	.032	.040

Style "T" Vertical Four Pin Mount



	CIE/CJE	CIL/CJL	CIN/CJN	CIR/CJR	CIT/CJT
A	.765	.900	1.100	1.500	1.750
B	.825	1.075	1.100	1.560	1.860
C	.440	.650	.650	.650	.850
D	.187	.187	.187	.187	.187
E	.600	.800	.800	.800	.900
F	.250	.400	.400	.400	.600

Nominal Current Rating in Amps

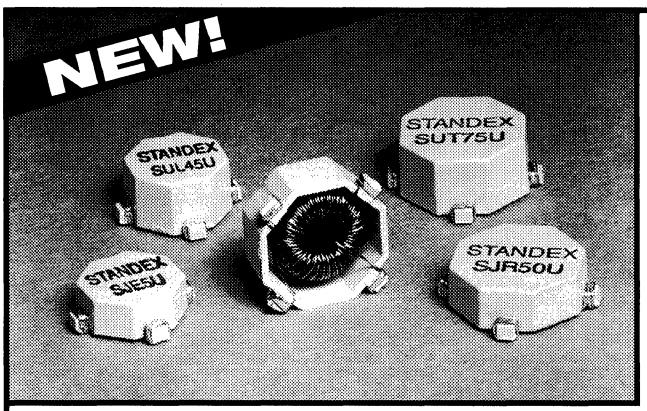
Lead Diameter	.5 (C)	1 (D)	2 (E)	3 (F)	5 (G)
Series CIE	.040	.040	.040	.040	.050
Series CIL, CIN, CIR and CIT	.050	.050	.050	.050	.050

Standex Electronics

Custom inductors and transformers are standard at Standex Electronics. Please call or write with any questions or requirement you may have.

a Standex company
4538 Camberwell Road, Cincinnati, OH 45209
513/871-3777 • FAX: 513/871-3779 • INTERNET: http://www.stdxelec.com • EMAIL: standex@stdxelec.com

Surface Mounted Toroidal Inductors

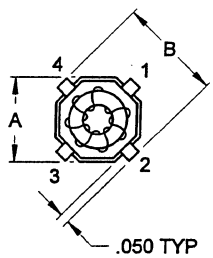


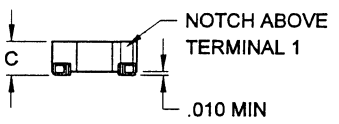
Features:

- Utilizes toroidal "naturally shielded" design
- Available in inductances up to 1.2 mH and current carrying capability to 8.1 amps DC
- Ideal in applications where space and weight are at a premium

- Standex surface mounted toroidal inductors are very versatile and may be used in a variety of applications depending upon their connections and are available in four package styles
- When used as inductors, they may be connected to provide higher current carrying capability with lower inductance or higher inductance with lower current carrying capability
- When used as 1:1 transformers (coupled inductors), they provide electrical isolation.
- Standex surface mounted inductors can be manufactured with economical powdered cores or higher performance low loss cores. Other core materials are available for a variety of applications.

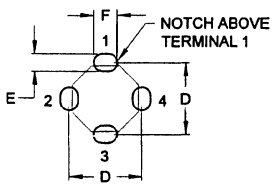
Mechanical Diagram





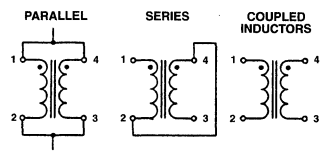
Series	A	B	C	D	E	F
SJE/SUE	0.350	0.450	0.165	0.390	0.120	0.150
SJL/SUL	0.350	0.450	0.235	0.390	0.120	0.150
SJR/SUR	0.450	0.550	0.180	0.490	0.120	0.160
SJT/SUT	0.450	0.550	0.250	0.490	0.120	0.160

Recommended Layout



Dimensions are in inches

Connection Diagram



Build your own Standard Part number!

You can optimize your design and get exactly the inductance you need by utilizing Standex Electronics **build your own part number** system. To build your own part number, specify the series, size and parallel inductance required from the tables below.

Example: SJ L 1R7 U

Series

Size	Height	Width
E	.165	.350
L	.235	.350
R	.180	.450
T	.250	.450

U = Micro Henry
M = Milli Henry

Parallel Inductance (a point is represented as an "R")

SJ SERIES economy

Standex Part Number	Choose between these values	PARALLEL L (0 ADC) µH ±20%	PARALLEL IDC Amps	PARALLEL L @ IDC µH typ.	PARALLEL DCR Ohms	SERIES L (0 ADC) µH ±20%	SERIES IDC Amps	SERIES L @ IDC µH typ.	SERIES DCR Ohms
SJE1U	Minimum	1.03	8.12	0.62	0.005	4.10	4.06	2.46	0.020
SJE50U	Maximum	50.00	1.72	30.00	0.26	200.00	0.86	120.00	1.04
SJL1R7U	Minimum	1.68	7.76	1.01	0.005	6.70	3.88	4.02	0.019
SJL123U	Maximum	122.50	0.90	73.50	0.39	490.00	0.45	294.00	1.56
SJR29U	Minimum	2.90	5.58	1.74	0.009	11.60	2.79	6.96	0.035
SJR110U	Maximum	110.00	0.91	66.00	0.34	440.00	0.45	264.00	1.37
SJT9R5U	Minimum	9.50	3.94	5.70	0.020	38.00	1.97	22.80	0.080
SJT300U	Maximum	300.00	0.71	180.00	0.69	1,200.00	0.35	720.00	2.75

SU SERIES low loss

SUE0R8U	Minimum	0.78	7.60	0.47	0.004	3.10	3.80	1.86	0.016
SUE21U	Maximum	20.50	1.46	12.30	0.13	82.00	0.73	49.20	0.50
SUL1R8U	Minimum	1.80	6.86	1.08	0.005	7.20	3.43	4.32	0.020
SUL80U	Maximum	80.00	1.03	48.00	0.25	320.00	0.52	192.00	1.00
SUR2U	Minimum	2.00	7.00	1.10	0.006	8.00	3.50	4.40	0.023
SUR110U	Maximum	110.00	0.96	60.50	0.32	440.00	0.48	242.00	1.26
SUT6R3U	Minimum	6.25	5.46	3.44	0.012	25.00	2.73	13.75	0.048
SUT300U	Maximum	300.00	0.79	165.00	0.63	1,200.00	0.40	660.00	2.50

Standex catalog specifications are subject to change without notice.

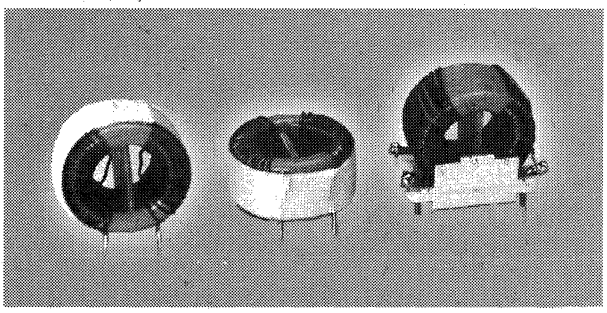
Standex Electronics

Custom inductors and transformers are standard at Standex Electronics. Please call or write with any questions or requirement you may have.

a Standex company
4538 Camberwell Road, Cincinnati, OH 45209
513/871-3777 • FAX: 513/871-3779 • INTERNET: http://www.stdxelec.com • EMAIL: standex@stdxelec.com

Common Mode Chokes for EMI/RFI Filter Applications

"CM" Chokes are designed primarily for Common Mode noise on A.C. lines.



Typical DC Resistance in Ohms

	Current Rating in Amps				
	.5	1	3	5	10
CME Series	.030 - .049	.012 - .039	.006 - .014	.004 - .006	.003
CMM Series	.032 - .070	.012 - .047	.007 - .015	.005 - .009	.003
CMP Series	.090 - .110	.040	.016 - .026	.007 - .010	.005
CMT Series	.100 - .140	.060 - .090	.030 - .050	.010 - .020	.010

Build Your Own Standard Part Number

To build your own part number, specify the series, inductance, current rating and case style. To optimize the inductance, size and current carrying capability, choose your part number from within the range of part numbers on the graphs below.

Example:

CMM 400 U F U

- CMM — Series
- 400 — Inductance (a 'point' is represented as 'R')
- U — Inductance Unit: U = Micro Henry, M = Milli Henry
- F — Current Rating: B = .25 amp, C = .5 amp, D = 1 amp, F = 3 amps, G = 5 amps, H = 10 amps
- U — Case Style (See options below)

Lead Diameter Dimensions				
Current Rating	Style U & H Series CMM, CMP & CMT	Style U & H Series CME	Style T Series CME & CMM	Style T Series CMP & CMT
.25	.016	–	–	.050
.5	.020	.016	.040	.050
1	.025	.025	.040	.050
3	.032	.025	.040	.050
5	.040	.032	.040	.050
10	.050	.040	.040/.050	.050

CME Series

Induct. (Per Winding)	Nominal Current Rating in Amps				
	.5	1	3	5	10
100µH	*	*	CME100UFX	CME100UGX	CME100UHX
220µH	*	*	CME220UFX	CME220UGX	**
330µH	*	CME330UDX	CME330UFX	**	**
470µH	CME470UCX	CME470UDX	CME470UFX	**	**
680µH	CME680UCX	CME680UDX	**	**	**
1mh	CME1MCX	CME1MDX	**	**	**

*Call factory **See CMM series

CMP Series

Induct. (Per Winding)	Nominal Current Rating in Amps					
	.25	.5	1	3	5	10
500µH	*	*	*	*	CMP500UGX	CME500UHX
1mH	*	*	*	CMP1MFX	CMP1MGX	**
2.5mH	*	*	CMP2R5MDX	CMP2R5MFX	**	**
5mH	CMP5MBX	CMP5MCX	**	**	**	**
7.5mH	CMP7R5MBX	CMP7R5MCX		**	**	**
10mh	CMP10MBX	**	**	**	**	**

*See CMM series **See CMT series

CMM Series

Induct. (Per Winding)	Nominal Current Rating in Amps				
	.5	1	3	5	10
250µH	*	CMM250UDX	CMM250UFX	CMM250UGX	CMM250UHX
500µH	*	CMM500UDX	CMM500UFX	CMM500UGX	**
750µH	CMM750UCX	CMM750UDX	CMM750UFX	CMM750UGX	**
1mH	CMM1MCX	CMM1MDX	CMM1MFX	**	**
2.5mH	CMM2R5MCX	CMM2R5MDX	**	**	**
3.6mH	CMM3R6MCX	**	**	**	**

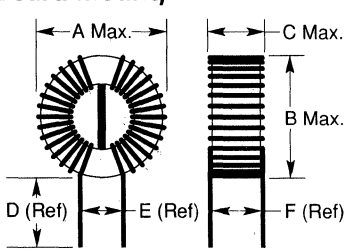
*See CME series **See CMP series

CMT Series

Induct. (Per Winding)	Nominal Current Rating in Amps					
	.25	.5	1	3	5	10
1mH	*	*	*	*	CMT1MGX	CMT1MHX
2.5mH	*	*	*	CMT2R5MFX	CMT2R5MGX	CMT2R5MHX
5mH	*	CMT5MCX	CMT5MDX	CMT5MFX	**	**
7.5mH	*	CMT7R5MCX	CMT7R5MDX	CMT7R5MFX	**	**
10mh	CMP10MBX	CMT10MCX	CMT10MDX	**	**	**
25mh	CMP25MBX	**	**	**	**	**

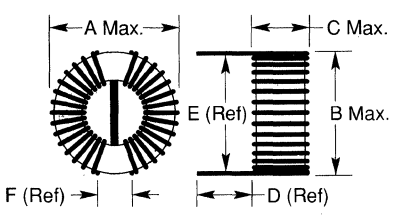
*See CMP series **Call factory

Style "U" Open (Vertical P.C. Board Mount)



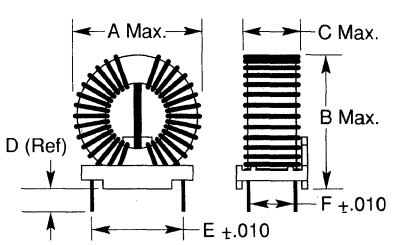
Size	CME	CMM	CMP	CMT
A	.700	1.100	1.500	1.750
B	.700	1.100	1.500	1.750
C	.400	.450	.675	.700
D	.187	.187	.187	.187
E	.300	.360	.400	.400
F	.400	.400	.600	.600

Style "H" Open (Horizontal P.C. Board Mount)



Size	CME	CMM	CMP	CMT
A	.700	1.100	1.500	1.750
B	.700	1.100	1.500	1.750
C	.400	.450	.675	.700
D	.187	.187	.187	.187
E	.600	1.000	1.000	1.600
F	.300	.300	.400	.400

Style "T" Four Pin Mount with Header



Size	CME	CMM	CMP	CMT
A	.765	1.100	1.500	1.750
B	.875	1.275	1.560	1.800
C	.440	.440	.650	.850
D	.187	.187	.187	.187
E	.600	.600	.800	.900
F	.250	.250	.400	.600

Note: Inductance tolerance is ± 20%; Dimensions are in inches

Standex Electronics

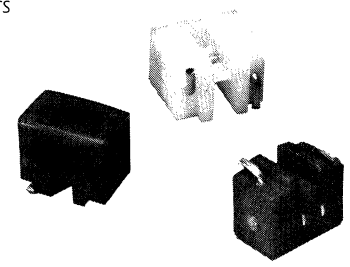
Custom inductors and transformers are standard at Standex Electronics. Please call or write with any questions or requirement you may have.

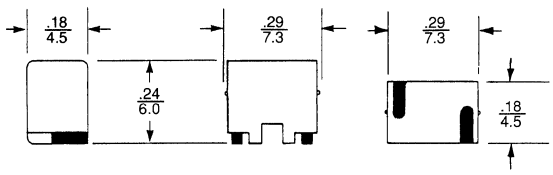
a Standex company
4538 Camberwell Road, Cincinnati, OH 45209
513/871-3777 • FAX: 513/871-3779 • INTERNET: http://www.stdxelec.com • EMAIL: standex@stdxelec.com

Standex Fixed RF Inductors

Series 166 & 168
Surface Mount Inductors

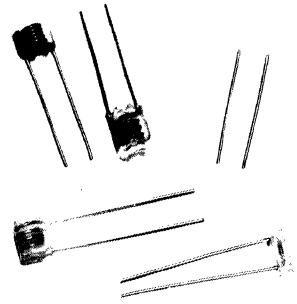
- Higher "Q" than other surface mount Inductors
- Very tight inductance tolerances
- May be packaged "Tape & Reel" or bulk
- Samples available "Off the Shelf"

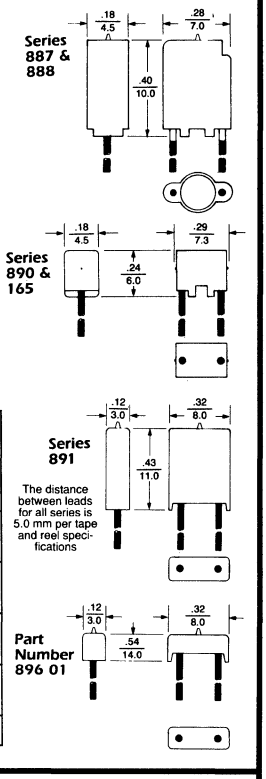




Series	Inductance Range	Q	Test Freq
166	3.5nH to 6.1nH (4 values)	155-170	270
168	16nH to 84nH (6 values)	105-130	100 to 150 MHz

Series 887, 888, 890, 891 & 896
Supplied "Tape and Reel" or "Fan Fold" for Automatic Insertion



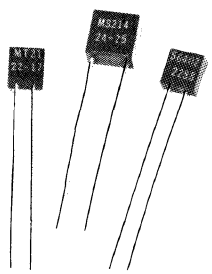


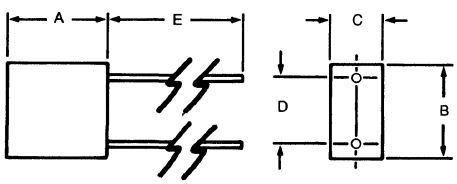
Series	Inductance Range	Q	Test Freq
887	15nH to 115nH (10 values)	100 to 105	100 to 150 MHz
888	15nH to 35nH (4 values)	100 to 115	100 to 150 MHz
165	3.5nH to 6.1nH (4 values)	155 to 170	270 MHz
890	16nH to 84nH (6 values)	105 to 130	100 to 150 MHz
891	9.5nH to17.1nH (8 values)	155 to 180	270 MHz
896	P.C. Board Jumper		

Series MT Toroidal Inductors

	MT2122 &23	MT2124
A	.215/5.46	.285/7.24
B	.20/5.1	.27/6.9
C	.10/2.5	.15/3.8
D	.10/2.5	.20/5.1
E	1.0/25.4	1.0/25.4
Leads	#24	#22

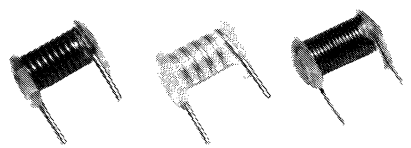
inches/millimeters

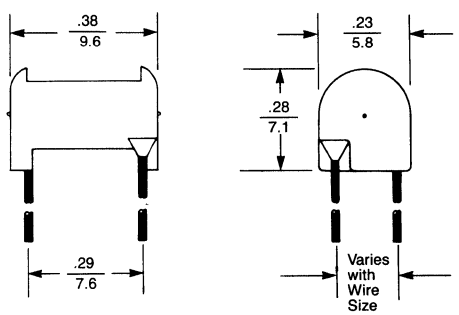




Series	Inductance Range	Q	Max Current
MT2123	.01µH to 1.0µH (25 values)	60 to 80	700 to 3000mA
MT2122	.10µH to 10µH (25 values)	55 to 70	280 to 2200 mA
MT2124	10µH to 1000µH (25 values)	45 to 80	110 to 550 mA

Series LM2





Inductance Range		Q at 7.9 to 50 MHz	
No Core	With Core	No Core	With Core
.0264µH to 660µH ±5% (26 values)	.69µH to 1.74µH ±10% (9 values)	80 to 100	40 to 55

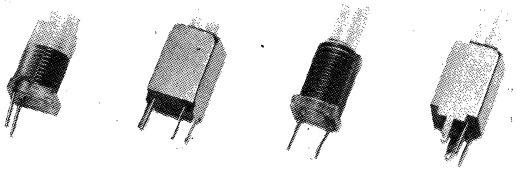
Standex Electronics

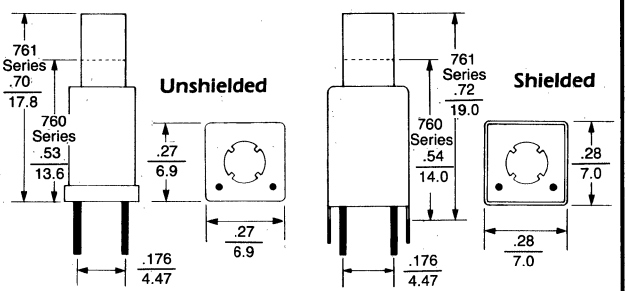
Custom inductors and transformers are standard at Standex Electronics. Please call or write with any questions or requirement you may have.

a Standex company
4538 Camberwell Road, Cincinnati, OH 45209
513/871-3777 • FAX: 513/871-3779 • INTERNET: http://www.stdxelec.com • EMAIL: standex@stdxelec.com

Standex 7mm & 10mm Molded Variable RF Inductors

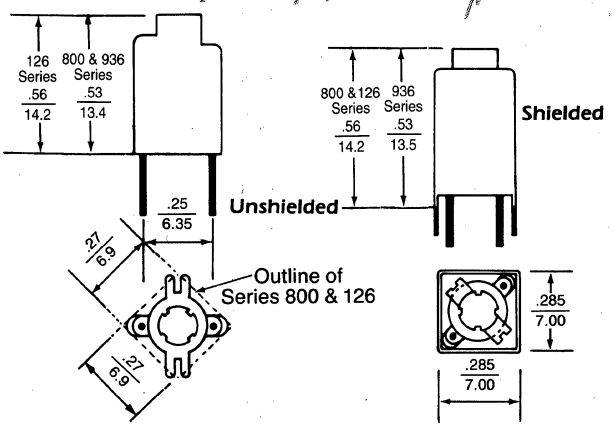
Series 760 and 761 — 7mm Coils





Series	Unshielded Inductance Range	Unshielded Q at 40MHz	Shielded Inductance Range	Shielded Q at 40MHz	Core
760	.064µH to .874µH	70 to 93	.059µH to .433µH	54 to 74	6-32
761	.062µH to .414µH	108 to 128	.056µH to .209µH	66 to 75	6-32

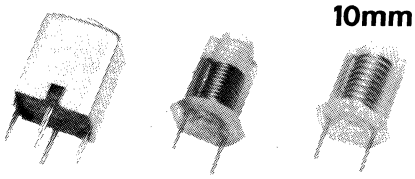
Series 800, 936 and 126 — 7mm Coils

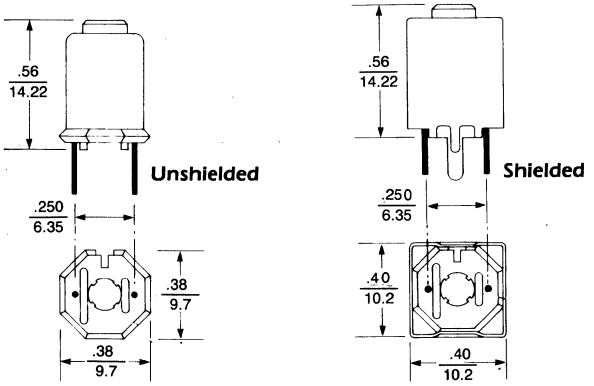


Series	Unshielded Inductance Range	Unshielded Q at 40MHz	Shielded Inductance Range	Shielded Q at 40MHz	Core
800	.069µH to .70µH	86 to 106	.063µH to .385µH	61 to 73	6-32
936 & 126	.051µH to .400µH	97 to 132	.048µH to .207µH	69 to 77	6-32

Series 936 & 126 are tapable

Series 925 and 926 — 7mm Coils with 10mm Shield Cans

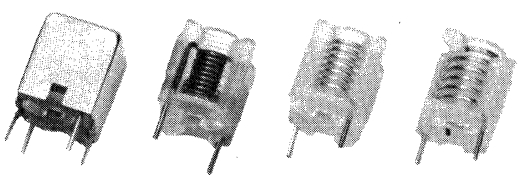


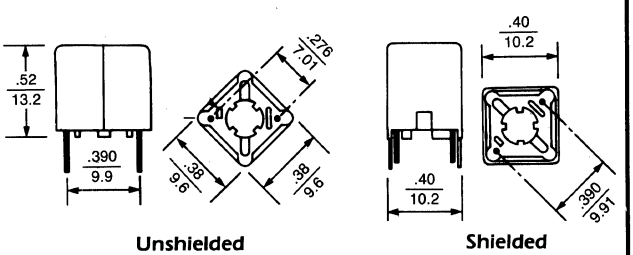


Series	Unshielded Inductance Range	Unshielded Q at 40MHz	Shielded Inductance Range	Shielded Q at 40MHz	Core
925	.069µH to .920µH	77 to 100	.067µH to .700µH	68 to 90	6-32
926	.052µH to .440µH	98 to 132	.051µH to .334µH	90 to 110	6-32

Series 926 is tapable

Series 957, 956 and 910 — 10mm Coils





Series	Unshielded Inductance Range	Unshielded Q at 40MHz	Shielded Inductance Range	Shielded Q at 40MHz	Core
910	.057µH to .268µH	111 to 156	.053µH to .172µH	86 to 101	10-32
956	.059µH to .380µH	107 to 159	.055µH to .234µH	87 to 102	10-32
957	.086µH to .885µH	97 to 123	.077µH to .501µH	68 to 90	10-32

Series 910 is tapable

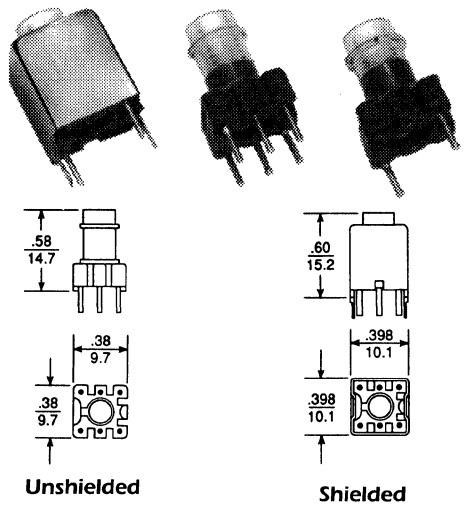
Standex Electronics

Custom inductors and transformers are standard at Standex Electronics. Please call or write with any questions or requirement you may have.

a Standex company
4538 Camberwell Road, Cincinnati, OH 45209
513/871-3777 • FAX: 513/871-3779 • INTERNET: http://www.stdxelec.com • EMAIL: standex@stdxelec.com

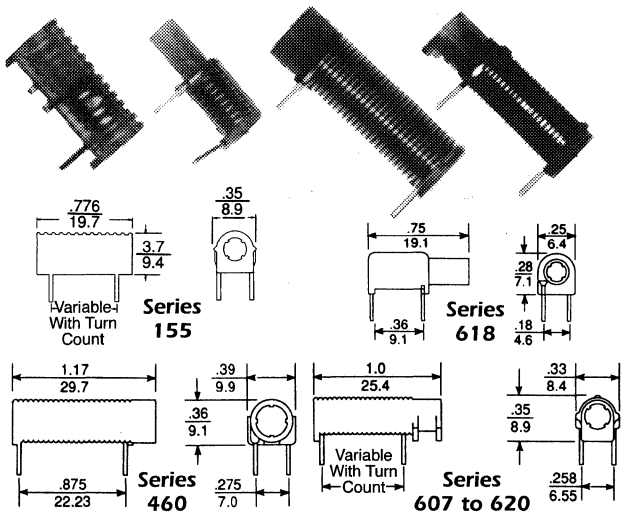
Standex Variable RF Inductors

Series 950 10mm Higher Inductance Coils



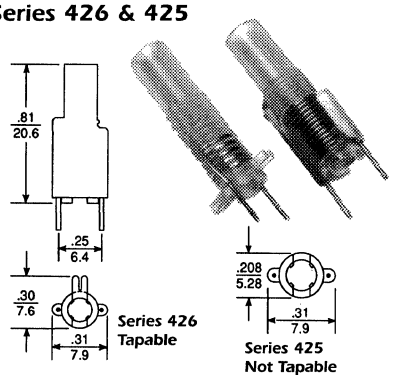
Unshielded		Shielded		Core
Inductance Range	Q at 7.9 to 25MHz	Inductance Range	Q at 7.9 to 25MHz	
.11µH to 9.45µH	43 to 68	.11µH to 6.93µH	.042µH to .58µH	10-32

Series 618, 607 to 620, 460, and 155



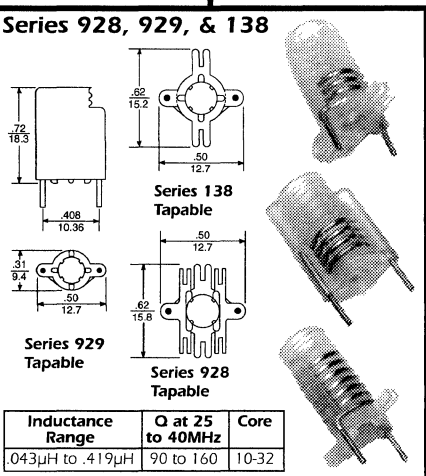
Series	Inductance Range	Q at 7.9 to 150MHz	Core
618	.023µH to .991µH	51 to 180	6-32
607-620	.138µH to 1.475µH	135 to 183	10-32
460	1.52µH to 3.45µH	95 to 125	¼ x 28
155	.030µH to .336µH	118 to 160	10-32

Series 426 & 425



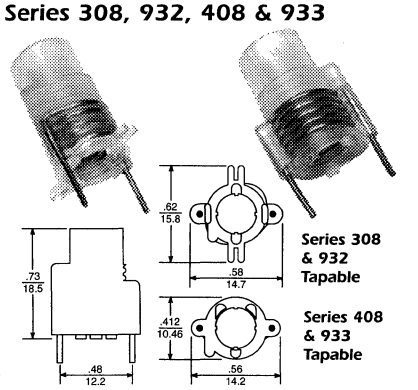
Series	Inductance Range	Q at 7.9 to 125MHz	Core
425	.054µH to 1.18µH	71 to 119	6-32
426	.0216µH to .4568µH	62 to 190	6-32

Series 928, 929, & 138



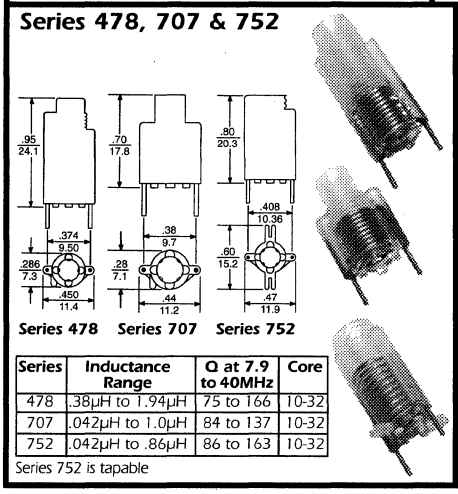
Inductance Range	Q at 25 to 40MHz	Core
.043µH to .419µH	90 to 160	10-32

Series 308, 932, 408 & 933



Series	Inductance Range	Q at 40MHz	Core
308 & 408	.046µH to .480µH	113 to 214	10-32
932 & 933	.045µH to .610µH	108 to 217	1/4" x 28

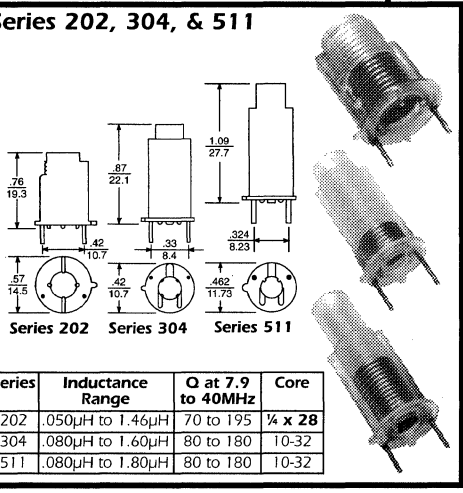
Series 478, 707 & 752



Series	Inductance Range	Q at 7.9 to 40MHz	Core
478	.38µH to 1.94µH	75 to 166	10-32
707	.042µH to 1.0µH	84 to 137	10-32
752	.042µH to .86µH	86 to 163	10-32

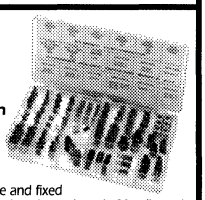
Series 752 is tapable

Series 202, 304, & 511



Series	Inductance Range	Q at 7.9 to 40MHz	Core
202	.050µH to 1.46µH	70 to 195	¼ x 28
304	.080µH to 1.60µH	80 to 180	10-32
511	.080µH to 1.80µH	80 to 180	10-32

Free* Sample Kits



***The sample kit cost of $100.00 will be credited on your first order of $500.00 or more.**

Standard RF Coil Kit (pictured) contains an assortment of most variable and fixed RF inductors in Standex's catalog. Approximately 80 coils total.

Surface Mount Designer's Kit contains 5 pieces each of each turn count available of Series 166 and 168. Approximately 50 coils total.

Thru hole Fixed and Variable Coil Designers Kits

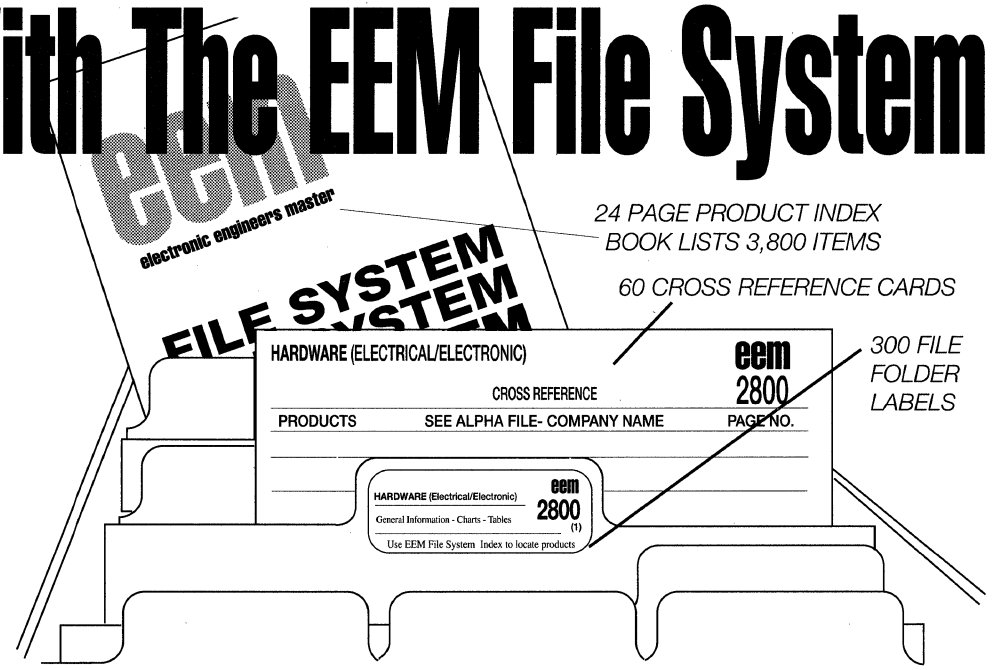
- **7 mm Kit** contains 3 pieces each of most turn counts of Series 800, 936, 126, 760 & 761. Approximately 75 coils total.
- **10 mm Kit** contains 3 pieces each of most turn counts of Series 910, 956 and 957. Approximately 75 coils total.
- **925/926 Kit** (7mm windings in 10 mm shields) contains 3 pieces each of most turn counts of Series 925 & 926. Approximately 72 coils total.
- **618 Kit** (Horizontal coils) contains 3 pieces each of most turn counts of Series 618. Approximately 48 coils total.
- **LM2 Kit** contains 3 pieces each of most turn counts of Series LM2 (without cores). Approximately 60 coils total.
- **Tape and Reel Kit** contains 5 pieces each of most turn counts available or Series 887, 888, 890, 891 & 896. Approximately 145 coils total.

Standex Electronics

Custom inductors and transformers are standard at Standex Electronics. Please call or write with any questions or requirement you may have.

a Standex company 4538 Camberwell Road, Cincinnati, OH 45209
513/871-3777 • FAX: 513/871-3779 • INTERNET: http://www.stdxelec.com • EMAIL: standex@stdxelec.com

Organize Your Files... With The EEM File System!



The EEM File System was developed 35 years ago to help you organize your catalog files the EEM way. The EEM File System follows the EEM cataloging system that organizes all electronic product information by the four-digit EEM Product Section Number. It puts an end to catalog clutter and filing frustration.

The EEM File System comes in one neat package:

Product Index Book - Tells you where to file information on each and every type of electronic product by generic product name and EEM Product Section Number.

300 File Folder Labels - Pressure sensitive labels are pre-printed with product names and EEM Product Section Number. You apply the labels to as many, or as few, file folders as you choose.

60 Cross Reference Cards - You'll never lose track of where you filed a catalog from a multi-product manufacturer.

With the EEM File System you can get organized and stay organized. You'll save countless hours of searching for elusive catalogs and data sheets. You'll be able to quickly find the catalog you need when you need it. The EEM File System is in everyday use in thousands of engineering and purchasing departments around the world. This proven, time-saving system belongs in your department!

The EEM File System is very affordable and easy to order...

- **Charge it to your VISA or MasterCard by calling toll-free 1-800-833-7138.**
- **Or, mail your purchase order and check for US $30.00 plus local sales tax* to:**

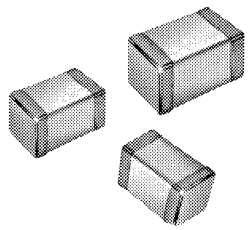
EEM/Hearst Business Publishing
645 Stewart Avenue
Garden City, NY 11530
Att: Marie Botta
(516) 227-1300 •FAX (516) 227-1453

*Add sales tax in CA,IL,MA,NJ,NY,PA and GST tax in Canada.

Pre-payment in U.S. dollars required for orders shipped outside the USA. Add $10 per set for foreign delivery.

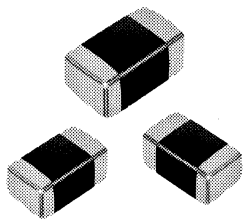
Inductors, Chokes & EMC Components

HK series – Chip Inductors for High Frequency



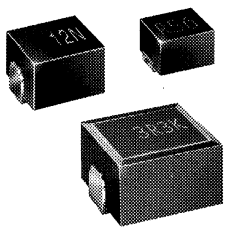
- Multilayer ceramic chip inductors for applications above 100 Mhz.
- Case sizes: 0402, 0603, 0805
- Inductance range: 1.5 nH~470 nH
- Tolerances: ±0.3nH, 5%, 10%

LK series – Multilayer Chip Inductors



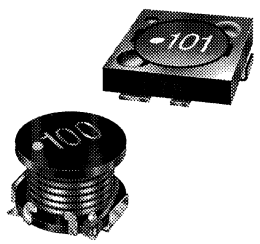
- Multilayer, general purpose inductors
- Case sizes: 0603, 0805, 1206
- Inductance range: 0.047µH~33µH
- Tolerances: 5%, 10%
- Rated current: 5mA~300mA

LEM series – Wire Wound Chip Inductors



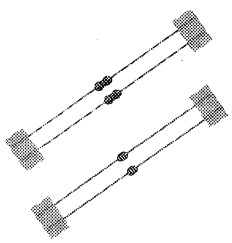
- Heat resistant resin coating
- Case sizes: 1008, 1210, 1812
- Inductance range: 10 nH~220µH
- Tolerances: 5%, 10%, 20%
- LEMC2520 high current version available

N06/N08 series – High Current SMD Inductors



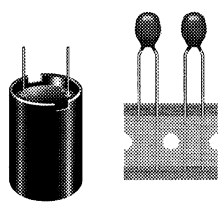
- NP06 shielded type also available
- Max. height (mm): 06 type: 3.2, 08 type: 6.0
- Inductance range: 1.0µH~1000µH
- Tolerances: 10%, 20%
- Rated current up to 4A

LAL series – Axial lead Inductors



- 4 Sizes (LAL02, LAL03, LAL04, LAL05)
- Inductance range: 0.22µH~1000µH
- Tolerances: 5%, 10%, 20%
- Rated current up to 1.5A (LAL05 series)

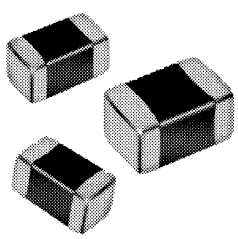
LHL series – Radial Lead Inductors



- 5 Sizes (LHL06, 08, 10, 13, and 16)
- Inductance range: 1.0µH~10,000µH
- Tolerances: 5%, 10%, 20%
- Rated current up to 4.5A (LHL 13/16 series)

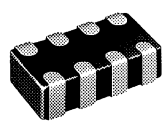
EMC Components

BK series – Multilayer Ferrite Chip Beads



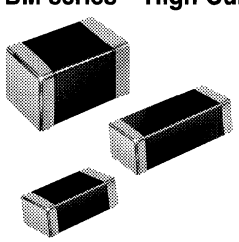
- 4 material types for EMI suppression in various applications.
- Case sizes: 0402, 0603, 0805
- Impedance range: 15Ω~2500Ω
- Rated current: 50mA~1000mA

BK3216 series – Multilayer Ferrite Chip Bead Array



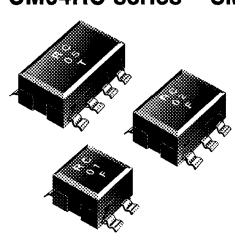
- 1206 case size with 2 material types
- Impedance range: 60Ω~1000Ω
- Rated current: 50mA~200mA
- 4 lines can be covered with one chip; same pitch (0.8 mm) as other array components

FBM series – High Current Ferrite Chip Beads



- 2 material types for EMI suppression in various applications
- Case sizes: 0805/1206/1210/ 1806/1810/1812
- Impedance range: 33Ω~1600Ω
- Rated current: 2A~4A

CM04RC series – SMD Common Mode Chokes



- 2, 3, and 4 line versions in a low profile, light weight package
- Impedance range: 270Ω~1000Ω
- Rated current: 0.2A~3A, 50 V (DC)
- Available in tape & reel packaging

TAIYO YUDEN *(USA), INC.*

E-mail: TYUSA@T-Yuden.com
http://www.T-YUDEN.com

Midwestern/Eastern (Chicago) 800-348-2496
Southwestern (San Diego) 800-258-2496
Northwestern (Silicon Valley) 800-368-2496

CA SERIES

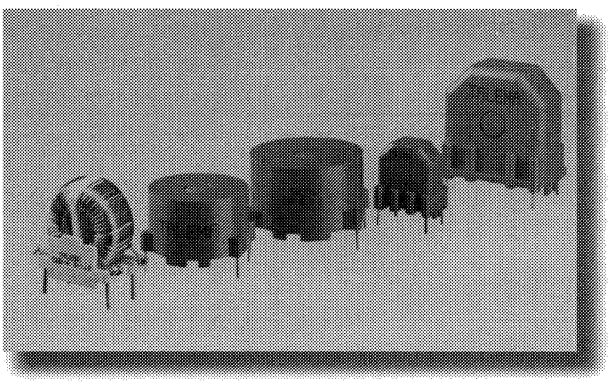
TECHNICAL INFORMATION

Common Mode Toroidal Chokes

CA Series common mode toroidal chokes provide an efficient means of filtering supply lines having in-phase signals of equal amplitude thus allowing equipment to meet stringent electrical radiation specifications. Wide frequency ranges can be filtered by using high and low inductance Common Mode toroids in series. Differential mode signals can be attenuated substantially when used together with input and output capacitors.

FEATURES

- Separated windings for minimum capacitance
- Meets requirements of IEC, VDE and CSA
- UL94, VO recognized materials
- Fully encapsulated styles available meeting class GFK (-40°C to + 125°C, humidity class F) per DIN 40040
- 1500 VAC, 50 Hz withstanding voltage for 60 seconds minimum
- Competitive pricing due to high volume production
- Manufactured in ISO-9000 approved facility



APPLICATIONS

- Power Line Filtering
- EMI/RFI Suppression in Switch Mode Power Supplies
- EMI/RFI Suppression

ELECTRICAL SPECS. AT 25°C

Part Number	I_{DC} Amp	Lo(mH) ±30% (2x) mH Min.	DCR mOhm (2x)	Mtg. Style Size B	V	F
CA__-0.4-100	0.4	100	2,807	3	3	3
CA__-0.5-100	0.5	100	2,044	5	4	4
CA__-0.6-100	0.6	100	1,543	5	4A	6
CA__-1.4-100	1.4	100	484	8	9	9
CA__-0.4-82	0.4	82	1,167	3	3	3
CA__-0.5-82	0.5	82	1,851	5	4	4
CA__-0.6-82	0.6	82	1,397	5	4A	6
CA__-1.6-82	1.6	82	350	8	9	9
CA__-0.3-68	0.3	68	3,692	3	2	2
CA__-0.5-68	0.5	68	1,853	3	3	3
CA__-0.6-68	0.6	68	1,353	5	4	4
CA__-0.7-68	0.7	68	1,108	5	4A	6
CA__-1.8-68	1.8	68	277	8	9	9
CA__-0.3-56	0.3	56	3,126	3	2	2
CA__-0.5-56	0.5	56	1,518	3	3	3
CA__-0.6-56	0.6	56	1,378	5	4	4
CA__-0.8-56	0.8	56	807	5	4A	6
CA__-2.0-56	2.0	56	228	8	9	9
CA__-0.4-47	0.4	47	1,942	3	2	2
CA__-0.5-47	0.5	47	1,390	3	3	3
CA__-0.6-47	0.6	47	1,001	5	4	4
CA__-0.9-47	0.9	47	658	5	4A	6
CA__-2.2-47	2.2	47	185	8	9	9
CA__-0.4-39	0.4	39	1,769	3	2	2
CA__-0.5-39	0.5	39	1,267	3	3	3
CA__-0.6-39	0.6	39	912	5	4	4
CA__-1.0-39	1.0	39	537	5	4A	6
CA__-2.5-39	2.5	39	150	8	9	9
CA__-0.4-33	0.4	33	1,628	3	2	2
CA__-0.6-33	0.6	33	837	3	3	3
CA__-0.7-33	0.7	33	751	5	4	4
CA__-1.1-33	1.1	33	434	5	5	6
CA__-2.7-33	2.7	33	124	8	9	9

Part Number	I_{DC} Amp	Lo(mH) ±30% (2x) mH Min.	DCR mOhm (2x)	Mtg. Style Size B	V	F
CA__-0.5-27	0.5	27	1,179	3	2	2
CA__-0.8-27	0.8	27	674	3	3	3
CA__-1.0-27	1.0	27	537	5	4	4
CA__-1.4-27	1.4	27	279	5	4A	6
CA__-3.2-27	3.2	27	87	8	9	9
CA__-0.5-22	0.5	22	960	3	2	2
CA__-0.9-22	0.9	22	542	3	3	3
CA__-1.0-22	1.0	22	485	5	4	4
CA__-1.5-22	1.5	22	227	5	4A	6
CA__-3.6-22	3.6	22	70	8	9	9
CA__-0.6-18	0.6	18	868	3	2	2
CA__-1.0-18	1.0	18	439	3	3	3
CA__-1.1-18	1.1	18	388	5	4	4
CA__-1.6-18	1.6	18	205	5	4A	6
CA__-3.9-18	3.9	18	57	8	9	9
CA__-0.6-15	0.6	15	793	3	2	2
CA__-1.0-15	1.0	15	401	3	3	3
CA__-1.2-15	1.2	15	315	5	4	4
CA__-1.8-15	1.8	15	167	5	4A	6
CA__-4.3-15	4.3	15	47	8	9	9
CA__-0.7-12	0.7	12	709	3	2	2
CA__-1.1-12	1.1	12	358	3	3	3
CA__-1.4-12	1.4	12	253	5	4	4
CA__-1.9-12	1.9	12	149	5	4A	6
CA__-4.9-12	4.9	12	37	8	9	9
CA__-0.7-10	0.7	10	647	3	2	2
CA__-1.2-10	1.2	10	285	3	3	3
CA__-1.6-10	1.6	10	203	5	4	4
CA__-2.0-10	2.0	10	136	5	4	4
CA__-5.0-10	5.0	10	34	8	9	9
CA__-1.1-6.8	1.1	6.8	342	3	2	2
CA__-1.3-6.8	1.3	6.8	235	3	3	3
CA__-2.0-6.8	2.0	6.8	148	5	4	4
CA__-2.6-6.8	2.6	6.8	79	5	4A	6
CA__-5.5-6.8	5.5	6.8	28	8	9	9

Part Number	I_{DC} Amp	Lo(mH) ±30% (2x) mH Min.	DCR mOhm (2x)	Mtg. Style Size B	V	F
CA__-1.2-5.6	1.2	5.6	276	3	2	2
CA__-1.5-5.6	1.5	5.6	193	3	3	3
CA__-2.0-5.6	2.0	5.6	120	5	4	4
CA__-2.8-5.6	2.8	5.6	72	5	4A	6
CA__-5.9-5.6	5.9	5.6	26	8	9	9
CA__-1.2-4.7	1.2	4.7	253	3	2	2
CA__-1.6-4.7	1.6	4.7	110	3	3	3
CA__-1.9-4.7	1.9	4.7	99	5	4	4
CA__-3.0-4.7	3.0	4.7	58	5	5	6
CA__-6.2-4.7	6.2	4.7	23	8	9	9
CA__-1.3-3.9	1.3	3.9	230	3	2	2
CA__-1.8-3.9	1.8	3.9	100	3	3	3
CA__-2.1-3.9	2.1	3.9	81	5	4	4
CA__-3.5-3.9	3.5	3.9	42	5	5	6
CA__-6.8-3.9	6.8	3.9	19	8	9	9
CA__-1.5-3.3	1.5	3.3	165	3	2	2
CA__-2.0-3.3	2.0	3.3	92	3	3	3
CA__-3.0-3.3	3.0	3.3	52	5	4	4
CA__-4.0-3.3	4.0	3.3	34	5	5	6
CA__-7.5-3.3	7.5	3.3	16	8	9	9
CA__-1.5-2.7	1.5	2.7	172	3	2	2
CA__-2.2-2.7	2.2	2.7	83	3	3	3
CA__-3.5-2,7	3.5	2.7	47	5	4	4
CA__-4.8-2.7	4.8	2.7	22	5	5	6
CA__-7.8-2.7	7.8	2.7	14	8	9	9
CA__-1.6-2.2	1.6	2.2	135	3	2	2
CA__-2.3-2.2	2.3	2.2	75	3	3	3
CA__-4.0-2.2	4.0	2.2	30	5	4	4
CA__-5.8-2.2	5.8	2.2	16	5	5	6
CA__-8.2-2.2	8.2	2.2	13	8	9	9
CA__-1.6-1.8	1.6	1.8	111	3	2	2
CA__-2.5-1.8	2.5	1.8	60	3	3	3
CA__-4.5-1.8	4.5	1.8	27	5	4	4
CA__-6.0-1.8	6.0	1.8	14	5	5	6
CA__-8.7-1.8	8.7	1.8	12	8	9	9

Talema's engineering staff can assist in the design of other inductance values and sizes.

talema electronic • 573-265-5500

TECHNICAL INFORMATION

CA SERIES

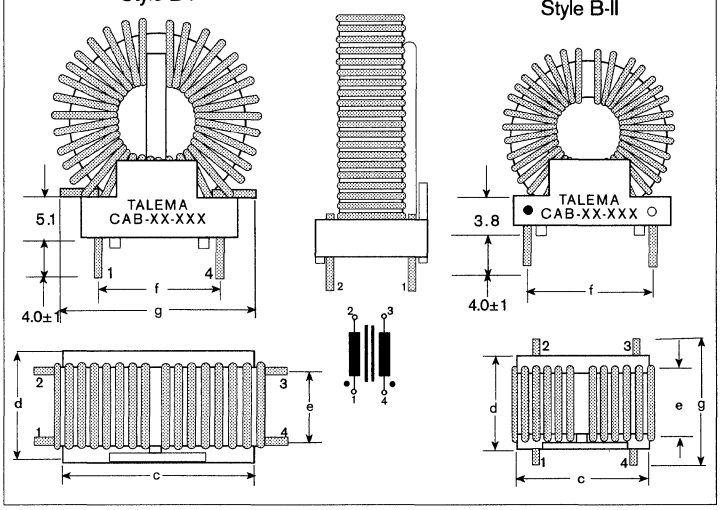
Common Mode Toroidal Chokes

Part Number	I_{DC} Amp	Lo(mH) ±30% (2x) mH Min.	DCR mOhm (2x)	Mtg. Style Size B	V	F
CA__-1.8-1.5	1.8	1.5	89	3	2	2
CA__-2.8-1.5	2.8	1.5	49	3	3	3
CA__-5.0-1.5	5.0	1.5	22	5	4	4
CA__-7.0-1.5	7.0	1.5	11	5	5	6
CA__-9.1-1.5	9.1	1.5	11	8	9	9
CA__-1.9-1.2	1.9	1.2	71	3	2	2
CA__-3.1-1.2	3.1	1.2	44	3	3	3
CA__-5.0-1.2	5.0	1.2	20	5	4	4
CA__-7.5-1.2	7.5	1.2	10	5	5	6
CA__-9.6-1.2	9.6	1.2	10	8	9	9
CA__-2.0-1.0	2.0	1.0	65	3	2	2
CA__-3.5-1.0	3.5	1.0	32	3	3	3
CA__-5.0-1.0	5.0	1.0	18	5	4	4
CA__-7.8-1.0	7.8	1.0	9	5	5	6
CA__-10-1.0	10	1.0	9	8	9	9

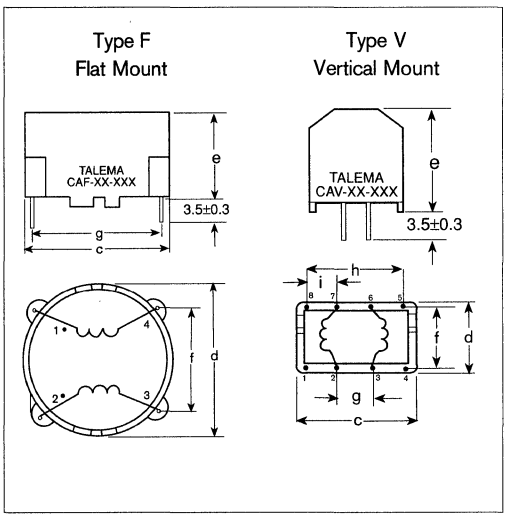
Part Number	I_{DC} Amp	Lo(mH) ±30% (2x) mH Min.	DCR mOhm (2x)	Mtg. Style Size B	V	F
CA__-2.8-0.68	2.8	0.68	37	3	2	2
CA__-4.2-0.68	4.2	0.68	21	3	3	3
CA__-6.0-0.68	6.0	0.68	13	5	4	4
CA__-8.5-0.68	8.5	0.68	7	5	5	6
CA__-11-0.68	11	0.68	7	8	9	9
CA__-3.6-0.47	3.6	0.47	28	3	2	2
CA__-6.0-0.47	6.0	0.47	11	3	3	3
CA__-7.0-0.47	7.0	0.47	10	5	4	4
CA__-9.5-0.47	9.5	0.47	6	5	5	6
CA__-12-0.47	12	0.47	6	8	9	9
CA__-3.2-0.33	3.2	0.33	17	3	2	2
CA__-6.1-0.33	6.1	0.33	7	3	3	3
CA__-7.2-0.33	7.2	0.33	7	5	4	4
CA__-10-0.33	10	0.33	5	5	5	6
CA__-13-0.3	13	0.33	5	8	9	9

Part Number	I_{DC} Amp	Lo(mH) ±30% (2x) mH Min.	DCR mOhm (2x)	Mtg. Style Size B	V	F
CA__-3.7-0.22	3.7	0.22	12	3	2	2
CA__-7.6-0.22	7.6	0.22	5	3	3	3
CA__-8.9-0.22	8.9	0.22	4	5	4	4
CA__-11.5-0.22	11.5	0.22	4	5	5	6
CA__-14-0.22	14	0.22	4	8	9	9
CA__-4.6-0.15	4.6	0.15	8	3	2	2
CA__-9.3-0.15	9.3	0.15	3	3	3	3
CA__-10-0.15	10	0.15	3	5	4	4
CA__-12.5-0.15	12.5	0.15	3	5	5	6
CA__-16-0.15	16	0.15	3	8	9	9
CA__-5.7-0.10	5.7	0.10	5	3	2	2
CA__-10-0.10	10	0.10	2	3	3	3
CA__-12-0.10	12	0.10	2	5	4	4
CA__-13.5-0.10	13.5	0.10	3	5	5	6
CA__-17-0.10	17	0.10	3	8	9	9

Type B-Base Mount



MOUNTING STYLE



Mounting Style		Size Code	Dimensions Nominal (mm) c	d	e	f	g	h	i	Pin Ø
Base Mount	"B-II"	3	19.1	10.8	6.4	15.2	15.9	—	—	1.02
	"B-I"	5	25.4	15.2	10.2	20.3	34.3	—	—	1.27
		8	27.9	20.3	15.2	22.9	36.8	—	—	1.27
Vertical Mount	"V"	2	17.8	12.8	20.0	10.0	5.0	15.0	5.0	0.60x0.88
		3	23.0	15.5	25.0	12.5	10.0	20.0	5.0	0.60x0.88
		4	27.0	18.0	30.0	15.0	12.5	22.5	5.0	0.60x0.88
		4A	32.5	18.0	35.0	15.0	12.5	—	—	0.60x0.88
		5	32.0	20.5	35.0	17.5	12.5	27.5	7.5	0.75x1.10
		6	32.0	23.0	35.0	20.0	12.5	27.5	7.5	0.75x1.10
		8	37.0	25.5	40.0	22.5	15.0	30.0	7.5	0.75x1.10
		9	43.0	28.0	47.5	25.0	25.0	40.0	7.5	0.75x1.10
Flat Mount	"F"	2	17.5	17.0	12.5	10.0	15.0	—	—	0.60x0.88
		3	22.5	22.0	15.0	12.5	20.0	—	—	0.60x0.88
		4	27.5	27.0	17.5	15.0	25.0	—	—	0.60x0.88
		6	32.5	32.0	20.0	20.0	30.0	—	—	0.75x1.10
		9	42.5	42.0	28.5	25.0	35.0	—	—	0.75x1.10

ORDERING KEY

CA B - 0.5 - 10mH

- 10mH — Inductance Value per Winding
- 0.5 — Current Rating (Amps)
- B — Mounting Style
  - B=Base Mount
  - V=Vertical Encapsulated
  - F=Flat Encapsulated
- CA — Basic Series Designation

NOTES

1) Inductance measured at 25°C±5°C and 10kHz.
   L < 2mH test level <2.5mA
   L > 2mH test level <250mV
2) Inductance loss <10% by DC preload with I_N (current compensated).
3) DC Resistance measured at 25°C±5°C.
4) Test voltage per VDE 0565/2
5) 250 VAC Nominal Operating Voltage
6) Maximum Ambient Temperature: 60°C

#3 Industrial Park Drive
P.O. Box 306
St. James, Missouri 65559
573-265-5500
E-Mail: talema@talema.com
FAX: 573-265-3350
http://www.talema.com

talema electronic • 573-265-5500

TECHNICAL INFORMATION

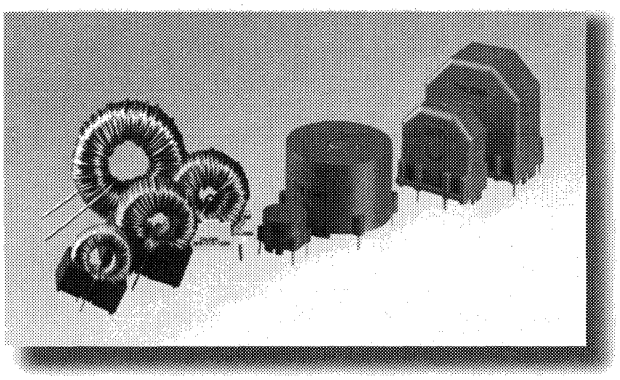
DP SERIES

Low Cost Power Inductors

DP Series Power Inductors provide an excellent, low cost alternative to conventional chokes or inductors. Used in EMI filtering and energy storage, these compact, low radiation inductors are extremely effective in controlling AC output ripple of Switch Mode Power Supplies.

FEATURES

- Broad range of inductance values and current ratings
- Low cost, no radiation design
- Compact size, for high density packaging
- Hot Solder, pre-tinned leads for easy PC board mounting
- UL94, VO recognized materials
- Operating frequency to 200kHz
- Competitive pricing due to high volume production
- Manufactured in ISO-9000 approved facility



APPLICATIONS

- Switching Power Supplies
- EMI/RFI filtering
- Output Chokes

ELECTRICAL SPECIFICATIONS AT 25°C

Part Number	I_{DC} (Amps)	L(µH)Min. @Rated Current	Lo(µH) +15/-8% No Load	DCR Ohms (Max.)	Min. Energy Storage (µJ)*	Wire Dia. (mm)	Coil Size mm O.D. x Ht.	Mounting Style Availability/Size C	B	V	F
DP__-0.5-47	0.5	47	50	0.095	5.9	0.400	14x8	2	3	2	2
DP__-0.5-68	0.5	68	73	0.115	8.5	0.400	14x8	2	3	2	2
DP__-0.5-100	0.5	100	109	0.140	12.5	0.400	14x8	2	3	2	2
DP__-0.5-150	0.5	150	167	0.173	18.8	0.400	15x8	2	3	2	2
DP__-0.5-220	0.5	220	258	0.215	27.5	0.400	15x9	2	3	2	2
DP__-0.5-330	0.5	330	393	0.265	41.3	0.400	15x9	2	3	2	2
DP__-0.5-470	0.5	470	557	0.322	58.8	0.400	20x9	3	3	3	3
DP__-0.5-680	0.5	680	849	0.398	85	0.400	20x10	3	3	3	3
DP__-0.5-1000	0.5	1000	1358	0.503	125	0.400	21x11	3	5	4	3
DP__-0.5-1500	0.5	1500	1863	0.714	188	0.400	25x12	5	5	4	4
DP__-0.5-2200	0.5	2200	3131	0.926	275	0.400	25x12	5	5	4	4
DP__-0.5-3300	0.5	3300	5024	1.173	413	0.400	26x13	5	5	5	6
DP__-0.5-4700	0.5	4700	6287	1.421	588	0.400	32x15	5	8	5	6
DP__-1.0-22	1.0	22	23	0.041	11.0	0.500	14x8	2	3	2	2
DP__-1.0-33	1.0	33	37	0.052	16.5	0.500	14x8	2	3	2	2
DP__-1.0-47	1.0	47	53	0.063	23.5	0.500	14x8	2	3	2	2
DP__-1.0-68	1.0	68	80	0.077	34	0.500	14x8	2	3	2	2
DP__-1.0-100	1.0	100	127	0.097	50	0.500	15x8	2	3	2	2
DP__-1.0-150	1.0	150	207	0.123	75	0.500	15x9	2	3	3	2
DP__-1.0-220	1.0	220	345	0.196	110	0.450	15x9	2	3	3	2
DP__-1.0-330	1.0	330	491	0.193	165	0.500	20x9	3	3	3	3
DP__-1.0-470	1.0	470	601	0.180	235	0.600	27x12	5	5	5	6
DP__-1.0-680	1.0	680	891	0.220	340	0.600	27x13	5	5	5	6
DP__-1.0-1000	1.0	1000	1619	0.426	500	0.500	26x13	4	5	5	6
DP__-1.0-1500	1.0	1500	2149	0.532	750	0.500	30x14	5	5	5	6
DP__-1.0-2200	1.0	2200	3609	0.689	1100	0.500	31x15	5	5	6	6
DP__-1.0-3300	1.0	3300	4731	0.609	1650	0.600	43x15	—	8	—	—

NOTES

The µJoule rating ($0.5 \times LI^2$) is the ability of the inductor to store energy.

Inductance is measured at 0.10V AC @ 10kHz.

talema

#3 Industrial Park Drive
P.O. Box 306
St. James, Missouri 65559
573-265-5500
E-Mail: talema@talema.com
FAX: 573-265-3350
http://www.talema.com

talema electronic • 573-265-5500

TECHNICAL INFORMATION

DP SERIES

Low Cost Power Inductors

Part Number	I_{DC} (Amps)	L(µH)Min. @Rated Current	Lo(µH) +15/-8% No Load	DCR Ohms (Max.)	Min. Energy Storage (µJ)*	Wire Dia. (mm)	Coil Size mm O.D. x Ht.	Mounting Style Availability/Size C	B	V	F
DP__-2.0-22	2.0	22	27	0.070	44	0.400	14x8	2	3	2	2
DP__-2.0-33	2.0	33	45	0.089	66	0.400	14x8	2	3	2	2
DP__-2.0-47	2.0	47	73	0.090	94	0.450	15x8	2	3	2	2
DP__-2.0-68	2.0	68	109	0.089	136	0.500	15x8	2	3	2	2
DP__-2.0-100	2.0	100	157	0.109	200	0.500	15x9	3	3	3	3
DP__-2.0-150	2.0	150	207	0.106	300	0.600	25x12	4	5	4	4
DP__-2.0-220	2.0	220	328	0.153	440	0.560	25x11	4	5	4	4
DP__-2.0-330	2.0	330	575	0.202	660	0.560	26x12	4	5	4	4
DP__-2.0-470	2.0	470	720	0.214	940	0.600	30x14	5	5	5	6
DP__-2.0-680	2.0	680	1251	0.282	1360	0.600	30x14	5	5	5	6
DP__-2.0-100	2.0	1000	1429	0.335	2000	0.600	42x14	—	5	9	—
DP__-2.0-1500	2.0	1500	2488	0.441	3000	0.600	42x15	—	8	9	—
DP__-2.0-2200	2.0	2200	3218	0.405	4400	0.710	51x22	—	10	—	—
DP__-3.0-15	3.0	15	21	0.039	68	0.500	14x8	2	3	2	2
DP__-3.0-22	3.0	22	34	0.038	99	0.500	14x8	2	3	2	2
DP__-3.0-33	3.0	33	49	0.038	149	0.630	19x8	3	3	3	3
DP__-3.0-47	3.0	47	75	0.048	212	0.630	19x8	3	3	3	3
DP__-3.0-68	3.0	68	92	0.050	306	0.710	25x12	4	5	4	4
DP__-3.0-100	3.0	100	157	0.066	458	0.710	25x12	4	5	4	4
DP__-3.0-150	3.0	150	207	0.076	675	0.710	25x12	4	5	4	4
DP__-3.0-220	3.0	220	346	0.134	990	0.630	29x13	5	5	5	6
DP__-3.0-330	3.0	330	625	0.142	1485	0.710	30x14	5	5	5	6
DP__-3.0-470	3.0	470	727	0.187	2115	0.670	42x14	—	5	9	—
DP__-3.0-680	3.0	680	1124	0.302	3060	0.630	42x16	—	8	—	—
DP__-3.0-1000	3.0	1000	1493	0.304	4500	0.670	49x20	—	10	—	—
DP__-3.0-1500	3.0	1500	2324	0.384	6750	0.670	53x24	—	11	—	—
DP__-3.0-2200	3.0	2200	4090	0.509	9900	0.670	54x26	—	11	—	—
DP__-5.0-15	5.0	15	23	0.029	188	0.600	20x8	3	3	3	3
DP__-5.0-22	5.0	22	28	0.039	275	0.600	25x12	4	5	4	4
DP__-5.0-33	5.0	33	48	0.036	413	0.710	25x12	4	5	4	4
DP__-5.0-47	5.0	47	82	0.043	588	0.750	25x12	4	5	4	4
DP__-5.0-68	5.0	68	137	0.055	850	0.750	26x12	4	5	4	4
DP__-5.0-100	5.0	100	172	0.059	1250	0.800	30x13	5	5	5	5
DP__-5.0-150	5.0	150	221	0.094	1875	0.710	41x13	—	5	9	—
DP__-5.0-220	5.0	220	381	0.097	2750	0.800	41x13	—	5	9	—
DP__-5.0-330	5.0	330	475	0.156	4125	0.710	49x20	—	10	—	—
DP__-5.0-470	5.0	470	852	0.187	5875	0.750	49x20	—	10	—	—
DP__-5.0-680	5.0	680	1186	0.196	8500	0.800	53x25	—	11	—	—
DP__-5.0-1000	5.0	1000	2093	0.206	12500	0.900	55x26	—	11	—	—
DP__-7.5-15	7.5	15	18	0.022	422	0.750	30x14	5	5	5	6
DP__-7.5-22	7.5	22	30	0.025	619	0.800	30x14	5	5	5	6
DP__-7.5-33	7.5	33	49	0.025	928	0.900	30x14	5	5	5	6
DP__-7.5-47	7.5	47	84	0.026	1322	1.000	31x14	5	5	5	6
DP__-7.5-68	7.5	68	105	0.040	1913	0.900	42x14	—	5	9	—
DP__-7.5-100	7.5	100	160	0.045	2813	1.000	43x17	—	8	—	—
DP__-7.5-150	7.5	150	219	0.074	4219	0.850	50x21	—	10	—	—
DP__-7.5-220	7.5	220	373	0.070	6188	1.000	51x22	—	10	—	—
DP__-7.5-330	7.5	330	605	0.090	9281	1.000	54x25	—	11	—	—
DP__-7.5-470	7.5	470	1054	0.085	13219	1.180	55x28	—	11	—	—

ELECTRICAL SPECIFICATIONS AT 25°C

NOTES

The µJoule rating ($0.5 \times LI^2$) is the ability of the inductor to store energy.

Inductance is measured at 0.10 VAC @ 10kHz.

talema

#3 Industrial Park Drive
P.O. Box 306
St. James, Missouri 65559
573-265-5500
E-Mail: talema@talema.com
FAX: 573-265-3350
http://www.talema.com

talema electronic • 573-265-5500

DP SERIES

TECHNICAL INFORMATION

Low Cost Power Inductors

ELECTRICAL SPECIFICATIONS AT 25°C

Part Number	I_{DC} (Amps)	L(µH)Min. @Rated Current	Lo(µH) +15/-8% No Load	DCR Ohms (Max.)	Min. Energy Storage (µJ)*	Wire Dia. (mm)	Coil Size mm O.D. x Ht.	Mounting Style Availability/Size C	B	V	F
DP__-10-15	10	15	21	0.013	750	0.950	30x14	5	5	5	6
DP__-10-22	10	22	28	0.021	1100	0.900	41x14	—	5	9	—
DP__-10-33	10	33	46	0.022	1650	1.000	42x14	—	5	9	—
DP__-10-47	10	47	75	0.028	2350	1.000	42x14	—	5	9	—
DP__-10-68	10	68	89	0.042	3400	0.900	50x21	—	10	—	—
DP__-10-100	10	100	152	0.044	5000	1.000	50x21	—	10	—	—
DP__-10-150	10	150	248	0.041	7500	1.180	55x26	—	11	—	—
DP__-10-220	10	220	427	0.054	11000	1.180	55x26	—	11	—	—
DP__-15-6.8	15	6.8	8	0.009	765	1.000	41x14	—	5	9	—
DP__-15-10	15	10	14	0.012	1125	1.000	41x14	—	5	9	—
DP__-15-15	15	15	22	0.011	1688	1.180	41x14	—	5	9	—
DP__-15-22	15	22	36	0.014	2475	1.250	44x18	—	8	—	—
DP__-15-33	15	33	49	0.018	3713	1.180	50x21	—	10	—	—
DP__-15-47	15	47	75	0.016	5288	1.400	51x22	—	11	—	—
DP__-15-68	15	68	123	0.018	7650	1.500	52x23	—	11	—	—
DP__-15-100	15	100	207	0.023	11250	1.500	56x27	—	11	—	—

NOTES

The µJoule rating ($0.5 \times LI^2$) is the ability of the inductor to store energy.

Inductance is measured at 0.10V AC @ 10kHz.

Talema's engineering staff can assist in the design of other inductance values and sizes.

ORDERING KEY

DP O - 0.5 - 470µH

- 470µH — Inductance Value in µH
- 0.5 — Current Rating (Amps)
- O — Mounting Style - Specify the appropriate suffix.
  - O=Open Mount
  - C=Clip Mount
  - B=Base Mount
  - V=Vertical Encapsulated
  - F=Flat Encapsulated
- DP — Basic Series Designation

OTHER QUALITY PRODUCTS

AS Series: Current Sensors for monitoring or measuring 20kHz to 200kHz AC currents
ASM Series: Current Sensors for 50/60Hz current measurements from 1 to 100 Amps
CA Series: Common Mode Filter Chokes filter-in-phase supply line noise
CK, CD & CQ Series: Common Mode Interface Chokes for ISDN systems
DJ Series: Storage Chokes offer high energy storage capacity in a low cost design
DM Series: Differential Mode Toroids are designed for applications requiring a known inductance at various DC bias currents
DP Series: Power Inductors provide a low cost method to control AC output ripple in switching power supplies
MA Series: Magnetic Amplifier reactors for use in regulated switching power supplies
SA Series: Storage Chokes are designed with Fe based amorphous cores for exceptional efficiency and highly stable inductance over a wide DC bias range
SD Series: Storage Chokes are similar to the SA Series, but designed on MPP cores for excellent efficiency and field modulation when used as loading coils in switchers
SM Series: Surface Mount inductors are excellent for filtering high frequency signals while supporting a substantial DC current
SS Series: Inductors for low power applications requiring a highly stable inductance when a rapid change in load current occurs

#3 Industrial Park Drive
P.O. Box 306
St. James, Missouri 65559
573-265-5500
E-Mail: talema@talema.com
FAX: 573-265-3350
http://www.talema.com

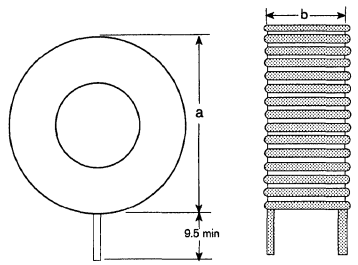
talema electronic • 573-265-5500

TECHNICAL INFORMATION

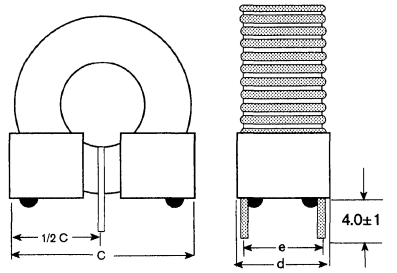
DP SERIES

Mounting Styles - Low Cost Power Inductors

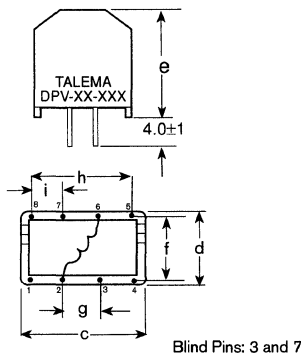
Type O- Open Mount



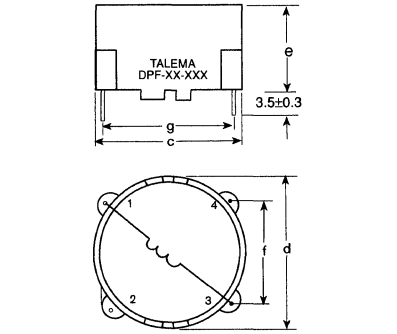
Type C - Clip Mount



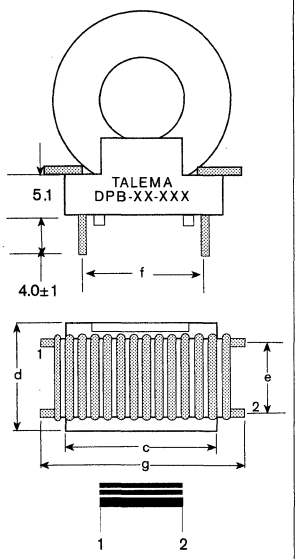
Type V - Vertical Mount



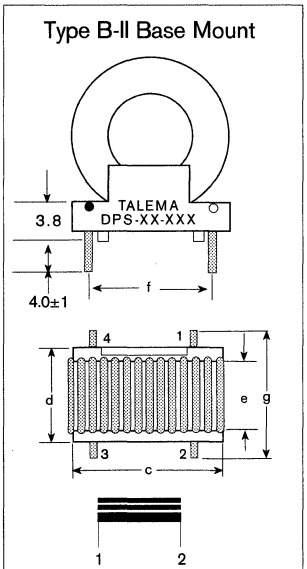
Type F - Flat Mount



Type B-I Base Mount



Type B-II Base Mount



Mounting Style	Size Code	Dimensions Nominal (mm) c	d	e	f	g	h	i	Pin O
"C" Clip Mount	1	14.7	8.6	5.6	—	—	—	—	see data page
	2	16.5	11.4	7.6	—	—	—	—	
	3	21.0	11.4	7.6	—	—	—	—	
	4	24.1	15.2	11.4	—	—	—	—	
	5	31.8	17.8	12.7	—	—	—	—	
"V" Vertical Mount	2	17.8	12.8	20.0	10.0	5.0	15.0	5.0	0.60x0.88
	3	23.0	15.5	25.0	12.5	10.0	20.0	5.0	0.60x0.88
	4	27.0	18.0	30.0	15.0	12.5	22.5	5.0	0.60x0.88
	5	32.0	20.5	35.0	17.5	12.5	27.5	7.5	0.75x1.10
	6	32.0	23.0	35.0	20.0	12.5	27.5	7.5	0.75x1.10
	7	32.0	25.5	37.5	22.5	12.5	27.5	7.5	0.75x1.10
	8	37.0	25.5	40.0	22.5	15.0	30.0	7.5	0.75x1.10
	9	43.0	28.0	47.5	25.0	25.0	40.0	7.5	0.75x1.10
"F" Flat Mount	2	17.5	17.0	12.5	10.0	15.0	—	—	0.60x0.88
	3	22.5	22.0	15.0	12.5	20.0	—	—	0.60x0.88
	4	27.5	27.0	17.5	15.0	25.0	—	—	0.60x0.88
	6	32.5	32.0	20.0	20.0	30.0	—	—	0.75x1.10
	9	42.5	42.0	28.5	25.0	35.0	—	—	0.75x1.10
"B-I" Base Mount	5	25.4	15.2	10.2	20.3	34.3	—	—	1.27
	8	27.9	20.3	15.2	22.9	36.8	—	—	1.27
	10	35.6	22.9	17.8	30.5	44.5	—	—	1.27
	11	43.2	27.9	22.9	38.1	52.1	—	—	1.27
"B-II"	3	19.1	10.8	6.4	15.2	15.9	—	—	1.02

#3 Industrial Park Drive
P.O. Box 306
St. James, Missouri 65559
573-265-5500
E-Mail: talema@talema.com
FAX: 573-265-3350
http://www.talema.com

talema electronic • 573-265-5500

TAMURA Designs OUT Custom Design IN TAMURA EMI/RFI Ripple & Noise.

ISO REGISTERED 9001/9002

File:
● E92559
E105042

File:
LR65763

File:
49913
49914
99973

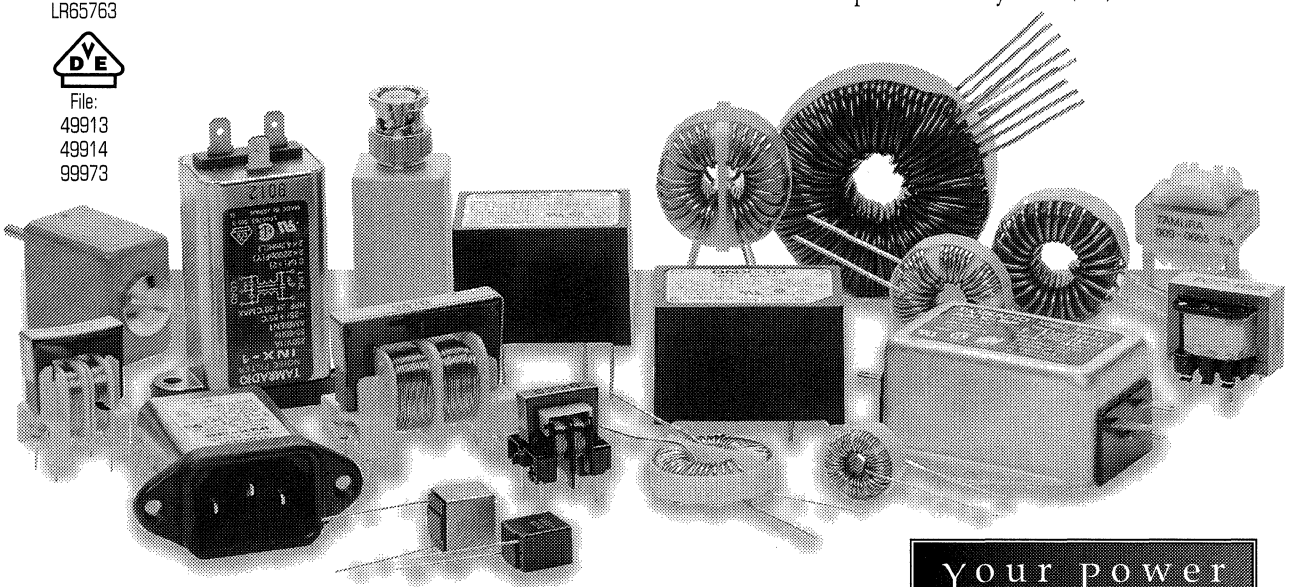
Low cost filters, common and normal mode coils & power inductors.

Serious designers conquer conducted noise problems with filters, coils and inductors custom-designed by TAMURA to your requirements.

- EMI/RFI line filters feature tab, pin and screw terminal type connectors.
- Common and normal mode coils for AC line and EMI/RFI filtering cover the range from 0.1 to 50 MHz.
- TAMURA offers a wide range of inductors for switch-mode power regulator control and energy storage circuits.

TAMURA HAS IT ALL.

For world-class manufacturing, reliability and responsibility, go to the source. Partner with TAMURA and you'll get it all. Send your requirements today or fax (909) 676-9482.



Your power partner.

For world-class manufacturing, distribution, reliability, and responsibility, go to the sources...

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

Microtran Division, Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

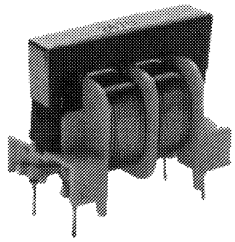
Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

COMMON MODE COILS FOR AC LINE & EMI-RFI FILTERING, 0.1 to 50 MHz.

tamura
MICROTRAN

FEATURES

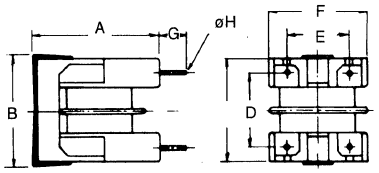
- Rated Voltage: 250VAC, 50/60 Hz.
- Rated Current: Spec'd at max. temp. rise.
- Insulation Resistance: 100 Megohms, 500 VDC.
- Direct Current Resistance (DCR): Spec'd per line, input to output.
- Dielectric Voltage: 1.5kVAC (line to gnd); 2.0kVAC, CMF Series.
- Temperature Rise: ≤30°C, CMT; ≤55°C, CMF.
- Operating Temperature: -25°C to +85°C, CMT; -25°C to +60°C, CMF.
- Creepage Distance: 3.2mm min., CMF Series.



CMF SERIES

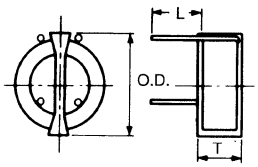
CMF SERIES (dim. mm)
MECHANICAL DIMENSION

SERIES PREFIX	A	B	C±1	D±1	E± .4	F±1	G± .8
CMF-0	20.5	17.5	18.0	12.5	10.0	16	4
CMF-6	28.0	22.5	18.0	12.5	10.0	18	4
CMF-8	31.0	24.0	22.0	16.0	10.0	20	4
CMF-2	33.5	38.5	37.0	30.0	12.5	21	4



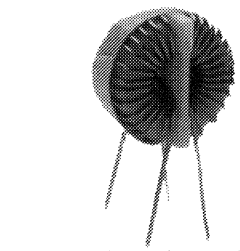
CMT SERIES (dim. mm)
MECHANICAL DIMENSIONS

SERIES PREFIX	O.D.	T	L±3mm
CMT-01	28	12.5	20
CMT-02	28	14.5	20
CMT-03	32	22.0	20

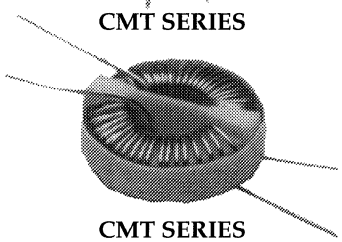


COMMON MODE NOISE FILTERING COILS

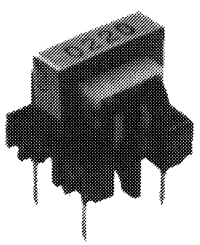
PART NO.	INDUCTANCE AMPS	INDUCTANCE mH min	DCR (Ω)	DIA mm
CMT-01102	1.00	2.0	0.25	0.40
CMT-01104	1.00	4.0	0.35	0.40
CMT-01202	2.00	2.0	0.15	0.55
CMT-01301	3.00	1.0	0.10	0.70
CMT-02105	1.00	5.0	0.40	0.40
CMT-02107	1.00	7.0	0.50	0.40
CMT-02203	2.00	3.0	0.20	0.55
CMT-02302	3.00	2.0	0.10	0.70
CMT-03110	1.00	10.0	0.55	0.40
CMT-03305	3.00	5.0	0.15	0.70
CMT-03502	5.00	2.0	0.04	0.95
CMT-03801	8.00	1.0	0.02	1.20
CMF-0470	0.15	47.0	7.00	0.70
CMF-0330	0.20	33.0	6.00	0.70
CMF-0220	0.30	22.0	4.50	0.70
CMF-0100	0.45	10.0	3.00	0.70
CMF-0056	0.55	5.6	1.00	0.70
CMF-0033	0.80	3.3	0.70	0.70
CMF-6470	0.45	47.0	3.00	0.70
CMF-6330	0.50	33.0	2.50	0.70
CMF-6220	0.65	22.0	2.00	0.70
CMF-6100	0.90	10.0	0.60	0.70
CMF-6056	1.00	5.6	0.40	0.70
CMF-6033	2.00	3.3	0.30	0.70
CMF-8470	0.50	47.0	4.00	0.80
CMF-8330	0.65	33.0	3.00	0.80
CMF-8220	0.80	22.0	2.00	0.80
CMF-8100	1.00	10.0	0.70	0.80
CMF-8056	1.50	5.6	0.40	0.80
CMF-8033	2.00	3.3	0.30	0.80
CMF-2470	1.00	47.0	2.00	1.00
CMF-2330	1.20	33.0	0.80	1.00
CMF-2220	1.40	22.0	0.60	1.00
CMF-2100	2.20	10.0	0.30	1.00
CMF-2056	2.70	5.6	0.25	1.00
CMF-2033	4.00	3.3	0.08	1.00



CMT SERIES



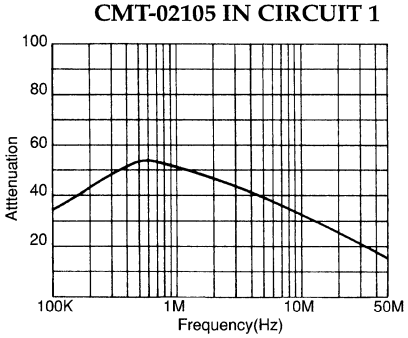
CMT SERIES



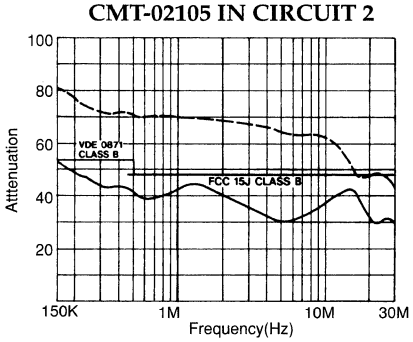
CMF SERIES

TYPICAL PERFORMANCE CHARACTERISTICS

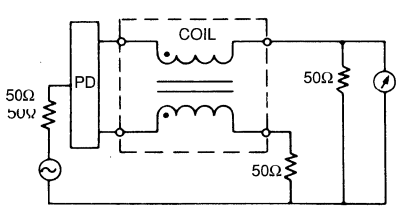
STATIC CHARACTERISTIC
CMT-02105 IN CIRCUIT 1



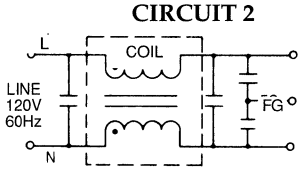
DYNAMIC CHARACTERISTIC
CMT-02105 IN CIRCUIT 2



CIRCUIT 1



CIRCUIT 2



Cy: 2200pf (line-to-FG)
Cx: 0.1μF (line-to-line)

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

Microtran Division, Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

MICROTRAN

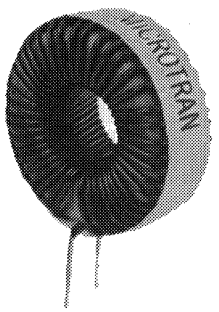
TOROIDAL POWER INDUCTORS

See Page A•1159 for Specifications *

Swinging Chokes for Switch Mode Power Supplies, Energy Storage Regulator, and EMI/RFI Filter Applications

- Specially designed for controlled saturation...repeatable specific inductance at a specific current.
- Designed to handle high current spikes typically encountered in high current SMPS applications.
- Application frequencies up to 1 MHz.
- Toroidal construction...closed magnetic field-low EMI.

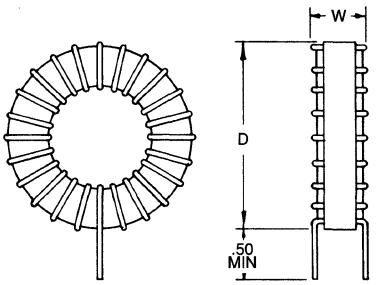
OPEN FRAME-F



SL-F

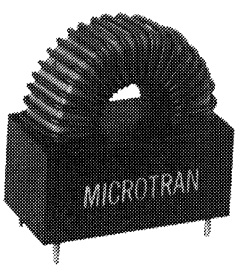
Tinned leads to 1/16" of body for PCB mounting. Additional mechanical mounting recommended for larger units with finer wire. To order add-F to Part No., i.e. SL2-50-F.

SERIES PREFIX	D MAX.	W MAX.	WT OZ.
SL05-*-F	0.56	0.30	0.13
SL06-*-F	0.87	0.40	0.45
SL1-*-F	1.00	0.50	0.64
SL2-*-F	1.30	0.65	1.59
SL3-*-F	1.90	0.90	4.10
SL4-*-F	2.20	1.10	8.00



Dimensions in inches.
*See page A•1159 for Specifications & Part Numbers

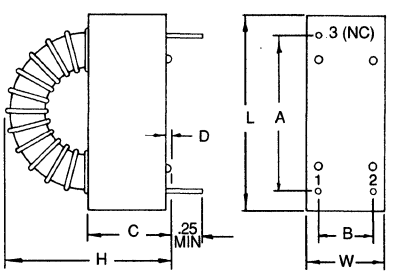
BASE MOUNTED-B



SL-B

Rugged, epoxy base mounted for PCB applications. To order add-B to Part No., i.e. SL2-50-B.

SERIES PREFIX	L MAX.	W MAX.	H MAX.	A	B	C MAX.	D	WT OZ.
SL05-*-B	0.66	0.34	0.62	0.50	0.20	0.22	.025	0.15
SL06-*-B	0.87	0.43	0.94	0.60	0.20	0.22	.025	0.49
SL1-*-B	1.01	0.52	1.08	0.90	0.40	0.26	025	0.70
SL2-*-B	1.31	0.66	1.33	1.10	0.50	0.36	030	1.70
SL3-*-B	1.90	0.90	1.98	1.60	0.60	0.41	.030	4.40
SL4-*-B	2.12	1.08	2.30	1.75	0.90	1.00	—	8.80



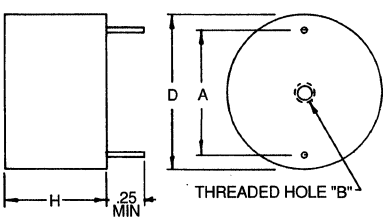
Dimensions in inches. Tolerances dimension A and B ±.015.
*See page A•1159 for Specifications & Part Numbers

MOLDED-M

SL-M

Epoxy molded with threaded insert for MIL and industrial PCB applications. MIL designation TF5S04ZZ. To order add -M to Part No.,i.e. SL2-50-M.

SERIES PREFIX	D	H	A	B	WT OZ.
SL05-*-M	0.625	0.34	0.50	—	0.18
SL06-*-M	0.937	0.46	0.75	—	0.60
SL1-*-M	1.080	0.52	0.90	4-40x8	0.86
SL2-*-M	1.375	0.70	1.20	6-32x8	2.30
SL3-*-M	2.000	1.00	1.70	8-32x10	6.00
SL4-*-M	2.500	1.25	1.25	10-32x12	10.80



Dimensions in inches. Tolerances ±.015.
*See page A•1159 for Specifications & Part Numbers

For additional inductor information see Microtran in this section.

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

INDUCTORS FOR SMPS, REGULATOR, CONTROL AND ENERGY STORAGE

tamura MICROTRAN

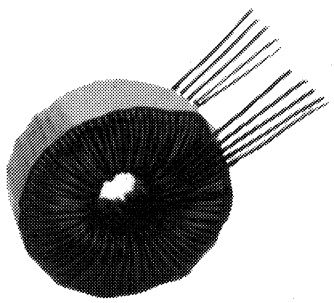
LINEAR INDUCTANCE TO 100kHz.
SMOOTHING AND ENERGY STORAGE COILS

MODEL NO.	AMPS DC	"L" (µH) @ 1kHz	DCR (Ω)	DIMENSIONS (mm) OD	HT	DIA x L†
SKC-101	5-10	30	0.009	32	18	1.3x1
SKC-102	5-10	50	0.011	32	18	1.3x1
SKC-103	5-10	100	0.017	32	18	1.3x1
SKC-104	5-10	150	0.023	32	18	1.3x1
SKC-105	5-10	200	0.024	37	20	1.3x1
SKC-106	5-7.5	400	0.048	37	20	1.3x2
SKC-107	5-7.5	600	0.056	44	26	1.3x2
SKC-108	5-7.5	800	0.044	54	25	1.3x2
SKC-109	5-6	1200	0.081	55	26	1.3x3
SKC-110	5-6	1800	0.099	55	26	1.3x3
SKC-201	10-15	30	0.005	32	18	1.3x2
SKC-202	10-15	50	0.007	37	20	1.3x2
SKC-203	10-15	100	0.012	37	20	1.3x2
SKC-204	10-15	150	0.014	44	26	1.3x2
SKC-205	10-15	200	0.011	54	25	1.3x2
SKC-206	10-12	400	0.024	55	26	1.3x4
SKC-207	10-12	600	0.032	56	27	1.3x4
SKC-208	10-12	800	0.032	56	33	1.3x4
SKC-301	15-25	30	0.004	37	20	1.3x3
SKC-302	15-25	50	0.006	39	21	1.3x3
SKC-303	15-25	100	0.006	54	25	1.3x3
SKC-304	15-20	150	0.009	55	26	1.3x3
SKC-305	15-20	200	0.011	55	26	1.3x3
SKC-306	15-20	400	0.016	56	33	1.3x6
SKC-401	20-30	30	0.004	41	23	1.3x4
SKC-402	20-30	50	0.005	46	25	1.3x4
SKC-403	20-28	100	0.006	55	26	1.3x4
SKC-404	20-25	150	0.008	56	27	1.3x4
SKC-405	20-25	200	0.008	56	33	1.3x4
SKC-501	25-35	30	0.003	45	24	1.3x5
SKC-502	25-35	50	0.003	55	26	1.3x5
SKC-503	25-35	100	0.004	55	33	1.3x5
SKC-504	25-30	150	0.006	57	34	1.3x5
SKC-601	30-40	30	0.002	54	25	1.3x6
SKC-602	30-40	50	0.003	55	26	1.3x6
SKC-603	30-35	100	0.004	56	33	1.3x6
SKC-801	40-50	30	0.002	55	33	1.3x8
SKC-802	40-50	50	0.002	54	34	1.3x8

NOTE 1: Wire diameter (DIA) by number of leads (L) in parallel.

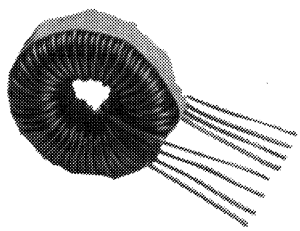
LINEAR INDUCTANCE TO 300kHz.
SMOOTHING AND ENERGY STORAGE COILS

MODEL NO.	AMPS DC	"L" µH @ 20kHz RATED DC	"L" µH @ 20kHz 0 DC	DCR (Ω)	DIMENSIONS (mm) OD	HT	DIA
RS1-1	2	150	215	0.010	24	14	0.6
RS1-2	3	100	160	0.060	24	14	0.8
RS1-3	5	30	45	0.025	24	14	1.0
RS2-1	3	200	325	0.105	29	15	0.8
RS2-2	5	100	190	0.055	29	15	1.0
RS2-3	7	30	45	0.020	29	15	1.3
RS3-1	3	250	400	0.145	31	17	0.8
RS3-2	5	150	280	0.085	33	18	1.0
RS3-3	7	75	135	0.035	33	19	1.3



VARIABLE INDUCTANCE TO 100kHz.
SMOOTHING AND ENERGY STORAGE COILS

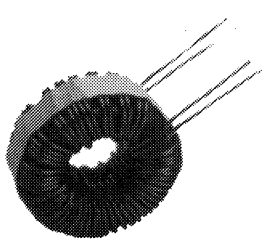
MODEL NO.	AMPS DC	"L" µH @1kHz RATED DC	"L" µH @1kHz 0 DC	DCR (Ω)	DIMENSIONS (mm) OD	HT	DIA x L†
SKL-103	5	100	450	0.017	32	18	1.3x1
SKL-105	5	200	1000	0.025	32	18	1.3x1
SKL-203	10	100	500	0.011	43	23	1.3x2
SKL-205	10	200	1000	0.015	54	29	1.3x2
SKL-303	15	100	500	0.008	55	26	1.3x3
SKL-305	15	200	1000	0.011	56	27	1.3x3
SKL-403	20	100	500	0.008	55	26	1.3x4
SKL-404	20	150	750	0.009	56	27	1.3x4
SKL-502	25	50	250	0.006	55	26	1.3x5
SKL-503	25	100	600	0.007	57	34	1.3x5



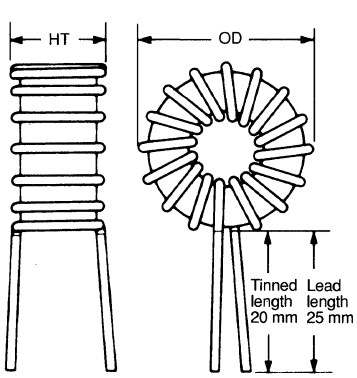
EMI/RFI NORMAL MODE NOISE FILTERING TOROIDAL COILS

MODEL NO.	AMPS DC*	"L" µH @1kHz 1 ma	DCR (Ω)	DIMENSIONS (mm) OD	HT	DIA
SKP1-30	2	30	0.039	16.0	8.0	0.6
SKP1-40	2	55	0.500	16.0	8.0	0.6
SKP1-50	2	80	0.061	16.0	8.5	0.6
SKP2-30	2	50	0.051	16.0	11.0	0.6
SKP2-40	2	90	0.066	16.0	11.0	0.6
SKP2-50	2	130	0.082	16.0	11.5	0.6
SKP3-30	3	40	0.028	21.0	11.0	0.8
SKP3-40	3	80	0.037	21.0	11.0	0.8
SKP3-50	3	120	0.045	21.5	11.5	0.8
SKP4-40	5	65	0.023	25.0	12.0	1.0
SKP4-50	5	100	0.028	26.0	12.0	1.0
SKP5-40	5	100	0.033	27.5	14.0	1.0
SKP5-50	5	150	0.041	28.0	15.0	1.0

NOTE 2: SKP series "L" with DC amp rating is approximately 50% value shown.



DIMENSIONS



For additional inductor information see Microtran in this section.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

CONFORMAL COATED INDUCTORS

ISO 9002 REGISTERED

EC 24 TYPE

The EC24 type choke coil incorporates a high-performance ferrite core in a small special structure. It is resin coated and achieves inductance values up to 1,000 µH.

FEATURES

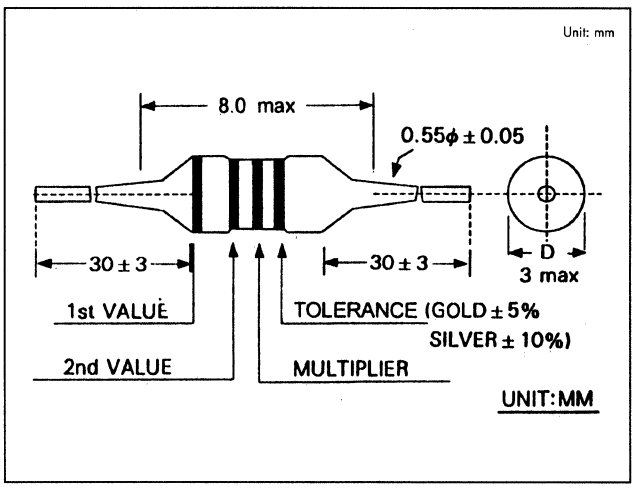
(1) Incorporation of a special lead wire structure entirely eliminates defects inherent in existing axial lead type products and prevents lead breakage.
(2) Special magnetic core structure permits the product to have both reduced size and high-Q, self-resonant frequencies.
(3) Low distributed capacity.
(4) Treated with epoxy resin coating for humidity resistance to ensure longer life.

CHARACTERISTICS

Style: Axial leaded type
Rated current based on coil temperature rise not to exceed 20°C at 80°C ambient temperature.
Rated Temperature Range: -20°C to + 100°C
Dielectric Withstanding Voltage: 250 V r.m.s.
L and Q measured with HP4342A Q meter at specified frequency
Terminal Tensile Strength: 2.0 kg min.
Terminal Bending Strength: 0.3 kg min.
Moisture Resistance Characteristic: ΔL/L ≤±5%, ΔQ/Q ≤±20%,

COLOR CODE

Inductance values are indicated with color code as shown below.



ORDERING INFORMATION

EC - 24 - 330 - K - T5
(1) (2) (3) (4) (5)

(1) Type
(2) Style
(3) Inductance
(4) Tolerance
(5) Taping or Forming

ELECTRICAL CHARACTERISTICS • EC24 INDUCTORS

3L PART NUMBER	INDUCTANCE (µH)	INDUCTANCE TOLERANCE	Q-FACTER (MIN.)	TEST FEEQ. (MHz)	S.R.F. (MHz) MIN.	DC RESISTANCE (Ω) MAX.	RATED DC CURRENT (mA) MAX.
EC24-R027M-CC	0.027				500	0.02	520
EC24-R033M-CC	0.033				490	0.02	500
EC24-R039M-CC	0.039	M (±20%)			480	0.02	500
EC24-R047M-CC	0.047			50.0	480	0.03	500
EC24-R056M-CC	0.056	[K(±10%)]			470	0.045	460
EC24-R068M-CC	0.068				470	0.05	460
EC24-R082M-CC	0.082				470	0.05	460
EC24-R10K	0.10				470	0.08	700
EC24-R12K	0.12				450	0.08	700
EC24-R15K	0.15				430	0.09	700
EC24-R18K	0.18				410	0.010	700
EC24-R22K	0.22				380	0.012	700
EC24-R27K	0.27		40	25.2	360	0.015	680
EC24-R33K	0.33				350	0.016	680
EC24-R39K	0.39				320	0.018	680
EC24-R47K	0.47				300	0.026	650
EC24-R56K	0.56	K (±10%)			280	0.038	500
EC24-R68K	0.68				250	0.42	500
EC24-R82K	0.82	[J(±5%)]			200	0.55	450
EC24-1R0K	1.0				180	0.12	700
EC24-1R2K	1.2				165	0.18	700
EC24-1R5K	1.5				150	0.20	700
EC24-1R8K	1.8				125	0.23	655
EC24-2R2K	2.2		40	7.96	85	0.25	630
EC24-2R7K	2.7				80	0.28	595
EC24-3R3K	3.3				75	0.30	575
EC24-3R9K	3.9				65	0.32	555
EC24-4R7K	4.7				45	0.35	530

3L PART NUMBER	INDUCTANCE (µH)	INDUCTANCE TOLERANCE	Q-FACTER (MIN.)	TEST FEEQ. (MHz)	S.R.F. (MHz) MIN.	DC RESISTANCE (Ω) MAX.	RATED DC CURRENT (mA) MAX.
EC24-5R6K	5.6				36	0.40	500
EC24-6R8K	6.8		40	7.96	30	0.45	470
EC24-8R2K	8.2				28	0.55	425
EC24-100K	10				22	0.72	370
EC24-120K	12				20	0.80	350
EC24-150K	15				16	0.88	335
EC24-180K	18				15	1.00	315
EC24-220K	22				13	1.20	285
EC24-270K	27				11	1.35	270
EC24-330K	33		50	2.52	10	1.50	255
EC24-390K	39				9.5	1.70	240
EC24-470K	47				8.5	2.30	205
EC24-560K	56	K (±10%)			7.5	2.60	195
EC24-680K	68				6.5	3.20	185
EC24-820K	82	[J(±5%)]			6.0	3.50	175
EC24-101K	100				5.5	4.20	165
EC24-121K	120				5.4	3.80	160
EC24-151K	150				4.75	4.40	150
EC24-181K	180				4.35	5.0	140
EC24-221K	220				4.0	5.7	130
EC24-271K	270				3.7	6.5	120
EC24-331K	330		30	0.796	3.4	9.5	100
EC24-391K	390				2.8	10.5	95
EC24-471K	470				2.4	12.5	90
EC24-561K	560				2.2	14.5	85
EC24-681K	680				2.0	18.0	75
EC24-821K	820				1.6	23.7	65
EC24-102K	1000				1.15	30.0	60

Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes

3L GLOBAL ELECTRONICS

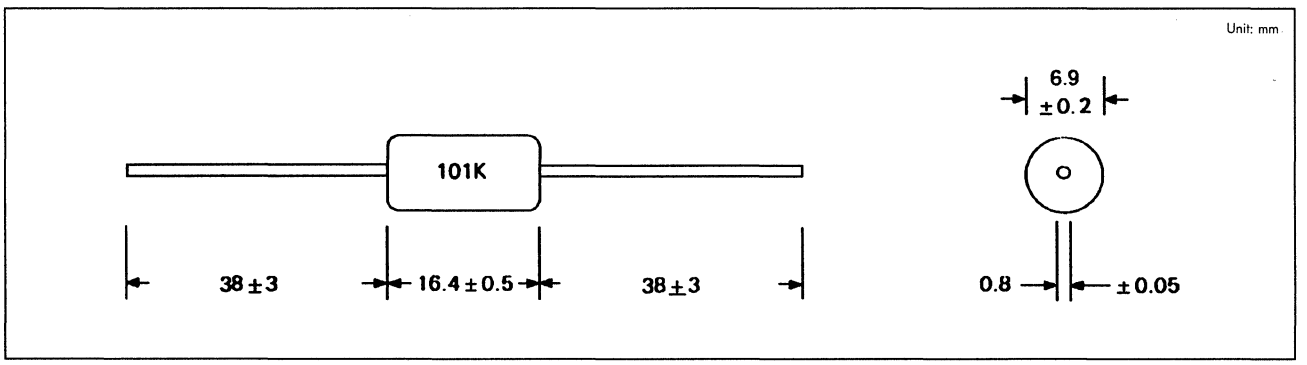
2915 Anvil Street N.
St. Petersburg, FL 33710
Phone: (813) 343-2679
Fax: (813) 343-4410

3lglobal@worldnet.att.net

MOLDED POWER LINE CHOKES (AXIAL LEADED MF0616 TYPE)

ISO 9002 REGISTERED

MF0616 TYPE / AXIAL LEADED



STANDARD SPECIFICATIONS

Inductance Range: 3.9µH to 18.000µH
Inductance: Measured at 1KHz
Operating Temperature Range: -40°C to + 140°C
Flammability: UL 94V0 Rated
Material: Polypropylene-Vz
Packaging: 1.000 pcs/reel or bulk

ORDERING INFORMATION

MF	-	06	16	-	101	-	K
(1)		(2)	(3)		(4)		(5)

(1) Molded Ferrite Choke
(2) Outside Diameter
(3) Length
(4) Inductance
(5) Tolerance

ELECTRICAL CHARACTERISTICS • MF0616 CHOKES

3L PART NUMBER	INDUCTANCE (µH)	DC RESISTANCE (Ω) MAX.	SATURATION CURRENT (AMPS)	SUGGESTED CURRENT (AMPS)
MF0616-3R9K	3.9 ± 10%	0.019	7.3	1.28
MF0616-4R7K	4.7 ± 10%	0.022	6.3	1.28
MF0616-5R6K	5.6 ± 10%	0.024	5.6	1.28
MF0616-6R8K	6.8 ± 10%	0.026	5.3	1.28
MF0616-8R2K	8.2 ± 10%	0.028	4.5	1.28
MF0616-100K	10 ± 10%	0.033	4.1	1.28
MF0616-120K	12 ± 10%	0.037	3.6	1.28
MF0616-150K	15 ± 10%	0.040	3.3	1.28
MF0616-180K	18 ± 10%	0.044	3.0	1.28
MF0616-220K	22 ± 10%	0.050	2.7	1.28
MF0616-270K	27 ± 10%	0.058	2.5	1.28
MF0616-330K	33 ± 10%	0.075	2.2	1.008
MF0616-390K	39 ± 10%	0.094	2.0	0.804
MF0616-470K	47 ± 10%	0.109	1.8	0.804
MF0616-560K	56 ± 10%	0.140	1.7	0.804
MF0616-680K	68 ± 10%	0.145	1.5	0.804
MF0616-820K	82 ± 10%	0.152	1.4	0.804
MF0616-101K	100 ± 10%	0.208	1.2	0.632
MF0616-121K	120 ± 10%	0.283	1.1	0.508
MF0616-151K	150 ± 10%	0.340	1.0	0.508
MF0616-181K	180 ± 10%	0.362	0.95	0.508
MF0616-221K	220 ± 10%	0.430	0.86	0.508
MF0616-271K	270 ± 10%	0.557	0.77	0.400
MF0616-331K	330 ± 10%	0.665	0.70	0.400
MF0616-391K	390 ± 10%	0.772	0.64	0.400

3L PART NUMBER	INDUCTANCE (µH)	DC RESISTANCE (Ω) MAX.	SATURATION CURRENT (AMPS)	SUGGESTED CURRENT (AMPS)
MF0616-471K	470 ± 10%	1.15	0.59	0.315
MF0616-561K	560 ± 10%	1.27	0.54	0.315
MF0616-681K	680 ± 10%	1.61	0.49	0.250
MF0616-821K	820 ± 10%	1.96	0.44	0.200
MF0616-102K	1000 ± 10%	2.30	0.40	0.200
MF0616-122K	1200 ± 10%	2.65	0.35	0.200
MF0616-152K	1500 ± 10%	3.45	0.33	0.158
MF0616-182K	1800 ± 10%	4.03	0.29	0.158
MF0616-222K	2200 ± 10%	4.48	0.27	0.158
MF0616-272K	2700 ± 10%	5.90	0.24	0.125
MF0616-332K	3300 ± 10%	6.56	0.22	0.125
MF0616-392K	3900 ± 10%	8.63	0.20	0.100
MF0616-472K	4700 ± 10%	10.5	0.18	0.100
MF0616-562K	5600 ± 10%	13.9	0.166	0.082
MF0616-682K	6800 ± 10%	16.3	0.151	0.082
MF0616-822K	8200 ± 10%	20.8	0.136	0.065
MF0616-103K	10000 ± 10%	26.4	0.125	0.050
MF0616-123K	12000 ± 10%	29.9	0.114	0.050
MF0616-153K	15000 ± 10%	42.5	0.098	0.039
MF0616-183K	18000 ± 10%	48.3	0.091	0.039

FOR SPECIAL VALUES OR OTHER REQUIREMENTS, PLEASE CALL US ... 813-343-2679.

Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes

3L GLOBAL ELECTRONICS

2915 Anvil Street N.
St. Petersburg, FL 33710
Phone: (813) 343-2679
Fax: (813) 343-4410

3lglobal@worldnet.att.net

POWER LINE CHOKE

ISO 9002 REGISTERED

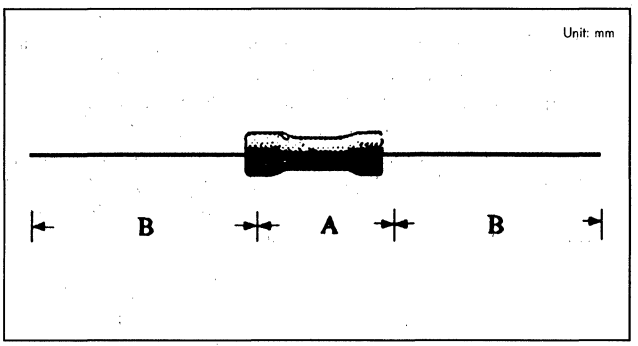
VC1019 TYPE

STANDARD SPECIFICATIONS

Body Size: A = 22.86 m/m B = 38.0 m/m
Lead Wire: # AWG 20
Testing: -Inductance measured at 1KHz
Sleeving: (UL) Shrink tubing
Packaging: Bulk

TYPICAL APPLICATIONS

- SCR & Triac controls
- Switching regulators
- Power amplifiers
- Power supplies
- RFI suppression
- Filters



ELECTRICAL CHARACTERISTICS • VC1019 POWER LINE CHOKES

FOR HIGHER SATURATION CURRENT APPLICATIONS, PLEASE CONTACT THE FACTORY

3L PART NUMBER	INDUCTANCE (µH)	DC RESISTANCE (Ω) MAX.	SATURATION CURRENT (AMPS)	SUGGESTED CURRENT (AMPS)	DIAMETER (NOMINAL) (mm)
VC1019-3R9K-UL	3.9 ± 10%	0.007	15.5	4.0	11.43
VC1019-4R7K-UL	4.7 ± 10%	0.008	13.9	4.0	11.43
VC1019-5R6K-UL	5.6 ± 10%	0.011	12.6	4.0	11.43
VC1019-6R8K-UL	6.8 ± 10%	0.011	11.6	4.0	11.43
VC1019-8R2K-UL	8.2 ± 10%	0.013	9.89	4.0	11.43
VC1019-100K-UL	10 ± 10%	0.017	8.70	4.0	11.43
VC1019-120K-UL	12 ± 10%	0.019	8.21	4.0	11.43
VC1019-150K-UL	15 ± 10%	0.022	7.34	4.0	11.43
VC1019-180K-UL	18 ± 10%	0.023	6.64	4.0	11.43
VC1019-220K-UL	22 ± 10%	0.026	6.07	4.0	11.43
VC1019-270K-UL	27 ± 10%	0.027	5.36	4.0	11.43
VC1019-330K-UL	33 ± 10%	0.032	4.82	4.0	11.43
VC1019-390K-UL	39 ± 10%	0.033	4.36	4.0	11.43
VC1019-470K-UL	47 ± 10%	0.035	3.98	4.0	11.43
VC1019-560K-UL	56 ± 10%	0.037	3.66	3.2	11.43
VC1019-680K-UL	68 ± 10%	0.047	3.31	2.5	11.43
VC1019-820K-UL	82 ± 10%	0.060	3.10	2.0	11.43
VC1019-101K-UL	100 ± 10%	0.090	2.79	1.6	11.43
VC1019-121K-UL	120 ± 10%	0.113	2.54	1.6	11.43
VC1019-151K-UL	150 ± 10%	0.129	2.22	1.6	11.43
VC1019-181K-UL	180 ± 10%	0.150	1.98	1.6	11.43
VC1019-221K-UL	220 ± 10%	0.162	1.89	1.6	11.43
VC1019-271K-UL	270 ± 10%	0.208	1.63	1.6	11.43
VC1019-331K-UL	330 ± 10%	0.212	1.51	1.6	11.43
VC1019-391K-UL	390 ± 10%	0.281	1.39	1.6	11.43
VC1019-471K-UL	470 ± 10%	0.380	1.24	1.2	11.43
VC1019-561K-UL	560 ± 10%	0.420	1.17	1.0	11.43
VC1019-681K-UL	680 ± 10%	0.548	1.05	1.0	11.43
VC1019-821K-UL	820 ± 10%	0.655	0.97	0.8	11.43
VC1019-102K-UL	1000 ± 10%	0.844	0.87	0.8	11.43

3L PART NUMBER	INDUCTANCE (µH)	DC RESISTANCE (Ω) MAX.	SATURATION CURRENT (AMPS)	SUGGESTED CURRENT (AMPS)	DIAMETER (NOMINAL) (mm)
VC1019-122K-UL	1200 ± 10%	1.04	0.79	0.6	11.43
VC1019-152K-UL	1500 ± 10%	1.18	0.70	0.6	11.43
VC1019-182K-UL	1800 ± 10%	1.56	0.64	0.6	11.43
VC1019-222K-UL	2200 ± 10%	2.00	0.58	0.5	11.43
VC1019-272K-UL	2700 ± 10%	2.06	0.53	0.4	11.43
VC1019-332K-UL	3300 ± 10%	2.53	0.47	0.4	11.43
VC1019-392K-UL	3900 ± 10%	2.75	0.43	0.4	11.43
VC1019-472K-UL	4700 ± 10%	3.19	0.39	0.4	11.43
VC1019-562K-UL	5600 ± 10%	3.92	0.359	0.315	11.43
VC1019-682K-UL	6800 ± 10%	5.69	0.322	0.250	11.43
VC1019-822K-UL	8200 ± 10%	6.32	0.293	0.250	11.43
VC1019-103K-UL	10000 ± 10%	7.30	0.266	0.250	11.43
VC1019-123K-UL	12000 ± 10%	9.21	0.241	0.200	11.43
VC1019-153K-UL	15000 ± 10%	10.5	0.214	0.200	11.43
VC1019-183K-UL	18000 ± 10%	14.8	0.198	0.158	11.43
VC1019-223K-UL	22000 ± 10%	21.8	0.180	0.125	11.43
VC1019-273K-UL	27000 ± 10%	22.7	0.162	0.125	11.43
VC1019-333K-UL	33000 ± 10%	25.7	0.146	0.125	11.43
VC1019-393K-UL	39000 ± 10%	31.8	0.135	0.100	11.43
VC1019-473K-UL	47000 ± 10%	36.1	0.122	0.100	11.43
VC1019-563K-UL	56000 ± 10%	40.9	0.112	0.100	11.43
VC1019-683K-UL	68000 ± 10%	57.3	0.101	0.082	11.43
VC1019-823K-UL	82000 ± 10%	79.3	0.090	0.065	11.43
VC1019-104K-UL	100000 ± 10%	89.7	0.081	0.065	11.43

FOR SPECIAL VALUES OR OTHER REQUIREMENTS, PLEASE CALL US ... 813-343-2679.

Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes

3L GLOBAL ELECTRONICS

2915 Anvil Street N.
St. Petersburg, FL 33710
Phone: (813) 343-2679
Fax: (813) 343-4410

3lglobal@worldnet.att.net

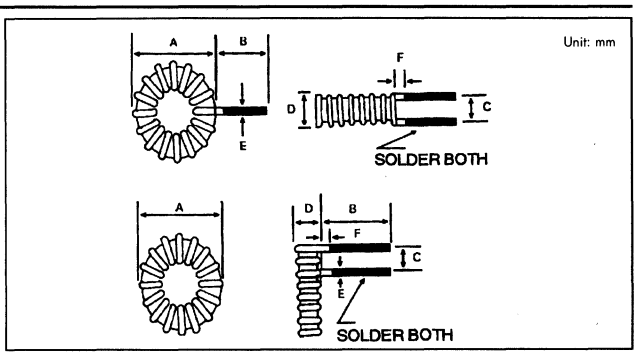
WOUND TOROIDS (TC TYPE)

ISO 9002 REGISTERED

TC SERIES

TC Series

TC Series are inductors wound on Iron Powder material toroids. 3L provides low volume hand windings to high volume automatic machine windings. Please call for the most competitive pricing and delivery schedules.



ORDERING INFORMATION

TC - 101 M - 2.0A - 5026
(1) (2) (3) (4) (5)

(1) Toroidal Coils
(2) Inductance
(3) Tolerance (J±5%, M±20%, U>, D<)
(4) Current in Amps
(5) Material Size

ELECTRICAL CHARACTERISTICS • TC TOROIDAL COILS (Indexed Inductance)

Number	3L Part Number	Max. Current idc: (AMP)	INDUCTANCE @ 1KHz AT idc =OA (µH)	INDUCTANCE @ 1KHz AT idc =MAX. (µH)	DC RESISTANCE (Ω) MAX.	DIMENSIONS (mm) A x D MAX.
1	TC-5R0M-0.5A-2026	0.5A	5	4.9	.007	7.5 x 4.5
2	TC-9R0M-0.3A-2026	0.3A	9	8.8	.011	8.0 x 4.5
3	TC-150M-0.5A-2026	0.5A	15	13.5	.070	7.5 x 4.5
4	TC-200M-0.2A-2026	0.2A	20	19.8	.198	7.5 x 4.0
5	TC-270M-0.1A-2026	0.1A	27	27	.033	7.5 x 4.0
6	TC-270M-0.3A-2026	0.3A	27	25.5	.031	8.0 x 4.5
7	TC-100M-2.0A-2026	2.0A	10	7.7	.017	12.0 x 7.0
8	TC-120M-1.0A-2026	1.0A	12	10.7	.040	10.5 x 6.0
9	TC-320M-1.0A-2026	1.0A	32	25	.065	12.0 x 7.0
10	TC-370M-0.5A-2026	0.5A	37	33.7	.135	10.0 x 5.5
11	TC-141M-0.5A-3026	0.5A	140	107	.265	10.0 x 6.0
12	TC-8R2M-2.0A-3726	2.0A	8.2	7.2	.017	14.5 x 7.0
13	TC-220M-2.0A-3726	2.0A	22	17	.030	14.5 x 7.5
14	TC-240M-1.0A-3726	1.0A	24	22	.055	13.5 x 6.0
15	TC-560M-0.5A-3726	0.5A	56	53	.181	12.5 x 5.5
16	TC-680M-1.0A-3726	1.0A	68	53	.095	13.5 x 6.5
17	TC-241M-0.5A-3726	0.5A	240	190	.360	13.0 x 6.5
18	TC-150M-2.0A-4426	2.0A	15	12.6	.023	15.5 x 7.5
19	TC-430M-1.0A-4426	1.0A	43	37	.074	14.5 x 7.0
20	TC-680M-2.0A-4426	2.0A	68	42	.056	15.5 x 9.0
21	TC-111M-0.5A-4426	0.5A	110	100	.250	14.0 x 6.5
22	TC-141M-1.0A-4426	1.0A	140	104	.140	15.0 x 7.5
23	TC-361M-0.5A-4426	0.5A	360	285	.460	14.5 x 7.5
24	TC-200M-3.0A-5026	3.0A	20	15	.021	17.5 x 9.0
25	TC-300M-2.0A-5026	2.0A	30	25	.035	17.0 x 8.5
26	TC-600M-3.0A-5026	3.0A	60	35	.038	18.0 x 10.0
27	TC-680M-1.0A-5026	1.0A	68	60	.101	16.0 x 7.5
28	TC-101M-2.0A-5026	2.0A	100	63	.081	17.0 x 9.0
29	TC-221M-1.0A-5026	1.0A	220	162	.190	16.5 x 8.0
30	TC-220M-5.0A-6026	5.0A	22	15	.014	21.5 x 11.5
31	TC-290M-4.0A-6026	4.0A	29	20	.020	21.0 x 11.0
32	TC-350M-3.0A-6026	3.0A	35	28	.026	20.5 x 10.5
33	TC-580M-2.0A-6026	2.0A	58	45	.061	20.0 x 10.0
34	TC-900M-3.0A-6026	3.0A	90	52.5	.044	20.5 x 12.5
35	TC-111M-2.0A-6026	2.0A	110	79	.069	19.5 x 10.0
36	TC-131M-1.0A-6026	1.0A	130	116	.146	19.0 x 9.0
37	TC-471M-1.0A-6026	1.0A	47	310	.289	21.0 x 11.0
38	TC-250M-5.0A-6826	5.0A	25	18	.016	24.0 x 10.5
39	TC-320M-4.0A-6826	4.0A	32	24	.021	23.5 x 10.0
40	TC-430M-3.0A-6826	3.0A	43	30	.030	23.0 x 9.5
41	TC-650M-2.0A-6826	2.0A	65	55	.055	22.0 x 9.0
42	TC-111M-4.0A-6826	4.0A	110	56	.042	23.5 x 11.0
43	TC-131M-3.0A-6826	3.0A	130	77	.055	23.0 x 10.5
44	TC-151M-1.0A-6826	1.0A	150	137	.159	21.5 x 7.5
45	TC-231M-2.0A-6826	2.0A	230	148	.108	22.5 x 9.5
46	TC-501M-1.0A-6826	1.0A	500	355	.300	22.0 x 9.0
47	TC-500M-5.0A-8026	5.0A	50	33	.022	26.5 x 12.0
48	TC-600M-4.0A-8026	4.0A	60	42	.030	26.5 x 11.5
49	TC-750M-3.0A-8026	3.0A	75	54	.039	25.5 x 11.0
50	TC-820M-3.0A-8026	3.0A	82	60	.042	24.5 x 10.5
51	TC-101M-5.0A-8026	5.0A	100	53	.033	26.5 x 12.5
52	TC-111M-2.0A-8026	2.0A	110	90	.074	25.0 x 10.0
53	TC-151M-5.0A-8026	5.0A	150	68	.042	27.0 x 13.5
54	TC-221M-4.0A-8026	4.0A	220	105	.059	26.5 x 13.0
55	TC-271M-3.0A-8026	3.0A	270	140	.081	26.0 x 12.0
56	TC-321M-2.0A-8026	2.0A	320	193	.131	25.0 x 10.5
57	TC-431M-2.0A-8026	2.0A	430	246	.150	25.0 x 11.0
58	TC-961M-1.0A-8026	1.0A	960	625	.438	25.0 x 11.0
59	TC-900M-5.0A-9026	5.0A	90	54	.140	29.5 x 15.5
60	TC-141M-3.0A-9026	3.0A	140	98	.064	28.0 x 14.5
61	TC-201M-2.0A-9026	2.0A	200	154	.114	28.0 x 14.0
62	TC-321M-5.0A-9026	5.0A	320	120	.068	29.5 x 17.0
63	TC-451M-2.0A-9026	2.0A	450	280	.174	28.0 x 14.0
64	TC-471M-1.0A-9026	1.0A	470	398	.354	26.5 x 13.0
65	TC-471M-3.0A-9026	3.0A	470	225	.118	28.5 x 15.5
66	TC-182M-1.0A-9026	1.0A	1800	1130	.680	27.5 x 14.0
67	TC-820M-5.0A-9426	5.0A	82	52	.033	31.0 x 15.5
68	TC-101M-4.0A-9426	4.0A	100	69	.042	29.5 x 13.5
69	TC-131M-3.0A-9426	3.0A	130	96	.061	29.0 x 13.0
70	TC-221M-2.0A-9426	2.0A	220	170	.121	28.5 x 12.0
71	TC-301M-5.0A-9426	5.0A	300	120	.064	30.0 x 15.5
72	TC-391M-4.0A-9426	4.0A	390	165	.088	29.5 x 15.0
73	TC-471M-1.0A-9426	1.0A	470	400	.342	27.5 x 11.5
74	TC-501M-3.0A-9426	3.0A	500	242	.124	29.0 x 14.0
75	TC-781M-2.0A-9426	2.0A	780	428	.225	28.5 x 13.5
76	TC-132M-1.0A-9426	1.0A	1300	933	.585	28.5 x 12.5
77	TC-300M-10A-10626	10.0A	30	21	.009	36.0 x 19.5
78	TC-350M-10A-10626	10.0A	35	25	.010	36.0 x 19.5
79	TC-560M-7.0A-10626	7.0A	56	41.5	.020	34.0 x 18.0
80	TC-680M-7.0A-10626	7.0A	68	46	.021	34.0 x 18.0
81	TC-820M-7.0A-10626	7.0A	82	53	.023	34.0 x 18.0
82	TC-101M-5.0A-10626	5.0A	100	75	.036	33.5 x 17.0
83	TC-151M-4.0A-10626	4.0A	150	110	.053	32.5 x 16.5
84	TC-201M-3.0A-10626	3.0A	200	157	.078	32.0 x 16.0
85	TC-301M-2.0A-10626	2.0A	300	250	.142	31.5 x 15.5
86	TC-851M-2.0A-10526	2.0A	850	567	.211	32.5 x 16.5
87	TC-750M-1.0A-13026	1.0A	75	43	.014	42.0 x 19.5
88	TC-131M-7.0A-13026	7.0A	130	79	.031	41.0 x 18.0
89	TC-201M-5.0A-13026	5.0A	200	134	.056	39.0 x 17.0
90	TC-251M-10A-13026	10.0A	250	105	.027	42.5 x 21.5
91	TC-471M-7.0A-13026	7.0A	470	190	.064	40.5 x 19.5
92	TC-681M-5.0A-13026	5.0A	680	295	.105	39.0 x 18.5

Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes

3L GLOBAL ELECTRONICS

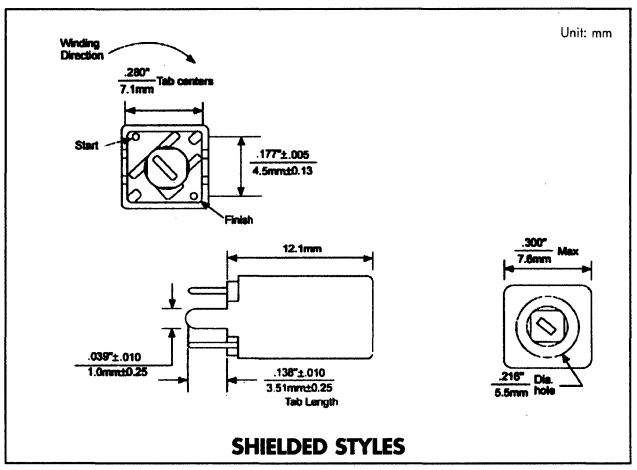
2915 Anvil Street N.
St. Petersburg, FL 33710
Phone: (813) 343-2679
Fax: (813) 343-4410

3lglobal@worldnet.att.net

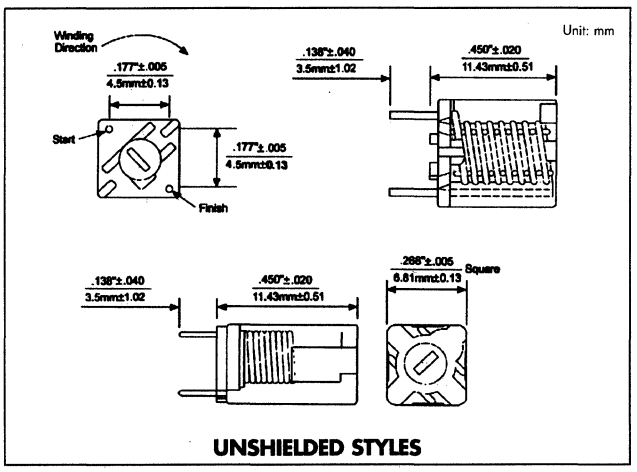
INSERT MOLDED COILS

ISO 9002 REGISTERED

MD - 0712U - XXT - S/C - J SERIES SHIELDED & UNSHIELDED STYLES



SHIELDED STYLES



UNSHIELDED STYLES

Plastic	**Novamont Moplen C-432-4 Polypropylene or approved equivalent**
Wire	#24 AWG Tinned Copper (S) • #24 AWG Single Polyurethane (C)
Coil T.P.I.	28 T.P.I. (S) • Closewound (C)
Turn Count	1½ Turn Min. - 7½ Turn Max. (S) • 1½ Turn Min. - 10½ Turn Max. (C)
Core	6-32 (.129" x 32 T.P.I.) Captive Slot Carbonyl "J" PI-1943

NOTE: Other core types available (i.e., brass, aluminum, ferrite, air)

ORDERING INFORMATION

MD	-	0712	S	-	1.5T	-	S	-	J
(1)		(2)	(3)		(4)		(5)		(6)

(1) Molded Coil Type
(2) Style (07 = Size; 12 = Height)
(3) S = Sheilded; U = Unsheilded
(4) Number of Turns
(5) S = Spacewound; C = Closewound
(6) Core Material

ELECTRICAL CHARACTERISTICS • J SERIES SHIELDED STYLES

3L PART NUMBER	Color	L MIN. (µH)	L MAX (µH)	L NOM. (µH)	Q MIN. (@ L NOM.)
MD-0712S-1.5T-S-J	Brown	.032	.034	.034	58 @ 100MHz
MD-0712S-2.5T-S-J	Red	.045	.050	.048	58 @ 100MHz
MD-0712S-3.5T-S-J	Orange	.062	.071	.067	58 @ 100MHz
MD-0712S-4.5T-S-J	Yellow	.082	.100	.092	56 @ 100MHz
MD-0712S-5.5T-S-J	Green	.107	.121	.115	54 @ 100MHz
MD-0712S-6.5T-S-J	Blue	.125	.143	.134	52 @ 50MHz
MD-0712S-7.5T-S-J	Violet	.150	.162	.156	50 @ 50MHz
MD-0712S-1.5T-C-J	Brown	.032	.034	.033	64 @ 100MHz
MD-0712S-2.5T-C-J	Red	.050	.056	.053	64 @ 100MHz
MD-0712S-3.5T-C-J	Orange	.070	.084	.077	64 @ 100MHz
MD-0712S-4.5T-C-J	Yellow	.100	.120	.110	60 @ 100MHz
MD-0712S-5.5T-C-J	Green	.120	.150	.135	60 @ 100MHz
MD-0712S-6.5T-C-J	Blue	.142	.184	.163	48 @ 50MHz
MD-0712S-7.5T-C-J	Violet	.172	.216	.194	48 @ 50MHz
MD-0712S-8.5T-C-J	Gray	.202	.248	.224	48 @ 50MHz
MD-0712S-9.5T-C-J	White	.234	.284	.260	46 @ 50MHz
MD-0712S-10.5T-C-J	Black	.260	.315	.288	46 @ 50MHz

ELECTRICAL CHARACTERISTICS • J SERIES UNSHIELDED STYLES

3L PART NUMBER	Color	L MIN. (µH)	L MAX (µH)	L NOM. (µH)	Q MIN. (@ L NOM.)
MD-0712U-1.5T-S-J	Brown	.036	.040	.038	72 @ 100MHz
MD-0712U-2.5T-S-J	Red	.056	.070	.063	72 @ 100MHz
MD-0712U-3.5T-S-J	Orange	.082	.108	.096	72 @ 100MHz
MD-0712U-4.5T-S-J	Yellow	.108	.151	.130	72 @ 100MHz
MD-0712U-5.5T-S-J	Green	.137	.193	.165	82 @ 50MHz
MD-0712U-6.5T-S-J	Blue	.176	.234	.205	90 @ 50MHz
MD-0712U-7.5T-S-J	Violet	.222	.268	.245	90 @ 50MHz
MD-0712U-1.5T-C-J	Brown	.036	.040	.038	76 @ 100MHz
MD-0712U-2.5T-C-J	Red	.057	.071	.064	76 @ 100MHz
MD-0712U-3.5T-C-J	Orange	.090	.122	.106	66 @ 100MHz
MD-0712U-4.5T-C-J	Yellow	.117	.175	.146	66 @ 100MHz
MD-0712U-5.5T-C-J	Green	.148	.232	.190	66 @ 100MHz
MD-0712U-6.5T-C-J	Blue	.188	.292	.240	62 @ 50MHz
MD-0712U-7.5T-C-J	Violet	.231	.373	.292	62 @ 50MHz
MD-0712U-8.5T-C-J	Gray	.272	.412	.342	62 @ 50MHz
MD-0712U-9.5T-C-J	White	.330	.480	.405	60 @ 50MHz
MD-0712U-10.5T-C-J	Black	.390	.540	.465	60 @ 50MHz

TESTING:

1. *Inductance & Q measured on MQ-171VHF meter. Attach 1/2" AWG #20 Tinned Copper wire soldered along full length of the coil leads. Then bend at 90•, 1/4" from bottom of lead.*
2. *Inductance min. is measured with core 1/2" way out top of form.*
3. *All inductance values greater than 0.1 µH read at recommended Q meter frequency.*
4. *All values less than 0.1 µH calculated from readings taken at 100 MHz.*

FOR MORE INFORMATION, PLEASE CALL THE FACTORY ... 813-343-2679.

Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes

3L GLOBAL ELECTRONICS

2915 Anvil Street N.
St. Petersburg, FL 33710
Phone: (813) 343-2679
Fax: (813) 343-4410

3lglobal@worldnet.att.net

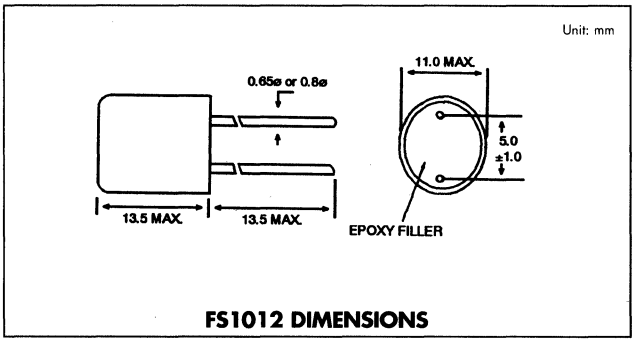
FERRITE SHIELDED INDUCTORS

ISO 9002 REGISTERED

FS & FSB TYPE

FEATURES

(1) Vertical, small, lightweight design.
(2) Vertical structure simplifies mounting.
(3) Inductive interference rare.
(4) Excellent Q vs. frequency.
(5) Small distributed capacity contributes to high self-resonant frequency.
(6) Excellent humidity resistance.
(7) High dielectric strength and insulation resistance.
(8) Available tape and reel for auto insertion.



FS1012 DIMENSIONS

ELECTRICAL CHARACTERISTICS

Style: Radial leaded type
Rated Current: Based on coil temperature rise not to exceed 20°C at 80°C ambient temperature.
Rated Temperature Range: -20°C to + 80°C
Dielectric Withstanding Voltage: 250 V r.m.s.
L and Q measured with HP4342A Q meter at specified frequency.
Terminal Tensile Strength: FS1012 type 1.0kg min./FS1014 type 2.5kg min.
Terminal Bending Strength: 0.5 kg min.
Moisture Resistance Characteristic: $\Delta L/L \leq \pm 5\%$, $\Delta Q/Q \leq \pm 10\%$

ORDERING INFORMATION

FS	1012	-	122	K
(1)	(2)		(3)	(4)

(1) FS Type
(2) Style
(3) Inductance
(4) Tolerance

ELECTRICAL CHARACTERISTICS • FS1012 INDUCTORS

3L PART NUMBER	INDUCTANCE @ 1KHz (µH) ± 10%	Q-FACTER (MIN.)	Q TEST FEEQ. (KHz)	DC RESISTANCE (Ω) MAX.	RATED DC CURRENT (mA) MAX.
FS1012-122K	1.2	50	252	1.2	200
FS1012-152K	1.5			1.5	
FS1012-182K	1.8			1.6	
FS1012-222K	2.2			1.8	
FS1012-272K	2.7	40		1.9	
FS1012-332K	3.3			2.3	
FS1012-392K	2.9			2.5	
FS1012-472K	4.7			3.7	140
FS1012-502K	5.0			3.8	
FS1012-562K	5.6			4.0	
FS1012-682K	6.8	100		4.2	
FS1012-822K	8.2		79.6	5.3	100
FS1012-102K	10			7.3	
FS1012-153K	15			11.0	90
FS1012-183K	18			13.6	75
FS1012-223K	22			15.4	
FS1012-273K	27			17.9	
FS1012-333K	33			23.3	60
FS1012-393K	39			25.9	

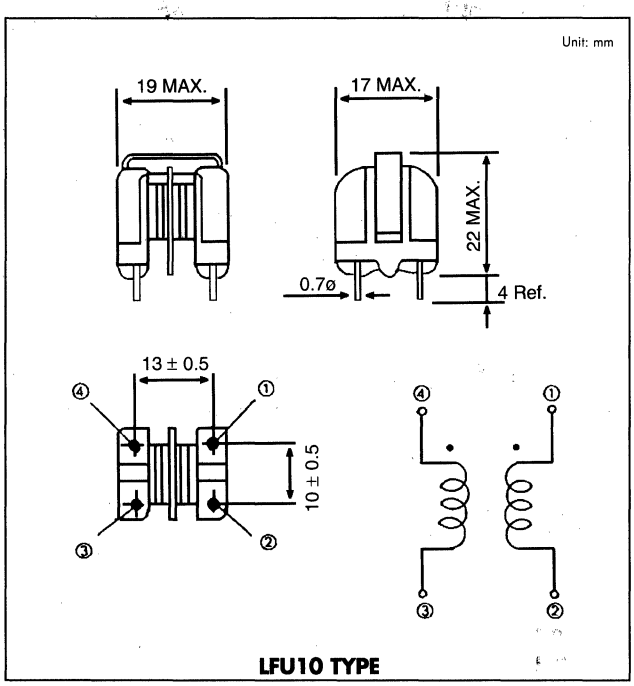
3L PART NUMBER	INDUCTANCE @ 1KHz (µH) ± 10%	Q-FACTER (MIN.)	Q TEST FEEQ. (KHz)	DC RESISTANCE (Ω) MAX.	RATED DC CURRENT (mA) MAX.
FS1012-473K	47	80	79.6	30.4	60
FS1012-503K	50			37.8	50
FS1012-563K	56			39.1	
FS1012-683K	68	50		40	
FS1012-823K	82			47	40
FS1012-104K	100	120	25.2	50	
FS1012-124K	120	100		91	30
FS1012-154K	150	90		140	20
FS1012-184K	180			164	
FS1012-224K	220			182	
FS1012-274K	270			200	
FS1012-334K	330	80		275	15
FS1012-394K	390			300	
FS1012-474K	470			345	
FS1012-564K	560	60		520	8.4
FS1012-684K	680			590	
FS1012-824K	820	50		675	
FS1012-105K	1,000			770	
FS1012-125K	1,200			845	

Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes
3L GLOBAL ELECTRONICS
2915 Anvil Street N.
St. Petersburg, FL 33710
Phone: (813) 343-2679
Fax: (813) 343-4410
3lglobal@worldnet.att.net

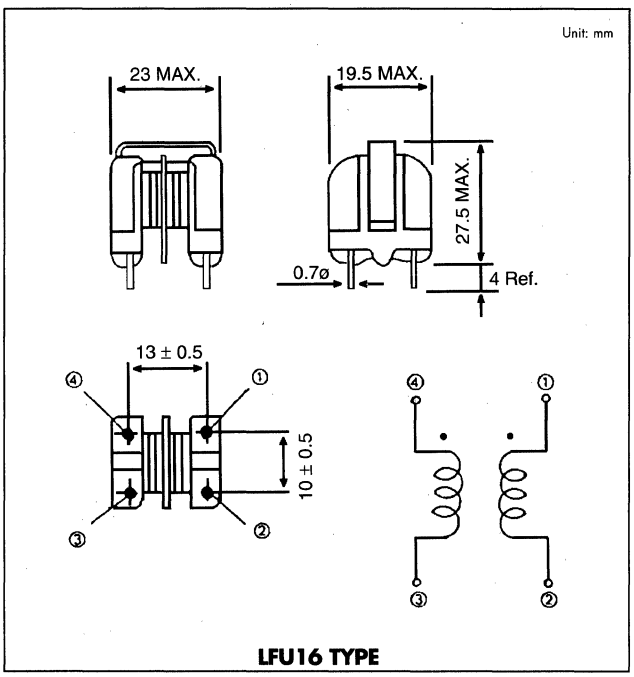
COMMON-MODE CHOKE

ISO 9002 REGISTERED

A.C. LINE FILTER (LFU10 & LFU16 TYPES)



LFU10 TYPE



LFU16 TYPE

Tested at 1KHz with universal bridge

The LFU Series provide excellent attenuation characteristics at low frequencies. They are compact in size, but provide high inductance. They offer excellent voltage resistant characteristics. (Material: UL 94V0)

TYPICAL APPLICATIONS

- Eliminates power line noise in switching power supplies
- Minimizes noise emission for conforming to JTTC, FCC, CISPR, VDE, VCCI
- Protects primary AC side from the effects of switching regulators

ORDERING INFORMATION

LF	U10	-	102U	-	1.0A
(1)	(2)		(3)		(4)

(1) Line Filter
(2) Size
(3) Inductance
(4) Amp

ELECTRICAL CHARACTERISTICS • LFU10 & LFU16 TYPES

3L PART NUMBER	RATED VOLTAGE (AC/DC)	RATED CURRENT (AMP)	INDUCTANCE (mH) MIN.	DC RESISTANCE (Ω)* MAX.	TEST VOLTAGE (VAC)**	INSULATION RESISTANCE (MΩ)*** MIN.	TEMP. RISE MAX. (°C)	TEMP. RANGE (°C)
LFU10-103U-0.3A	250V	0.3A	10.0	3.0	2000	100	40	-25~120
LFU10-502U-0.3A			5.0	2.0				
LFU10-502U-0.5A		0.5A		1.5				
LFU10-402U-0.7A		0.7A	4.0	1.0				
LFU10-302U-1.0A		1.0A	3.0	0.5				
LFU10-202U-1.0A			2.0					
LFU10-102U-1.0A			1.0	0.4				
LFU10-102U-1.3A		1.3A		0.3				
LFU10-102U-1.5A		1.5A		0.2				
LFU10-601U-2.0A		2.0A	0.6	0.15				

3L PART NUMBER	RATED VOLTAGE (AC/DC)	RATED CURRENT (AMP)	INDUCTANCE (mH) MIN.	DC RESISTANCE (Ω)* MAX.	TEST VOLTAGE (VAC)**	INSULATION RESISTANCE (MΩ)*** MIN.	TEMP. RISE MAX. (°C)	TEMP. RANGE (°C)
LFU16-303U-0.4A	250V	0.4A	30	2.8	2000	100	40	-25~120
LFU16-203U-0.4A			20	2.2				
LFU16-203U-0.5A		0.5A		1.6				
LFU16-103U-0.6A		0.6A	10	1.2				
LFU16-802U-0.8A		0.8A	8	0.8				
LFU16-602U-0.8A			6	0.7				
LFU16-602U-1.0A		1.0A		0.5				
LFU16-402U-1.0A			4	0.4				
LFU16-352U-1.2A		1.2A	3.5	0.3				
LFU16-252U-1.2A			2.5	0.25				
LFU16-152U-1.5A		1.5A	1.5	0.15				

* *Line at one side*
** *For one minute between lines*
*** *At 500V DC between lines*

Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes

3L GLOBAL ELECTRONICS

2915 Anvil Street N.
St. Petersburg, FL 33710
Phone: (813) 343-2679
Fax: (813) 343-4410

3lglobal@worldnet.att.net

HIGH CURRENT FILTER CHOKES

ISO 9002 REGISTERED

FC TYPE

The FC Series high current filter chokes feature printed circuit board mounting terminations and tin-plated leads.

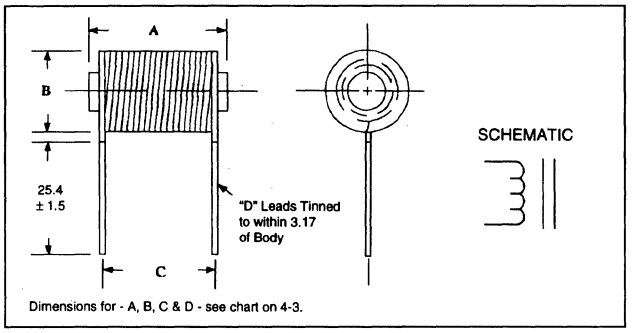
TYPICAL APPLICATIONS

- Noise filter for switching regulators
- Power amplifiers
- Power supplies
- SCR & Triac control circuits

ORDERING INFORMATION

FC	0828	-	101	N	-	3A
(1)	(2)		(3)	(4)		(5)

(1) Base model high current choke
(2) Size
(3) Inductance
(4) Tolerance
(5) Maximum current rating (AMP)

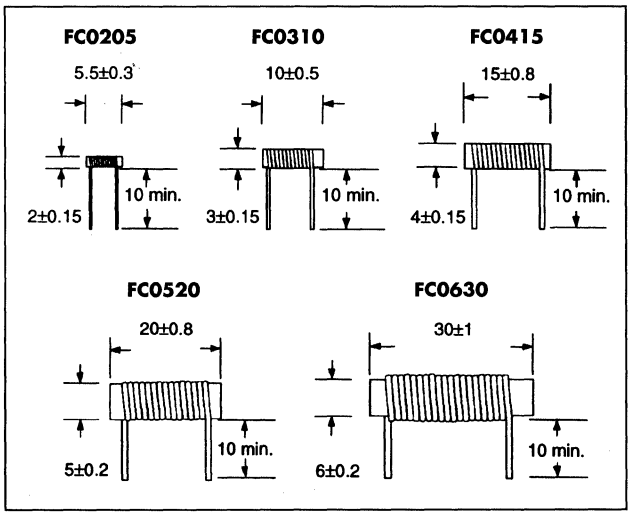


Dimensions for - A, B, C & D - see chart on 4-3.

ORDERING INFORMATION

FC	0520	100	-	K
(1)	(2)	(3)		(4)

(1) Base model high current choke
(2) Size
(3) Inductance
(4) Tolerance



ELECTRICAL CHARACTERISTICS • FC TYPE

3L PART NUMBER	INDUCTANCE @ 1KHz (µH±10%)	DC RESISTANCE (Ω) MAX.	RATED DC CURRENT (AMP) MAX.	S.R.F. (MHz) MIN.	WIRE SIZE (mm)	NO. OF TURNS	NET WEIGHT /pc(g)
FC0205-1R0K	1.0	.040	0.56	200	0.3	11.5	.150
FC0205-1R2K	1.2	.040	0.56	180	0.3	12.5	.165
FC0310-1R8K	1.8	.026	1.90	160	0.55	11.5	.70
FC0310-2R2K	2.2	.028	1.57	150	0.5	13.5	.714
FC0310-2R7K	2.7	.030	1.57	140	0.5	15.5	.729
FC0310-3R3K	3.3	.035	1.27	135	0.45	17.5	.686
FC0310-3R9K	3.9	.050	1.00	110	0.4	18.5	.634
FC0310-4R7K	4.7	.070	0.76	90	0.35	19.5	.575
FC0415-4R7K	4.7	.024	2.26	90	0.6	17.5	1.60
FC0415-5R6K	5.6	.030	1.90	80	0.55	18.5	1.40
FC0415-6R8K	6.8	.040	1.57	80	0.5	18.5	1.40
FC0415-8R2K	8.2	.060	1.27	80	0.45	21.5	1.32
FC0415-100K	10	.080	1.00	70	0.4	24.5	1.20
FC0520-100K	10	.040	2.65	60	0.65	22.5	3.10
FC0520-120K	12	.044	2.26	55	0.6	23.5	2.98
FC0520-150K	15	.060	1.90	45	0.55	27.5	2.97
FC0520-180K	18	.080	1.57	40	0.5	29.5	2.87
FC0520-220K	22	0.10	1.27	38	0.45	32.5	2.73
FC0520-270K	27	0.15	1.00	36	0.4	36.5	2.63
FC0630-4R7K	4.7	.005	16.08	85	1.6	12.5	10.2
FC0630-5R6K	5.6	.005	16.08	80	1.6	14.5	11.0
FC0630-6R8K	6.8	.008	10.61	75	1.3	15.5	8.68
FC0630-8R2K	8.2	.009	9.04	67	1.2	16.5	8.35
FC0630-100K	10	.010	9.04	64	1.2	19.5	8.80
FC0630-120K	12	.018	6.28	57	1.0	20.5	7.43
FC0630-150K	15	.023	5.08	53	0.9	23.5	7.23
FC0630-180K	18	.030	4.02	49	0.8	24.5	6.70
FC0630-220K	22	.045	3.07	44	0.7	27.5	6.24
FC0630-270K	27	.050	3.07	42	0.7	31.5	6.40
FC0630-330K	33	.060	2.65	36	0.65	35.5	6.53
FC0630-390K	39	.080	2.26	34	0.6	40.5	6.23
FC0630-470K	47	1.10	1.90	32	0.55	44.5	6.22
FC0630-560K	56	1.40	1.57	30	0.5	46.5	5.80

3L PART NUMBER	INDUCTANCE @ 1KHz (µH±15%)	RATED DC CURRENT (AMP) MAX.	DC RESISTANCE (Ω) MAX.	S.R.F. (MHz) MIN.	INCREMENTAL CURRENT (AMP)	DIMENSIONS A MAX.	B MAX.	C MAX.	D MAX.
FC0820-5R0N-3A	5.0		0.15	40	19.0	22.23	15.88	12.70	
FC1025-100N-3A	10		.081	25	17.0	28.58	15.88	17.45	
FC0820-270N-3A	27		.035	8	15.0	22.23	20.62	11.10	
FC0525-550N-3A	50	3.0	.050	5	12.0	28.58	20.62	19.05	1.067
FC08280101N-3A	100		.065	2.5	8.0	28.58	20.62	23.80	
FC0832-151N-3A	150		.075	2.0	5.0	34.98	20.62	26.97	
FC0840-252N-3A	250		.090	1.0	3.0	41.28	20.62	33.32	
FC1020-5R0N-5A	5.0		0.12	30	20.0	22.23	16.62	19.05	
FC0820-270N-5A	27		0.25	7	15.0	22.23	22.23	14.27	
FC1025-500N-5A	50	5.0	.030	4	10.0	28.53	22.23	19.05	1.35
FC0828-680N-5A	68		.035	3.5	9.0	28.53	22.23	22.23	
FC10320191N05A	100		.050	2.5	7.0	34.93	22.23	25.40	
FC1040-151N-5A	150		.060	2.0	5.0	41.28	22.23	31.75	
FC1025-5R0N-10A	5.0		.010	30	19.0	28.53	17.45	20.62	
FC10320199N019A	10		.012	20	17.0	34.93	17.45	30.94	
FC0825-270N-10A	27	10	.018	7	15.0	28.53	23.80	17.45	1.65
FC0832-500N-10A	50		.025	4	9.0	34.93	23.80	23.80	
FC1032-680N-10A	68		.027	3.5	8.0	34.93	23.80	28.53	
FC1040-101N-10A	100		.030	2.5	6.0	41.28	23.80	33.32	
FC1032-5R0N-15A	5.0		.008	30	20.0	34.93	18.42	23.80	
FC1040-100N-15A	10	15	.010	20	17.0	42.85	18.42	38.10	2.08
FC0828-270N-15A	27		.015	7	14.0	34.98	25.40	23.80	
FC1035-500N-15A	50		.020	4	9.0	41.28	25.40	28.53	

FOR SPECIAL VALUES AND OTHER REQUIREMENTS, PLEASE CONTACT THE FACTORY.

- Inductance measured with zero D.C. current • Incremental current reduces inductance at less than 10%
- Average current must not exceed specified rated current

Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes
Inductors • Coils • Chokes

3L GLOBAL ELECTRONICS

2915 Anvil Street N.
St. Petersburg, FL 33710
Phone: (813) 343-2679
Fax: (813) 343-4410

3lglobal@worldnet.att.net

TOKO Surface Mount Inductors

1-800-PIK-TOKO
http://www.tokoam.com

TOKO SURFACE MOUNT FIXED INDUCTORS

TOKO Types	Height mm max.	RATED DC (Ref.) CURRENT AT:(A) 1.0µH	10µH	100µH	Quantity by Reel	Inductance Range 1µH 10µH 100µH 1mH 10mH
3DM High inductance Multiplier choke	2.75	-	-	0.032	2,000	100 — 4.7
3DF Miniature size DC choke	3.1	1.34	0.63	0.21	2,000	1 — 270
D52FU Miniature size DC choke	2.2	-	-	0.75	2,000	100 — 680
D62F	2.7	2.73	1.20	-	1,000	1 — 47
D62C Low profile DC choke	2.7	2.87	0.99	-	1,000	1 — 47
D73LF	3.0	3.60	1.37	0.39	1,000	1
D73LC Low profile DC choke	3.0	2.72	1.04	0.30	1,000	1
D73F	3.5	2.88	1.41	0.38	1,000	1
D73C Multipurpose DC choke	3.5	3.12	1.34	0.41	1,000	1
D75F	5.1	2.88	1.68	0.50	1,000	1 — 470
D75F Multipurpose DC choke	5.1	2.88	1.56	0.51	1,000	1 — 560
D75P Pot core shielded DC choke	5.0	-	0.84	0.26	1,000	10 — 470
D78C High current DC choke	8.1	4.60	1.75	0.60	500	1 — 330
D10F High current DC choke	5.0	-	2.60	1.05	750	10 — 1.5

Non Shielded
Shielded

TOKO CHIP INDUCTORS

TOKO Types	Typical Q	EIA Footprint	Quantity per Reel	Inductance Range 1nH 10nH 100nH 1µH 10µH 100µH 1mH
LL1005-FH "World's smallest" Ceramic nH	50@ 1900 MHz	0402 (1.0 x 0.5 mm)	10,000	5.6; 6.8 — 47; 3.3 — 47
LL1608-FS High current, High Q in micro size Ceramic nH	50@ 800 MHz	0603 (1.6 x 0.8 mm)	4,000	1.2 — 5.6; 6.8 — 270; 3.3 — 270
LL2012-FH General purpose nH Ceramic nH	55@ 800 MHz	0805 (2.0 x 1.2 mm)	4,000 (3,000) ≥47nH	1.5 — 5.6; 6.8 — 680; 3.3 — 680
PTL2012 Tight Tolerance	40@ 800 MHz	0805 (2.0 x 1.2 mm)	4,000	5.6; 6.8 — 8.2; 10 — 39
FSLM General purpose Ferrite nH and µH	45	1008 (2.5 x 2.0 mm)	2,000	100 — 220; 100 — 220
FSLB High current/Low DCR Ferrite µH	40	1008 (2.5 x 2.0 mm)	2,000	1 — 10; 10 — 47
32CS General purpose Ferrite nH and µH	30	1210 (3.2 x 2.7 mm)	1,500	10 — 220; 1 — 220; 10 — 8.2
33CS	85@ 150 MHz	1616 (4.0 x 4.0 mm)	2,000	6.8 — 22
36CS Air core High Q		2616 (6.4 x 4.0 mm)	2,000	22 — 50

Tolerances:
C = ±0.3nH
S = ±0.3nH
T = 3%
J = 5%
K = 10%
M = 20%

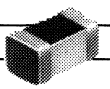
TOKO America, Inc. ■ 1250 Feehanville Drive ■ Mount Prospect, IL 60056 ■ Tel: (847) 297-0070 ■ Fax: (847) 699-7864

1-800-PIK-TOKO
http://www.tokoam.com

Surface Mount Inductors

TOKO

LL1005-FH MULTILAYER CHIP INDUCTOR



The LL1005-FH Series is a miniature multilayer ceramic chip inductor. Toko's proprietary laminated ceramic material provides high SRF, excellent Q, and superior reliability. It has an industry standard 0402 footprint and comes on tape in 10,000 piece reels. Designing with the LL1005-FH allows savings of 50-80% board space which reduces the overall cost of the end product and/or allows for more features to be designed in. An ideal replacement for printed as well as wirewound inductors, for today's miniature high frequency RF and wireless communications equipment.

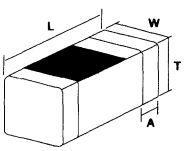
FEATURES

- Laminated ceramic allows high SRF over 6 GHz
- Miniature size: 0402 footprint (1.0 x 0.5 mm)
- Inductance range: 1.0 ~ 47nH
- Q: 30 typical at 800 MHz
- Operating Temperature Range: -40°C ~ +100°C
- Packaged on tape and reel in 10,000 piece quantity

STANDARD PART NUMBERS

TOKO Part Number	Inductance nH @100MHz	Inductance Tolerance	Q typ @ MHz 100	Q typ @ MHz 800	SRF MHz min	RDC Ω max	Idc mA max	Qty pcs/Reel
LL1005-FH1N0S	1.0	S	9	(28)	>4000	0.10	300	10,000
LL1005-FH1N2S	1.2	S	9	(28)	>4000	0.10	300	10,000
LL1005-FH1N5S	1.5	S	10	(28)	>4000	0.10	300	10,000
LL1005-FH1N8S	1.8	S	10	(27)	>4000	0.10	300	10,000
LL1005-FH2N2S	2.2	S	10	(29)	>4000	0.12	300	10,000
LL1005-FH2N7S	2.7	S	10	(30)	>4000	0.12	300	10,000
LL1005-FH3N3_*	3.3	S,K	10	(30)	3800	0.15	300	10,000
LL1005-FH3N9_*	3.9	S,K	11	(30)	3400	0.15	300	10,000
LL1005-FH4N7_*	4.7	S,K	11	(30)	3000	0.18	300	10,000
LL1005-FH5N6_*	5.6	S,K	11	(31)	2700	0.20	300	10,000
LL1005-FH6N8_*	6.8	J,K	11	(31)	2400	0.25	300	10,000
LL1005-FH8N2_*	8.2	J,K	12	(33)	2200	0.25	300	10,000
LL1005-FH10N_*	10.0	J,K	12	(32)	1900	0.30	300	10,000
LL1005-FH12N_*	12.0	J,K	12	(31)	1750	0.30	300	10,000
LL1005-FH15N_*	15.0	J,K	12	(30)	1550	0.40	300	10,000
LL1005-FH18N_*	18.0	J,K	12	(29)	1350	0.50	300	10,000
LL1005-FH22N_*	22.0	J,K	12	(28)	1250	0.60	300	10,000
LL1005-FH27N_*	27.0	J,K	12	(27)	1100	0.60	300	10,000
LL1005-FH33N_*	33.0	J,K	10	(25)	1000	1.50	200	10,000
LL1005-FH39N_*	39.0	J,K	10	(25)	900	1.80	200	10,000
LL1005-FH47N_*	47.0	J,K	9	(22)	800	2.00	200	10,000

DIMENSIONS

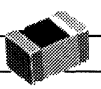


Type	L (mm)	W (mm)	T (mm)	A (mm)
LL1005	1.0±0.15	0.5±0.15	0.5±0.15	0.25±0.1

* Add tolerance to part number: S=±0.3nH, J =5%, K=10%

Testing Conditions:
(1) L,Q: HP4291A at 100MHz (Test fixture 16092)
(2) SRF: HP8753C (Test fixture 16091A)
(3) Rdc: VP-2811A (MAISUSHITA)

LL1608-FS MULTILAYER CHIP INDUCTOR



The LL1608-FS Series is a miniature multilayer ceramic chip inductor. Toko's proprietary laminated ceramic material provides high SRF, excellent Q, and superior reliability. The FS allows up to 3 times the current handling of standard multilayers. In addition, the Qs are 1.3 - 1.6 times higher. It has an industry standard 0603 footprint and comes on tape in 4,000 piece reels. It is an ideal solution for higher current needs in high frequency RF and wireless communications equipment.

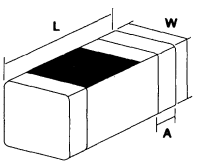
FEATURES

- High current handling, up to 1W
- Laminated ceramic allows high SRF
- Miniature size: 0603 footprint
- Inductance range: 1.2 ~ 270 nH
- Q: 40 ~ 57 typical at 800 MHz
- Operating temperature: -40°C ~ +100°C
- Packaged on tape and reel in 4000 piece quantity

STANDARD PART NUMBERS

TOKO Part Number	Inductance (nH) @ 100MHz	Inductance Tolerance	Q (Typ. @-MHz) 100	Q (Typ. @-MHz) 800	Q (Typ. @-MHz) 1800	SRF MHz (typ)	RDC Ω (max)	Idc (mA) (max)	Qty pcs/Reel
LL1608-FS1N2S	1.2	S	13	(45)	(60)	10.000	0.10	1000	4.000
LL1608-FS1N5S	1.5	S	13	(45)	(60)	8.000	0.10	1000	4.000
LL1608-FS1N8S	1.8	S	12	(40)	(61)	8.000	0.10	1000	4.000
LL1608-FS2N2S	2.2	S	13	(45)	(69)	7.200	0.10	1000	4.000
LL1608-FS2N7S	2.7	S	13	(45)	(67)	6.200	0.10	1000	4.000
LL1608-FS3N3_*	3.3	S, K	16	(53)	(71)	5.350	0.10	1000	4.00
LL1608-FS3N9_*	3.9	S, K	13	(42)	(59)	5.250	0.12	1000	4.000
LL1608-FS4N7_*	4.7	S, K	14	(43)	(59)	4.750	0.12	600	4.000
LL1608-FS5N6_*	5.6	S, K	15	(47)	(66)	4.100	0.14	600	4.000
LL1608-FS6N8_*	6.8	J, K	15	(50)	(66)	3.300	0.16	600	4.000
LL1608-FS8N2_*	8.2	J, K	16	(52)	(69)	3.300	0.18	600	4.000
LL1608-FS10N_*	10	J, K	20	(56)	(60)	3.000	0.20	600	4.000
LL1608-FS12N_*	12	J, K	20	(57)	(43)	2.500	0.22	600	4.000
LL1608-FS15N_*	15	J, K	18	(53)	(58)	2.500	0.25	600	4.000
LL1608-FS18N_*	18	J, K	14	(40)	(—)	2.350	0.30	600	4.000
LL1608-FS22N_*	22	J, K	22	(56)	(—)	2.050	0.35	600	4.000
LL1608-FS27N_*	27	J, K	21	(54)	(—)	1.900	0.40	600	4.000
LL1608-FS33N_*	33	J, K	21	(53)	(—)	1.750	0.45	600	4.000
LL1608-FS39N_*	39	J, K	23	(51)	(—)	1.450	0.50	500	4.000
LL1608-FS47N_*	47	J, K	22	(40)	(—)	1.250	0.60	500	4.000
LL1608-FS56N_*	56	J, K	23	(44)	(—)	1.200	0.70	500	4.000
LL1608-FS68N_*	68	J, K	23	(38)	(—)	1.100	0.80	400	4.00
LL1608-FS82N_*	82	J, K	23	(—)	(—)	950	1.1	300	4.000
LL1608-FSR10_*	100	J, K	24	(—)	(—)	850	1.2	300	4.000
LL1608-FSR12_*	120	J, K	* 18	(—)	(—)	850	1.5	250	4.000
LL1608-FSR15_*	150	J, K	* 19	(—)	(—)	680	1.8	250	4.000
LL1608-FSR18_*	180	J, K	* 19	(—)	(—)	600	2.0	200	4.000
LL1608-FSR22_*	220	J, K	* 19	(—)	(—)	500	2.5	200	4.000
LL1608-FSR27_*	270	J, K	** 15	(—)	(—)	450	3.0	200	4.000

DIMENSIONS



Type	L (mm)	W (mm)	T (mm)	A (mm)
LL1608	1.6±0.15	0.8±0.15	0.8±0.15	0.3±0.2

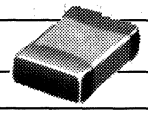
Test Equipment
* 50MHz **25MHz

L, Q : HP4291A at 100MHz (Test fixture:16192A)
S.R.F.: HP3719D
Rdc: VP-2811A (Matsushita)

TOKO Surface Mount Inductors

1-800-PIK-TOKO
http://www.tokoam.com

LL2012-FH MULTILAYER CHIP INDUCTOR



The LL2012-FH Series is a miniature multilayer ceramic chip inductor. Toko's proprietary laminated ceramic material provides high SRF, excellent Q, and superior reliability. These inductors are an ideal solution for signal shaping, or RF filtering for high frequency RF and wireless communication devices.

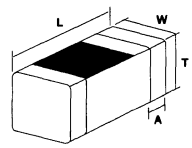
FEATURES

- Laminated ceramic allows SRF over 6GHz
- Inductance range: 1.5 ~ 680 nH
- Temp. coefficient of L: +250ppm/°C
- Packaged on tape & reel
- Miniature size: 0805 footprint
- Q: 45 ~ 65 typical at 800 MHz
- Operating temperature: -40°C ~ +100°C

STANDARD PART NUMBERS

TOKO Part Number	Inductance (nH) @ 100MHz	Inductance Tolerance	Q (Typ.) @-MHz 100	800	1800	SRF MHz (Typ)	RDC Ω (max)	Idc (mA) (max)	Q'ty pcs/Reel
LL2012-FH1N5S	1.5	S	15	(50)	(60)	7.000	0.10	300	4.000
LL2012-FH1N8S	1.8	S	15	(51)	(61)	6.800	0.10	300	4.000
LL2012-FH2N2S	2.2	S	19	(61)	(125)	5.700	0.10	300	4.000
LL2012-FH2N7S	2.7	S	21	(62)	(75)	5.350	0.10	300	4.000
LL2012-FH3N3_*	3.3	S, K	21	(64)	(79)	4.300	0.10	300	4.00
LL2012-FH3N9_*	3.9	S, K	17	(59)	(90)	4.000	0.10	300	4.000
LL2012-FH4N7_*	4.7	S, K	17	(55)	(55)	3.600	0.12	300	4.000
LL2012-FH5N6_*	5.6	S, K	17	(51)	(52)	3.500	0.15	300	4.000
LL2012-FH6N8_*	6.8	J, K	20	(58)	(53)	3.000	0.15	300	4.000
LL2012-FH8N2_*	8.2	J, K	20	(58)	(55)	2.800	0.18	300	4.000
LL2012-FH10N_*	10	J, K	20	(58)	(55)	2.600	0.20	300	4.000
LL2012-FH12N_*	12	J, K	21	(61)	(70)	2.250	0.22	300	4.000
LL2012-FH15N_*	15	J, K	17	(48)	(38)	2.250	0.24	300	4.000
LL2012-FH18N_*	18	J, K	21	(58)	(—)	2.000	0.26	300	4.000
LL2012-FH22N_*	22	J, K	22	(59)	(—)	1.800	0.28	300	4.000
LL2012-FH27N_*	27	J, K	21	(54)	(—)	1.600	0.30	300	4.000
LL2012-FH33N_*	33	J, K	22	(54)	(—)	1.400	0.40	300	4.000
LL2012-FH39N_*	39	J, K	23	(50)	(—)	1.300	0.50	300	4.000
LL2012-FH47N_*	47	J, K	24	(47)	(—)	1.150	0.55	300	3.000
LL2012-FH56N_*	56	J, K	25	(45)	(—)	1.050	0.60	300	3.000
LL2012-FH68N_*	68	J, K	26	(—)	(—)	950	0.65	300	3.000
LL2012-FH82N_*	82	J, K	28	(—)	(—)	800	0.70	300	3.000
LL2012-FHR10_*	100	J, K	27	(—)	(—)	700	0.80	300	3.000
LL2012-FHR12_*	120	J, K	* 22	(—)	(—)	650	0.85	250	3.000
LL2012-FHR15_*	150	J, K	* 21	(—)	(—)	550	0.90	250	3.000
LL2012-FHR18_*	180	J, K	* 22	(—)	(—)	500	1.0	250	3.000
LL2012-FHR22_*	220	J, K	* 22	(—)	(—)	450	1.2	200	3.000
LL2012-FHR27_*	270	J, K	** 14	(—)	(—)	350	1.3	200	3.000
LL2012-FHR33_*	330	J, K	** 14	(—)	(—)	350	1.5	150	3.000
LL2012-FHR39_*	390	J, K	** 15	(—)	(—)	300	1.8	150	3.000
LL2012-FHR47_*	470	J, K	** 14	(—)	(—)	260	2.0	100	3.000
LL2012-FHR56_*	560	J, K	** 15	(—)	(—)	230	2.2	100	3.000
LL2012-FHR68_*	680	J, K	** 14	(—)	(—)	180	5.5	50	3.000

DIMENSIONS

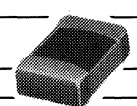


Type	L (mm)	W (mm)	T (mm)	A (mm)
LL2012	2.0 ± 0.2	1.25 ± 0.25	0.60 ± 0.2	0.5 ± 0.3
			0.85 ± 0.3	
			1.00 ± 0.3	
			1.10 ± 0.3**	

Test Equipment
* 50MHz **25MHz

L, Q : HP4291A at 100MHz
(Text fixture:16192A)
S.R.F.: HP8719D
Rdc: VP-2811A (Matsushita)

PTL2012-F PHOTOLITHOGRAPHIC CHIP INDUCTOR



The PTL2012-F Series is a photolithographically etched single layer ceramic chip inductor. Toko's proprietary design provides high SRF, excellent Q, and superior temperature stability. This inductor family is specifically designed for critical tolerance inductor needs. The family features Qs of well over 100 at 1.9 GHz. More economical than thin film or screened wirewounds, the PTL2012 is an ideal solution for tight tolerance requirements, such as VCO circuits and GaAs matching.

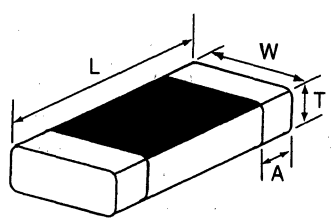
FEATURES

- 3% Inductance Tolerance
- Temperature Coefficient ±100 ppm/°C
- Miniature size: 0805 footprint
- Inductance range: 1.0 ~ 39nH
- Operating Temperature: -40°C ~ +100°C
- Packaged on tape and reel in 4,000 piece quantity

STANDARD PART NUMBERS

TOKO Part Number	Inductance (nH) at 100MHz (1)	Inductance Tolerance	Q (Typ.) @-MHz 100	800	1800	SRF MHz typ (2)	RDC Ω max (3)	IDC mA max
PTL2012-F1N0C	1.0	C	15	55	70	10,000	0.10	300
PTL2012-F1N2C	1.2	C	12	42	56	9,000	0.10	300
PTL2012-F1N5C	1.5	C	9	34	47	8,000	0.15	300
PTL2012-F1N8C	1.8	C	9	30	42	7,200	0.20	300
PTL2012-F2N2C	2.2	C	11	50	67	6,500	0.20	300
PTL2012-F2N7C	2.7	C	10	40	55	6,000	0.30	300
PTL2012-F3N3C	3.3	C	10	40	55	5,300	0.35	300
PTL2012-F3N9C	3.9	C	10	38	53	4,800	0.45	300
PTL2012-F4N7C	4.7	C	10	37	50	4,400	0.50	300
PTL2012-F5N6C	5.6	C	10	40	53	3,950	0.55	300
PTL2012-F6N8S	6.8	S	9	38	52	3,600	0.75	300
PTL2012-F8N2S	8.2	S	9	37	50	3,150	0.90	300
PTL2012-F10NT	10	T	9	38	46	2,900	1.10	300
PTL2012-F12NT	12	T	9	38	44	2,550	1.30	300
PTL2012-F15NT	15	T	9	37	40	2,350	1.80	300
PTL2012-F18NT	18	T	9	36	35	2,050	2.10	300
PTL2012-F22NT	22	T	9	36	—	1,800	2.50	250
PTL2012-F27NT	27	T	9	35	—	1,650	2.70	250
PTL2012-F33NT	33	T	11	36	—	1,450	2.70	250
PTL2012-F39NT	39	T	11	33	—	1,300	3.00	250

DIMENSIONS



Type	L (mm)	W (mm)	T (mm)	A (mm)
PTL2012	2.0 ± 0.2	1.25 ± 0.2	0.5 ± 0.15	0.3 ± 0.2

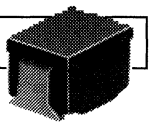
* The rated DC Current is that which the temperature rises to 20°C by excitation DC Current.

1-800-PIK-TOKO
http://www.tokoam.com

Surface Mount Inductors

TOKO

FSLM2520 AND FSLB2520 WIREWOUND CHIP INDUCTOR



The FSLM2520 and FSLB2520 Series is a ferrite core wirewound surface mount chip inductor which conforms to the EIA standard 1008 footprint. Its proprietary welded termination architecture offers superior reliability and high heat-resistance for flow and reflow soldering capability. It is recommended for general signal conditioning, RF or IF filtering applications, or as matching elements.

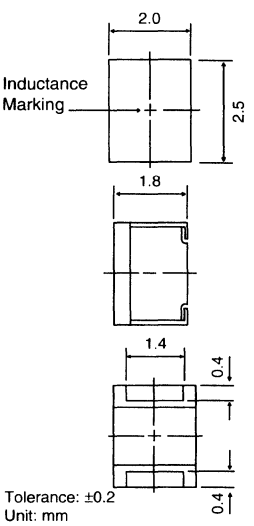
STANDARD PART NUMBERS

TOKO Part Number	Inductance		Q	Test Frequency	DC Resistance	Rated DC Current	Self Resonant Frequency
	L (µH)	Tolerance	Min.	(MHz)	(Ω)Max.	(mA) max	(MHz) min.
FSLM2520-R10_	0.10	±5%, ±10%	30	25.2	0.21	570	680
FSLM2520-R12_	0.12	±5%, ±10%	30	25.2	0.22	550	650
FSLM2520-R15_	0.15	±5%, ±10%	30	25.2	0.25	500	530
FSLM2520-R18_	0.18	±5%, ±10%	30	25.2	0.29	460	520
FSLM2520-R22_	0.22	±5%, ±10%	30	25.2	0.30	430	390
FSLM2520-R27_	0.27	±5%, ±10%	30	25.2	0.33	420	330
FSLM2520-R33_	0.33	±5%, ±10%	30	25.2	0.39	400	310
FSLM2520-R39_	0.39	±5%, ±10%	30	25.2	0.40	375	290
FSLM2520-R47_	0.47	±5%, ±10%	30	25.2	0.44	350	260
FSLM2520-R56_	0.56	±5%, ±10%	30	25.2	0.49	330	230
FSLM2520-R68_	0.68	±5%, ±10%	30	25.2	0.52	320	200
FSLM2520-R82_	0.82	±5%, ±10%	30	25.2	0.61	290	180
FSLM2520-1R0_	1.0	±5%, ±10%	30	7.96	0.75	250	150
FSLM2520-1R2_	1.2	±5%, ±10%	30	7.96	0.87	240	140
FSLM2520-1R5_	1.5	±5%, ±10%	30	7.96	1.0	230	130
FSLM2520-1R8_	1.8	±5%, ±10%	30	7.96	1.1	220	120
FSLM2520-2R2_	2.2	±5%, ±10%	30	7.96	1.3	210	105
FSLM2520-2R7_	2.7	±5%, ±10%	30	7.96	1.4	200	90
FSLM2520-R33_	3.3	±5%, ±10%	30	7.96	1.6	190	80
FSLM2520-3R9_	3.9	±5%, ±10%	30	7.96	1.7	185	75
FSLM2520-4R7_	4.7	±5%, ±10%	30	7.96	1.9	180	70
FSLM2520-5R6_	5.6	±5%, ±10%	30	7.96	2.2	170	60
FSLM2520-6R8_	6.8	±5%, ±10%	30	7.96	2.4	165	55
FSLM2520-8R2_	8.2	±5%, ±10%	30	7.96	2.6	160	50
FSLM2520-100_	10	±5%, ±10%	25	2.52	2.2	155	30
FSLM2520-120_	12	±5%, ±10%	25	2.52	2.5	150	27
FSLM2520-150_	15	±5%, ±10%	25	2.52	2.8	140	23
FSLM2520-180_	18	±5%, ±10%	25	2.52	3.2	130	22
FSLM2520-220_	22	±5%, ±10%	25	2.52	3.6	125	21
FSLM2520-270_	27	±5%, ±10%	25	2.52	4.3	115	19
FSLM2520-330_	33	±5%, ±10%	25	2.52	4.7	110	17
FSLM2520-390_	39	±5%, ±10%	25	2.52	8.1	85	15
FSLM2520-470_	47	±5%, ±10%	25	2.52	8.8	80	14
FSLM2520-560_	56	±5%, ±10%	25	2.52	10.0	75	12.5
FSLM2520-680_	68	±5%, ±10%	25	2.52	11.5	70	12
FSLM2520-820_	82	±5%, ±10%	25	2.52	12.5	65	11
FSLM2520-101_	100	±5%, ±10%	15	0.796	13.0	60	10
FSLM2520-121_	120	±5%, ±10%	15	0.796	19.0	55	8
FSLM2520-151_	150	±5%, ±10%	15	0.796	22.0	50	7.5
FSLM2520-181_	180	±5%, ±10%	15	0.796	25.0	47	7
FSLM2520-221_	220	±5%, ±10%	15	0.796	28.0	44	6.5

FEATURES

- Inductance range: 100nH ~ 220nH
- Typical max Q: 40 ~ 50
- Proprietary wirewound structure with welded terminations offers high reliability
- Operating temp. range: -40°C ~ +85°C
- Superior solderability & high heat-resistance for flow & reflow soldering
- FSLB type for higher current applications
- On tape & reel, 2000 pieces/reel

DIMENSIONS



* Add tolerance to part number: J = 5%, K = 10%, M = 20%.

STANDARD PART NUMBERS

TOKO Part Number	Inductance		Test Freq.	DC Resistance	Rated DC	Self Resonant
	Lo (µH)	Tolerance	MHz	Ω Max.	Current mA Max.	Freq. MHz Min.
FSLB2520-1R0M	1.0	±20%	1	0.30 (0.20)	480 (650)	130 (200)
FSLB2520-1R5M	1.5	±20%	1	0.38 (0.25)	435 (580)	95 (145)
FSLB2520-2R2M	2.2	±20%	1	0.44 (0.32)	390 (500)	75 (100)
FSLB2520-3R3M	3.3	±20%	1	0.57 (0.43)	340 (450)	60 (80)
FSLB2520-4R7M	4.7	±20%	1	0.68 (0.53)	310 (395)	50 (70)
FSLB2520-6R8M	6.8	±20%	1	0.89 (0.66)	295 (350)	40 (54)

TOKO Part Number	Inductance		Test Freq.	DC Resistance	Rated DC	Self Resonant
	Lo (µH)	Tolerance	MHz	Ω Max.	Current mA Max.	Freq. MHz Min.
FSLB2520-100K	10	±10%	1	1.1 (0.86)	220 (325)	33 (47)
FSLB2520-150K	15	±10%	1	1.7 (1.3)	180 (255)	28 (39)
FSLB2520-220K	22	±10%	1	2.5 (2.0)	160 (205)	23 (34)
FSLB2520-330K	33	±10%	1	3.8 (2.9)	130 (170)	18 (26)
FSLB2520-470K	47	±10%	1	5.4 (4.1)	100 (140)	15 (21)

SWITCH MODE POWER INDUCTORS

TOROTEL PRODUCTS INC
WEB PAGE: WWW.TOROTELPROD.COM E-MAIL:TOROTEL@SOUND.NET
13402 SOUTH 71 HIGHWAY GRANDVIEW, MO 64030 TEL: (816) 761-6314 FAX: (816) 763-2278

PART NUMBER	"L" NO DC (µH)	DCR MAX. (Ω)	DCI MAX. (AMPS)	"L" WITH DCI (µH)	LEAD DIA.
**13A0.9	0.9	0.0022	10.0	0.7	0.050
**13A1.6	1.6	0.0035	6.5	1.2	0.040
**13A3.0	3.0	0.0070	4.0	2.4	0.032
**13A5.6	5.6	0.0140	2.5	4.7	0.025
**13A9.9	9.9	0.0280	1.6	8.7	0.020
**13A16.8	16.8	0.0640	1.0	15.4	0.016
**13B1.9	1.9	0.0022	16.0	1.0	0.064
**13B3.6	3.6	0.0042	10.0	2.3	0.050
**13B7.5	7.5	0.0089	6.5	5.0	0.040
**13B11.6	11.6	0.0166	4.0	8.8	0.032
**13B22.6	22.6	0.0342	2.5	17.6	0.025
**13B33.0	33.0	0.0653	1.6	28.1	0.020
**13C0.6	0.6	0.0010	16.0	0.5	0.064
**13C1.7	1.7	0.0023	10.0	1.5	0.050
**13C3.3	3.3	0.0057	6.5	2.9	0.040
**13C6.7	6.7	0.0102	4.0	6.2	0.032
**13C19.4	19.4	0.0263	2.5	17.4	0.025
**13C35.4	35.4	0.0550	1.6	33.0	0.020
**13D4.2	4.2	0.0036	16.0	2.4	0.064
**13D8.2	8.2	0.0073	10.0	5.0	0.050
**13D16.5	16.5	0.0142	6.5	10.4	0.040
**13D25.5	25.5	0.0280	4.0	18.9	0.032
**13D36.4	36.4	0.0544	2.5	29.1	0.025
**13D67.3	67.3	0.1110	1.6	56.5	0.020
**13E5.70	5.7	0.0035	16.0	3.3	0.064
**13E10.6	10.6	0.0073	10.0	6.9	0.050
**13E18.8	18.8	0.0143	6.5	13.3	0.040
**13E34.3	34.3	0.0290	4.0	25.9	0.032
**13E54.3	54.3	0.0564	2.5	44.5	0.025
**13E86.9	86.9	0.1140	1.6	75.6	0.020
**13F6.80	6.8	0.0025	26.0	2.9	0.080
**13F11.5	11.5	0.0049	16.0	5.6	0.064
**13F20.9	20.9	0.0100	10.0	11.3	0.050
**13F32.9	32.9	0.0190	6.5	20.4	0.040
**13F55.9	55.9	0.0380	4.0	39.1	0.032
**13F96.7	96.7	0.0750	2.5	73.0	0.025
**13F147	147.0	0.1480	1.6	121.0	0.020
**13G14.8	14.8	0.0035	26.0	5.9	0.080
**13G25.2	25.2	0.0066	16.0	11.6	0.064
**13G41.3	41.3	0.0140	10.0	21.9	0.050
**13G68.7	68.7	0.0282	6.5	41.2	0.040
**13G113	113.0	0.0564	4.0	75.7	0.032
**13G187	187.0	0.1137	2.5	140.0	0.025
**13G285	285.0	0.2232	1.6	231.0	0.020
**13J12.7	12.7	0.0033	26.0	5.1	0.080
**13J21.7	21.7	0.0060	16.0	10.2	0.064
**13J38.0	38.2	0.0132	10.0	20.2	0.050
**13J62.5	62.5	0.0264	6.5	36.9	0.040
**13J101	101.0	0.0527	4.0	68.7	0.032
**13J160	160.0	0.1038	2.5	122.0	0.025
**13J252	252.0	0.2066	1.6	209.0	0.020

PART NUMBER	"L" NO DC (µH)	DCR MAX. (Ω)	DCI MAX. (AMPS)	"L" WITH DCI (µH)	LEAD DIA.
**13K21.0	21.0	0.0047	26.0	8.8	0.080
**13K36.0	36.0	0.0093	16.0	17.8	0.064
**13K59.0	59.0	0.0184	10.0	33.6	0.050
**13K98.0	98.0	0.0364	6.5	61.7	0.040
**13K161	161.0	0.0710	4.0	114.0	0.032
**13K276	276.0	0.1427	2.5	215.0	0.025
**13K418	418.0	0.2794	1.6	351.0	0.020
**13M40.2	40.2	0.0068	26.0	15.3	0.080
**13M62.2	62.2	0.0129	16.0	28.6	0.064
**13M104	104.0	0.0256	10.0	54.1	0.050
**13M170	170.0	0.0498	6.5	100.0	0.040
**13M275	275.0	0.1000	4.0	187.0	0.032
**13M429	429.0	0.1905	2.5	326.0	0.025
**13M678	678.0	0.3809	1.6	549.0	0.020
**13R45.0	45.0	0.0076	26.0	17.1	0.080
**13R75.0	75.0	0.0146	16.0	33.0	0.064
**13R122	122.0	0.0294	10.0	63.4	0.050
**13R194	194.0	0.0567	6.5	113.0	0.040
**13R306	306.0	0.1116	4.0	202.0	0.032
**13R522	522.0	0.2242	2.5	392.0	0.025
**13R760	760.0	0.4314	1.6	616.0	0.020
**13S79.0	79.0	0.0100	26.0	30.0	0.080
**13S125	125.0	0.0196	16.0	55.0	0.064
**13S197	197.0	0.0389	10.0	102.0	0.050
**13S325	325.0	0.0776	6.5	186.0	0.040
**13S515	515.0	0.1508	4.0	345.0	0.032
**13S822	822.0	0.2946	2.5	617.0	0.025
**13S1255	1255.0	0.5808	1.6	1029.0	0.020
**13V123	123.0	0.0123	26.0	51.7	0.080
**13V209	209.0	0.0246	16.0	100.0	0.064
**13V330	330.0	0.0490	10.0	185.0	0.050
**13V545	545.0	0.0982	6.5	338.0	0.040
**13V854	854.0	0.1926	4.0	606.0	0.032
**13V1348	1348.0	0.3762	2.5	1051.0	0.025
**13V2103	2103.0	0.7492	1.6	1767.0	0.020
**13X80.0	80.0	0.0069	41.0	25.6	0.100
**13X138	138.0	0.0141	26.0	49.7	0.080
**13X220	220.0	0.0270	16.0	92.4	0.064
**13X351	351.0	0.0552	10.0	175.0	0.050
**13X550	550.0	0.1096	6.5	308.0	0.040
**13X880	880.0	0.2195	4.0	581.0	0.032
**13X1376	1376.0	0.4335	2.5	1018.0	0.025
**13Y106	106.0	0.0082	41.0	32.9	0.100
**13Y172	172.0	0.0165	26.0	61.9	0.080
**13Y280	280.0	0.0329	16.0	118.0	0.064
**13Y448	448.0	0.0666	10.0	222.0	0.050
**13Y696	696.0	0.1320	6.5	390.0	0.040
**13Y1100	1100.0	0.2625	4.0	726.0	0.032
**13Y1730	1730.0	0.5261	2.5	1280.0	0.025

Switch Mode Power Supply Inductors

All the power inductors on these two facing pages have a full, tightly spaced single layer winding on a toroidal core, using powdered composition ferromagnetic technology.

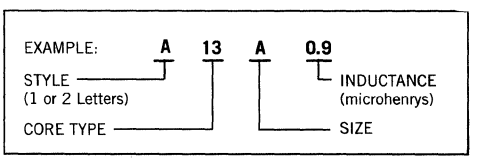
Small distributed gaps in the magnetic path greatly decrease the effective permeability and increase the energy storage capacity of the inductors. The distributed gaps significantly lower radiated fields.

The single layer toroidal winding results in a minimum distributed capacitance and high self-resonance for good high-frequency noise rejection.

The "13" Core Material has the lowest cost, while the "18" Core Material has the lowest core loss. Four condensed tables from the "Switch Mode Power Supply Resource Handbook" are shown on this and the next three pages.

All materials are conservatively rated for 130°C operation.

PART NUMBER ORDERING INFORMATION



SIZE	STYLE A			STYLE D		STYLE N				STYLE F						STYLE G			
	A	B	C	A	B	A	B	C	D	A	B	C	D	E	F	A	B	C	D
A	.620	.300	.520	.570	.300	.700	.370	.520	N/A	.770	.650	.600	.440	.250	.040	.630	.700	.390	.220
B	.880	.400	.750	.820	.400	.930	.470	.750	N/A	N/A	N/A	N/A	N/A	N/A	N/A	.970	.930	.630	.450
C	.880	.470	.750	.820	.470	.920	.540	.750	N/A	N/A	N/A	N/A	N/A	N/A	N/A	.970	.930	.630	.450
D	.970	.470	.750	.900	.470	1.000	.540	.750	.112-40	1.100	1.100	.800	.650	.400	.050	.970	1.050	.630	.450
E	1.030	.500	.800	.950	.500	1.050	.570	.800	.112-40	1.100	1.120	.800	.650	.400	.050	.970	1.100	.630	.450
F	1.160	.550	.970	1.080	.550	1.200	.620	1.000	.112-40	1.100	1.150	.800	.650	.400	.050	1.280	1.200	.730	.500
G	1.260	.610	1.050	1.180	.610	1.250	.680	1.000	.112-40	1.180	1.260	.900	.830	.600	.050	1.280	1.310	.730	.500
J	1.300	.620	1.140	1.220	.620	1.380	.690	1.200	.138-32	1.260	1.380	.900	.830	.600	.050	1.280	1.380	.730	.500
K	1.450	.760	1.290	1.370	.760	1.450	.830	1.200	.138-32	1.370	1.450	.900	.830	.600	.050	N/A	N/A	N/A	N/A
M	1.750	.750	1.580	1.660	.750	1.750	.820	1.500	.138-32	1.660	1.770	.900	.830	.600	.050	N/A	N/A	N/A	N/A
P	1.800	.700	1.630	1.710	.700	1.800	.770	1.600	.138-32	1.710	1.860	.900	.830	.600	.050	N/A	N/A	N/A	N/A
R	1.830	.720	1.660	1.740	.720	1.840	.790	1.600	.138-32	1.740	1.840	.900	.830	.600	.050	N/A	N/A	N/A	N/A
S	2.000	.900	1.820	1.910	.900	2.100	.970	1.900	.138-32	1.910	2.000	.900	.950	.600	.050	N/A	N/A	N/A	N/A
U	2.360	.970	2.150	2.250	.970	2.400	1.040	2.200	.164-32	2.250	2.400	1.500	1.130	.900	.050	N/A	N/A	N/A	N/A
V	2.360	1.080	2.150	2.250	1.080	2.400	1.150	2.200	.164-32	N/A	N/A	N/A	N/A	N/A	.050	N/A	N/A	N/A	N/A
X	2.500	.930	2.300	2.400	.930	2.550	1.000	2.350	.164-32	2.400	2.550	1.500	1.130	.900	.050	N/A	N/A	N/A	N/A
Y	2.780	.970	2.580	2.680	.970	2.830	1.040	2.650	.164-32	2.680	2.830	1.500	1.130	.900	.050	N/A	N/A	N/A	N/A

SWITCH MODE POWER INDUCTORS

TOROTEL PRODUCTS INC
WEB PAGE: WWW.TOROTELPROD.COM E-MAIL:TOROTEL@SOUND.NET
13402 SOUTH 71 HIGHWAY GRANDVIEW, MO 64030 TEL: (816) 761-6314 FAX: (816) 763-2278

Free to Power Supply Engineers! "Switch Mode Power Supply Resource Handbook" 2nd Edition

The 2nd Edition has been simplified, to make the selection process easier. It contains:

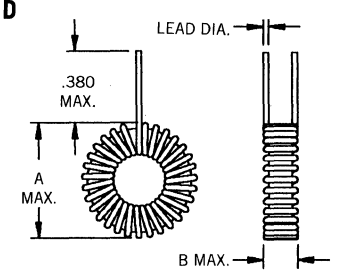
- Six catalogs of power inductors.
- 632 Inductors — 16 physical sizes — 6 Types of Core Materials
- A common mode inductor catalog.
- A current sense inductor catalog.
- Technical data to aid in the proper selection of size, core material, and physical configurations.
- Relative data is given for cost, energy storage capacity, and core loss.

Phone Dept. 75, FAX, or write for a **FREE** handbook.

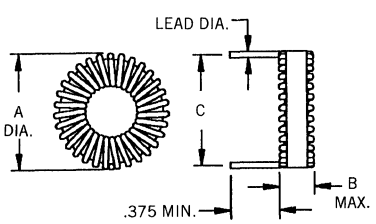
PART NUMBER	"L" NO DC (µH)	DCR MAX. (Ω)	DCI MAX. (AMPS)	"L" WITH DCI (µH)	LEAD DIA.
**18A0.9	0.9	0.0022	10.0	0.8	0.050
**18A1.6	1.6	0.0035	6.5	1.5	0.040
**18A3.1	3.1	0.0070	4.0	2.9	0.032
**18A5.7	5.7	0.0140	2.5	5.5	0.025
**18A10.1	10.1	0.0280	1.6	9.8	0.020
**18A17.1	17.1	0.0640	1.0	16.8	0.016
**18B1.8	1.8	0.0022	16.0	1.5	0.064
**18B3.3	3.3	0.0042	10.0	2.9	0.050
**18B7.0	7.0	0.0089	6.5	6.1	0.040
**18B11.0	11.0	0.0166	4.0	10.2	0.032
**18B23.0	23.0	0.0342	2.5	21.8	0.025
**18B32.0	32.0	0.0653	1.6	30.7	0.020
**18D5.3	5.3	0.0036	16.0	4.2	0.064
**18D10.5	10.5	0.0073	10.0	8.7	0.050
**18D17.4	17.4	0.0142	6.5	15.3	0.040
**18D30.0	30.0	0.0280	4.0	27.9	0.032
**18D48.5	48.5	0.0544	2.5	46.1	0.025
**18D81.0	81.0	0.1110	1.6	78.5	0.020
**18E5.2	5.2	0.0035	16.0	4.1	0.064
**18E9.7	9.7	0.0073	10.0	8.3	0.050
**18E17.2	17.2	0.0143	6.5	15.1	0.040
**18E31.3	31.3	0.0290	4.0	28.8	0.032
**18E49.7	49.7	0.0564	2.5	47.2	0.025
**18E79.5	79.5	0.1140	1.6	76.7	0.020
**18F5.5	5.5	0.0025	26.0	3.5	0.080
**18F9.5	9.5	0.0049	16.0	7.2	0.064
**18F17.0	17.0	0.0100	10.0	13.7	0.050
**18F27.0	27.0	0.0190	6.5	23.5	0.040
**18F46.5	46.5	0.0380	4.0	42.3	0.032
**18F80.0	80.0	0.0750	2.5	74.4	0.025
**18F123	123.0	0.1480	1.6	118.0	0.020
**18G10.0	10.0	0.0033	26.0	6.3	0.080
**18G17.5	17.5	0.0068	16.0	12.6	0.064
**18G29.5	29.5	0.0129	10.0	23.6	0.050
**18G50.0	50.0	0.0255	6.5	42.0	0.040
**18G80.0	80.0	0.0490	4.0	72.8	0.032
**18G140	140.0	0.0992	2.5	130.0	0.025
**18G205	205.0	0.1902	1.6	196.0	0.020
**18J13.0	13.5	0.0039	26.0	8.2	0.080
**18J23.0	23.0	0.0078	16.0	16.5	0.064
**18J35.0	35.0	0.0142	10.0	28.3	0.050
**18J60.0	60.0	0.0280	6.5	51.6	0.040
**18J100	100.0	0.0551	4.0	91.0	0.032
**18J178	178.0	0.1130	2.5	165.0	0.025
**18J257	257.0	0.2160	1.6	246.0	0.020
**18K20.0	20.0	0.0047	26.0	13.0	0.080
**18K34.5	34.5	0.0093	16.0	25.8	0.064
**18K56.5	56.5	0.0184	10.0	46.3	0.050
**18K93.5	93.5	0.0364	6.5	82.2	0.040
**18K153	153.0	0.0710	4.0	140.0	0.032
**18K263	263.0	0.1427	2.5	247.0	0.025
**18K400	400.0	0.2794	1.6	388.0	0.020
**18M37.0	37.0	0.0068	26.0	21.0	0.080
**18M57.0	57.0	0.0129	16.0	41.0	0.064
**18M95.5	95.5	0.0256	10.0	75.4	0.050
**18M155	155.0	0.0498	6.5	131.0	0.040
**18M252	252.0	0.1000	4.0	224.0	0.032
**18M394	394.0	0.1905	2.5	366.0	0.025
**18M623	623.0	0.3809	1.6	598.0	0.020

PART NUMBER	"L" NO DC (µH)	DCR MAX. (Ω)	DCI MAX. (AMPS)	"L" WITH DCI (µH)	LEAD DIA.
**18P33.0	33.0	0.0073	26.0	15.8	0.080
**18P53.0	53.0	0.0142	16.0	33.4	0.064
**18P86.0	86.0	0.0275	10.0	62.8	0.050
**18P140	140.0	0.0532	6.4	113.0	0.040
**18P223	223.0	0.1057	4.0	194.0	0.032
**18P355	355.0	0.2035	2.5	327.0	0.025
**18P544	544.0	0.3996	1.6	517.0	0.020
**18R43.0	43.0	0.0076	26.0	23.5	0.080
**18R71.5	71.5	0.0146	16.0	48.5	0.064
**18R117	117.0	0.0294	10.0	90.0	0.050
**18R186	186.0	0.0567	6.5	154.0	0.040
**18R293	293.0	0.1116	4.0	260.0	0.032
**18R495	495.0	0.2242	2.5	455.0	0.025
**18R728	728.0	0.4314	1.6	691.0	0.020
**18S76.5	76.5	0.0100	26.0	42.0	0.080
**18S121	121.0	0.0196	16.0	83.0	0.064
**18S192	192.0	0.0389	10.0	149.0	0.050
**18S318	318.0	0.0776	6.5	266.0	0.040
**18S498	498.0	0.1508	4.0	443.0	0.032
**18S801	801.0	0.2946	2.5	752.0	0.025
**18S1225	1225.0	0.5808	1.6	1188.0	0.020
**18U66.0	66.0	0.007	41.0	28.0	0.100
**18U116	116.0	0.014	26.0	63.0	0.080
**18U187	187.0	0.025	16.0	125.0	0.064
**18U305	305.0	0.053	10.0	232.0	0.050
**18U489	489.0	0.106	6.5	400.0	0.040
**18U767	767.0	0.209	4.0	682.0	0.032
**18U1197	1197.0	0.412	2.5	1113.0	0.025
**18V120	120.0	0.0123	26.0	74.0	0.080
**18V203	203.0	0.0246	16.0	144.0	0.064
**18V320	320.0	0.0490	10.0	259.0	0.050
**18V529	529.0	0.0982	6.5	454.0	0.040
**18V830	830.0	0.1926	4.0	755.0	0.032
**18V1309	1309.0	0.3762	2.5	1243.0	0.025
**18V2042	2042.0	0.7492	1.6	1960.0	0.020
**18X74.0	74.0	0.0069	41.0	30.0	0.100
**18X128	128.0	0.0141	26.0	64.0	0.080
**18X203	203.0	0.0270	16.0	134.0	0.064
**18X324	324.0	0.0552	10.0	246.0	0.050
**18X508	508.0	0.1096	6.5	421.0	0.040
**18X813	813.0	0.2195	4.0	723.0	0.032
**18X1272	1272.0	0.4335	2.5	1182.0	0.025
**18Y102	102.0	0.0082	41.0	37.0	0.100
**18Y165	165.0	0.0165	26.0	82.0	0.080
**18Y269	269.0	0.0329	16.0	174.0	0.064
**18Y430	430.0	0.0666	10.0	322.0	0.050
**18Y669	669.0	0.1320	6.5	548.0	0.040
**18Y1054	1054.0	0.2625	4.0	932.0	0.032
**18Y1665	1665.0	0.5261	2.5	1548.0	0.025

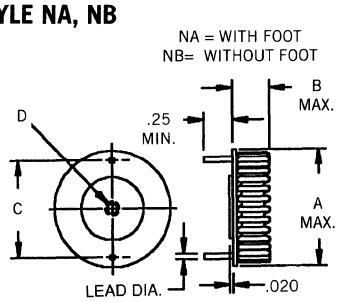
STYLE D



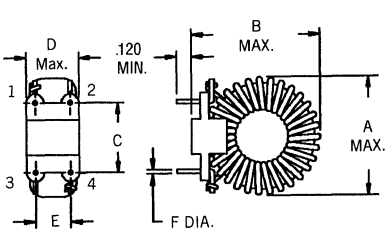
STYLE A



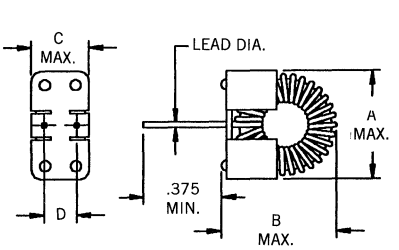
STYLE NA, NB



STYLE F



STYLE G



.080 Dia. Leads Are Not Available

COMMON MODE INDUCTORS

TOROTEL PRODUCTS INC
WEB PAGE: WWW.TOROTELPROD.COM E-MAIL:TOROTEL@SOUND.NET
13402 SOUTH 71 HIGHWAY GRANDVIEW, MO 64030 TEL: (816) 761-6314 FAX: (816) 763-2278

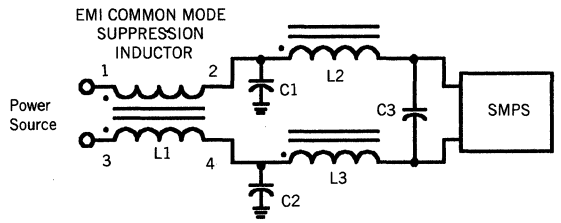
Common Mode Inductors for EMI/RFI Applications

Common Mode Inductors are most often used to eliminate line transmitted noise, such as that caused by transistors, SCR's, etc., in switch mode regulated power supplies. Interference caused by multiple equipment on a common power line can be minimized by the "split-winding" design, thus reducing the inherent conducted noise to an acceptable level.

- Maximum operating temperature: 130°C. (ambient + temperature rise)
- Dielectric strength: 1500 Vrms
- Winding balance: ±1%

PART NUMBER	"L"† (mH)	DCI‡ (Amps)	DCR† (Ω) max.	LEAKAGE INDUCTANCE (µH)	TEST** LEVEL (VRMS)	LEAD DIA.
*31G1	1.0	6.0	0.02	12	0.08	0.036
*31G3	3.0	3.5	0.06	35	0.20	0.032
*31G10	10.0	1.8	0.24	130	0.50	0.032

† Inductance and DCR values shown are for each winding. Other inductances are available.
‡ DCI is for 40°C temperature rise.
** Test level is at 1 KHZ.

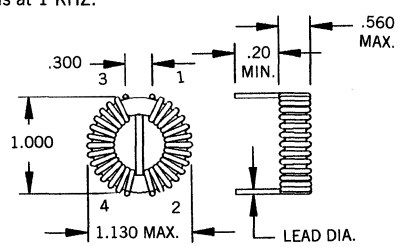


A typical circuit for the elimination of noise is shown above. The filter contains two stages, one for common mode noise (L1, C1 and C2) and one for conducted noise (L2, L3 and C3). Special note should be made of the phasing dots.

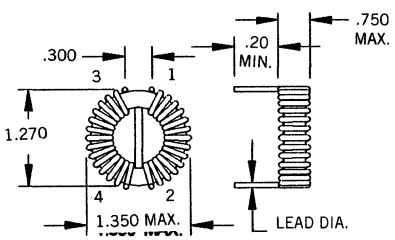
PART NUMBER	"L"† (mH)	DCI‡ (Amps)	DCR† (Ω) max.	LEAKAGE INDUCTANCE (µH)	TEST** LEVEL (VRMS)	LEAD DIA.
*32K2	2.0	7.5	0.02	25	0.08	0.047
*32K4	4.0	5.2	0.04	45	0.20	0.036
*32K8	8.0	3.2	0.12	90	0.50	0.032
*32K16	16.0	2.6	0.16	180	1.00	0.032

Dimensions are in inches
For LEAD DIA. see table above.

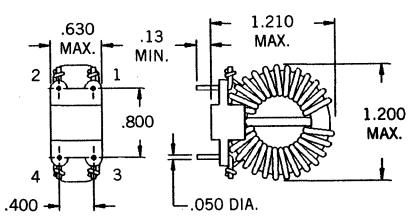
STYLE A



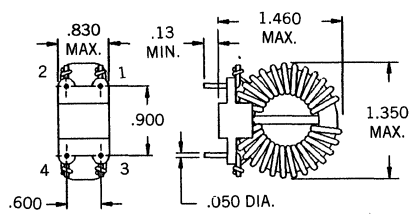
STYLE A



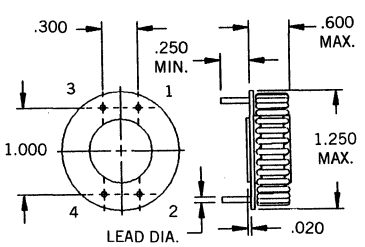
STYLE F



STYLE F



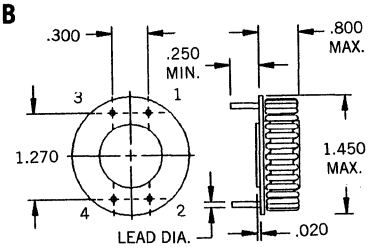
STYLE NA, NB



STYLE	DESCRIPTION
NA	WITH FOOT
NB	WITHOUT FOOT

These parts may be special ordered with a 4-40UNC X 5 threads min. insert.

STYLE NA, NB



PART NUMBER ORDERING INFORMATION

* Add style prefix (from this page) to part number

EXAMPLE: A 31 G 1
STYLE
INDUCTANCE (milihenrys)
CORE TYPE
SIZE

CURRENT SENSE INDUCTORS

TOROTEL PRODUCTS INC
WEB PAGE: WWW.TOROTELPROD.COM E-MAIL:TOROTEL@SOUND.NET
13402 SOUTH 71 HIGHWAY GRANDVIEW, MO 64030 TEL: (816) 761-6314 FAX: (816) 763-2278

PART NUMBER	TURNS	INDUCTANCE (mH)	TEST LEVEL (V) †	DCR (Ω)	R_T (Ω)	SCHEMATIC
*1C30	30	1.8	0.015	0.3	30	1
*1C50	50	5.0	0.025	0.7	50	1
*1C100	100	20	0.050	1.4	100	1
*1C200	200	80	0.100	4.5	200	1
*1C400	400	320	0.200	10.0	400	1
*1C600	600	1080	0.300	20.0	600	1
*2C30	30CT	1.8	0.015	0.3	30	2
*2C50	50CT	5.0	0.025	0.7	50	2
*2C100	100CT	20	0.050	1.4	100	2
*2C200	200CT	80	0.100	4.5	200	2
*2C400	400CT	320	0.200	10.0	400	2
*2C600	600CT	1080	0.300	20.0	600	2

† Test frequency is 1 kHz.

Current transformers are used to sense a current in a conductor and provide a voltage which is proportional to that current, while providing high voltage isolation. These current transformers are suitable for switch mode power supply applications and are rated for 130°C operating temperature. Center tap models are also available.

SCHEMATIC 1

FIG. 1

SCHEMATIC 2

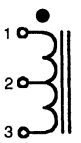
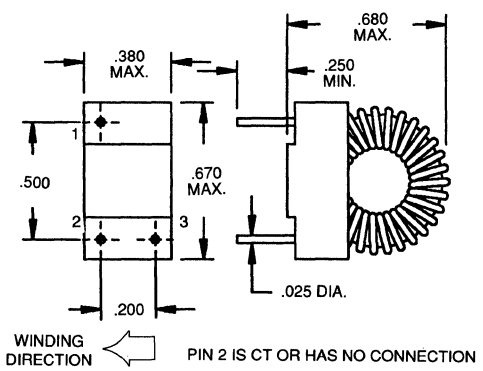
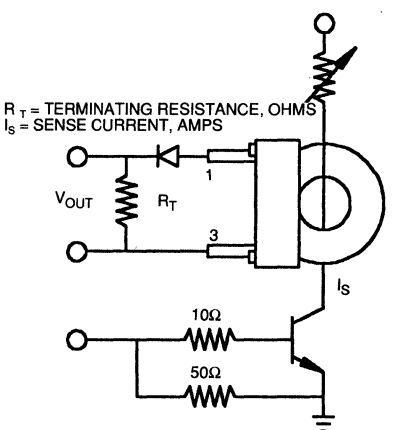


FIG. 2

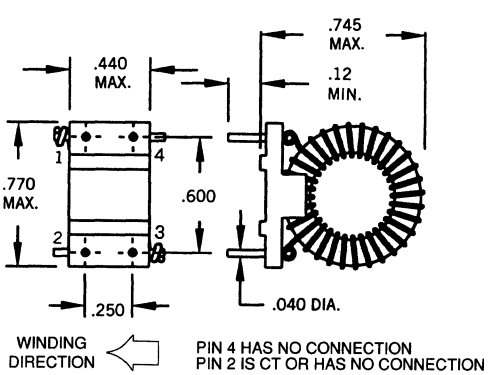
STYLE E



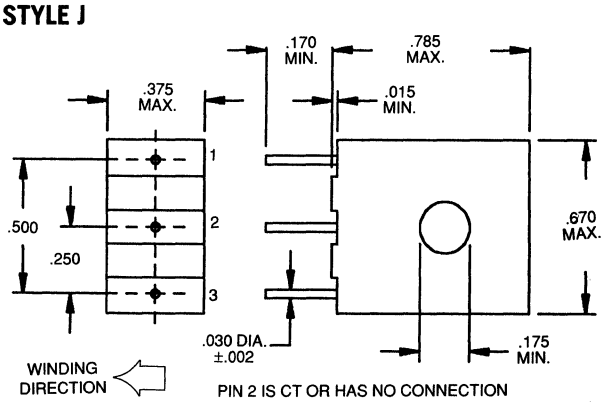
TYPICAL CIRCUIT APPLICATION



STYLE F



STYLE J



PART NUMBER ORDERING INFORMATION

* Add style prefix (from this page) to part number

EXAMPLE: **E** **1** **C** **30**
STYLE — SCHEMATIC — SIZE — TURNS

Dimensions are in inches

MINIATURIZED POWER INDUCTORS

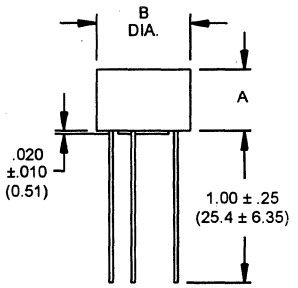
These Power Inductors are also manufactured and tested to MIL-T-27/356. Contact Torotel for price and delivery information and applicable part numbers (MIL-T-27/356-01 through MIL-T-27/356-63).

- Ideally suited as switching regulator and coupled inductors, common mode chokes, or in other power filtering applications.
- The temperature rise is less than 30 °C when measured at an ambient temperature of 100 °C, 0.1 Vrms, 10 kHz, and at rated DC current as shown in the Tables below.
- A large number of sizes allows a selection for optimum performance per unit volume.
- Each unit is magnetically shielded.

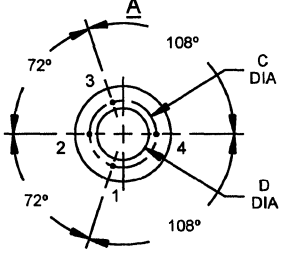
PART NUMBER	SERIES CONNECTED INDUCTANCE @ 0 DC (mHt)	DC CURRENT (Amps.)	DCR (Ω)	SIZE
PK356-2	20.0	0.100	29.0	2
PK356-3	20.0	0.140	20.0	3
PK356-4	20.0	0.220	12.4	4
PK356-5	20.0	0.290	10.2	5
PK356-7	15.0	0.120	22.0	2
PK356-8	15.0	0.160	15.0	3
PK356-9	15.0	0.250	9.3	4
PK356-10	15.0	0.330	7.7	5
PK356-12	10.0	0.140	14.6	2
PK356-13	10.0	0.200	10.0	3
PK356-14	10.0	0.310	6.2	4
PK356-15	10.0	0.400	5.1	5
PK356-16	7.5	0.100	20.3	1
PK356-17	7.5	0.170	11.0	2
PK356-18	7.5	0.240	7.5	3
PK356-19	7.5	0.380	4.7	4
PK356-20	7.5	0.490	3.8	5
PK356-21	5.0	0.120	13.5	1
PK356-22	5.0	0.210	7.3	2
PK356-23	5.0	0.300	5.0	3
PK356-24	5.0	0.470	3.1	4
PK356-25	5.0	0.600	2.6	5
PK356-26	3.0	0.160	8.1	1
PK356-27	3.0	0.270	4.4	2
PK356-28	3.0	0.380	3.0	3
PK356-29	3.0	0.600	1.9	4
PK356-30	3.0	0.780	1.5	5
PK356-31	2.0	0.190	5.4	1
PK356-32	2.0	0.330	2.9	2
PK356-33	2.0	0.470	2.0	3
PK356-34	2.0	0.740	1.3	4
PK356-35	2.0	0.950	1.0	5

PART NUMBER	SERIES CONNECTED INDUCTANCE @ 0 DC (mHt)	DC CURRENT (Amps.)	DCR (Ω)	SIZE
PK356-36	1.00	0.270	2.70	1
PK356-37	1.00	0.470	1.50	2
PK356-38	1.00	0.660	1.00	3
PK356-39	1.00	1.000	0.62	4
PK356-40	1.00	1.300	0.50	5
PK356-41	0.75	0.310	2.00	1
PK356-42	0.75	0.540	1.00	2
PK356-43	0.75	0.760	0.75	3
PK356-44	0.75	1.200	0.47	4
PK356-45	0.75	1.600	0.38	5
PK356-46	0.50	0.380	1.30	1
PK356-47	0.50	0.660	0.66	2
PK356-48	0.50	0.930	0.50	3
PK356-49	0.50	1.470	0.31	4
PK356-50	0.50	1.900	0.25	5
PK356-51	0.25	0.530	0.66	1
PK356-52	0.25	0.930	0.33	2
PK356-53	0.25	1.300	0.25	3
PK356-54	0.25	2.080	0.16	4
PK356-55	0.25	2.700	0.13	5
PK356-56	0.10	0.780	0.30	1
PK356-57	0.10	1.350	0.17	2
PK356-58	0.10	1.950	0.11	3
PK356-59	0.10	3.080	0.07	4
PK356-60	0.10	3.880	0.06	5
PK356-61	0.04	1.180	0.14	1
PK356-62	0.04	2.030	0.07	2
PK356-63	0.04	2.680	0.25	3

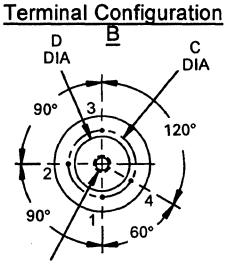
† Inductance is measured at 0.1 Vrms and 10kHz. The inductance is at least 80% of the table value when measured with rated dc current.



Terminal Configuration A



Terminal Configuration B



Insert 0.200 Deep Min.

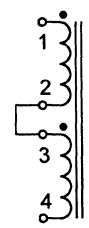
Only Case Size 5 has .138-32 UNC-2B Insert as shown in Terminal Configuration B Diagram.

All inductors have split windings for versatility. They can be connected in series, parallel or individually for balanced filtering applications.

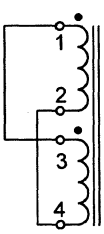
The ratings in the above tables are for a series-aided connection of both windings. The inductance of a parallel connection of these windings will result in 25% of the inductance at twice the rated current. The DCR will be 25% of the series connection.

Example: Parallel connection of PK356-2 will have 5 mh at .20 Amp DC with a DCR of 7.25 ohms.

SERIES



PARALLEL



SIZE	A (MAX.)	B (MAX.)	C (±.010)	D (±.010)	TERMINAL CONFIG.	LEAD DIA.
1	0.280 (7.11)	0.410 (10.41)	0.260 (6.60)	0.160 (4.06)	A	0.012 (0.31)
2	0.340 (8.63)	0.500 (12.70)	0.350 (8.89)	0.250 (6.35)	A	0.012 (0.31)
3	0.415 (10.54)	0.630 (16.00)	0.440 (11.17)	0.340 (8.64)	A	0.016 (0.41)
4	0.500 (12.70)	0.800 (20.32)	0.560 (14.22)	0.460 (11.68)	B	0.016 (0.41)
5	0.635 (16.12)	0.950 (24.13)	0.670 (17.00)	0.570 (14.48)	B	0.020 (0.51)

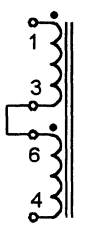
TOROTEL PRODUCTS INC
WEB PAGE: WWW.TOROTELPROD.COM E-MAIL:TOROTEL@SOUND.NET
13402 SOUTH 71 HIGHWAY GRANDVIEW, MO 64030 TEL: (816) 761-6314 FAX: (816) 763-2278

MINIATURIZED SURFACE MOUNT POWER INDUCTORS

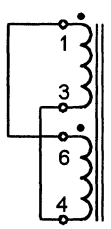
The Widely Used PK356 Series of Miniaturized Power Inductors Is Now Available in Surface Mount Styles

- These miniature power inductors with split windings are ideally suited as switching regulator and coupled inductors, common mode chokes, or in other power filtering applications.
- Surface mount inductors are designed to withstand the extreme temperatures encountered in reflow soldering processes.
- Designed and manufactured to the requirements of MIL-T-27, Type TF5S04ZZ (Not QPL-27 listed).
- The temperature rise is less than 30 °C when measured at an ambient temperature of 100 °C, 0.1 Vrms, 10 kHz, and at the rated DC current as shown in the table at right. The maximum operating temperature (ambient plus temperature rise) is 130 °C
- Low losses at frequencies up to 100 kHz and higher.
- Maximum performance for minimum size.

SERIES



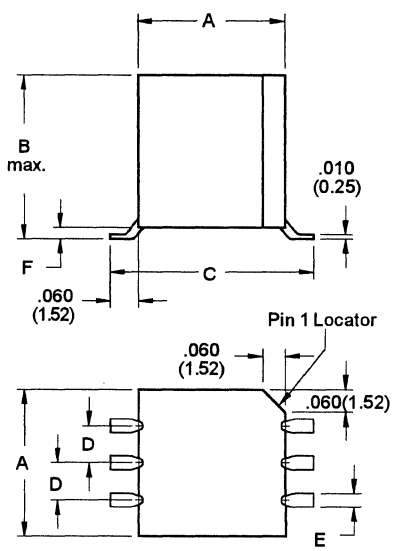
PARALLEL



All inductors have split windings for versatility. They can be connected in series, parallel or individually for balanced filtering applications.

The ratings in the table at the far right are for a series-aided connection of both windings. The inductance of a parallel connection of these windings will result in 25% of the inductance at twice the rated current. The DCR will be 25% of the series connection.

Example: Parallel connection of SK356-2 will have 5 mh at .20 Amp DC with a DCR of 7.25 ohms.



Terminals are Numbered Clockwise from Pin 1. Pins 2 and 5 (center pins) are dummy pins (NC).

PHYSICAL DIMENSIONS

SIZE	A	B	C	D	E	F
1	0.400 (10.16)	0.310 (7.87)	0.520 (13.21)	0.115 (2.92)	0.020 (0.51)	0.012 (0.30)
2	0.495 (12.57)	0.365 (9.27)	0.615 (15.62)	0.140 (3.56)	0.027 (0.69)	0.015 (0.38)
3	0.615 (15.62)	0.460 (11.68)	0.735 (18.67)	0.185 (4.70)	0.027 (0.69)	0.020 (0.51)

Dimensions are in inches (mm).

PART NUMBER	SERIES CONNECTED INDUCTANCE @ 0 DC (mHt)	SERIES CONNECTED DC CURRENT (Amps.)	DCR (Ω)	SIZE
SK356-2	20.00	0.100	29.00	2
SK356-3	20.00	0.140	20.00	3
SK356-7	15.00	0.120	22.00	2
SK356-8	15.00	0.160	15.00	3
SK356-12	10.00	0.140	14.60	2
SK356-13	10.00	0.200	10.00	3
SK356-16	7.50	0.100	20.30	1
SK356-17	7.50	0.170	11.00	2
SK356-18	7.50	0.240	7.50	3
SK356-21	5.00	0.120	13.50	1
SK356-22	5.00	0.210	7.30	2
SK356-23	5.00	0.300	5.00	3
SK356-26	3.00	0.160	8.10	1
SK356-27	3.00	0.270	4.40	2
SK356-28	3.00	0.380	3.00	3
SK356-31	2.00	0.190	5.40	1
SK356-32	2.00	0.330	2.90	2
SK356-33	2.00	0.470	2.00	3
SK356-36	1.00	0.270	2.70	1
SK356-37	1.00	0.470	1.50	2
SK356-38	1.00	0.660	1.00	3
SK356-41	0.75	0.310	2.00	1
SK356-42	0.75	0.540	1.00	2
SK356-43	0.75	0.760	0.75	3
SK356-46	0.50	0.380	1.30	1
SK356-47	0.50	0.660	0.66	2
SK356-48	0.50	0.930	0.50	3
SK356-51	0.25	0.530	0.66	1
SK356-52	0.25	0.930	0.33	2
SK356-53	0.25	0.300	0.25	3
SK356-56	0.10	0.780	0.30	1
SK356-57	0.10	1.350	0.17	2
SK356-58	0.10	1.950	0.11	3
SK356-61	0.04	1.180	0.14	1
SK356-62	0.04	2.030	0.07	2
SK356-63	0.04	2.680	0.06	3

† Inductance is measured at 0.1 Vrms and 10kHz. The inductance is at least 80% of the table value when measured with rated dc current.

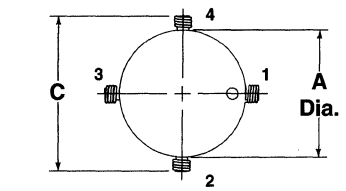
TOROTEL PRODUCTS INC
WEB PAGE: WWW.TOROTELPROD.COM E-MAIL:TOROTEL@SOUND.NET
13402 SOUTH 71 HIGHWAY GRANDVIEW, MO 64030 TEL: (816) 761-6314 FAX: (816) 763-2278

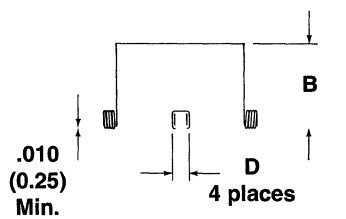
MINIATURIZED POWER INDUCTORS

- Ideally suited as switching regulator and coupled inductors, common mode chokes, or in other power filtering applications.
- The temperature rise is less than 30 ºC when measured at an ambient temperature of 100 ºC, 0.1 Vrms, 10 kHz, and at rated DC current as shown in the Tables below.
- A large number of sizes allows a selection for optimum performance per unit volume.

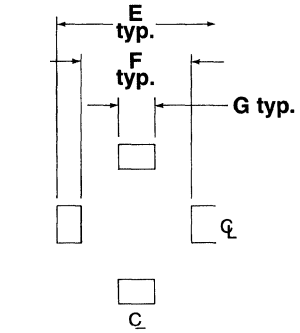
PART NUMBER	INDUCTANCE @ 0 DC (mH†)	DC CURRENT (Amps.)	DCR (Ω)	SIZE
SKC-2	20.0	0.100	29.0	2
SKC-3	20.0	0.140	20.0	3
SKC-4	20.0	0.220	12.4	4
SKC-7	15.0	0.120	22.0	2
SKC-8	15.0	0.160	15.0	3
SKC-9	15.0	0.250	9.3	4
SKC-12	10.0	0.140	14.6	2
SKC-13	10.0	0.200	10.0	3
SKC-14	10.0	0.310	6.2	4
SKC-16	7.5	0.100	20.3	1
SKC-17	7.5	0.170	11.0	2
SKC-18	7.5	0.240	7.5	3
SKC-19	7.5	0.380	4.7	4
SKC-21	5.0	0.120	13.5	1
SKC-22	5.0	0.210	7.3	2
SKC-23	5.0	0.300	5.0	3
SKC-24	5.0	0.470	3.1	4
SKC-26	3.0	0.160	8.1	1
SKC-27	3.0	0.270	4.4	2
SKC-28	3.0	0.380	3.0	3
SKC-29	3.0	0.600	1.9	4
SKC-31	2.0	0.190	5.4	1
SKC-32	2.0	0.330	2.9	2
SKC-33	2.0	0.470	2.0	3
SKC-34	2.0	0.740	1.3	4

PART NUMBER	INDUCTANCE @ 0 DC (mH†)	DC CURRENT (Amps.)	DCR (Ω)	SIZE
SKC-36	1.00	0.270	2.70	1
SKC-37	1.00	0.470	1.50	2
SKC-38	1.00	0.660	1.00	3
SKC-39	1.00	1.000	0.62	4
SKC-41	0.75	0.310	2.00	1
SKC-42	0.75	0.540	1.00	2
SKC-43	0.75	0.760	0.75	3
SKC-44	0.75	1.200	0.47	4
SKC-46	0.50	0.380	1.30	1
SKC-47	0.50	0.660	0.66	2
SKC-48	0.50	0.930	0.50	3
SKC-49	0.50	1.470	0.31	4
SKC-51	0.25	0.530	0.66	1
SKC-52	0.25	0.930	0.33	2
SKC-53	0.25	1.300	0.25	3
SKC-54	0.25	2.080	0.16	4
SKC-56	0.10	0.780	0.30	1
SKC-57	0.10	1.350	0.17	2
SKC-58	0.10	1.950	0.11	3
SKC-59	0.10	3.080	0.07	4
SKC-61	0.04	1.180	0.14	1
SKC-62	0.04	2.030	0.07	2
SKC-63	0.04	2.680	0.06	3





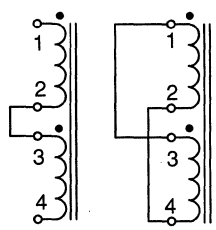
Mechanical Configuration



Suggested Board Layout

† Inductance is measured at 0.1 Vrms and 10kHz. The inductance is at least 80% of the table value when measured with rated dc current.

SERIES PARALLEL



SIZE	A (MAX.)	B (MAX.)	C (MAX.)	D Ref.	E Ref.	F Ref.	G Ref.
1	0.410 (10.41)	0.320 (8.13)	0.510 (12.95)	0.065 (1.65)	0.550 (13.97)	0.400 (10.16)	0.150 (3.85)
2	0.530 (13.21)	0.350 (8.89)	0.630 (16.00)	0.075 (1.91)	0.650 (16.51)	0.500 (12.7)	0.150 (3.85)
3	0.580 (14.73)	0.630 (16.00)	0.680 (17.27)	0.075 (1.91)	0.750 (19.05)	0.600 (15.24)	0.150 (3.85)
4	0.850 (21.59)	0.800 (20.32)	0.880 (22.35)	0.075 (1.91)	0.930 (23.62)	0.850 (21.59)	0.150 (3.85)

Size 2 is available now.
Contact Torotel for status of sizes 1, 3 and 4.

All inductors have split windings for versatility. They can be connected in series, parallel or individually for balanced filtering applications.

The ratings in the above tables are for a series-aided connection of both windings. The inductance of a parallel connection of these windings will result in 25% of the inductance at twice the rated current. The DCR will be 25% of the series connection.

Example: Parallel connection of SKC-2 will be 5 mh and have a current ratting of .20 Amp DC with a DCR of 7.25 ohms.

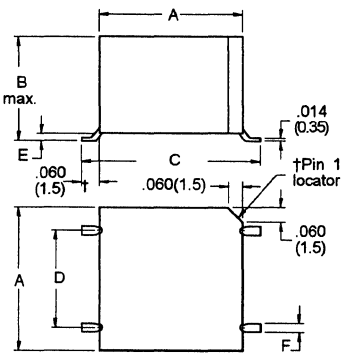
TOROTEL PRODUCTS INC 13402 SOUTH 71 HIGHWAY GRANDVIEW, M0 64030 TEL: (816) 761-6314 FAX: (816) 763-2278
WEB PAGE: WWW.TOROTELPROD.COM E-MAIL: TOROTEL@SOUND.NET

LOW PROFILE SURFACE MOUNT POWER INDUCTORS

These Surface Mount Power Inductors with high shielding efficiency are perfect for filtering in Power Supplies, Switching Regulators and DC-DC Converters.

- Five case sizes allow optimization of performance per unit size
- Surface Mount Inductors are designed to withstand the extreme temperatures encounted in reflow soldering processes.
- High shielding efficiency minimizes "cross coupling"
- Low losses at frequencies up to 100 kHZ and higher.
- Designed and manufactured to the requirements of MIL-T-27, Type TF5S04ZZ (Not QPL-27 listed)

PHYSICAL DIMENSIONS



Dimensions are in inches (mm)

† Pin 1 Locator Symbol. Terminals are numbered clockwise from Pin 1. Pins 3 & 4 are NC (Dummies).

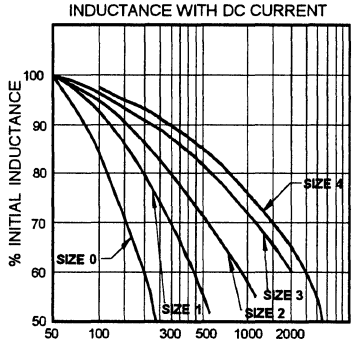
CASE DIMENSIONS

SIZE	A	B	C	D	E	F
1	0.450 (11.43)	0.305 (7.75)	0.570 (14.48)	0.300 (7.62)	0.020 (0.51)	0.027 (0.69)
2	0.550 (13.97)	0.360 (9.14)	0.670 (17.02)	0.400 (10.16)	0.025 (0.64)	0.037 (0.94)
3	0.650 (16.51)	0.360 (9.14)	0.770 (19.56)	0.500 (12.70)	0.025 (0.64)	0.037 (0.94)
4	0.850 (21.59)	0.455 (11.56)	0.970 (24.64)	0.600 (15.24)	0.025 (0.64)	0.037 (0.94)

SPECIFICATIONS

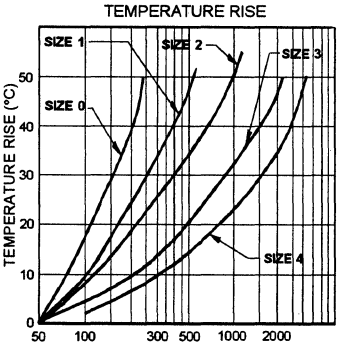
- Inductance is measured at 0.1 Vrms, 10 kHz.
- The dc current, resulting in 10%, 20%, and 30% decrease in inductance, is given in the table at right.
- The DC Resistance (DCR) and Self Resonant Frequency (SRF) are listed in the table at right.
- Maximum Operating Temperature (ambient plus temperature rise) is limited to 130°C.

INDUCTANCE WITH DC CURRENT



LI^2 (L @ 0 DC Current in µH & I in Amperes)

TEMPERATURE RISE



LI^2 (L @ 0 DC Current in µH & I in Amperes)

PART NUMBER	"L" NO DC (µH)	DC CURRENT FOR % DECREASE IN "L" 10% (Amps)	20% (Amps)	30% (Amps)	DCR (Ohms)	SRF (MHz)	SIZE
LP1-25	25	1.90	2.60	3.30	0.032	4.50	1
LP1-50	50	1.34	1.84	2.33	0.064	3.30	1
LP1-75	75	1.10	1.50	1.91	0.096	2.70	1
LP1-100	100	0.95	1.30	1.65	0.128	2.25	1
LP1-150	150	0.77	1.00	1.30	0.190	1.90	1
LP1-200	200	0.67	0.91	1.10	0.260	1.70	1
LP1-250	250	0.60	0.82	1.04	0.320	1.50	1
LP1-500	500	0.42	0.57	0.73	0.640	1.00	1
LP1-750	750	0.35	0.47	0.60	0.960	0.85	1
LP1-1000	1000	0.30	0.41	0.52	1.280	0.73	1
LP1-1500	1500	0.25	0.34	0.43	1.920	0.60	1
LP1-2000	2000	0.21	0.29	0.36	2.560	0.52	1
LP1-2500	2500	0.19	0.26	0.33	3.200	0.45	1
LP1-5000	5000	0.13	0.18	0.23	6.400	0.33	1
LP2-25	25	2.50	3.70	4.70	0.020	4.50	2
LP2-50	50	1.77	2.61	3.30	0.040	3.30	2
LP2-75	75	1.44	2.14	2.71	0.060	2.70	2
LP2-100	100	1.25	1.85	2.35	0.080	2.25	2
LP2-150	150	1.00	1.50	1.90	0.120	1.90	2
LP2-200	200	0.88	1.30	1.60	0.160	1.70	2
LP2-250	250	0.79	1.17	1.49	0.200	1.50	2
LP2-500	500	0.55	0.82	1.00	0.400	1.00	2
LP2-750	750	0.46	0.68	0.86	0.600	0.85	2
LP2-1000	1000	0.40	0.59	0.74	0.800	0.73	2
LP2-1500	1500	0.32	0.48	0.61	1.200	0.60	2
LP2-2000	2000	0.28	0.41	0.50	1.600	0.52	2
LP2-2500	2500	0.25	0.37	0.47	2.000	0.45	2
LP2-5000	5000	0.18	0.26	0.33	4.000	0.33	2
LP3-25	25	3.00	4.40	5.60	0.015	4.00	3
LP3-50	50	2.12	3.11	4.00	0.030	3.00	3
LP3-75	75	1.73	2.54	3.23	0.050	2.40	3
LP3-100	100	1.50	2.20	2.80	0.060	2.00	3
LP3-150	150	1.20	1.70	2.20	0.090	1.70	3
LP3-200	200	1.00	1.50	1.90	0.120	1.50	3
LP3-250	250	0.95	1.39	1.77	0.150	1.30	3
LP3-500	500	0.67	0.98	1.25	0.300	1.00	3
LP3-750	750	0.55	0.80	1.02	0.450	0.75	3
LP3-1000	1000	0.47	0.70	0.89	0.600	0.65	3
LP3-1500	1500	0.39	0.57	0.72	0.900	0.55	3
LP3-2000	2000	0.33	0.49	0.62	1.200	0.46	3
LP3-2500	2500	0.30	0.44	0.56	1.500	0.40	3
LP3-5000	5000	0.21	0.31	0.40	3.000	0.30	3
LP4-25	25	3.53	4.80	5.94	0.012	4.00	4
LP4-50	50	2.50	3.40	4.20	0.024	3.00	4
LP4-75	75	2.04	2.78	3.43	0.036	2.40	4
LP4-100	100	1.77	2.40	2.99	0.048	2.00	4
LP4-150	150	1.44	1.95	2.44	0.072	1.70	4
LP4-200	200	1.25	1.69	2.11	0.096	1.50	4
LP4-250	250	1.12	1.52	1.88	0.120	1.30	4
LP4-500	500	0.79	1.00	1.32	0.240	1.00	4
LP4-750	750	0.65	0.88	1.08	0.360	0.75	4
LP4-1000	1000	0.56	0.76	0.94	0.480	0.65	4
LP4-1500	1500	0.46	0.62	0.77	0.720	0.55	4
LP4-2000	2000	0.39	0.53	0.66	0.960	0.47	4
LP4-2500	2500	0.35	0.48	0.59	1.200	0.40	4
LP4-5000	5000	0.25	0.34	0.42	2.400	0.30	4

TOROTEL PRODUCTS INC
WEB PAGE: WWW.TOROTELPROD.COM E-MAIL:TOROTEL@SOUND.NET
13402 SOUTH 71 HIGHWAY GRANDVIEW, MO 64030 TEL: (816) 761-6314 FAX: (816) 763-2278

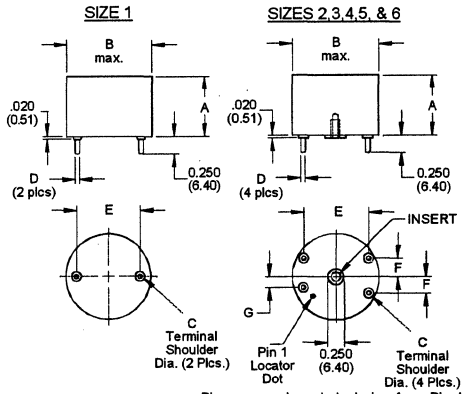
POWER INDUCTORS

These Printed Circuit "Plug-In" Power Inductors with high shielding efficiency are perfect for filtering in Power Supplies, Switching Regulators and DC-DC Converters.

- All Inductors have split windings except for size 1
- High shielding efficiency minimizes "cross coupling"
- Available in six size selections for optimized performance per unit size
- Inductors are capable of carrying large DC current transients.
- Low losses at frequencies up to 100 kHz and higher.
- Designed and manufactured to the requirements of MIL-T-27, Type TF5S04ZZ (Not QPL-27 listed)

SPECIFICATIONS

- Inductance is measured at 0.1 Vrms, 10 kHz.
- The dc current, resulting in 10%, 20%, and 30% decrease in inductance, is given in the table at right.
- The DC Resistance (DCR), and Self Resonant Frequency (SRF) are listed in the table at right.
- Maximum Operating Temperature (ambient plus temperature rise) is limited to 130°C.



Pins are numbered clockwise from Pin 1.

PART NUMBER	"L" NO DC (µH)	DC CURRENT FOR % DECREASE IN "L" 10% (Amps)	20% (Amps)	30% (Amps)	DCR (Ohms)	SRF (MHz)	SIZE
PL1-25	25	3.53	4.80	5.94	0.012	4.00	1
PL1-50	50	2.50	3.40	4.20	0.024	3.00	1
PL1-75	75	2.04	2.78	3.43	0.036	2.40	1
PL1-100	100	1.77	2.40	2.99	0.048	2.00	1
PL1-250	250	1.12	1.52	1.88	0.120	1.30	1
PL1-750	750	0.65	0.88	1.08	0.360	0.75	1
PL1-1000	1000	0.56	0.76	0.94	0.480	0.65	1
PL1-1500	1500	0.46	0.62	0.77	0.720	0.55	1
PL1-2500	2500	0.35	0.48	0.59	1.200	0.40	1
PL1-5000	5000	0.25	0.34	0.42	2.400	0.30	1
PL2-130	130	3.00	4.50	5.50	0.060	1.70	2
PL2-210	210	2.50	3.50	4.50	0.110	1.40	2
PL2-260	260	2.20	3.20	3.90	0.140	1.25	2
PL2-315	315	2.00	2.90	3.50	0.170	1.14	2
PL2-525	525	1.60	2.20	2.70	0.280	0.90	2
PL2-790	790	1.20	1.80	2.20	0.420	0.70	2
PL2-1050	1050	1.00	1.60	1.90	0.560	0.60	2
PL2-1300	1300	0.95	1.40	1.70	0.700	0.40	2
PL3-228	228	3.50	5.20	6.80	0.070	1.10	3
PL3-323	323	2.70	4.00	5.00	0.105	0.90	3
PL3-460	460	2.50	3.70	4.80	0.150	0.80	3
PL3-787	787	1.90	2.80	3.70	0.260	0.60	3
PL3-1050	1050	1.60	2.40	3.20	0.340	0.50	3
PL3-1310	1310	1.50	2.20	2.80	0.430	0.45	3
PL3-1600	1600	1.30	2.00	2.60	0.520	0.40	3
PL3-1840	1840	1.20	1.80	2.40	0.600	0.38	3
PL3-2100	2100	1.10	1.70	2.20	0.700	0.33	3
PL4-165	165	5.00	7.00	9.50	0.040	1.40	4
PL4-191	191	4.70	6.55	8.80	0.050	1.30	4
PL4-262	262	4.00	5.60	7.50	0.070	1.10	4
PL4-390	390	3.30	4.60	6.20	0.100	0.90	4
PL4-525	525	2.80	4.00	5.30	0.140	0.80	4
PL4-790	790	2.30	3.20	4.30	0.200	0.60	4
PL4-1050	1050	2.00	2.80	3.80	0.270	0.55	4
PL4-1310	1310	1.80	2.50	3.40	0.340	0.50	4
PL4-1580	1580	1.60	2.30	3.00	0.410	0.45	4
PL4-1838	1838	1.50	2.10	2.80	0.480	0.40	4
PL5-150	150	6.35	9.23	11.50	0.027	1.40	5
PL5-250	250	4.90	7.15	9.00	0.045	1.20	5
PL5-500	500	3.50	5.00	6.32	0.090	0.80	5
PL5-750	750	2.80	4.13	5.16	0.135	0.65	5
PL5-1000	1000	2.50	3.60	4.50	0.180	0.55	5
PL5-2500	2500	1.55	2.26	2.80	0.450	0.35	5
PL5-5000	5000	1.10	1.60	2.00	0.900	0.25	5
PL6-1500	1500	2.60	4.50	6.00	0.130	0.40	6
PL6-2000	2000	2.25	3.90	5.20	0.170	0.35	6
PL6-3000	3000	1.85	3.20	4.25	0.260	0.30	6
PL6-4000	4000	1.60	2.80	3.70	0.350	0.25	6
PL6-5000	5000	1.45	2.50	3.30	0.450	0.20	6
PL6-7500	7500	1.15	2.00	2.70	0.650	0.18	6
PL6-10000	10000	1.00	1.75	2.35	0.850	0.15	6

CASE DIMENSIONS

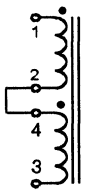
SIZE	A max.	B max.	C	D dia.	E	F	G	INSERT	TYPICAL WEIGHT (grams)
1	0.450 (11.43)	0.750 (19.05)	0.100 (2.54)	0.070 (1.78)	0.500 (12.70)				7
2	0.560 (14.22	0.960 (24.38)	0.100 (2.54)	0.070 (1.78)	0.600 (15.24)	0.200 (5.08)	0.100 (2.54)	4-40 UNC 5 Thrds Deep	23
3	0.635 (16.13)	1.215 (30.90)	0.100 (2.54)	0.070 (1.78)	0.800 (20.32)	0.250 (6.35)	0.150 (3.81)	4-40 UNC 5 Thrds Deep	44
4	0.720 (18.29)	1.330 (33.78)	0.125 (3.18)	0.094 (2.39)	0.900 (22.86)	0.250 (6.35)	0.150 (3.81)	6-32 UNC 6 Thrds Deep	60
5	0.760 (19.30)	1.500 (38.10)	0.125 (3.18)	0.094 (2.39)	1.100 (27.94)	0.300 (7.62	0.200 (5.08)	6-32 UNC 6 Thrds Deep	80
6	1.100 (27.94)	2.150 (54.61)	0.150 (3.81)	0..125 (3.18)	1.700 (43.18)	0.400 (10.16)	0.300 (7.62)	6-32 UNC 6 Thrds Deep	170

All inductors have split windings for versatility. They can be connected in series, parallel or individually for balanced filtering applications.

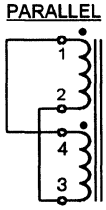
The ratings in the table at the far right are for a series-aided connection of both windings. The inductance of a parallel connection of these windings will result in 25% of the inductance at twice the rated current. The DCR will be 25% of the series connection.

Example: A parallel connection of PL2-130 will result in an inductance of 32.5 µH with a DCR of .015 ohms. 9 Amps DC will cause a 20% decrease in inductance.

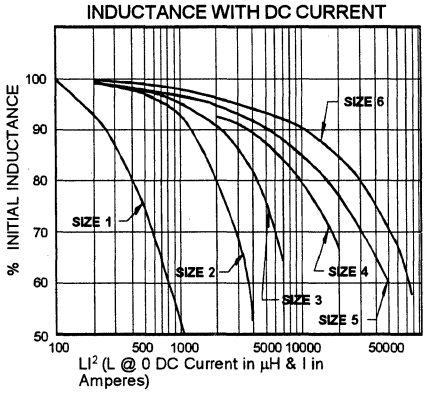
SERIES



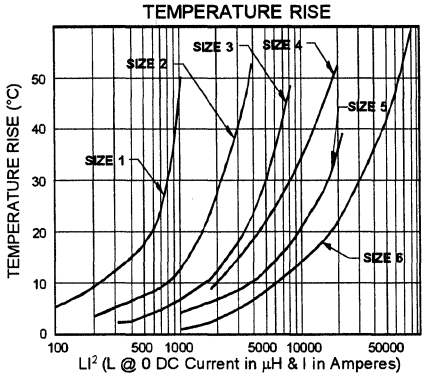
PARALLEL



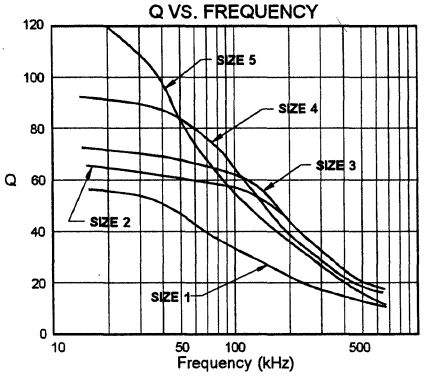
INDUCTANCE WITH DC CURRENT



TEMPERATURE RISE



Q VS. FREQUENCY



TOROTEL PRODUCTS INC
WEB PAGE: WWW.TOROTELPROD.COM E-MAIL:TOROTEL@SOUND.NET
13402 SOUTH 71 HIGHWAY GRANDVIEW, MO 64030 TEL: (816) 761-6314 FAX: (816) 763-2278

VISHAY DALE

INDUCTORS

- **Surface Mount**
- **Leaded**
- **Military and Commercial**

EEM DESCRIPTIONS

CHOKES:
- Filter
- Military
- Swinging

COILS:
- AF
- Antenna
- Chip
- Foil Wound
- High Q, Low Frequency
- IF
- Molded
- RF
- Saturable Reactor
- Shielded
- Solenoid
- Switching, Power
- Telephone
- Toroidal
- Transformer
- TV
- Variable
- Military, RF
- Military, Non-RF

CORES:
- Magnetic, Ferrite
- Magnetic, Ferrite, Toroid
- Powdered Iron, Toroid
- Silicon, Toroid

SERVICES:
- Magnetic
- PC Design, Prep/Prod

OTHER:
- Regulators & Stabilizers Voltage
- Solenoids, Rotary
- Suppressors, Transient Voltage

FLASHFAX℠

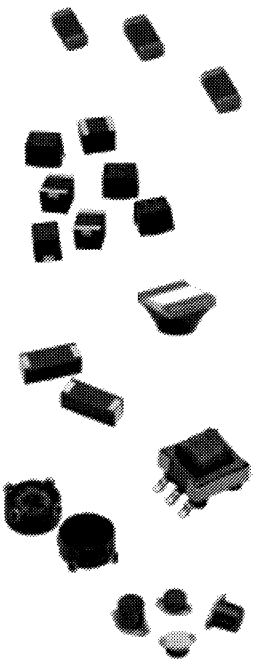
Fax 1-800-835-4272 for literature.

Or call Vishay's FlashFax℠ at 1-800-487-9437. Request document 9999. This is a listing of data sheets you can order by fax in a flash!

52 Inductor data sheets are available.

INTERNET

SURFACE MOUNT



ILS-0805, ILS-1206
Monolithic Chips

ILB-1206
Multilayer Ferrite Bead

IS
EIA PDP-100 Standard Package

IMC-1210, IMC-1812
Molded

ISC-1210, ISC-1812
Molded, Shielded

WCM, WCS
Coated

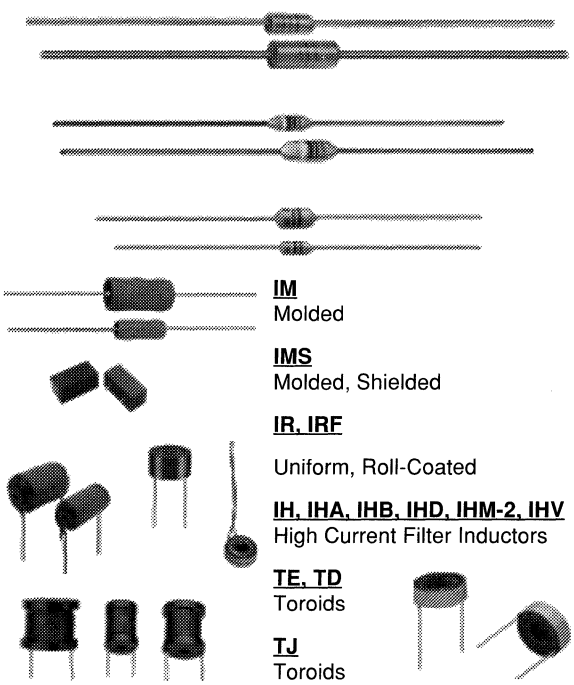
IHSM-4825, IHSM-5832, IHSM-7832
High Current

LPE-3325, LPE-4841, LPE-5047, LPE-6562, LPE-6855
Gapped and Ungapped

LPT-4545
Toroidal

LPC-2516, LPC-3019
Excellent Coplanarity

LEADED
MIL-C-15305 and Commercial



IM
Molded

IMS
Molded, Shielded

IR, IRF
Uniform, Roll-Coated

IH, IHA, IHB, IHD, IHM-2, IHV
High Current Filter Inductors

TE, TD
Toroids

TJ
Toroids

Vishay Dale E. Hwy 50, PO Box 180, Yankton, SD 57078-0180 • **Phone** (605) 665-9301 • **Fax** 605-665-1627 • **Internet** www.vishay.com
Major Vishay Brands Dale • Draloric • Foil Resistors • Measurements Group • Roederstein • Sfernice • Sprague • Thin Film • Vitramon

WILCO CORPORATION

6451 Saguaro Court
Indianapolis, Indiana 46268

Choose from a complete line of over 30 standard inductor types, each with superior production quantity deliveries - or call with your specifications for custom inductors and be assured of reliable performance, modified to your requirements in only 72 hours!

Voice: (317) 293-9300
Fax: (317) 293-9462
Toll-free Hotline: (800) 611-2343
e-mail: wilco@iquest.net

DESIGNER'S KITS

These convenient, low cost sample kits are perfect for use as an aid to the designer of switching regulators, power supplies, and filters. The broad range of inductance values allows for selection of the optimal inductor for your design application. Every kit contains 3 pieces of each value and includes free refills.

ITS Small Torodial Inductors
Inductance 1 to 1000 uh
12 values
ITS-KIT **Price: $50.00**

MC Miniature Encapsulated Inductors
Inductance 1 to 100 mh
12 values
MC-KIT **Price: $75.00**

LFB Large Ferrite Bobbin Inductors
Inductance 3.9 to 100000 uh
12 values
LFB-KIT **Price: $30.00**

SFB Small Ferrite Bobbin Inductors
Inductance 3.9 to 18000 uh
12 values
SFB-KIT **Price: $25.00**

SMC1210 Surface Mount Chip Inductors
Inductance .01 to 180 uh
12 values
1210-KIT **Price: $25.00**

SMC1812 Surface Mount Chip Inductors
Inductance .1 to 1000 uh
12 values
1812-KIT **Price: $30.00**

SMS Surface Mount Spring Coils
t turn to 10 turns
10 values
SMS-KIT **Price: $25.00**

SMT Surface Mount Toroidial Inductors
Inductance 1 to 1000 uh
12 values
SMT-KIT **Price: $100.00**

DC1 Power Line Inductors
Inductance 1 to 560 uh
12 values
DC1-KIT **Price: $75.00**

DC2 Power Line Inductors
Inductance 1 to 2200 uh
12 values
DC2-KIT **Price: $85.00**

DC3 Power Line Inductors
Inductance 1 to 4700 uh
12 values
DC#-KIT **Price: $95.00**

HCS Small Has Chokes
Inductance 10 to 250 uh
8 values
HCS-KIT **Price: $25.00**

HCL Large Hash Chokes
Inductance 100 to 800 uh
8 values
HCL-KIT **Price: $30.00**

FB Wide Band Chokes
Ferrite Beads
7 values
FB-KIT **Price: $20.00**

AC Thru Hole Air Coils
2.5 turns to 10.5 turns
9 values
AC-KIT **Price: $20.00**

CS Current Sensor
50:1 to 400:1
4 values
CS-KIT **Price: $20.00**

MF High Q PiWound Coils
Inductance 100 to 1000 uh
12 values
MF-KIT **Price: $40.00**

MU Miniature PiWound Coils
Inductance 39 to 1500 uh
12 values
MU-KIT **Price: $20.00**

ML Miniatrue Layer Wound Coils
Inductance .1 to 27 uh
12 values
ML-KIT **Price: $20.00**

W Medium Layer Wound Coils
Inductance 1 to 100 uh
12 values
W-KIT **Price: $20.00**

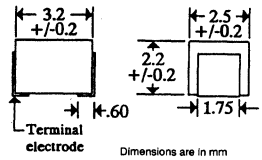
HFT Torodial Inductors
Inductance 1 to 2000 mh
12 values
HFT-KIT **Price: $100.00**

600 Choke Coils
Inductance 1 to 100 uh
12 values
600-KIT **Price: $40.00**

200 Choke Coils
Inductance .24 to 15 uh
12 values
200-KIT **Price: $20.00**

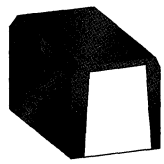
MFB Miniature Ferrite Bobbin Inductors
Inductance 1 to 1000 uh
12 values
MFB-KIT **Price: $20.00**

Surface Mount Inductors



Dimensions are in mm

- Excellent solderability by reflow soldering or soldering iron*
- Excellent for automatic insertion in the higher density circuit design*
- Resistant to external shocks and pressure
- Ideal application for radio, auto telecommunications, tuners, instrumental and hybrid



Packaged 2000/reel
(minimum order 1 reel)

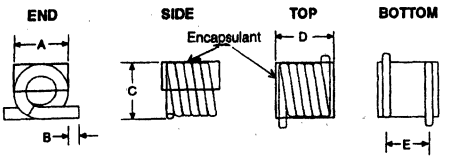
SMC1210 SERIES

PART NUMBER	L uH	TOL%	Q MIN.	SRF MIN	DCR MAX	IDC MAX AMPS	TEST FREQ.
SMC1210-R010M	0.01	+/-20	15	2500	0.13	0.45	100
SMC1210-R012M	0.012	+/-20	17	2300	0.14	0.45	100
SMC1210-R015M	0.015	+/-20	19	2100	0.16	0.45	100
SMC1210-R022M	0.022	+/-20	23	1700	0.20	0.45	100
SMC1210-R027M	0.027	+/-20	23	1500	0.22	0.45	100
SMC1210-R033M	0.033	+/-20	25	1400	0.24	0.45	100
SMC1210-R039M	0.039	+/-20	25	1300	0.27	0.45	100
SMC1210-R056M	0.056	+/-20	26	1100	0.33	0.45	100
SMC1210-R066M	0.068	+/-20	27	1000	0.36	0.45	100
SMC1210-R082M	0.082	+/-20	27	900	0.40	0.45	100
SMC1210-R10M	0.10	+/-10	28	700	0.44	0.45	100
SMC1210-R15M	0.15	+/-10	28	450	0.25	0.45	25.2
SMC1210-R16M	0.18	+/-10	28	400	0.26	0.45	25.2
SMC1210-R22M	0.22	+/-10	28	350	0.32	0.45	25.2
SMC1210-R27M	0.27	+/-10	28	320	0.36	0.45	25.2
SMC1210-R39M	0.39	+/-10	28	250	0.45	0.45	25.2
SMC1210-R47M	0.47	+/-10	28	220	0.50	0.45	25.2
SMC1210-R56M	0.56	+/-10	28	180	0.55	0.45	25.2
SMC1210-R66M	0.66	+/-10	28	160	0.60	0.45	25.2
SMC1210-1R0K	1.0	+/-10	28	120	0.70	0.40	7.96
SMC1210-1R2K	1.2	+/-10	28	100	0.75	0.39	7.96
SMC1210-1R5K	1.6	+/-10	28	85	0.85	0.37	7.96
SMC1210-1R8K	1.8	+/-10	28	80	0.90	0.35	7.96
SMC1210-2R7K	2.7	+/-10	30	70	1.1	0.29	7.96
SMC1210-3R3K	3.3	+/-10	30	60	1.2	0.26	7.96
SMC1210-3R9K	3.9	+/-10	30	55	1.3	0.25	7.96
SMC1210-4R7K	4.7	+/-10	30	50	1.7	0.22	7.96
SMC1210-6R8K	6.1	+/-10	30	43	2.0	0.18	7.96
SMC1210-8R2K	8.2	+/-10	30	40	2.3	0.17	7.96
SMC1210-100K	10	+/-10	30	36	2.5	0.15	2.52
SMC1210-120K	12	+/-10	30	33	2.8	0.14	2.52
SMC1210-180K	18	+/-10	30	27	3.6	0.12	2.52
SMC1210-220K	22	+/-10	30	25	4.0	0.11	2.52
SMC1210-270K	27	+/-10	30	20	5.0	0.08	2.52
SMC1210-330K	33	+/-10	30	17	5.6	0.07	2.52
SMC1210-470K	47	+/-10	30	15	7.0	0.06	2.52
SMC1210-560K	56	+/-10	30	13	8.0	0.055	2.52
SMC1210-680K	68	+/-10	30	12	9.0	0.05	2.52
SMC1210-820K	82	+/-10	30	11	10	0.045	2.52
SMC1210-121K	120	+/-10	20	10	11	0.07	0.796
SMC1210-181K	180	+/-10	20	7	17	0.06	0.796

INTERIM VALUES AVAILABLE
Made in America and shipped around the world

WILCO CORPORATION
6451 Saguaro Court
Indianapolis, Indiana 46268
Voice: (317) 293-9300
Fax: (317) 293-9462
Toll-free Hotline: (800) 611-2343
e-mail: wilco@iquest.net

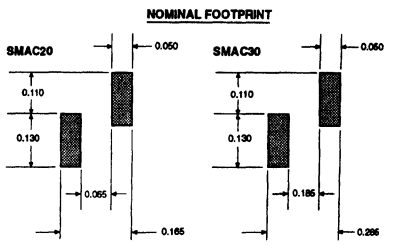
SURFACE MOUNT "SPRING" AIR CORE INDUCTORS



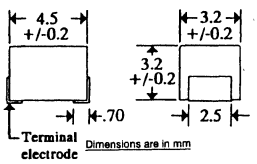
SIZE		A	B	C	D	E
SMS20	in	0.120	0.023 ± 0.015	0.125	0.145	0.115 ± 0.010
	mm	3.05	0.58 ± 0.38	3.18	3.68	2.92 ± 0.25
SMS30	in	0.120	0.023 ± 0.015	0.125	0.270	0.230 ± 0.010
	mm	3.05	0.58 ± 0.38	3.18	6.86	5.84 ± 0.25

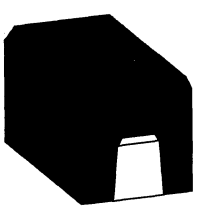
SMS SERIES

PART NUMBER	TURNS	INDUCTANCE (nh)	Q MIN.	TEST FREQ (MHz)	SRF MIN. (Ghz)
SMS20-1	1	2.5 ± 10%	143	150	3
SMS20-2	2	5.0 ± 10%	140	150	3
SMS20-3	3	8.0 ± 5%	139	150	3
SMS20-5	5	18.5 ± 5%	133	150	3
SMS30-6	6	17.5 ± 5%	100	150	3
SMS30-7	7	22.0 ± 5%	103	150	3
SMS30-9	9	35.5 ± 5%	108	150	1.8
SMS30-10	10	43.0 ± 5%	108	150	1.5



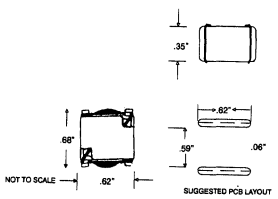
SMC1812 SERIES

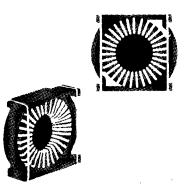




PART NUMBER	L uH	TOL%	Q MIN.	SRF MIN	DCR MAX	IDC MAX AMPS	TEST FREQ. MHZ
SMC1812-R10M	0.10	+/-20	28	700	0.44	0.45	25.2
SMC1812-R12M	0.12	+/-20	30	500	0.22	0.45	25.2
SMC1812-R18M	0.18	+/-20	30	400	0.28	0.45	25.2
SMC1812-R27M	0.27	+/-20	30	320	0.36	0.45	25.2
SMC1812-R33M	0.33	+/-20	30	300	0.40	0.45	25.2
SMC1812-R47M	0.47	+/-20	30	220	0.50	0.45	25.2
SMC1812-R68M	0.68	+/-20	30	160	0.60	0.45	25.2
SMC1812-R82M	0.82	+/-20	30	140	0.67	0.45	25.2
SMC1812-1R2K	1.2	+/-10	50	80	0.55	0.43	7.96
SMC1812-1R8K	1.8	+/-10	50	60	0.65	0.39	7.96
SMC1812-2R2K	2.2	+/-10	50	55	0.7	0.38	7.96
SMC1812-3R3K	3.3	+/-10	50	45	0.80	0.355	7.96
SMC1812-4R7K	4.7	+/-10	50	35	1.0	0.315	7.96
SMC1812-5R6K	5.6	+/-10	50	33	1.1	0.30	7.96
SMC1812-8R2K	8.2	+/-10	50	25	1.4	0.27	7.96
SMC1812-120K	12	+/-10	50	18	2.0	0.225	2.52
SMC1812-150K	15	+/-10	50	17	2.5	0.20	2.52
SMC1812-220K	22	+/-10	50	13	3.2	0.18	2.52
SMC1812-330K	33	+/-10	50	11	4.0	0.16	2.52
SMC1812-390K	39	+/-10	50	10	4.5	0.15	2.52
SMC1812-560K	56	+/-10	50	9	5.5	0.135	2.52
SMC1812-820K	82	+/-10	50	8	7.0	0.12	2.52
SMC1812-101K	100	+/-10	40	7	8.0	0.110	0.796
SMC1812-151K	150	+/-10	40	5	9.0	0.105	0.796
SMC1812-221K	220	+/-10	40	4	10	0.1	0.796
SMC1812-271K	270	+/-10	30	3	18	0.092	0.796
SMC1812-391K	390	+/-10	30	3	23	0.08	0.796
SMC1812-561K	560	+/-10	30	2	30	0.05	0.796
SMC1812-681K	680	+/-10	30	2	40	0.05	0.796
SMC1812-102K	1000	+/-10	30	2	50	0.03	0.796

SURFACE MOUNT TOROIDS



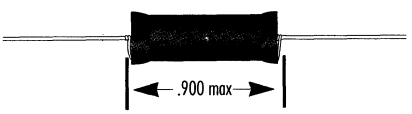


PART NUMBER	LuH +/- 15%	MAX Rdc (OHMS)	MAX (AMPS)
SMT10G	1.0	.004	5
SMT15G	1.5	.005	5
SMT22G	2.2	.007	5
SMT47G	4.7	.01	5
SMT68G	6.8	.012	4.5
SMT100	10	.014	4.5
SMT120	12	.018	4
SMT180	18	.025	3.5
SMT220	22	0.29	3.5
SMT270	27	.035	2.5
SMT330	33	.04	2.5
SMT470	47	.095	2.5
SMT560	56	.120	2.5
SMT680	68	.125	2.0
SMT820	82	.2	1.7
SMT121	120	.31	1.5
SMT151	150	.42	1.5
SMT181	180	.49	1.5
SMT221	220	.59	1
SMT331	330	.66	.7
SMT391	390	.74	.7
SMT471	470	.88	.7
SMT561	560	.99	.7
SMT821	820	1.3	.5
SMT102	1000	1.6	.5

FERRITE BOBBIN TYPE

LFB SERIES

- Leads No. 20 Tinned Copper 1.5" long
- Coils Finished with Polyolefin Shrink Tube
- Nonstandard Values Available
- Saturation Current Lowers Inductance 5%



PART NUMBER	L uH +/-15%	R.D.C. OHMS MAX.	SATURATION CURRENT (DC AMPS)	I AMPS SUGGESTED RATING	DIA. NOM.	TEST FREQ.
LFB 39G	3.9	.007	15.5	4.0	.450	1KHz
LFB 47G	4.7	.008	13.9	4.0	.450	1KHz
LFB 82G	8.2	.013	9.89	4.0	.450	1KHz
LFB 120	12	.019	8.21	4.0	.450	1KHz
LFB 220	22	.026	6.07	4.0	.450	1KHz
LFB 270	27	.027	5.36	4.0	.450	1KHz
LFB 560	56	.037	3.66	3.2	.450	1KHz
LFB 680	68	.047	3.31	2.5	.450	1KHz
LFB 820	82	.060	3.10	2.0	.450	1KHz
LFB 151	150	.107	2.22	1.6	.450	1KHz
LFB 221	220	.150	1.89	1.6	.450	1KHz
LFB 391	390	.212	1.39	1.6	.450	1KHz
LFB 471	470	.281	1.24	1.2	.450	1KHz
LFB 102	1000	.655	.87	0.8	.450	1KHz
LFB 122	1200	.884	.79	0.6	.450	1KHz
LFB 152	1500	1.04	.70	0.6	.450	1KHz
LFB 272	2700	2.06	.53	0.4	.450	1KHz
LFB 392	3900	2.75	.43	0.4	.450	1KHz
LFB 682	6800	5.69	.322	.250	.450	1KHz
LFB 822	8200	6.32	.293	.250	.450	1KHz
LFB 183	18000	14.8	.198	.158	.450	1KHz
LFB 223	22000	21.8	.180	.125	.450	1KHz
LFB 273	27000	22.7	.162	.125	.450	1KHz
LFB 473	47000	36.1	.122	.100	.450	1KHz
LFB 823	82000	79.3	.090	.065	.450	1KHz
LFB 104	100000	89.7	.081	.065	.450	1KHz

INTERIM VALUES AVAILABLE
Made in America and shipped around the world

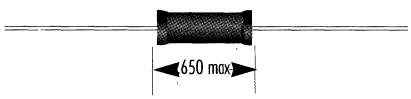
WILCO CORPORATION

6451 Saguaro Court
Indianapolis, Indiana 46268
Voice: (317) 293-9300
Fax: (317) 293-9462
Toll-free Hotline: (800) 611-2343
e-mail: wilco@iquest.net

FERRITE BOBBIN TYPE

SFB SERIES

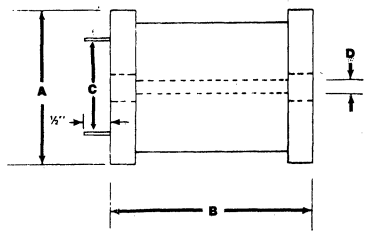
- Leads No. 20 Tinned Copper 1.5" long
- Coils Finished with Polyolefin Shrink Tube
- Nonstandard Values Available
- Saturation Current Lowers Inductance 5%



PART NUMBER	L uH +/-15%	R.D.C. OHMS MAX.	SATURATION CURRENT (DC AMPS)	I AMPS SUGGESTED RATING	DIA. NOM.	TEST FREQ.
SFB 39G	3.9	.019	7.3	1.28	.260	1KHz
SFB 47G	4.7	.022	6.3	1.28	.260	1KHz
SFB 56G	5.6	.024	5.6	1.28	.260	1KHz
SFB 82G	8.2	.028	4.5	1.28	.260	1KHz
SFB 100	10	.033	4.1	1.28	.260	1KHz
SFB 120	12	.037	3.6	1.28	.260	1KHz
SFB 150	15	.040	3.3	1.28	.260	1KHz
SFB 220	22	.050	2.7	1.28	.260	1KHz
SFB 270	27	.058	2.5	1.28	.260	1KHz
SFB 330	33	.075	2.2	1.008	.260	1KHz
SFB 390	39	.094	2.0	.804	.260	1KHz
SFB 560	56	.140	1.7	.804	.260	1KHz
SFB 680	68	.131	1.5	.804	.260	1KHz
SFB 820	82	.152	1.4	.804	.260	1KHz
SFB 101	100	.208	1.2	.632	.260	1KHz
SFB 151	150	.340	1.0	.508	.260	1KHz
SFB 181	180	.362	.95	.508	.260	1KHz
SFB 221	220	.430	.86	.508	.260	1KHz
SFB 271	270	.557	.77	.400	.260	1KHz
SFB 391	390	.712	.64	.400	.260	1KHz
SFB 471	470	1.15	.59	.315	.260	1KHz
SFB 561	560	1.27	.54	.315	.260	1KHz
SFB 680	680	1.61	.49	.250	.260	1KHz
SFB 102	1000	2.30	.40	.200	.260	1KHz
SFB 122	1200	2.65	.35	.200	.260	1KHz
SFB 152	1500	3.45	.33	.158	.260	1KHz
SFB 182	1800	4.30	.29	.158	.260	1KHz
SFB 272	2700	5.40	.24	.125	.260	1KHz
SFB 332	3300	6.56	.22	.125	.260	1KHz
SFB 392	3900	8.63	.20	.100	.260	1KHz
SFB 472	4700	9.66	.18	.100	.260	1KHz
SFB 682	6800	16.3	.151	.082	.260	1KHz
SFB 822	8200	20.8	.138	.065	.260	1KHz
SFB 103	10000	26.4	.125	.050	.260	1KHz
SFB 123	12000	29.9	.114	.050	.260	1KHz
SFB 183	18000	48.3	.091	.039	.260	1KHz

FERRITE DRUM TYPE

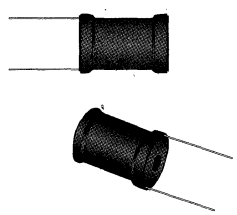
MAXIMUM PHYSICAL DIMENSIONS:				
	A	B	C	D
DC1	.660	.840	.45±.03	Clearance Hole
DC2	.825	.840	.60±.05	For 4/40
DC3	1.1	.840	.75±.05	Screw



NOTES:

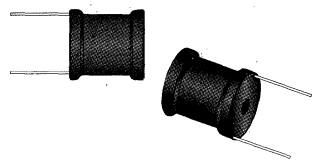
- Saturation current lowers inductance 5%.
- Inductance ±10% measured at 1 KHz.
- Leads for PC mounting tinned to within 1/16" of body.
- Non-listed values available on request.
- Coils finished with sleeving (Polyolefin shrink tube).
- Center hole for mechanical mounting.
- RDC measured @ 20°C.
- Values below 10uH ±20%.

DC1 SERIES



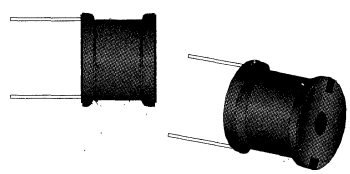
PART NUMBER	INDUCTANCE AT O DC (uH)	MAX. DCR (Ohms)	SATURATION CURRENT (DC Amps)	RATED CURRENT (AC Amps)
DC1-10G	1.0	.003	87.0	9.0
DC1-12G	1.2	.003	68.0	9.0
DC1-15G	1.5	.004	56.0	9.0
DC1-22G	2.2	.005	47.0	9.0
DC1-27G	2.7	.005	47.0	9.0
DC1-33G	3.3	.005	40.0	9.0
DC1-39G	3.9	.006	36.0	9.0
DC1-56G	5.6	.007	29.0	9.0
DC1-16G	6.8	.008	26.0	9.0
DC1-82G	8.2	.009	24.5	9.0
DC1-100	10.0	.010	21.2	9.0
DC1-150	15.0	0.15	17.5	7.2
DC1-180	18.0	.016	16.5	7.2
DC1-220	22.0	0.20	15.8	5.5
DC1-270	27.0	0.30	14.4	4.5
DC1-390	39.0	.046	11.8	4.0
DC1-470	47.0	0.62	11.0	2.8
DC1-560	56.0	0.69	10.0	2.8
DC1-680	68.0	.077	8.9	2.8
DC1-101	100.0	.095	7.5	2.8
DC1-121	120.0	.127	5.8	2.0
DC1-151	150.0	.181	5.6	1.6
DC1-181	180.0	.217	5.1	1.6
DC1-271	270.0	.300	4.1	1.6
DC1-331	330.0	.336	3.8	1.3
DC1-391	390.0	.460	3.3	1.0
DC1-471	470.0	.636	3.2	0.8
DC1-561	560.0	.696	2.9	0.8

DC2 SERIES



PART NUMBER	INDUCTANCE AT O DC (uH)	MAX. DCR (Ohms)	SATURATION CURRENT (DC Amps)	RATED CURRENT (AC Amps)
DC2-10G	1.0	.003	108.0	11.4
DC2-12G	1.2	.003	108.0	11.4
DC2-22G	2.2	.004	68.0	11.4
DC2-33G	3.3	.005	58.0	11.4
DC2-56G	5.6	.006	44.0	11.4
DC2-68G	6.8	.007	39.0	11.4
DC2-150	15.0	.013	25.0	9.4
DC2-180	18.0	.018	22.0	7.2
DC2-220	22.0	.019	21.0	7.2
DC2-470	47.0	.035	15.1	5.5
DC2-560	56.0	.039	13.6	5.5
DC2-101	100.0	.080	10.4	4.0
DC2-151	150.0	.980	8.6	4.0
DC2-271	270.0	.213	6.3	2.0
DC2-331	330.0	.305	5.2	1.6
DC2-681	680.0	.430	3.7	1.6
DC2-821	820.0	.590	3.4	1.3
DC2-102	1000.0	.818	3.1	1.0
DC2-222	2200.0	1.54	2.0	0.8

DC3 SERIES



PART NUMBER	INDUCTANCE AT O DC (uH)	MAX. DCR (Ohms)	SATURATION CURRENT (DC Amps)	RATED CURRENT (AC Amps)
DC3-10G	1.0	.003	116.0	21.0
DC3-12G	1.2	.003	116.0	21.0
DC3-22G	2.2	.003	90.0	21.0
DC3-33G	3.3	.003	74.0	21.0
DC3-56G	5.6	.003	54.0	21.0
DC3-68G	6.8	.004	47.0	21.0
DC3-150	15.0	.009	32.0	13.5
DC3-180	18.0	.010	29.0	13.5
DC3-220	22.0	.011	25.0	13.5
DC3-470	47.0	.024	19.1	9.0
DC3-560	56.0	.026	17.5	9.0
DC3-101	100.0	.034	13.2	9.0
DC3-151	150.0	.064	10.8	5.5
DC3-271	270.0	.110	7.9	4.5
DC3-331	330.0	.122	7.1	4.5
DC3-681	680.0	.256	5.0	2.8
DC3-821	820.0	.288	4.5	2.8
DC3-102	1000.0	.426	4.1	2.0
DC3-222	2200.0	1.02	2.5	1.3
DC3-272	2700.0	1.14	2.3	1.3
DC3-472	4700.0	1.86	1.7	1.0

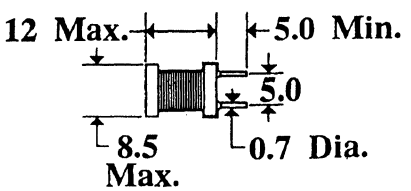
INTERIM VALUES AVAILABLE
Made in America and shipped around the world

WILCO CORPORATION

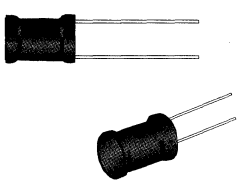
6451 Saguaro Court
Indianapolis, Indiana 46268
Voice: (317) 293-9300
Fax: (317) 293-9462
Toll-free Hotline: (800) 611-2343
e-mail: wilco@iquest.net

HASH CHOKES

RADIAL LEAD - HIGH CURRENT SERIES



Dimensions are in mm



PART NUMBER	L uH	TOL%	Q MIN.	SRF MIN	DCR MAX	IDC MAX AMPS	TEST FREQ. MHZ
RLH10G	1.0	+/-20	20	150	0.13	10	7.96
RLH15G	1.5	+/-20	20	130	.016	8.5	7.96
RLH22G	2.2	+/-20	20	100	.021	6.5	7.96
RLH47G	4.7	+/-20	20	51	.030	4.6	7.96
RLH68G	6.8	+/-20	20	29	.035	4.1	7.96
RLH100	10	+/-10	50	14	.045	3.4	2.52
RLH120	12	+/-10	50	13	.05	3.1	2.52
RLH180	18	+/-10	40	11	.061	2.66	2.52
RLH220	22	+/-10	40	9.2	.070	2.4	2.52
RLH270	27	+/-10	40	8.5	.08	2.22	2.52
RLH330	33	+/-10	30	7.8	.09	2.05	2.52
RLH470	47	+/-10	30	6.5	.16	1.77	2.52
RLH560	56	+/-10	30	5.4	.18	1.48	2.52
RLH680	68	+/-10	30	4.9	.21	1.36	2.52
RLH820	82	+/-10	30	4.1	.23	1.3	2.52
RLH121	120	+/-10	20	3.4	.32	1.25	.796
RLH151	150	+/-10	20	3.2	.37	1.15	.796
RLH181	180	+/-10	20	2.8	.58	1.08	.796
RLH221	220	+/-10	20	2.7	.65	1.0	.796
RLH331	330	+/-10	20	2.3	.85	.78	.796
RLH391	390	+/-10	20	2.1	.1	.74	.796
RLH471	470	+/-10	20	1.9	1.1	.68	.796
RLH561	560	+/-10	10	1.8	1.4	.64	.796
RLH821	820	+/-10	10	1.3	1.8	.56	.796
RLH102	1000	+/-10	50	1.5	2.9	.51	.252

HASH CHOKES

HCS SERIES

L = ± 15% @1KHz Measured with zero D.C. current.

OPTIONS AVAILABLE:
- Intermediate values
- Shrink tube sleeving
- Formed leads
- Tight "L" tolerances

PART NUMBER	L uH	R.D.C. OHMS MAX.	RATED CURRENT SUGGESTED MAX (AMPS)	LEAD SPACING TYP	LEAD DIA. NOM	BODY DIA. MAX
HCS100	10	.016	10.00	.260	.050	.590
HSC200	20	.017	11.00	.560	.050	.590
HCS300	30	.021	11.00	.610	.050	.590
HCS500	50	.043	7.00	.625	.039	.550
HCS101	100	.086	6.00	.750	.030	.550
HCS151	150	.107	5.00	.565	.030	.600
HCS201	200	.140	4.00	.620	.030	.600
HCS251	250	.184	4.00	.750	.030	.600

HCL SERIES

Compact size and pretinned leads for fast and easy PCB insertion in:

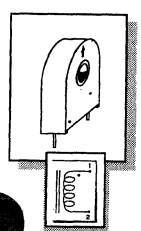
- Filters for switching regulators
- SCR.TRIAC control circuits
- Power supplies
- Hash filters
- RF circuits

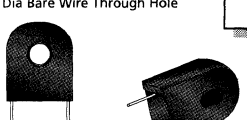
PART NUMBER	L uH	R.D.C. OHMS MAX.	RATED CURRENT SUGGESTED MAX (AMPS)	LEAD SPACING TYP	LEAD DIA. NOM	BODY DIA. MAX
HCL101	100	.016	8.00	1.143	.050	.590
HSC201	200	.110	6.00	1.103	.039	.550
HCL301	300	.140	5.00	1.145	.030	.550
HCL401	400	.167	4.00	.775	.030	.600
HCL501	500	.192	4.00	.880	.030	.600
HCL601	600	.237	4.00	1.080	.030	.600
HCL701	700	.257	4.00	1.115	.030	.600
HCL801	800	.291	4.00	1.285	.030	.600

CURRENT SENSORS

CS SERIES

- Molded Case Using 94 Vo Material
- Center Hole Wall Thickness .02 min
- Complies With Class B Requirements
- PCB Standoffs For Through Circuit Board Wash
- Miniature Size
- Ideal for Switch Mode Power Supplies
- Hopot Tested at 3000 VRMS Secondary
- To .180" Dia Bare Wire Through Hole





PART NUMBER	TURNS RATIO	L @ 1Khz DIM. SECONDARY	Rdc MAX SECONDARY
CS-050	50:1	8mH Min	0.8 Ohms Max.
CS-100	100:1	20mH Min	1.4 Ohms Max.
CS-200	200:1	118 mH Min	4.1 Ohms Max.
CS-400	400:1	420 mH Min	16.5 Ohms Max.

TOROIDAL INDUCTORS

ITS SERIES

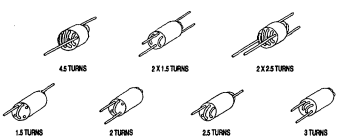
- Inductance measured @ 1KHz with zero DC current
- Toroids are self leaded for PCB insertion

OPTIONS AVAILABLE:
- Intermediate Values
- Custom Mounts
- Encapsulation

PART NUMBER	L uH ± 15%	MAX RDC (OHMS)	I MAX (AMPS)	OD (NOM)	ID (NOM)	H (NOM)	LEAD LENGTH (NOM)
ITS10G	1	.004	5	.58	.25	.262	.5
ITS12G	1.2	.004	5	.58	.25	.262	.5
ITS22G	2.2	.007	5	.58	.25	.262	.5
ITS33G	3.3	.008	5	.58	.25	.262	.5
ITS56G	5.6	.011	4.5	.60	.22	.28	.5
ITS68G	6.8	.012	4.5	.60	.22	.28	.5
ITS150	15	.02	4.0	.60	.22	.28	.5
ITS180	18	.025	3.5	.60	.22	.28	.5
ITS220	22	.029	3.5	.60	.22	.28	.5
ITS470	47	.095	2.5	.60	.22	.28	.5
ITS560	56	.120	2.5	.56	.23	.24	.5
ITS101	100	.250	1.7	.56	.23	.24	.5
ITS151	150	.42	1.5	.56	.23	.24	.5
ITS271	270	.64	1.0	.56	.23	.24	.5
ITS331	330	.66	.7	.56	.23	.24	.5
ITS561	560	.99	.7	.56	.23	.24	.5
ITS102	1000	1.6	.5	.56	.23	.24	.5

FB SERIES

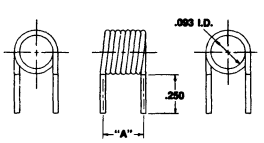
- Ferrite beads also known as wide-band chokes, low and high pass filters or band reject filters
- Used to supress a selected frequency or band of frequencies
- Reduce signal noise



PART NUMBER	LENGTH (INCHES) MAX	DIAMETER (INCHES) MAX	TURNS (TCW)	WIRE @ 50 MHZ	IMPEDANCE @100 MHZ	IMPEDENCE	LEAD LENGTH (INCHES) MIN
FB1111	.43	.26	1.5	24 AWG	400	470	1.25
FB1112	.43	.26	2.0	24 AWG	650	600	1.25
FB1113	.43	.26	2.5	24 AWG	850	725	1.25
FB1114	.43	.26	3.0	24 AWG	1000	750	1.25
FB1115	.43	.42	4.5	22 AWG		670	1.25
FB1116	.43	.426	2 X 1.5	24AWG		450	1.25
FB1117	.42	.42	2 X 2.25	22 AWG		650	1.25

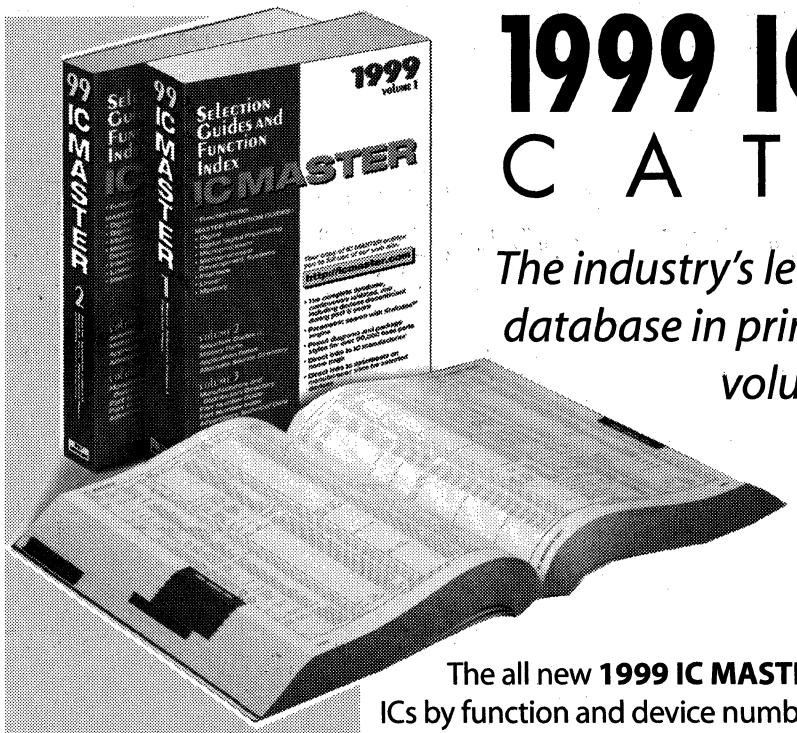
AIR CORE INDUCTORS

1. Leads Stripped .250 TYP.
2. 26 AWG — Left Hand Wind



PART NUMBER	NO. OF TURNS	"A" DIM.	WIRE	ELECTRICAL DATA
AC 0952	2 1/2	.051	26 GUAGE, SPN, GREEN	L=22nh
AC 0953	3 1/2	.068	26 GUAGE, SPN, GREEN	L= 34nh
AC 0954	4 1/2	.085	26 GUAGE, SPN, GREEN	L=43nh
AC0956	6 1/2	.119	26 GUAGE, SPN, GREEN	L=64nh
AC 0957	7 1/2	.136	26 GUAGE, SPN,GREEN	L=77nh
AC 0958	8 1/2	.153	26 GUAGE, SPN, GREEN	L=92nh
AC 0959	9 1/2	.170	26 GUAGE, SPN, GREEN	L=99nh
AC 0960	10 1/2	.187	26 GUAGE, SPN, GREEN	L=118nh

INTERIM VALUES AVAILABLE
Made in America and shipped around the world



1999 IC MASTER CATALOG

The industry's leading integrated circuit database in print. In three easy-to-use volumes you can:

- **Review current IC product information.**
- **Identify second-sources.**
- **Locate manufacturers with sales offices and distributors.**

The all new **1999 IC MASTER** catalog lists over 100,000 current ICs by function and device number. To make your search for information fast and easy, device data is organized in ten Master Selection Guides:

- **Digital**
- **Digital Signal Processing**
- **Microprocessor**
- **Interface**
- **Microprocessor Development Systems**
- **Linear**
- **Programmable Logic Devices**
- **ASIC/Custom**
- **Memory**
- **Chip Sets & Multifunction Devices**

The comprehensive, industry-wide Alternate Source Directory lists over 120,000 functional equivalents for current and discontinued ICs. It includes NTE and Philips ECG parts.

There's more. Other valuable sections include the Part Number Index, the Military Parts Directory, the Application Notes Directory, and the Manufacturers & Distributors Directory. You have access to pinout and package data for over 90,000 devices on the Internet at http://icmaster.com.

When you want a comprehensive overview of the IC industry, turn to the **1999 IC MASTER** catalog. An industry standard since 1974.

To order your 1999 IC MASTER

contact your local IC MASTER distributor or Marie Botta at:

Hearst Business Communications, Inc.
645 Stewart Avenue, Garden City, NY 11530
(516) 227-1314 FAX (516) 227-1453
Credit Card Hotline: 1-800-833-7138

Tell Marie you saw IC MASTER in the 1999 EEM, and she'll take $10.00 off the subscription price!

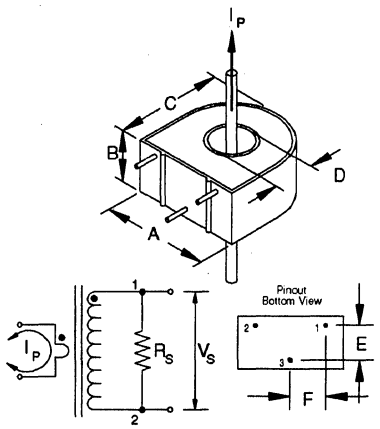
The IC MASTER catalog is published annually in February.

See us on the World Wide Web at http://icmaster.com

ZMAN magnetics

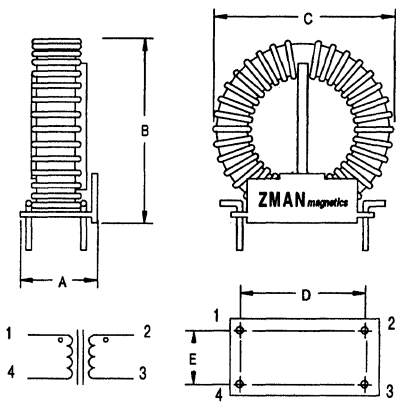
Custom Designed and Standard Value magnetic components.
***Our commitment is* On Time Service *at* Competitive Prices.**

Current Sense Transformer Line (47-400Hz)



P/N	Turns Ratio	DCR	A	B	C	D	E	F
Z-A210	50:1	3.10	0.75	0.40	0.78	0.18	0.20	0.30
Z-B210	100:1	3.50	0.88	0.43	0.90	0.20	0.20	0.35
Z-C220	200:1	6.60	1.00	0.45	1.20	0.37	0.30	0.30
Z-D220	200:1	9.70	1.13	0.50	1.20	0.37	0.30	0.45
Z-E250	500:1	23.0	1.20	0.56	1.20	0.45	0.40	0.40
Z-F250	500:1	23.0	1.25	0.57	1.28	0.51	0.30	0.55
Z-G275	750:1	35.0	1.38	0.57	1.40	0.57	0.40	0.50
Z-H310	1000:1	57.0	1.50	0.63	1.53	0.58	0.40	0.65

Common Mode Inductor Line



P/N	I in Amps	L in mH	A	B	C	D	E	F
CMI-100	0.5 to 1.0	0.5 to 1.5	0.42	0.75	0.65	0.25	0.60	0.04
CMI-120	1.0 to 3.0	0.8 to 2.2	0.60	1.30	1.20	0.40	0.80	0.05
CMI-160	3.0 to 8.0	1.2 to 3.5	0.80	1.70	1.60	0.60	0.90	0.05
CMI-250	3.0 to 8.0	2.0 to 15	0.90	2.65	2.55	0.70	1.20	0.05

F = Pin Diameter

Other Available Products

- Vertical Mount
- Signal, EMI
- Pulse, RF, IF, AF
- Surface Mount
- Normal Mode
- Switch Mode
- Choke/Filter
- Axial & Radial
- UL VDE CSA
- Toroid
- Shielded
- Low Profile

See section 5600 for Transformers

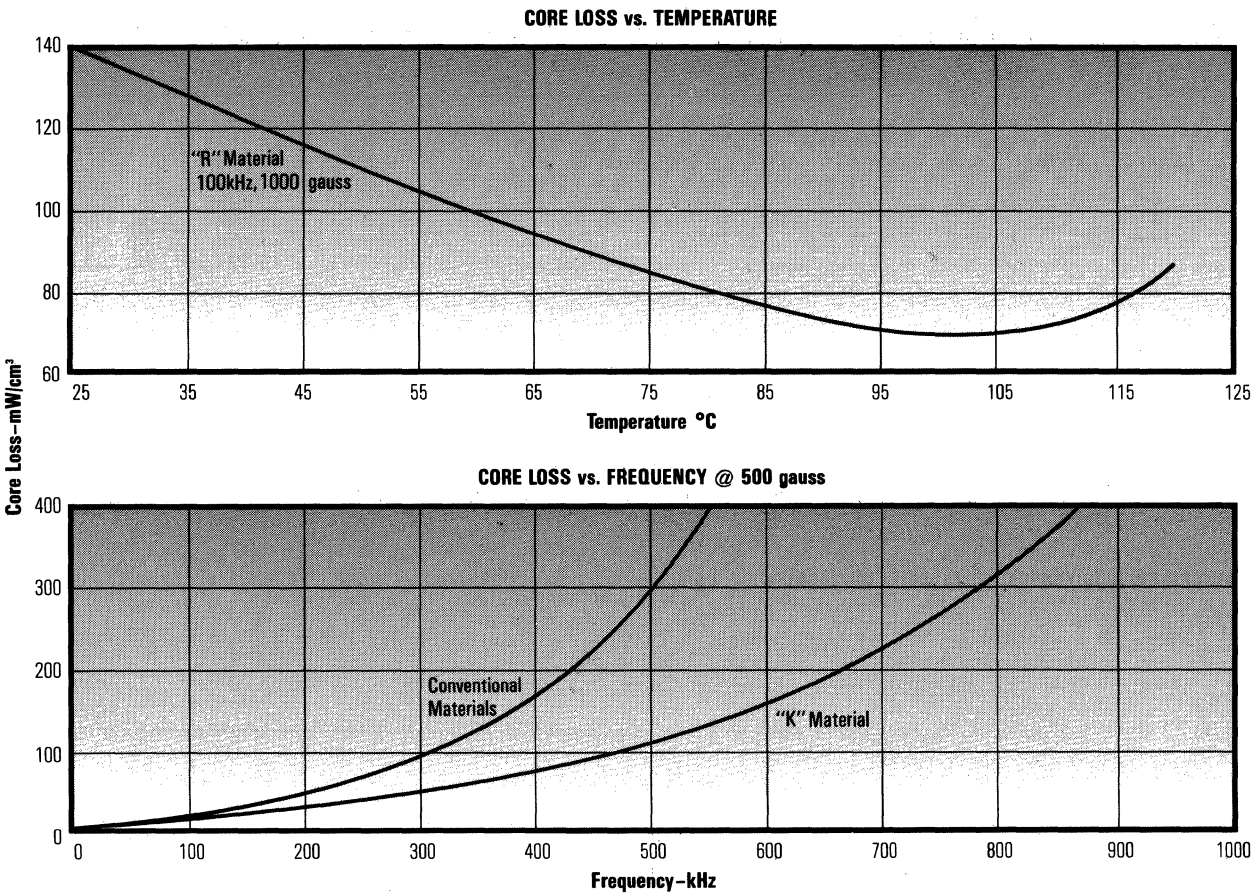
ZMAN *magnetics*

WASHINGTON
7633 S. 180th
Kent, Washington 98032
Phone: (425) 251-8064
Fax: (425) 251-6264

OREGON
2350 NE Griffin Oaks St., Suite 1500
Hillsboro, Oregon 97124
Phone: (503) 681-0900
Fax: (503) 681-0909

Email: sales@zmanmag.com
http//www.zmanmagnetics.com

Need ferrites for high frequency power supplies?



MAGNETICS delivers two new materials.

Cooler switching improves efficiency or cuts sizes.

Heat's the problem, but our cores don't build it up. Designed for use at 25 to 200kHz, core losses of our new **"R" material** actually decrease up to 100°C.

Want to cut size? If your power supply operates over 200kHz, our new **"K" material** core losses are reduced by half or more over conventional materials.

What's more, flux density and permeability for both materials stay higher at elevated temperatures when compared to other ferrite materials.

Magnetics offers the designer the broadest assortment of sizes and geometries, specifically developed for switched mode power supplies.

We offer a wide variety of sizes and geometries that include ECs, ETDs, lamination size Es, slab-sided solid center post types, pot cores, toroids, RMs, PQ and low profile shapes

Want details? Write Magnetics, P.O. Box 391, Dept. EEM-15, Butler, PA 16003 or call 1-800-245-3984 FAX: (724) 282-6955.

MAGNETICS®
Division of Spang & Company

CORES, MAGNETS & FERRITES

TAPE CORES

Manufacturer	Starting EEM Page No.	Common Mode Noise Filters	Converters	Current Transformers	Electronic Transformers	EMI/RFI Filters	High Frequency Counters	Inductors – High Q Filters	In-Line Filters	Inverters	Magnetic Amplifiers	Noise Filters	Power Factor Correction	Pulse Transformers	Regulators	Saturating Transformers	Static Magnetic Devices	Switching Regulators
Group Arnold	A•1351			√						√				√				√
Magnetics	A•1358	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

BOBBIN CORES

Manufacturer	Starting EEM Page No.	Common Mode Noise Filters	Converters	Current Transformers	Electronic Transformers	EMI/RFI Filters	High Frequency Counters	Inductors – High Q Filters	In-Line Filters	Inverters	Magnetic Amplifiers	Noise Filters	Power Factor Correction	Pulse Transformers	Regulators	Saturating Transformers	Static Magnetic Devices	Switching Regulators
Group Arnold	A•1351									√	√							
Kaschke USA, Inc	A•1356	√		√		√	√	√	√		√	√	√					
Magnetics	A•1358	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

CUT CORES

Manufacturer	Starting EEM Page No.	Common Mode Noise Filters	Converters	Current Transformers	Electronic Transformers	EMI/RFI Filters	High Frequency Counters	Inductors – High Q Filters	In-Line Filters	Inverters	Magnetic Amplifiers	Noise Filters	Power Factor Correction	Pulse Transformers	Regulators	Saturating Transformers	Static Magnetic Devices	Switching Regulators
Group Arnold	A•1351			√						√				√				√
Magnetics	A•1358	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

POWDER CORES

Manufacturer	Starting EEM Page No.	Common Mode Noise Filters	Converters	Current Transformers	Electronic Transformers	EMI/RFI Filters	High Frequency Counters	Inductors – High Q Filters	In-Line Filters	Inverters	Magnetic Amplifiers	Noise Filters	Power Factor Correction	Pulse Transformers	Regulators	Saturating Transformers	Static Magnetic Devices	Switching Regulators
Group Arnold	A•1351	√				√		√	√			√						√
Kaschke USA, Inc.	A•1356	√				√		√	√			√	√					
Micrometals	A•1359		√	√		√		√	√	√		√	√	√	√			√

FERRITE CORES

Manufacturer	Starting EEM Page No.	Common Mode Noise Filters	Converters	Current Transformers	Electronic Transformers	EMI/RFI Filters	High Frequency Counters	Inductors – High Q Filters	In-Line Filters	Inverters	Magnetic Amplifiers	Noise Filters	Power Factor Correction	Pulse Transformers	Regulators	Saturating Transformers	Static Magnetic Devices	Switching Regulators
Fair-Rite Products	A•1352	√				√												
Ferronics, Inc.	A•1353	√	√	√	√	√		√	√	√	√	√	√	√	√	√		√
Kaschke USA, Inc.	A•1356	√	√	√	√	√	√	√	√	√	√	√	√		√	√	√	√
Magnetics	A•1358	√	√	√	√		√	√	√	√	√	√	√	√	√	√	√	√
World Products Inc.	A•1362	√				√	√	√				√	√		√		√	

MAGNETS

Manufacturer	Starting EEM Page No.	Type			
		Alnico	Ceramic	Sm Co	Nd fe
Group Arnold	A•1351	√	√	√	
Jobmaster Corp.	A•1355	√	√	√	√
Magnetics	A•1358	√	√	√	√
World Products Inc.	A•1362		√		√

Bookmark EEM on the Web!

http://eemonline.com

Hearst Business Communications, Inc./UTP Division
645 Stewart Avenue, Garden City, NY 11530 • Tel: 516.227.1300 • FAX: 516.227.1901

GROUP ARNOLD®

THE MAGNETIC MATERIALS GROUP OF SPS TECHNOLOGIES

MAGNETIC POWDER CORES

Molybdenum Permalloy Powder (MPP) cores provide high Q and low core loss. MPP is extremely stable with respect to temperature and AC flux. MPP has a wide range of permeabilities, and is useful into the megahertz range of frequencies.

Advantages:

High Energy Storage	Lowest Magnetostriction
Low Core Loss	Stable Permeability with Temperature and Flux Density Changes
Permeabilities up to 300	Tight Inductance Factor Tolerances (±8%)

HI-FLUX is a distributed gap core capable of up to15000 gauss saturation flux density with low core losses. When used in high DC current applications, Hi-Flux cores can provide a reduction in inductor size, as well as total cost.

Advantages:

Temperature Stability	Permeabilities up to 160
High Energy Storage	High Flux Densities

SUPER-MSS offers low loss characteristics and a very low magnetostriction coefficient relative to mechanical noise levels when excitation is applied. SUPER-MSS provides good inductance under high DC bias conditions.

Advantages:

Low Core Loss	Temperature Stability
High Energy Storage	Low Magnetostriction

Popular Magnetic Powder Cores Data and Part Numbers ("A" prefix indicates MPP, "HF" for HIGH-FLUX and "MS" for SUPER-MSS Cores.)

O.D. Nom. Max. (in.)	I.D. Nom. Min. (in.)	HT. Nom. Max. (in.)	Magnetic Path Length (cm)	Cores Sectional Area (cm^2)	Inductance Factor (±8% nH/T²) and Part Numbers 60μ	125μ
0.310	0.156	0.125	1.787	0.0615	A_L = 25°	A_L = 52°
0.335	0.135	0.150			A-138025-8	A-137052-8
					HF-031060-8	HF-031125-8
					MS-031060-8	MS-031125-8
0.500	0.300	0.187	3.12	0.1140	A_L = 27	A_L = 56
0.530	0.275	0.217			A-051027-2	A-050056-2
					HF-050060-2	HF-050125-2
					MS-050060-2	MS-050125-2
0.655	0.400	0.250	4.11	0.1920	A_L = 36	A_L = 72
0.685	0.375	0.280			A-266036-2	A-281072-2
					HF-065060-2	HF-065125-2
					MS-065060-2	MS-065125-2
0.680	0.380	0.250	4.14	0.232	A_L = 43	A_L = 89
0.710	0.355	0.280			A-189043-2	A-190089-2
					HF-068060-2	HF-068125-2
					MS-068060-2	MS-068125-2
0.800	0.500	0.250	5.09	0.226	A_L = 32	A_L = 68
0.830	0.475	0.280			A-848032-2	A-206068-2
					HF-080060-2	HF-080125-2
					MS-080060-2	MS-080125-2
0.900	0.550	0.300	5.67	0.331	A_L = 43	A_L = 90
0.930	0.527	0.330			A-059043-2	A-310090-2
					HF-090060-2	HF-090125-2
					MS-090060-2	MS-090125-2
1.060	0.580	0.440	6.35	0.654	A_L = 75	A_L = 157
1.090	0.555	0.472			A-894075-2	A-930157-2
					HF-106060-2	HF-106125-2
					MS-106060-2	MS-106125-2
1.300	0.785	0.420	8.15	0.672	A_L = 61	A_L = 127
1.332	0.760	0.457			A-291061-2	A-548127-2
					HF-130060-2	HF-130125-2
					MS-130060-2	MS-130125-2
1.570	0.950	0.570	9.85	1.072	A_L = 81	A_L = 168
1.602	0.918	0.605			A-083081-2	A-254168-2
					HF-157060-2	HF-157125-2
					MS-157060-2	MS-157125-2

*±12% for Super MSS Core.

Applications

FOR	USE
Inductors for Power Conversion (DC to 500 kHz)	MPP/HI-FLUX/SUPER-MSS
EMI/RFI Inductors	MPP/HI-FLUX/SUPER-MSS
Pulse and Flyback Transformers	MPP/HI-FLUX/SUPER-MSS
Tuned Circuits (High Q, Resonant Circuits)	MPP
Impedance Matching Transformers	MPP

Typical Performance Data

	Core Loss @ 50 kHz, 1000 Gauss (mW/cm^3)		DC Magnetizing Force[1] for 50% Inductance Drop (Oersteds)	
	60μ	125μ	60μ	125μ
MPP	250	225	100	46
HI-FLUX	650	500	120	70
SUPER-MSS	400	350	90	37

[1]*Magnetizing Force = 0.4 π times the number of turns times the direct current in amperes divided by the magnetic path length in centimeters.*

For literature, samples and application assistance contact us at: **800•545•4578** or www.arnoldengr.com

Fax: 815•568•2238

GROUP ARNOLD®

Alnico Products — Cast & Sintered Alnico

Ferrite Products — Ceramic Arcs, Slabs & Rings

Flexmag Industries, Inc. — Extruded Flexible Magnets

Magnetic Technologies Corp. — Precision Magnetic Assemblies

Swift Levick Magnets Ltd. — SmCo & Cast Alnico Magnets

Rolled Products — Precision Strip and Foil

Ogallala Electronics — Custom Magnetic Assemblies & Solenoids

National - Arnold Magnetics — Tape Wound Cores

Plastiform — Bonded Ferrite & Rare Earth Magnets

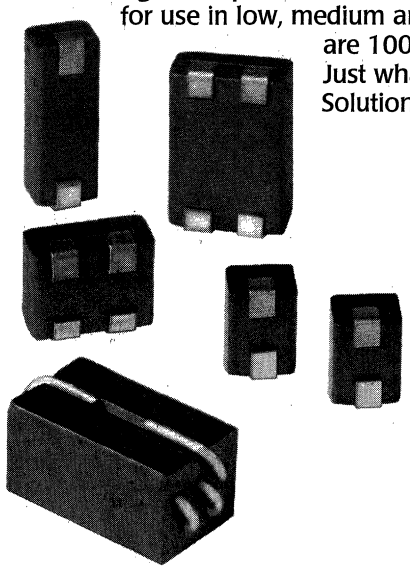
Magnetic Technologies Europe — Precision Magnetic Assemblies

4 Solutions for EMI

From Your Signal Solution™ Company.

Multi Layer Chip Beads

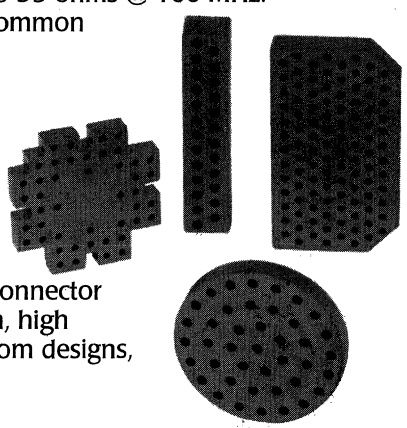
For big problems in small places, try these for a quality and cost effective EMI solution. Our Multi Layer Chip Beads are now available in the most popular package sizes, and are offered in a wide range of impedance values. These beads are engineered for use in low, medium and high current applications, and are 100% tested for impedance and DCR. Just what you'd expect from "Your Signal Solution" Company.



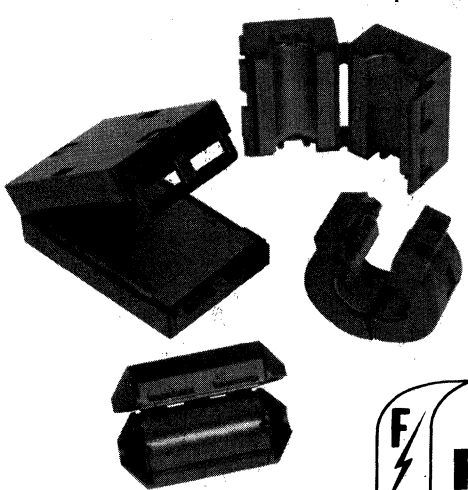
Surface Mount Beads

Surface Mount Beads, available in several sizes and materials are today's components for circuit board suppression applications. The unique solid wire construction of this Fair-Rite series offers the capability of surviving a 25 amp surge while handling 10 amps on a continuing basis. Impedance up to 95 ohms @ 100 MHz. Our common-mode bead is an uncommon solution to common-mode EMI.

Connector Suppression Plates



For broadband EMI filtration, our newly expanded line of multi-hole connector plates in .100" and 2mm pitches are available in our high attenuation, high resistivity 44 suppression material. We specialize in high volume custom designs, so fax us a sketch for a fast response.



Clamp-On Suppression Cores

Concerned with conducted EMI in wiring and cables? Contact the Number One Source for ferrites for suppression applications. We even have engineering kits to help you troubleshoot your tough EMI problems.

QS-9000 REGISTERED COMPANY — ACCREDITED ANSI-RAB REGISTRAR

Call or Fax for more details...

Fair-Rite Products Corp.

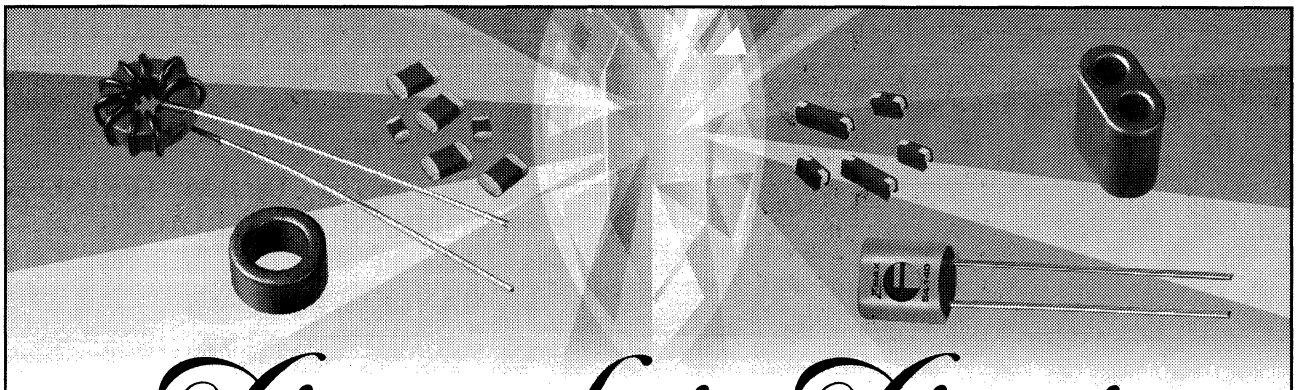
One Commercial Row, Wallkill, NY 12589-0288

Phone (888) FAIR-RITE ● FAX (888) FERRITE

(914) 895-2055 (914) 895-2629

E-Mail: ferrites@fair-rite.com

Visit us at: www.fair-rite.com



Diamonds in Disguise

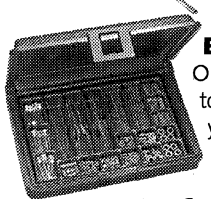
Ferronics ferrite cores and assemblies are as important to the electronics industry as diamonds are to the jewelry industry. That's because they're the proven way to transfer wanted signals and suppress unwanted high frequency noise or oscillations. We manufacture standard and custom ferrite cores including toroids, baluns, and wide band multi-hole cores with permeabilities from 40 to 15,000 Perm.

You can use our cores and assemblies as inductors, chokes, and transformers in monitors, displays, CATV taps and splitters, power supplies, GFI's, computers, and related peripheral devices. They're especially sought after for high speed telecommunications applications and data transfer.

Put our expertise in ferrite engineering to work for you. Call us or our authorized distributor with your specific requirements.

Z-MAX® Chokes

Our Z-MAX® ferrite chokes are specifically engineered for maximum impedance over a wide frequency range. At the top of the Z-MAX® line is the patented "Gold" series which has the unique capability of providing a very flat impedance profile across a broad range of frequencies from 5 to 500 MHz. By using our "Gold Series" Z-MAX® choke right off the shelf, you can be confident it will dampen a full range of frequencies necessary to eliminate most noise.



EMI/RFI Kit

Our special EMI/RFI Design Kit contains a wide assortment of precision engineered ferrites especially designed to suppress unwanted high frequency noise or oscillations. The kit has over 200 pieces ready for installation in your test circuit including single and multi-hole beads, beads on leads, six-hole chokes, and Z-MAX® chokes. To find the best ferrite for your EMI/RFI application, order a kit today.

Surface Mount Multilayer Chip Beads

The Ferronics FMB and FRB Series of surface mount, ferrite multilayer chip beads are specifically engineered to suppress EMI/RFI and to prevent self-oscillation in TVs, VCRs, pagers, cellular phones, and a host of other electronic products. The miniature multilayer chip beads come in standard EIA and EIAJ chip sizes including 0603, 0805, 1206, 1806, and 1812. They are available in an impedance range from 30 Ω to 1500 Ω at 100 MHz and in current ratings to 700 mA max.

OUR AUTHORIZED DISTRIBUTOR

DEXTER MAGNETIC MATERIALS DIVISION

Our authorized international stocking distributor, Dexter Magnetic Materials, provides customers with rapid, easy access to full line product information, computer supported customer service, as well as dependable and timely delivery.

Extensive Product Selection

Comprehensive ferrite core, amorphous core, powder core, and thermistor inventory; all shapes, sizes, and grades, as well as hard-to-find materials.

To reach a Dexter location near you,

CALL 1-800-345-4082

FERRONICS INCORPORATED

Quality Ferrites For Worldwide Markets

45 O'Connor Road, Fairport, NY 14450 USA
Tel: (716) 388-1020 Fax: (716) 388-0036
Website: www.ferronics.com

© Ferronics, Inc. 1998. All rights reserved.

LODESTONE PACIFIC

Factory Authorized and Supported Distribution

WORLD CLASS DISTRIBUTOR OF MAGNETIC CORE MATERIALS, BOBBINS AND HARDWARE

MANUFACTURER OF TOROID MOUNTS & HEADERS

PHONE: (800) 694-8092
Facsimile: (714) 970-0800

E-Mail: sales@lodestonepacific.com
Internet: http://www.lodestonepacific.com

"Finest In The Field"

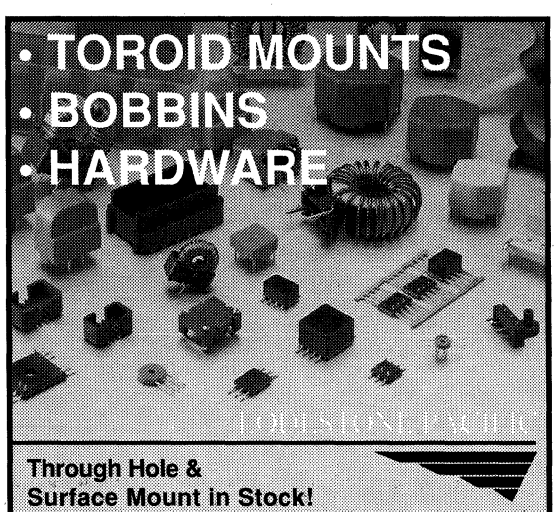
MAGNETICS

- The Finest Core Materials
- Free Samples the Next Day
- Free Catalogs the Next Day
- Core Grinding & Gapping
- Core Coating & Painting
- In House Technical Support
- In House Cross Reference
- Millions of Cores in Stock
- Closely Scheduled Deliveries

FERRITE CORES Factory Authorized and Supported Distribution

MICROMETALS
IRON POWDER CORES Factory Authorized & Supported Distribution

- TOROID MOUNTS
- BOBBINS
- HARDWARE

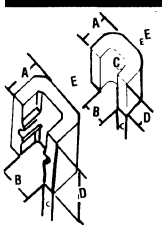


Through Hole & Surface Mount In Stock!

See our Toroid Mount, Bobbin and Hardware Catalog on pages A1235-1239

JOBMASTER MAGNETS

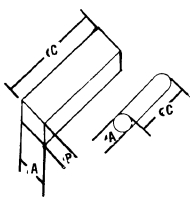
STOCK JOBMASTER MAGNETS



POWER MAGNET

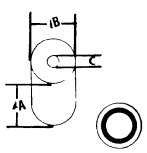
Cat No	A mm	A ins	B mm	B ins	C mm	C ins	D mm	D ins	E mm	E ins	Weight gr	Weight oz
811	19	¾	14.2	9/16	7.9	5/16	19	¾	4	5/32	71	2½
812	25.4	1	19	¾	9.5	⅜	25.4	1	4.7	3/16	142	5
813	28.6	1⅛	22.2	⅞	11.1	7/16	28.6	1⅛	4.7	3/16	226	8
814	35	1⅜	35	1⅜	11	7/16	44.5	1¾	8	5/16	368	13
815	41	1⅝	41	1⅝	14.3	9/16	57	2¼	8	5/16	709	25
816	54	2⅛	47.6	1⅞	16	⅝	82.5	3¼	9.5	⅜	1446	51

Hole centres 814 31 75 mm 1¼" 815 38 mm 1½" 816 43 mm 1¹¹⁄₁₆"



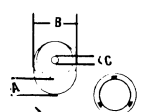
BAR MAGNET

Cat No	A mm	A ins	B mm	B ins	C mm	C ins	WEIGHT gr	WEIGHT oz
805	6	¼ diameter			20	13/16	4	.15
806	8	5/16 diameter			25	1	8	.30
807	10	⅜ diameter			30	1 3/16	16	.58
844	10	⅜	5	3/16	20	13/16	11	.38
845	12.5	½	5	3/16	40	1 9/16	21	.75
846	15	⅝	5	3/16	60	2⅜	56	2
842	15	⅜	10	⅜	50	2	70	2½
843	15	⅝	10	⅜	75	3	100	3½



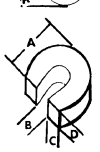
POT MAGNET

Cat No	A mm	A ins	B mm	B ins	C	WEIGHT gr	WEIGHT oz
831	15.8	⅝	17.5	11/16	Tapped Hole	28	1
832	19.0	¾	20.6	13/16	OBA/6 SI	47	1¾
833	25.4	1	27	1 1/16	or 10 NF	100	3½
834	30.1	1 3/16	35	1⅜		198	7



SHALLOW POT MAGNET

Cat No	A mm	A ins	B mm	B ins	C mm	C ins	WEIGHT gr	WEIGHT oz
826	8	5/16	19	¾	3.5	9/64	14	½
827	9.5	⅜	28.6	1⅛	4.7	3/16	50	1¾
828	11.1	7/16	38	1½	4.7	3/16	100	3½



POWER MAGNET

Cat No	A mm	A ins	B mm	B ins	C mm	C ins	D mm	D ins	Weight gr	Weight oz
802	25.4	1	6.35	¼	7.9	5/16	7.9	5/16	28.3	1

RARE EARTH MAGNETS

Permanent Magnet Material

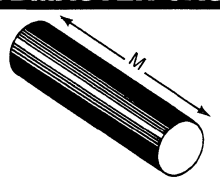
Jobmax 18 — Samarium Cobalt	Diameter	Thickness
Stock sizes	0.071"	0.157"
	0.098"	0.157"
	0.125"	0.125"
	0.187"	0.187"
	0.197"	0.059"
	0.250"	0.250"
	0.312"	0.062"
	0.375"	0.125"
	0.375"	0.250"
	0.375"	0.500"
	0.500"	0.187"
	0.500"	0.375"
	0.730"	0.300"

Jobmax 27 — Neodymium Iron Boron	Diameter	Thickness
Stock sizes	0.118"	0.059"
	0.197"	0.059"
	0.250"	0.125"
	0.330"	0.125"
	0.375"	0.062"
	0.375"	0.125"
	0.375"	0.100"
	0.394"	0.059"
	0.500"	0.125"
	0.500"	0.250"
	0.750"	0.187"
	1.000"	0.187"

Jobmax 35 is also available in many sizes.

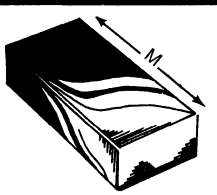
Cut blocks available in most sizes. Call for details.

JOBMASTER CAST ALNICO 5 MAGNETS



RODS — ALNICO 5

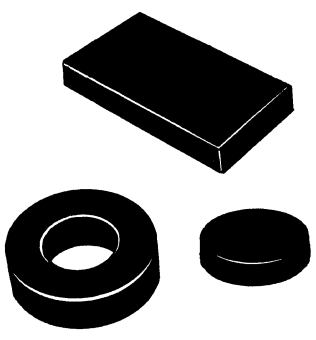
Dimensions in inches A	C
.125	4
.187	5
.250	6
.375	6
.500	6
.625	6
.750	6
.875	6
1.000	6



BARS, single — ALNICO 5

Dimensions in inches A	B	C
.125	.250	6
.250	.250	6
.250	.500	6
.500	.500	6
.500	.750	6
.500	1.000	6
.750	.750	6
1.000	1.000	6

CERAMIC MAGNETS



available in most sizes

Ceramic magnets are Barium Ferrite permanent magnets. They are extremely resistant to demagnetization (they lose approximately 4% of their strength every 100 years!) and are relatively inexpensive. They are extremely resistant to solvents and corrosive agents.

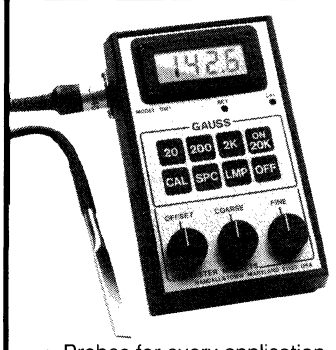
There are several grades of ceramic magnets:

Grade 1 Ceramic are unoriented and inexpensive. These magnets are usually magnetized conventionally but can be ordered multipole.

Grade 5 Ceramic are oriented. They are usually magnetized conventionally. The energy product is very close to that of Alnico 5, a fine magnetic alloy.

Grade 8 Ceramic is also oriented. It is even more resistant to demagnetization than Grade 5 Ceramic.

MICROPOWER GAUSSMETER



- Probes for every application available at low cost

MODEL GM1A

- 0.25% ± 1 digit accuracy all ranges
- Automatic low battery warning, 100 hrs. life, 9V battery
- No reference magnets required... precalibrated probes
- Cal function for special or custom probes
- Calibrated analog output 200mV Full scale
- Front panel calibration and set-up
- Touch keyboard controls
- Display lighting
- Incremental/expanded scale operation. Null out up to ± 4 kG
- Militesia version available, at no extra cost
- Easy zeroing with three well balanced controls
- 3 ft. cable
- Rugged ABS case
- Duracell battery included

MANY OF OUR MAGNETS, MAGNETIC PRODUCTS AND SERVICES ARE NOT LISTED ABOVE. PLEASE CALL FOR INFORMATION.

JOBMASTER MAINTAINS AN EXTENSIVE STOCK OF MAGNETS, ELECTROMAGNETS, AND RELATED COMPONENTS. CALL OR WRITE FOR CATALOG.

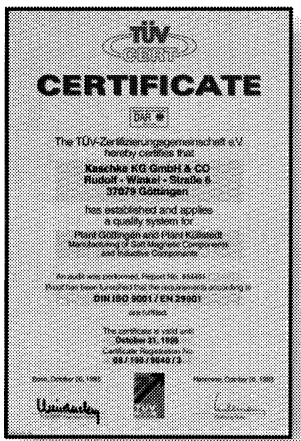
1-800-891-4148
FAX: 410-521-5461

e-mail us at: sales@jobmaster.com
In Canada call 905-897-1380
P.O. Drawer 207 E.
Randallstown, Maryland 21133
Phone: (410) 655-1400

JOBMASTER CORPORATION

KASCHKE KG GmbH & Co.

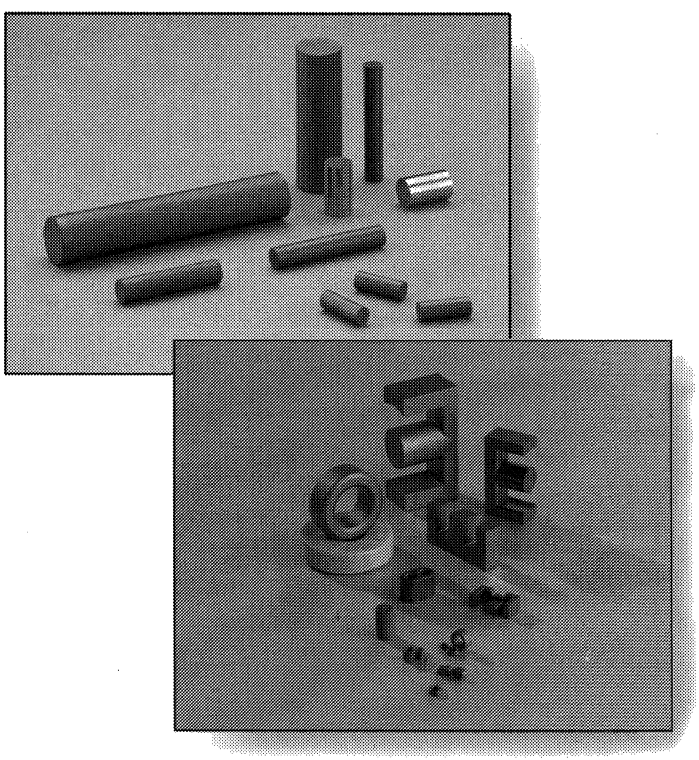
FERRITES • BOBBINS • WOUND COMPONENTS


TÜV CERT
CERTIFICATE
The TÜV-Zertifizierungsgemeinschaft e.V. hereby certifies that
Kaschke KG GmbH & CO
Rudolf - Winkel - Straße 6
37079 Göttingen
has established and applies a quality system for
Plant Göttingen and Plant Kolkwitz
Manufacture of Soft Magnetic Components and Inductive Components
An audit was performed, Report No.: 964662
Proof has been furnished that the requirements according to
DIN ISO 9001 / EN 29001
are fulfilled.
This certificate is valid until
October 31, 1998
Certificate Registration No.:
68 100 964662
Date, October 30, 1995
Representative for TÜV CERT

Kaschke KG GmbH & Co. is a ISO 9001 approved manufacturer of Ferrites, bobbins and wound components, employing approximately 1200 people at factories in Germany and Tunisia. We have more than 40 years experience in the production of soft magnetic ferrite material and supply more than 30 different grades. The core size dimensions range from 1-130mm. To complete the product range we can offer the respective bobbins listed to UL 94 specification. HB to VO.

Ferrite materials

- NiZn ferrites with permeabilities from 10 to 2000
- MnZn ferrites for power applications from 10 kHz to 1.5 MHz
- MnZn ferrites with permeabilities from 300 to 20,000
- Customized materials



The product range covers the following core shapes:

Toroids

- Diameters from 2.5 to 12.5 mm with permeabilities of up to 20,000
- Diameters of up to 102 mm made of high-permeability or power ferrites coated with parylene or with epoxy resin

U cores

- U cores from U 10/3 to U 130/25 made of high-permeability and power ferrites
- UR cores from UR 29/17 to UR 43/34 made of power ferrites
- U2R cores from U2R 34/22 to U2R 47/24 made of power ferrites

Cores for EMC applications

- Toroids made of K 40, K 800 or K 5500
- Absorber tiles made of K 1500 or K 2000
- Ferrite beads, sleeves and small rods

E cores

- E cores from E 5,3/2 to E 100/28 made of high-permeability or power ferrites
- ETD cores from ETD 19 to ETD 49 made of power ferrites
- ER cores from ER 9,5/5 to ER 53/28 made of power ferrites
- Planar PE and PI cores
- EFS cores
- Bobbins to the listed parts

Miscellaneous

- Rods with diameters from 1.6 mm to 10 mm and lengths of up to 60 mm
- Sleeves with outer diameters from 3 mm to 10 mm and lengths of up to 50 mm
- Double- or multi-aperture cores
- Pot cores for proximity sensors
- Rods or tubes for inductive welding

KASCHKE USA INC.

3100 Airway Avenue, Suite #130
Costa Mesa, CA 92626
Tel: 714-708-2379 • Fax: 714-708-2380
E-mail: kaschke.usa@lbm.net

Visit us at "http://www.kaschke.de"

KASCHKE KG GmbH & Co.

STANDARDIZED PRODUCTS
CUSTOMIZED COMPONENTS

Kaschke KG GmbH & Co. is your "Vertically Integrated Producer" and competent partner for the design and cost effective production of Inductive components to the requirements of relevant standards. We stock a wide variety of standardized products, and specialize in the development of customized components.

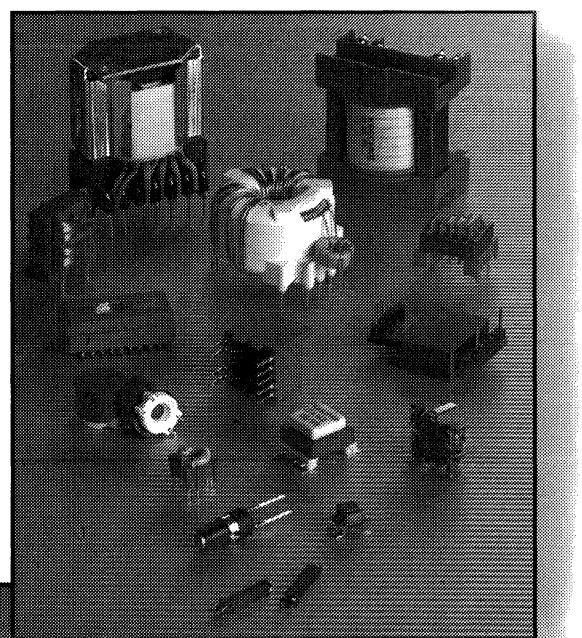
We now bring German Excellence in Technology to you through our office in Costa Mesa, California USA. E.mail address Kaschke.usa@ibm.net

The main fields of application for our wound components are:

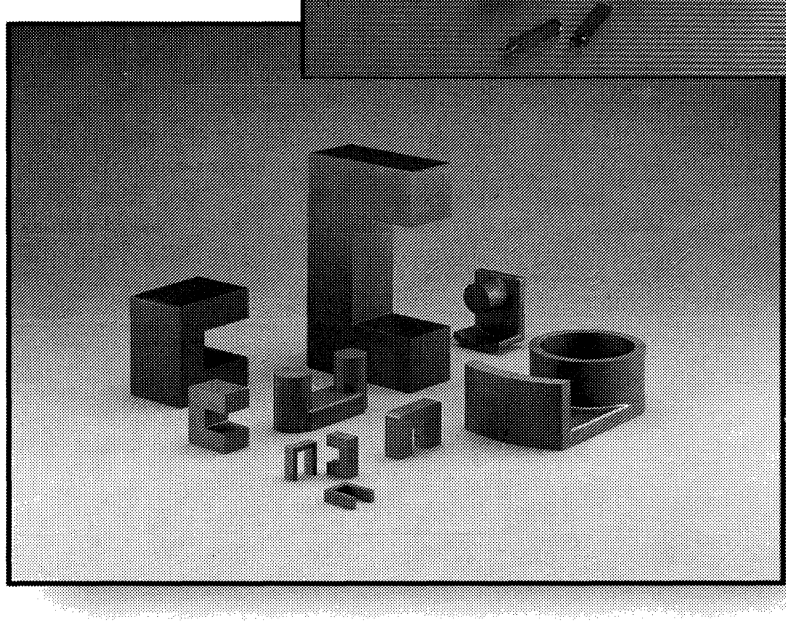
EMC
- Common-mode chokes
- RFI suppression chokes based on cores with an open magnetic circuit
- RFI suppression chokes based on iron powder toroids

Lighting Technology
- Output transformers for SELV
- Current transformers
- Oscillating chokes
- PFC chokes

SMPS
- Power transformers
- Planar transformers
- Drive and control transformers
- Storage chokes



Antenna Technology
- Splitters
- Directional couplers
- Baluns
- Impedance transformers
- DCF antennae



ISDN and ADSL
- Common-mode toroidal chokes in THT and SMT
- S_O transformers and modules in THT and SMT
- S_{2M} transformers in THT and SMT
- U_{KO} transformers
- U_{PO} / U_{PN} transformers

KASCHKE USA INC.
3100 Airway Avenue, Suite #130
Costa Mesa, CA 92626
Tel: 714-708-2379 • Fax: 714-708-2380
E-mail: kaschke.usa@lbm.net

Visit us at "http://www.kaschke.de"

FOR HIGH TECH APPLICATIONS

MAGNETICS®
Division of Spang & Company

THE BROADEST RANGE OF MAGNETIC CORES FROM A SINGLE SOURCE

Ferrites

Ferrites are ceramic structures made from high purity oxides of manganese, zinc, and iron. They are pressed, fired, and machined to meet requirements. They can be used over a wide frequency range, having a high electrical resistivity and low eddy current losses, for low level and power applications.

Powder Cores

Molypermalloy powder (MPP) cores are a distributive air gap type and have many outstanding characteristics-high resistivity, low hysteresis and eddy current losses and excellent inductance stability under both dc and ac conditions. MPP, High Flux, and Kool Mμ® cores are excellent for uni-directional drive applications such as pulse or fly back transformers.

Tape Wound Cores

Tape wound cores are made from high permeability magnetic strip alloys (.0005" to .014" thick) of nickel-iron (80% or 50% Ni), silicon-iron, cobalt-iron, and amorphous metals.

Bobbin Cores

Bobbin cores are miniature tape cores made from ultra-thin (.000125" to .001" thick) nickel-iron strip (80% Ni or 50% Ni) wound on non-magnetic stainless steel bobbins. Covered with protective caps and epoxy coated, bobbin cores are made as small as .050" in ID and widths of .032".

Cut Cores (nickel-iron, cobalt-iron, amorphous)

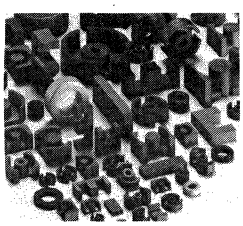
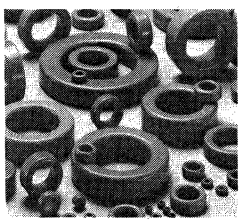
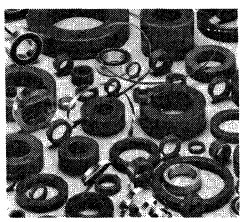
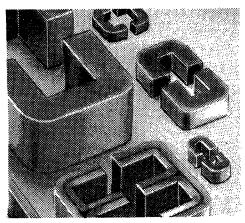
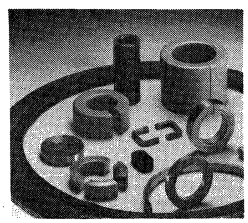
These cores are ideal for applications where low core loss is needed and core saturation is undesirable.

Core Material Considerations

Please Call or Fax Us for our Complete catalog

	Flux Density	Initial Perm.	Frequency* Range	Max. op. Temp.	Core Losses	Core Cost	Winding Cost	Temp. Stability	Mounting Flexibility
Ferrite Toroids MAGNETICS®									
J Mat'l	4300	5000	to > MHz	100°C	low	low	high	fair	fair
W Mat'l	4300	10,000							
H Mat'l	4200	15,000							
Ferrite Shapes									
K Mat'l	4600	1500	to 2MHz	125°C		depends upon geometry			
R Mat'l	5000	2300	to 200kHz	125°C	(1)				
P Mat'l	5100	2500	to 100kHz	125°C	(2)				
F Mat'l	4700	3000	to 100kHz	125°C	(3)				
MPP Cores	7000	14-550	< 1MHz	200°C	low	high	high	good	fair
50 Ni-50 Fe Powder Cores	15,000	60-200	< 1MHz	200°C	low	high	high	good	fair
KOOL Mμ® Powder Cores	11,000	26-125	< 1MHz	200°C	low	low	high	good	fair
Ni/Fe Tape Cores Ni/Fe Bobbin Cores	7,000 to 15,000	to 100,000	to 100kHZ	200°C	low to medium	high	high	good	fair
Amorphous Tape Cores (iron-base)	16,000	10,000	to 500kHz	150°C	low	high	high	good	fair
Amorphous Tape Cores (cobalt-base)	5,000	to 100,000	to 500kHz	100°C	low	high	high	good	fair
Si-Fe Tape Cores	16,000	4000	<1000Hz	300°C	high	medium	high	good	fair
Ni-Fe Cut Cores	15,000	15,000	to 100kHz	150°C	medium	high	low	good	fair

*Frequency depends on adjusting operating flux density to levels that keep core losses to acceptable limits.
(1) Core losses decrease up to 100°C
(2) Core losses decrease up to 70°C, remain low to 100°C
(3) Low core losses at lower temperatures

MAGNETICS: Division of Spang & Company
Dept. EEM • P.O. Box 391 • Butler, PA 16003 • **Phone: 412-282-8282** • Fax: 412-282-6955 • **1-800-245-3984**

MICROMETALS
IRON POWDER CORES
USA: 800/356-5977
TEL: 714/970-9400
FAX: 714/970-0400
INTERNET:www.micrometals.com

RADIO FREQUENCY (RF) APPLICATIONS

Introduction

Typically iron powder cores are used to produce high "Q" inductors from 50 KHz to 500 MHz and broadband transformers above 50 MHz. It is a preferred core material due to its stability, high"Q", frequency response, and power handling capabilities.

Micrometals offers iron powder cores produced to narrow permeability tolerances, which results in cores with close uniformity within lots and relative uniformity from lot to lot.

Material Description

-1, -3, -8, -15 Materials: These materials are annealed carbonyl irons providing the highest carbonyl permeability. They are useful for high Q applications below 1 MHz. They will provide the broadest band transformers covering a typical range from 50 to 500 MHz.

-2, -4, -6, -7, Materials: These are the most popular carbonyl irons. They will provide high Q up to 40 MHz and are the most popular materials for amateur radio and a variety of other communication applications. They are also useful for moderate band transformers in the 200 to 400 MHz frequency range.

-10, -17 Materials: These Materials are the highest frequency carbonyl irons. They will provide high Q up to 150 MHz and are popular materials for cable television applications. They will produce moderate band transformers typically covering 400 to 700 MHz.

-0 Material: This is a non-magnetic material. It provides a solid form for winding air coils. It has excellent temperature stability and will provide high Q up to the highest frequencies. It is also useful for moderate band transformer applications covering a typical range from 600 to 1000 MHz.

GENERAL MATERIAL PROPERTIES

Material Mix No.	Basic Iron Powder	Material Permeability (μ_i)	Temperature[1] Stability (ppm/°C)	Relative Cost	Toroidal Color Code
1	Carbonyl C	20	280	2.7	Blue/Clear
2	Carbonyl E	10	95	1.7	Red/Clear
3	Carbonyl HP	35	370	2.5	Gray/Clear
4	Carbonyl J	9.0	280	2.0	Blue/White
6	Carbonyl SF	8.5	35	2.0	Yellow/Clear
7	Carbonyl TH	9.0	30	2.0	White/Clear
8	Carbonyl GQ4	35	255	2.5	Orange/Clear
10	Carbonyl W	6.0	150	4.7	Black/Clear
12*	Synthetic Oxide	4.0	170**	1.5	Green/White
15	Carbonyl GS6	25	190	3.1	Red/White
17	Carbonyl	4.0	50	3.1	Blue/Yellow
42	Hydrogen Reduced	40	550	1.4	Blue/Red
0	Phenolic	1	0	1.0	Tan/Tan

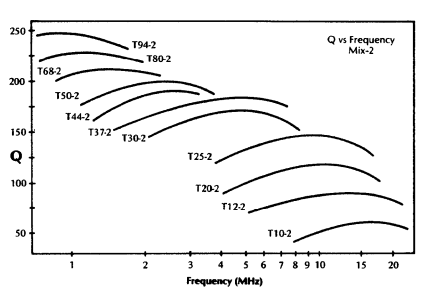
[1] Temperature stability values listed are for closed magnetic structures.
* Non-linear
** Mix 17 was developed as a temperature stable alternative to mix 12 and is recommended for all new designs.

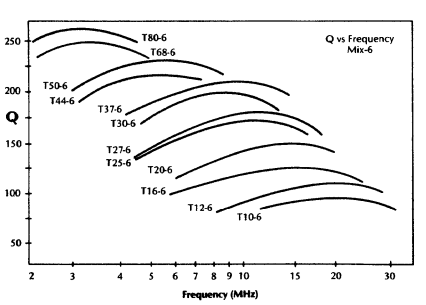
RESONANT FREQUENCY (—) AND BROADBAND (----) RANGE

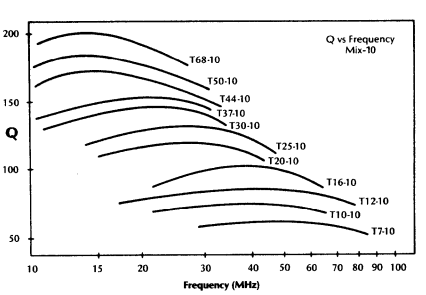
Mix No.	Range (MHz)	2KHz to 50KHz	50KHz to 250KHz	250KHz to 500KHz	500KHz to 2MHz	2MHz to 10MHz	10MHz to 40MHz	40MHz to 150MHz	150MHz to 250MHz	250MHz to 500MHz	500MHz to 1GHz
42	.03-.80	—	—								
3	.02-1	—	—	—	—						
8	.02-1	—	—	—	—			----	----	----	
1	.15-3		—	—	—	—					
15	.15-3		—	—	—	—					
2	.25-10			—	—	—	—		----	----	----
7	1-25				—	—	—				
4	3-40					—	—	—			
6	3-40					—	—	—	----	----	
10	15-100						—	—	—	----	----
17	20-200						—	—	—		
12	30-250						—	—	—		
0	50-350							—	—	—	----

* Please note, materials can be used outside of resonate frequency range. Frequency range is given to optimize Q and core loss.

Q VERSUS FREQUENCY CURVES







MICROMETALS
IRON POWDER CORES
USA: 800/356-5977
TEL: 714/970-9400
FAX: 714/970-0400
INTERNET:www.micrometals.com

POWER CONVERSION AND LINE FILTER APPLICATIONS

Introduction

Iron powder as a core material has been widely used in RF applications for years. The distributed air gap properties inherent in iron powder cores also make them extremely well-suited for a variety of energy storage inductor applications. Iron powder is a cost-effective design alternative to molypermalloy powder (MPP), high flux, or sendust cores. It can be used in place of ferrites and iron-alloy laminations requiring a gap.

The iron powder cores described below are typically used for DC output chokes, differential-mode input chokes, power factor correction inductors, continuous-mode flyback inductors, light dimmer chokes and other EMI/RFI applications.

Material Description

-2 Material The low permeability of this material will result in a lower operating AC flux density than with other materials with no additional gap-loss.

-8 Material This material has low core loss and good linearity under high bias conditions. A good high frequency material. The highest cost material.

-18 Material This material has low core loss similar to the -8 Material with higher permeability and a lower cost. Good DC saturation characteristics.

-26 Material The most popular material. It is a cost effective general purpose material that is useful in a wide variety of power conversion and line filter applications.

-28 Material The good linearity, low cost, and relatively low permeability of this material make it popular in the larger sizes for high power UPS chokes.

-33 Material An inexpensive alternate to the -8 Material for applications where high frequency core loss is not critical. Good linearity with high bias.

-38 Material A higher permeability alternate to -26 Material. A low cost material best used at line frequency.

-40 Material The least expensive material. It has characteristics quite similar to the very popular -26 Material. Popular in larger sizes.

-45 Material The highest permeability material. A high permeability alternate to -52 Material with slightly higher core losses.

-52 Material This material has lower core loss at high frequency and the same permeability as the -26 Material. It is very popular for new high frequency choke designs.

GENERAL MATERIAL PROPERTIES

Material Mix No.	Reference Permeability (μo)	Temp. Coef. of Perm. (+ppm/°C)	Material Density (g/cm³)	Coef. of Lin. Expan. (+ppm/°C)	Relative Cost	Color Code
-2	10	95	5.0	10	2.7	Red/Clear
-8	35	255	6.5	10	5.0	Yellow/Red
-18	55	385	6.6	11	3.4	Green/Red
-26	75	825	7.0	12	1.0	Yellow/White
-28	22	415	6.0	11	1.9	Gray/Green
-33	33	635	6.3	11	1.6	Gray/Yellow
-38	85	955	7.1	12	1.1	Gray/Black
-40	60	950	6.9	11	1.0	Green/Yellow
-45	100	1040	7.2	12	2.6	Black/Black
-52	75	650	7.0	12	1.4	Green/Blue

CORE LOSS COMPARISON (mW/cm³)

PERM. WITH DC BIAS

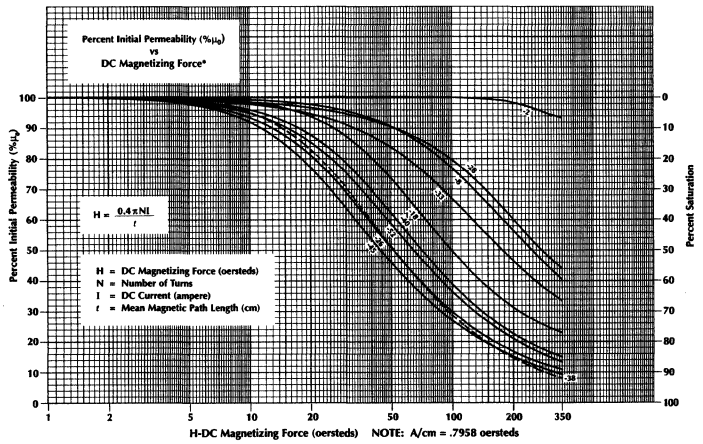
Material Mix No.	60Hz @5000G	1kHz @1500G	10kHz @500G	50kHz @225G	100kHz @140G	500kHz @50G	H_{DC} = 50 oersteds $\%_{\mu o}$	$\mu_{effective}$
-2	19*	32*	32*	28	19	12	100	10.0
-8	45	64	59	50	36	28	91	31.9
-18	48	72	71	63	46	37	74	40.7
-26	33	60	75	89	83	139	51	38.3
-28	38	80	120	164	158	247	91	20.0
-33	37	80	126	182	180	291	84	27.7
-38	31	57	72	99	103	217	51	43.4
-40	29	62	93	130	127	224	62	37.2
-45	26	49	60	69	62	92	46	46.0
-52	30	56	68	72	58	63	59	44.3

* Low frequency core loss is extrapolated from data measured at high frequency.

MATERIAL APPLICATIONS

Typical Application	Material (Mix No.) -2	-8	-18	-26	-28	-33	-38	-40	-45	-52
Light Dimmer Chokes				X			X	X	X	
60 Hz Differential-mode EMI Line Chokes				X			X	X	X	X
DC Chokes: <50kHz or low Et/N				X	X	X	X	X	X	
DC Chokes: ≥50 kHz or higher Et/N		X	X							X
Power Factor Correction Chokes: <50kHz				X	X	X		X		
Power Factor Correction Chokes:≥50 kHz	X	X	X							X
Resonant Inductors: ≥50 KHz	X									

PERCENT INITIAL PERM. VS. DC MAGNETIZING FORCE



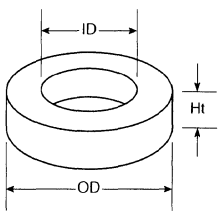
MICROMETALS
IRON POWDER CORES
USA: 800/356-5977
TEL: 714/970-9400
FAX: 714/970-0400
INTERNET:www.micrometals.com

TYPICAL SHAPES AND SIZES

Micrometals manufactures the following shapes in a wide range of sizes and in any of the previously mentioned materials. Please call for technical questions, catalogs, price and deliver. Also, Micrometals will gladly extend sample cores.

POWER CONVERSION, LINE FILTER AND RF APPLICATIONS

TORODIAL CORES



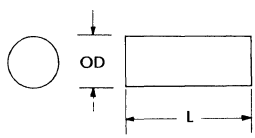
Typical Part No.

T 106 - 26 ☐ / ☐

OD in 100th inches
Micrometals Mix No.
Letter Indicates Alternate Height
Code Area for Other Characteristics

OD ranging from .05 in. to 5.2 in.

PLAIN CORES



Typical Part No.

P 16 32 - 1 40

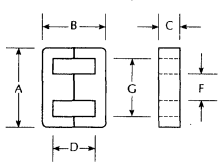
OD in 64th inches
Length in 32nd inches
Code Area for Other Characteristics
Micrometals Mix No.

OD ranging from .033 in. to 1.0 in.

POWER CONVERSION AND LINE FILTER

E-CORES

E cores ordered per half



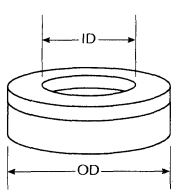
Typical Part No.

E 168 - 26 A / G 015

"A" Dim. in 100th inches
Micrometals Mix No.
Letter Indicates Alternate "C" dim.
Indicates Center-leg gap per half in .001 in.

"A" dimensions ranging from .50 in to 4.5 in.

COMPOSITE CORES



Typical Part No.

ST 102 - 2 75 B

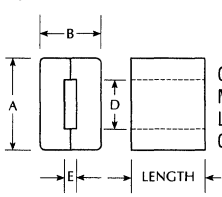
OD in 100th inches
Code to indicate iron powder mix
Indicates percent iron
Letter indicates different Ht.

Material Composition

	Fair Rite 77 Material (μ=2000)	Micrometals -52 Material(μ=75)
267	33%	67%
275	25%	75%

OD ranging from .51 in. to 2.01 in.

BUS-BAR CORES



Typical Part No.

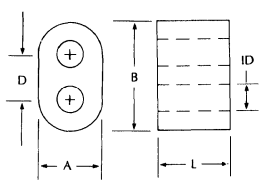
HS 300 - 26 A / ☐

Code to Indicate Max. Current
Micrometals Mix No.
Letter Indicates Alternate Length
Code Area For Other Characteristics

Length ranging from .5 in. to 1.5 in.

RF APPLICATIONS

BALUN CORES



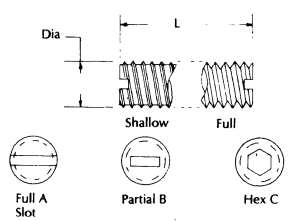
Typical Part No.

BLN1728- 10 A

Micrometals Mix No.

"A" dimensions ranging from .082 in. to .169 in.

THREADED CORES



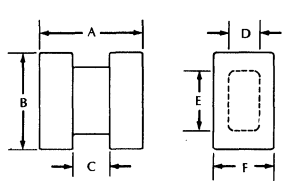
Typical Part No.

TH34-02 02

Micrometals Mix No.

OD ranging from .111 in. to .249 in.

SQUARED BOBBINS



Typical Part No.

SBB1010-18 02

Micrometals Mix No.

"A" dimensions ranging from .078 in. to .327 in.

W O R L D P R O D U C T S

CHIP FERRITE INDUCTORS / 2012 SERIES (REFERENCE 0805 TYPE)

PART NUMBER	INDUCTANCE (μH)	INDUCTANCE TOLERANCE	Q MIN.	Q TYP.	L.Q. TEST FREQUENCY (MHz)	SRF (MHz) MIN.	SRF (MHz) TYP.	DCR (mΩ) MAX.	DCR (mΩ) TYP.	RATED CURRENT (mA) MAX.
FI-A2012-470□□□	0.047	±10%/±20%	20	60	50	320	400	200	80	300
FI-A2012-560□□□	0.056	±10%/±20%	20	60	50	300	380	200	80	300
FI-A2012-680□□□	0.068	±10%/±20%	20	60	50	280	350	200	80	300
FI-A2012-820□□□	0.082	±10%/±20%	20	60	50	255	320	200	80	300
FI-A2012-101□□□	0.10	5%/±10%/±20%	25	50	25	235	300	200	90	250
FI-A2012-121□□□	0.12	5%/±10%/±20%	25	50	25	220	280	200	120	250
FI-A2012-151□□□	0.15	5%/±10%/±20%	25	50	25	200	250	200	130	250
FI-A2012-181□□□	0.18	5%/±10%/±20%	25	50	25	185	230	200	130	250
FI-A2012-221□□□	0.22	5%/±10%/±20%	25	50	25	170	220	250	150	250
FI-A2012-271□□□	0.27	5%/±10%/±20%	25	50	25	150	200	300	200	250
FI-A2012-331□□□	0.33	5%/±10%/±20%	25	50	25	145	180	300	200	250
FI-A2012-391□□□	0.39	5%/±10%/±20%	30	50	25	135	170	400	220	200
FI-A2012-471□□□	0.47	5%/±10%/±20%	30	50	25	125	160	400	250	200
FI-A2012-561□□□	0.56	5%/±10%/±20%	30	50	25	115	150	400	280	150
FI-A2012-681□□□	0.68	5%/±10%/±20%	30	50	25	105	135	500	300	150
FI-A2012-821□□□	0.82	5%/±10%/±20%	30	50	25	100	125	600	350	150
FI-B2012-102□□□	1.0	5%/±10%/±20%	45	75	10	75	105	400	210	100
FI-B2012-122□□□	1.2	5%/±10%/±20%	45	75	10	65	95	500	260	100
FI-B2012-152□□□	1.5	5%/±10%/±20%	45	75	10	60	85	500	260	100
FI-B2012-182□□□	1.8	5%/±10%/±20%	45	75	10	55	75	600	310	100
FI-B2012-222□□□	2.2	5%/±10%/±20%	45	80	10	50	70	650	360	50
FI-B2012-272□□□	2.7	5%/±10%/±20%	45	80	10	45	65	750	410	50
FI-B2012-332□□□	3.3	5%/±10%/±20%	45	80	10	40	55	800	460	50
FI-B2012-392□□□	3.9	5%/±10%/±20%	45	80	10	38	50	1400	700	50
FI-B2012-472□□□	4.7	5%/±10%/±20%	45	80	10	35	48	1400	700	50
FI-C2012-562□□□	5.6	5%/±10%/±20%	50	60	4	32	45	700	350	50
FI-C2012-682□□□	6.8	5%/±10%/±20%	50	60	4	29	40	1000	560	25
FI-C2012-822□□□	8.2	5%/±10%/±20%	50	60	4	26	36	1100	610	25
FI-C2012-103□□□	10.0	5%/±10%/±20%	50	60	2	24	33	1400	700	25
FI-C2012-123□□□	12.0	5%/±10%/±20%	50	60	2	22	30	1400	720	25
FI-C2012-153□□□	15.0	5%/±10%/±20%	30	40	1	19	27	1500	750	15
FI-C2012-183□□□	18.0	5%/±10%/±20%	30	40	1	18	25	1500	810	15
FI-D2012-223□□□	22.0	5%/±10%/±20%	30	40	1	16	22	1100	550	5
FI-D2012-273□□□	27.0	5%/±10%/±20%	30	40	1	14	20	1150	600	5
FI-D2012-333□□□	33.0	5%/±10%/±20%	30	40	0.4	13	18	1250	700	5

Notes: • SRF: Self-Resonat Frequency. • DCR: DC Resistance.

ORDERING INFORMATION

FL - A	2012 -	681	K	J	T
(1) (2)	(3)	(4)	(5)	(6)	(7)

1) ***Series***
2) ***Material***
3) ***Size dimensions****/also series # (ex. :2012 or 3216)*
The first two digits: length(mm)
The last two digits: width (mm)
4) ***Inductance***
The first two digits are significant, the last digit is the number of zero follow
5) ***Tolerance***
K : ±10% M : ±20%
6) ***Termination***
J : Nickel barrier
P : Silver-palladium
7) ***Packing***
B : Bulk pack
T : Tape & Reel (ø178mm [7 inches])
L : Tape & Reel (ø254mm [10 inches])

APPLICATIONS

■ Prevention of electromagnetic interfaces to signals on the secondary side of electronic equipments.

3216 SERIES (REFERENCE 1206 TYPE)

FI-A3216-470□□□	0.047	±10%/±20%	20	60	50	320	400	150	80	300
FI-A3216-560□□□	0.056	±10%/±20%	20	60	50	300	360	150	80	300
FI-A3216-680□□□	0.068	±10%/±20%	20	60	50	280	330	150	100	300
FI-A3216-820□□□	0.082	±10%/±20%	20	60	50	255	300	150	100	300
FI-A3216-101□□□	0.10	5%/±10%/±20%	25	50	25	235	280	200	150	250
FI-A3216-121□□□	0.12	5%/±10%/±20%	25	50	25	220	260	200	150	250
FI-A3216-151□□□	0.15	5%/±10%/±20%	25	50	25	200	240	200	150	250
FI-A3216-181□□□	0.18	5%/±10%/±20%	25	50	25	185	220	200	150	250
FI-A3216-221□□□	0.22	5%/±10%/±20%	25	50	25	170	200	250	150	250
FI-A3216-271□□□	0.27	5%/±10%/±20%	25	50	25	150	180	250	150	250
FI-A3216-331□□□	0.33	5%/±10%/±20%	25	50	25	145	170	300	200	250
FI-A3216-391□□□	0.39	5%/±10%/±20%	30	50	25	135	160	300	200	200
FI-A3216-471□□□	0.47	5%/±10%/±20%	30	50	25	125	145	300	200	200
FI-A3216-561□□□	0.56	5%/±10%/±20%	30	50	25	115	135	350	250	150
FI-A3216-681□□□	0.68	5%/±10%/±20%	30	50	25	105	125	350	250	150
FI-A3216-821□□□	0.82	5%/±10%/±20%	30	50	25	100	115	400	300	150
FI-B3216-102□□□	1.0	5%/±10%/±20%	45	80	10	75	90	350	170	100
FI-B3216-122□□□	1.2	5%/±10%/±20%	45	80	10	65	80	350	180	100
FI-B3216-152□□□	1.5	5%/±10%/±20%	45	80	10	60	70	400	200	50
FI-B3216-182□□□	1.8	5%/±10%/±20%	45	80	10	55	66	500	250	50
FI-B3216-222□□□	2.2	5%/±10%/±20%	45	80	10	50	58	600	300	50
FI-B3216-272□□□	2.7	5%/±10%/±20%	45	80	10	45	53	600	300	50
FI-B3216-332□□□	3.3	5%/±10%/±20%	45	85	10	41	49	700	350	50
FI-B3216-392□□□	3.9	5%/±10%/±20%	45	85	10	38	45	800	400	50
FI-B3216-472□□□	4.7	5%/±10%/±20%	45	85	10	35	41	800	400	50
FI-C3216-562□□□	5.6	5%/±10%/±20%	50	65	4	32	38	600	300	50
FI-C3216-682□□□	6.8	5%/±10%/±20%	50	65	4	29	34	600	300	50
FI-C3216-822□□□	8.2	5%/±10%/±20%	50	65	4	26	31	900	450	50
FI-C3216-103□□□	10.0	5%/±10%/±20%	50	65	2	24	28	900	450	50
FI-C3216-123□□□	12.0	5%/±10%/±20%	50	65	2	22	26	900	450	25
FI-C3216-153□□□	15.0	5%/±10%/±20%	35	45	1	19	23	1100	550	25
FI-C3216-183□□□	18.0	5%/±10%/±20%	35	45	1	18	21	1500	800	25
FI-C3216-223□□□	22.0	5%/±10%/±20%	35	45	1	16	19	1500	800	25
FI-C3216-273□□□	27.0	5%/±10%/±20%	35	45	1	14	17	1500	800	25
FI-C3216-333□□□	33.0	5%/±10%/±20%	35	45	0.4	13	16	1600	850	25

Notes: • SRF: Self-Resonat Frequency. • DCR: DC Resistance.
* Also Available Sizes: 0402 (1005), 0603 (1608), 0805 (2012), 1206 (3216), 1806 (4516), 1812 (4532), 2220 (5750), 2008 (5020) & 2018 (5045)

*** Note: Also available:**
Ceramic Chip Inductors,
Ferrite Bead Product,
LC Filter & Multilayer Varistors

SEE OUR OTHER DATA PAGES IN SECTIONS 1500, 2460, 4300, 4700 AND 4800

WORLD PRODUCTS INC.
19654 8TH ST. EAST, SONOMA, CA 95476 PHONE (707) 996-5201 FAX (707) 996-3380
Internet: www.worldproducts.com • E-Mail: ppgsales@worldproducts.com

W O R L D P R O D U C T S

CHIP CERAMIC INDUCTORS (REFERENCE 0402 TYPE)

Series CI1005

PART NUMBER	INDUCTANCE (µH)	INDUCTANCE TOLERANCE	Q MIN.	L.Q. TEST FREQUENCY (MHz)	SRF (MHz) MIN.	SRF (MHz) TYPE	DCR (mΩ) MAX.	RATED CURRENT (mA) MAX
CI-B1005-10N□□□	1.0	±0.3nH	8	100	4000	6000	100	300
CI-B1005-12N□□□	1.2	±0.3nH	8	100	4000	6000	100	300
CI-B1005-15N□□□	1.5	±0.3nH	8	100	4000	6000	100	300
CI-B1005-18N□□□	1.8	±0.3nH	8	100	3800	6000	120	300
CI-B1005-22N□□□	2.2	±0.3nH	8	100	3600	6000	160	300
CI-B1005-27N□□□	2.7	±0.3nH	8	100	3400	5500	200	300
CI-B1005-33N□□□	3.3	±10%	8	100	3200	5000	220	300
CI-B1005-39N□□□	3.9	±10%	8	100	3000	4700	250	300
CI-B1005-47N□□□	4.7	±10%	8	100	2800	4300	280	300
CI-B1005-56N□□□	5.6	±10%	8	100	2700	4000	290	300
CI-B1005-68N□□□	6.8	±10%	8	100	2600	3650	350	300
CI-B1005-82N□□□	8.2	±10%	8	100	2200	3200	400	300
CI-B1005-100□□□	10.0	±10%	8	100	1800	2800	450	300

Notes: • SRF: Self-Resonant Frequency. • DCR: DC Resistance.

Series CI1608

CI-B1608-10N□□□	1.0	±0.3nH	8	100	4000	6000	100	300
CI-B1608-12N□□□	1.2	±0.3nH	8	100	4000	6000	100	300
CI-B1608-15N□□□	1.5	±0.3nH	8	100	4000	6000	100	300
CI-B1608-18N□□□	1.8	±0.3nH	8	100	3800	6000	120	300
CI-B1608-22N□□□	2.2	±0.3nH	8	100	3600	6000	160	300
CI-B1608-27N□□□	2.7	±0.3nH	8	100	3400	6000	200	300
CI-B1608-33N□□□	3.3	±10%	8	100	3200	5700	220	300
CI-B1608-39N□□□	3.9	±10%	8	100	3000	5600	250	300
CI-B1608-47N□□□	4.7	±10%	8	100	2800	4800	280	300
CI-B1608-56N□□□	5.6	±10%	8	100	2700	4350	290	300
CI-B1608-68N□□□	6.8	±10%	8	100	2600	3750	300	300
CI-B1608-82N□□□	8.2	±10%	8	100	2200	3300	330	300
CI-B1608-100□□□	10	±5%/±10%	8	100	1800	2850	350	300
CI-B1608-120□□□	12	±5%/±10%	8	100	1650	2700	400	300
CI-B1608-150□□□	15	±5%/±10%	8	100	1350	2400	450	300
CI-B1608-180□□□	18	±5%/±10%	8	100	1350	2050	500	300
CI-B1608-220□□□	22	±5%/±10%	8	100	1100	1850	550	300
CI-B1608-270□□□	27	±5%/±10%	8	100	1100	1750	600	300
CI-B1608-330□□□	33	±5%/±10%	8	100	1000	1500	650	300
CI-B1608-390□□□	39	±5%/±10%	8	100	900	1350	700	300
CI-B1608-470□□□	47	±5%/±10%	8	100	800	1200	900	300

Notes: • SRF: Self-Resonant Frequency. • DCR: DC Resistance.

Series CI2012

CI-B2012-10N□□□	1.0	±0.3nH	10	100	4000	6000	100	300
CI-B2012-12N□□□	1.2	±0.3nH	10	100	4000	6000	100	300
CI-B2012-15N□□□	1.5	±0.3nH	10	100	4000	6000	100	250
CI-B2012-18N□□□	1.8	±0.3nH	10	100	4000	6000	100	300
CI-B2012-22N□□□	2.2	±0.3nH	10	100	3800	6000	100	300
CI-B2012-27N□□□	2.7	±0.3nH	10	100	3600	6000	100	300
CI-B2012-33N□□□	3.3	±10%	10	100	3400	6000	130	300
CI-B2012-39N□□□	3.9	±10%	10	100	3200	5400	150	300
CI-B2012-47N□□□	4.7	±10%	10	100	3000	4500	200	300
CI-B2012-56N□□□	5.6	±10%	10	100	2800	4000	230	300
CI-B2012-68N□□□	6.8	±10%	10	100	2600	3650	250	300
CI-B2012-82N□□□	8.2	±10%	10	100	2200	3000	280	300
CI-B2012-100□□□	10	5%/±10%	10	100	1800	2500	300	300
CI-B2012-120□□□	12	5%/±10%	10	100	1650	2450	350	300
CI-B2012-150□□□	15	5%/±10%	10	100	1350	2000	400	300
CI-B2012-180□□□	18	5%/±10%	10	100	1350	1750	450	300
CI-B2012-220□□□	22	5%/±10%	15	100	1100	1700	500	300
CI-B2012-270□□□	27	5%/±10%	15	100	1100	1550	550	300
CI-B2012-330□□□	33	5%/±10%	15	100	1000	1350	600	300
CI-B2012-390□□□	39	5%/±10%	15	100	900	1300	650	300
CI-B2012-470□□□	47	5%/±10%	15	100	850	1200	700	300
CI-B2012-560□□□	56	5%/±10%	15	100	750	1150	750	300
CI-B2012-680□□□	68	5%/±10%	15	100	700	1000	800	300
CI-B2012-820□□□	82	5%/±10%	15	100	600	850	900	300
CI-B2012-101□□□	100	5%/±10%	15	100	500	730	1000	300
CI-B2012-121□□□	120	5%/±10%	15	100	450	650	1300	250
CI-B2012-151□□□	150	5%/±10%	15	100	400	550	1500	250
CI-B2012-181□□□	180	5%/±10%	15	100	350	500	1800	250

Notes: • SRF: Self-Resonant Frequency. • DCR: DC Resistance.

CHIP LC FILTERS

PART NUMBER	CUT-OFF FREQ. (MHz)	ATTENUATION at - 10dB (MHz)	DC RESISTANCE (mΩ) MAX.	RATED CURRENT (mA) MAX
LC-□□□□-300	30	80	150	300
LC-□□□□-500	50	122	150	300
LC-□□□□-101	100	220	150	300
LC-□□□□-151	150	340	150	300
LC-□□□□-301	300	580	150	300
LC-□□□□-501	500	1000	150	300

SEE OUR OTHER DATA PAGES IN SECTIONS 1500, 2460, 4300, 4700 AND 4800

WORLD PRODUCTS INC.
19654 8TH ST. EAST, SONOMA, CA 95476 PHONE (707) 996-5201 FAX (707) 996-3380
Internet: www.worldproducts.com • E-Mail: ppgsales@worldproducts.com

CRYSTALS

TCXO'S, VCXO'S, OCXO'S, HI-REL OSC., DIP OSC.

MONITOR PRODUCTS COMPANY, INC.
IMPROVED DESIGNS, SMALLER SIZES

MARKET APPLICATIONS

- WIRELESS COMMUNICATIONS
- TELECOMMUNICATIONS
- INSTRUMENTATION
- SATELLITE COMMUNICATIONS
- AVIONICS
- COMPUTERS AND COMPUTER PERIPHERALS

MONITOR'S PRODUCT LINE

- Crystals:
  Frequencies up to 170 MHz
  Temp Range up to -55°C to +125°C
- Oscillators:
  Frequencies up to 200 MHz
  Temp Range up to -55°C to +125°C
- VCXO's:
  Frequencies up to 155 MHz
  Pullability up to ± 500 ppm
- TCXO's:
  Frequencies up to 100 MHz
  Tolerances as tight as ± 0.1 ppm
  Temperature Range up to -40°C to +85°C
- OCXO's:
  Tolerances up to ± $5x10^{-10}$
  Temp Range up to -40°C to +85°C
- Component Ovens: Standard and Custom
- Through Hole and Surface Mount
- Products Available From Stock to Customer's Specification
- Specialization in Low Noise Oscillators

NEW PRODUCTS

- New for 1998: Industry's Smallest Ceramic Surface Mount Oscillator
  Package Size: 5.0mm x 3.2mm x 1.1mm
- New for 1998: Digital Temperature Controlled Crystal Oscillator
  +/-0.5 ppm -40°C to 85°C
- New for 1998: Oven Controlled Crystal Oscillator +/- 0.1 ppm, 0°C to -60°C
  Package Size: 1" x 1" x 0.5"

MONITOR Products
A Bowthorpe Company
Designers and Manufacturers of Frequency Control Devices Since 1927

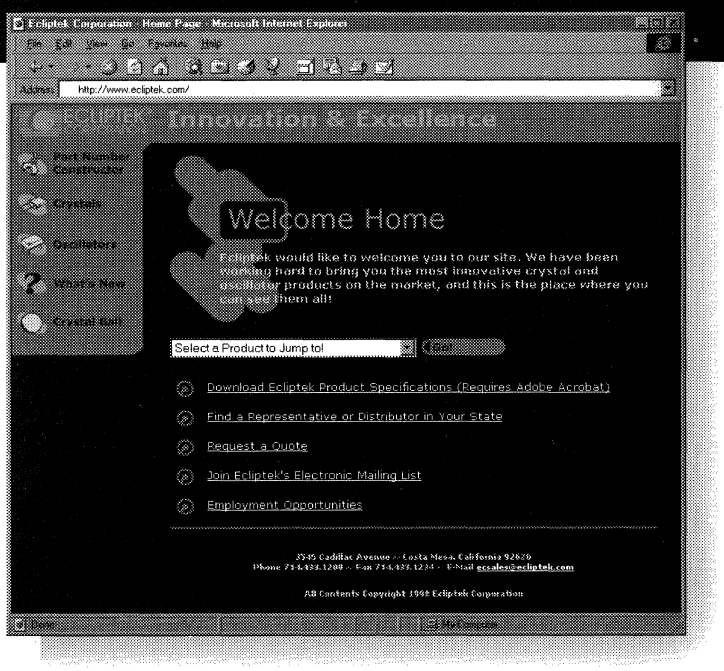
MONITOR PRODUCTS COMPANY, INC.
MAIN OFFICE / FACTORY
502 Via del Monte, Oceanside, CA 92054
Tel: 760-433-4510 FAX: 760-434-0255
EASTERN REGIONAL OFFICE
3415 Custer Road, Suite 117, Plano, TX 75023
Tel: 972-758-8687 FAX: 972-758-7574
http://eemonline.com/monpro

CRYSTALS

Manufacturer	Starting EEM Page No.	Crystal Blanks	Microprocessor	Quartz	Quartz (Watches)	Crystal Holders
Abracon Corp.	A•1372		√§	√§	√§	
Anodyne Components	A•1380		√§	√§	√§	
Ardin Frequecy Control Inc.	A•1381		√	√		
Bliley Electric Company	A•1386	√		√§*		√§*
Bomar Crystal Company	A•1388		√§		√§	
Champion Technologies, Inc.	A•1391		√§	√§		
Citizen America	A•1392		√§	√§	√§	
Colorado Crystal Corp.	A•1397	√*		√*		
Comclok, Inc.	A•1398		√§	√§	√§	
Connor-Winfield Corporation	A•1403			√§		
CTS Corp.	A•1404		√§	√§*		
Dove Electronic Components, Inc.	A•1412		√§*	√§*	√§	
Ecliptek Corp.	A•1414			√§	√§	
Fox Electronics	A•1422		√	√	√	
Frequency Electronics, Inc.	A•1428			√*		
Frequency Management	A•1430	√§	√§	√§	√§	
HEC, Inc.	A•1432	√	√	√§*	√	√
Hy-Q International	A•1434		√§	√§		
Jauch	A•1438		√	√		
Micro Crystal	A•1454			√	√	
Monitor Products Company, Inc.	A•1464		√§*	√§*	√§*	√§
M-Tron Industries	A•1470	√§*	√§*	√§*		
Oak Frequency Control Group	A•1474	√§*		√*		√§*
Precision Devices Inc.	A•1480		√§*	√§*	√§*	
Raltron Electronics	A•1494		√§	√§	√§	
RXD Inc.	A•1496		√§	√§	√§	
SARONIX	A•1497		√§	√§	√§	
Siward International Inc.	A•1502	√	√§	√§	√	
Statek Corp.	A•1504	√	√	√	√	
Tellurian Technologies	A•1506		√§	√§	√§	
Valpey-Fisher	A•1507	√§	√§	√§		
Vectron International	A•1509	√	√	√	√	√
Vishay Dale Electronics	A•1544		√§	√§	√§	
VITE	A•1536		√§	√§		

* MIL Spec. § Surface Mount.

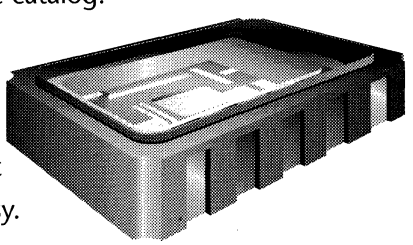
THIS ONLINE CATALOG IS MAKING PRODUCT SELECTION CRYSTAL CLEAR.



Choose a package and frequency then e-mail your request for price and delivery.

We'll respond in 24-hours or less.

Some people would rather get their product information from printed catalogs and data sheets. You might be the kind of person who would rather use an online catalog.



Our web site has specs, drawings, and value added options for a complete line of crystals and oscillators. It's even got an interactive part number form that makes ordering fast and easy. Just enter your key parameters to generate an Ecliptek part number. Submit your e-mail request for price and delivery. We'll respond in 24-hours or less.

ECLIPTEK®
CORPORATION

Copyright © 1998 Ecliptek Corporation

1-(800) ECLIPTEK www.ecliptek.com sales@ecliptek.com

CRYSTAL FILTERS

Manufacturer	Starting EEM Page No.	Active	AF	IF	UHF/ VHF	RF	Micro-wave	LC	Comb	Single Side-band	Vesti-gial Side-band	Band pass	Low pass	High pass	Notch (Band Elim.)	Linear Phase	Equal-izer	Other
Abracon Corp.	A•1372	√§			√§	√§	√§					√§	√§	√§				
Ardin Frequency Control, Inc.	A•1381				√							√§	√	√				
Dove Electronic Components, Inc.	A•1412			√§*	√	√			√§*	√§*		√§*			√§*	√§*		
Fox Electronics	A•1422											√						
Frequency Electronics, Inc.	A•1428		√	√*		√*				√		√*	√*	√*	√			
Frequency Management	A•1430			√														
HEC, Inc.	A•1432	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
Hy-Q International	A•1434			√§		√§												Monolithic
Jauch	A•1438		√		√	√												
Oak Frequency Control Group	A•1474					√*		√	√	√		√*	√	√	√			
Precision Devices Inc.	A•1480			√§*	√	√		√	√§*	√§*		√§*	√		√§*	√§*		
Siward International Inc.	A•1502		√			√§				√§		√§	√§	√§				
Tellurian Technologies	A•1506			√§	√§	√§						√§	√§	√§				
Vectron International	A•1509	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	

* MIL Spec. § Surface Mount.

TIME & FREQUENCY INSTRUMENTATION

Manufacturer	Starting EEM Page No.	Standards	Clocks	Distribution Amplifier	Systems	Test Sets	Other
Abracon Corp.	A•1372		√§				
Ardin Frequency Control Inc.	A•1381	√	√				
Bomar Crystal Company	A•1388	√§	√§				
Connor-Winfield Corporation	A•1403	√§	√§		√§		
Dove Electronic Components, Inc.	A•1412	√§*	√§*				
Fox Electronics	A•1422		√§				
Frequency Electronics, Inc.	A•1428	√*	√*	√*	√*		
HEC, Inc.	A•1432	√	√	√	√	√	√
M-Tron Industries	A•1470		√§*				
Monitor Products Company, Inc.	A•1464	√§*	√§*				
SARONIX	A•1497		√§				
Siward International Inc.	A•1502	√	√§				
Tellurian Technologies	A•1506		√				
Valpey-Fisher	A•1507		√§*				
Vectron International	A•1509	√	√	√	√	√	

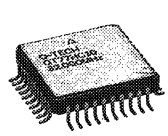
* MIL Spec. § Surface Mount

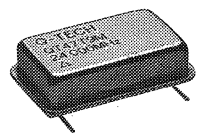
Q-TECH Design Solutions for a Digital World

High Reliability Crystal Oscillators

LEADED SMT OSCILLATORS

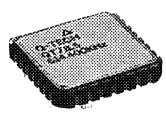
Q-TECH Corporation offers a variety of quality leaded surface mount package options designed to eliminate problems due to thermal stress.

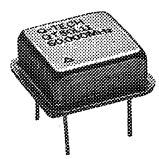




LOW VOLTAGE OSCILLATORS

State of the art digital logic desgin utilizes a supply voltage of 3.3 volts as a new **Q-TECH** standard for low power consumption.

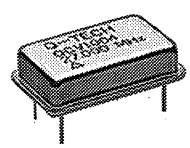


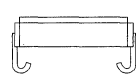


VCXO'S

We offer VCXO'S and other Clock Oscillators for Telecommunication Applications.

- Wide Frequency Range
- Wide Pull Range
- Various Package Styles
- Supply Voltage: 3V to 15V
- Linearity





Offered with "J" leads.

*Please find us on the following pages in this **EEM** guide: Pages* **A1486** *thru* **A1492**

QPL OSCILLATORS

Qualified per MIL-O-55310. Slash sheets/08 thru/20 inclusive and /25 and /26.

PRODUCT RANGE

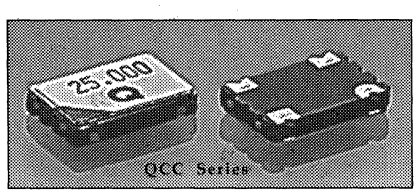
At **Q-TECH**, our Product Range Includes TTL, HCMOS, ACMOS, & ECL Clocks.

(Frequency Range: .01 Hz to 250 MHz.)

Extended Temperature for High Reliablilty & Downhole Applications now up to +225°C.

Low Frequency Hybrid Sine Wave Sources.

High Frequency Signal Sources.



SMD Commercial Clocks.
(Dimentions: .295 X .197 X .059)

CERTIFIED ISO 9001 Q-Tech Corporation REGISTERED

Q-TECH Corporation

10150 West Jefferson Blvd., Culver City, Ca 90232-3502

Telephone: (310) 836-7900 • *Fax*: (310) 836-2157 • *E-mail*: sales@q-tech.com

OSCILLATORS

Manufacturer	Starting EEM Page No.	AF	LF	RF	Micro-wave	Sinu-soidal	Square Wave	SAW	Pulse	UHF/ VHF	Crys-tal Con-trol Mod-ule	Tun-ing Fork Con-trol	Oven-lized	Digit-ally Comp-ensat-ed DCXO	Evac-uated Mini-ature Crystal (EMXO)	Volt-age Con-trol VCXO	Temp. Com-pen-sated TCXO	Volt-age Con-trol/ Temp. Comp.	Clock	Other
Abracon Corp.	A•1372					√§	√§				√§	√§	√§			√§	√§	√§	√§	
Anodyne Components	A•1380					√§	√§				√§	√§	√§			√§	√§	√§	√§	
Ardin Frequency Control, Inc.	A•1381				√	√	√				√	√	√			√	√	√	√	
Bliley Electric Company	A•1386										√		√	√		√	√	√	√	
Bomar Crystal Company	A•1388					√§	√§				√§	√§				√§	√§		√§	
Champion Technologies, Inc.	A•1391			√	√						√§	√				√§	√§	√§	√§	
Citizen America	A•1392						√§				√§								√§	
Comclok, Inc.	A•1398						√§				√§									Tri-state Oscillators
Communication Techniques, Inc.	A•1400			√	√					√						√				
Connor-Winfield Corporation	A•1403		√§	√§		√§	√§				√§		√§	√§	√§	√§	√§	√§	√§	
CTS Corp.	A•1404						√				√		√	√		√	√	√	√§	
Dove Electronic Components, Inc.	A•1412			√§		√	√§				√§	√§	√§	v§	√§	√§	√§	√§	√§*	
Ecliptek Corp.	A•1414					√§	√§				√§					√§	√§	√§	√§	
Electronic Research Co.	A•1419			√		√	√						√							OCVCXO
Fordahl	A•1420					√§	√§				√§		√§			√§	√§	√§	√§	
Fox Electronics	A•1422					√§	√§				√§			√§		√§	√§	√§	√§	
Frequency Electronics, Inc.	A•1428			√*	√*	√*	√*		√	√*	√*		√*	√*		√*	√*	√*		
Frequency Management	A•1430			√§			√§				√§					√§	√§			
HEC, Inc.	A•1432	√	√	√	√	√	√	√§*	√	√	√	√	√§*	√§*	√§*	√§*	√§*	√§*	√§*	
Hy-Q International	A•1434	√§	√§	√§															√§	

* MIL Spec. § Surface Mount.

JITO™ – Just-in-Time Oscillators™ from Fox

Custom and Standard Frequency Oscillators in 10 Working Days!

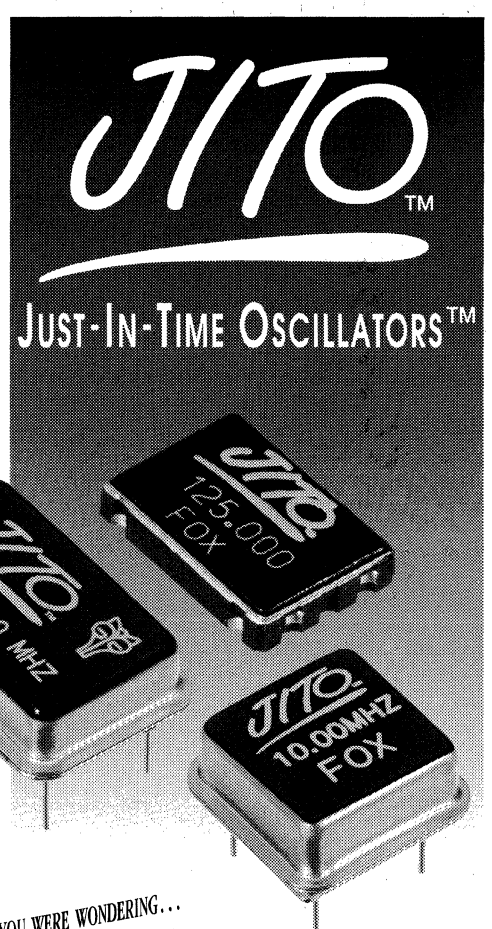
Fox has made the world's best oscillators even better by making them available even faster. Because we know that when you're bringing new designs to market, every day counts.

The Fox JITO line combines unparalleled oscillator performance and reliability with the fast-turn delivery and ordering flexibility that meets your toughest prototyping and build-to-order production needs.

THE JITO ADVANTAGE:

Employing a proprietary PLL-based technology, the Fox JITO series cuts industry-standard lead times from 10 weeks to a mere 10 business days! All that plus:

- Custom and standard frequencies from 340 kHz up to 125 MHz
- 100 PPM stability
- 3.3 or 5 volts; 0 to 70°C operating range
- Both SMD and thru-hole packaging available
- Fox quality built-in and test verified
- Perfect for Build-to-Order
- Total technical support from the industry leader
- Shipment in 10 business days



FOX

The Fox JITO series. The world's best oscillators in 10 working days. Because timing *is* everything.

IN CASE YOU WERE WONDERING...
CONCEIVED, DESIGNED, BUILT AND TESTED BY FOX.

JITO EASY-ORDER PART NUMBERING GUIDE

JITO - C C 3 A C

Frequency (340kHz–125MHz)

Package Style:	Type:	Supply Voltage:	Stability:	Temperature Range:
A = 14 Pin DIP	C = HCMOS	5 = +5.0V	A = ±100ppm	C = 0°C to+70°C
B = 8 Pin DIP		3 = +3.3V		
C = 5x7.5x1.5mm SMD				
D = 5x7.5x1.5mm 6 Pad SMD				

FOX Electronics

We're On Your Frequency.

5570 Enterprise Parkway
Fort Myers, FL 33905
Tel: ***888-GET-2-FOX***
Fax: 941-693-1554

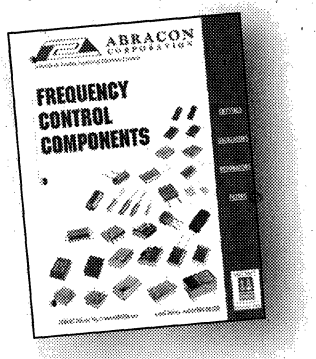
ON THE WEB
www.foxonline.com

OSCILLATORS (cont'd.)

Manufacturer	Starting EEM Page No.	AF	LF	RF	Micro-wave	Sinu-soidal	Square Wave	SAW	Pulse	UHF/ VHF	Crystal Control Module	Tuning Fork Control	Oven-ized	Digitally Compensated DCXO	Evacuated Miniature Crystal (EMXO)	Voltage Control VCXO	Temp. Compensated TCXO	Voltage Control/ Temp. Comp.	Clock	Other
Isotemp Research,Inc.	A•1436			√		√	√				√		√			√	√	√		
Jauch	A•1438	√		√			√	√			√	√		√		√	√	√		
M-Tron Industries	A•1470	√§	√§	√§	√§	√§	√§					√§				√§	√§	√§	√§	
MF Electronics Corp.	A•1439						√§				√§			√§		√§	√§	√§	√§	
Micro Crystal	A•1454			√		√	√					√	√			√			√	
Micro Networks, Corp.	A•1452						√				√					√			√	Freq., mult.,clock, dist.
Mini-Circuits	A•1462			√§*	√§*	√§*				√§*						√§*				VCO
Monitor Products Company, Inc.	A•1464	√	√	√	√	√	√		√		√§	√§	√	√		√§	√§	√§	√§	
Oak Frequency	A•1474			√§*		√§*	√§*			√§*			√§*	√§*		√§*	√§*	√§*	√§*	DIP OCXOs, Double oven OCXO
Precision Devices Inc.	A•1480					√§*	√				√					√§*	√§*	√§*	√§*	
Q-Tech Corp.	A•1486		√	√		√§	√§*		√	√	√§*		√	√		√§		√§	√§*	MCXO Microcomputer Compensated Crystal Oscillator
Raltron Electronics	A•1494			√	√	√	√						√	√		√	√	√§	√§	
RXD Inc.	A•1496						√				√§		√			√	√§	√	√§	
SARONIX	A•1497			√§		√§	√§				√§	√§		√§		√§	√§	√§	√§	Programmable 3.3V Tristate
Siward International	A•1502			√§		√§	√§				√§	√	√	√§		√§	√§	√§	√§	
Statek Corp.	A•1504						√				√	√							√	
Tellurian Technologies	A•1506			√§		√§	√§				√§	√§	√§	√§		√§	√§	√§	√§	
Valpey-Fisher	A•1507			√§	√§	√§	√§		√§	√§	√§		√§	√§		√§	√§	√§	√§*	
Vectron International	A•1509			√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	
Vishay Dale Electronics	A•1544		√	√			√§									√§			√§	
VITE	A•1536	√§	√§	√§															√§	

* MIL Spec. § Surface Mount.

CRYSTALS/OSCILLATORS



ABRACON Corporation supplies a complete line of Frequency Control Components such as crystals and crystal oscillators. We stock large inventory of standard microprocessor and communication crystals for your applications. Abracon also designs and manufactures crystals and oscillators for special applications such as PLLs, VCXOs, VCTXOs, and VCOs. Please call us for details.

Abracon Crystal Reference Guide

SERIES TYPE	FREQUENCY RANGE	FREQUENCY TOLERANCE	FREQUENCY STABILITY	STANDARD LOAD CAPACITANCE	SHUNT CAPACITANCE	DRIVE LEVEL	PACKAGE TYPE
ABC2	3.57-25 MHz	±50ppm	±50ppm@-10-60°C	16pF	7 pF max.	100µW max.	Ceramic SMT
ABLS, ABLS2	3.57-70 MHz	±50ppm	±100ppm@0-70°C	18pF	7 pF max.	1 mW max.	HC49/US SMT
ABM2	9.8-90 MHz	±50ppm	±100ppm@-10-60°C	18pF	7 pF max.	500µ max.	Ceramic SMT
ABM5	12-50 MHz	±100ppm	±100ppm@-10-70°C	18pF	7pF max.	500 µW max.	Ceramic SMT
ABMC2	3.57-70 MHz	±50ppm	±50ppm@-10-60°C	18pF	7 pF max.	100µW max.	Ceramic SMT
ABMM	8.0-100 MHz	±50ppm	±50ppm@-10-60°C	18pF	7pFmax.	1 mW max.	Ceramic SMT
ABMM2	12.8-100 MHz	±20ppm	±20ppm@-10-60°C	18pF	7pFmax.	500µW max.	Ceramic SMT
ABSM	3.57-70 MHz	±50ppm	±100ppm@-10-60°C	18pF	7pFmax.	100µW max.	Plastic SMT
ABSM2	3.57-70 MHz	±50ppm	±50ppm@-10-60°C	16pF	7pFmax.	100µW max.	Plastic SMT
ABS25	24-200 kHz	±30ppm	-0.034ppm/(25-C)²	12.5pF	1.35 pF	1 µW max.	Watch crystal SMT
AB	18-160 MHz	±50ppm	±100ppm @ 0-70°C	18pF	7 pF max.	1 mW max.	HC49/ U leaded
ABL, ABL2	3.57-70 MHz	±50ppm	±100ppm@0-70°C	18pF	7 pF max.	1 mW max.	HC-49/US leaded
ABU, ABU4, ABU5	6.0-200 MHz	±50ppm	±50ppm@0-70°C	18pF	7 pF max.	1 mW max.	UM1, UM4, UM5
ABS0	3.57-60 MHz	±50ppm	±100ppm@-10°-60°C	18pF	7pF max.	100 µW max.	HC-49/US
AB308, AB310	3.57-70 MHz	30ppm	±50ppm@-10-60°C	16pF	5 pF max.	100µW max.	3x9mm Cylindrical
AB38T	32.768 kHz	±20ppm	-0.034ppm/(25-c)2	12.5pF	1.6 pF	1 µW max.	Watch crystal 3x8mm
AB26T	24-1000 kHz	±20ppm	-0.034ppm/(25-C)2	12.5pF	1.35 pF	1 µW max.	Watch crystal 2x6mm

Abracon Oscillator Reference Guide

SERIES TYPE	FREQUENCY RANGE	INPUT VOLTAGE OVER TEMP.	OVERALL FREQUENCY STABILITY	INPUT CURRENT	DUTY CYCLE	RISE/FALL TIME	PACKAGE TYPE
ASVL (HCMOS/TTL)	1.5-32 MHz	3V/+5Vdc±10%	±100ppm@-10-70°C	20 mA	45/55%	10ns max.	Ceramic SMT 7.5 x 5mm
ASM (HCMOS/TTL)	1.0-50 MHz	+5Vdc±10%	±100ppm@0-70°C	30 mA max.	40/60%	6-8ns max.	Plastic SMT, J-leaded
ASMT (TTL)	1.0-70 MHz	+5Vdc±10%	±100ppm@0-70°C	40 mA max.	40/60%	6-8ns max.	Plastic SMT, J-leaded
ASMH (HCMOS)	1.0-70 MHz	+5Vdc±10%	±100ppm@0-70°C	40 mA max.	40/60%	6-8ns max.	Plastic SMT, J-leaded
ASV (HCMOS/TTL)	1.5-70 MHz	+3.3Vdc±10%	±100ppm@-10-70°C	30 mA max.	45/55%	5 ns max.	Ceramic SMT 7.5 x 5mm
ASL (HCMOS/TTL)	1.5-70 MHz	+5.0Vdc±10%	±100ppm@-10-70°C	20-60 mA	45/55%	8-10 ns max.	Ceramic SMT 7.5 x 5mm
ACE (10kECL)	20-200 MHz	-5.2Vdc±5%	±100ppm@0-70°C	60 mA max.	40/60%	4 ns max.	Full size DIP
ACH (HCMOS/TTL)	500k-110 MHz	+5Vdc±10%	±100ppm@0-70°C	30-85 mA	40/60%	5-10ns max.	Half size DIP
ACM (HCMOS/TTL)	1-70 MHz	+5Vdc±10%	±100ppm@-10-70°C	20-40mA	40/60%	10ns max.	In Line 3 leads
ACO (HCMOS/TTL)	250k-110 MHz	+5Vdc±10%	±100ppm@0-70°C	30-85mA	40/60%	5-10 ns max.	Full size DIP
ACOL(HCMOS/TTL)	500k-70 MHz	+3.3Vdc±10%	±100ppm@0-70°C	25 mA max.	40/60%	10ns max.	Full size DIP
ACHL (HCMOS/TTL)	500k-70 MHz	+3.3Vdc±10%	±100ppm@0-70°C	25 mA max.	40/60%	10ns max.	Half size DIP
ACPE (Positive 10kECL)	20-200 MHz	+5.2Vdc±5%	±100ppm@0-70°C	60 mA max.	40/60%	4 ns max.	Full size DIP
ACT (TTL)	500k-70 MHz	+5Vdc±10%	±100ppm@0-70°C	30-70mA	40/60%	6-10ns max.	Full size DIP
AHT (TTL)	500k-70 MHz	+5Vdc±10%	±100ppm@0-70°C	30-70mA	40/60%	6-10ns max.	Half size DIP

For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com / Internet: http://www.abracon.com

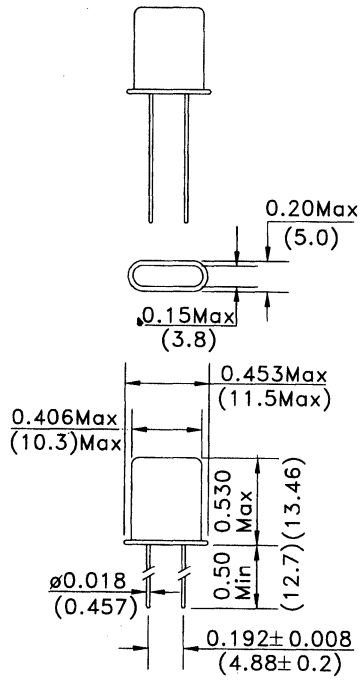
CRYSTALS/OSCILLATORS

AB Microprocessor Crystals HC49/U

Standard Specifications

Frequency Range	1.5 MHz-160 MHz
Standard Frequency	Call Factory
Operation Mode	1.5 MHz ~ 24 MHz Fundamental 24.01 MHz ~ 66 MHz 3rd overtone 66.01 MHz ~ 110 MHz 5th overtone 110.01 MHz ~ 160 MHz 7th overtone
Operating Temperature	0°C to +70°c
Storage Temperature	-55°C to +125°C
Frequency Tolerance @ 25°C	±50ppm max. (Call us for options)
Frequency Stability over Temp.	±100ppm max. (Call us for options)
Equivalent Series Resistance (ESR)	2000Ω max. for F~1.5 MHz to 1.799 MHz
	750Ω max. for F~1.8 MHz to 1.999 MHz
	550Ω max. for F~2.0 MHz to 2.399 MHz
	350Ω max. for F~2.4 MHz to 2.999 MHz
Fundamental	200Ω max. for F~3.0 MHz to 3.699 MHz
	100Ω max. for F~3.7 MHz to 4.199 MHz
	70Ω max. for F~4.2 MHz to 4.899 MHz
	50Ω max. for F~4.9 MHz to 5.999 MHz
	40Ω max. for F~6 MHz to 7.999 MHz
	35Ω max. for F~8 MHz to 9.999 MHz
	30Ω max. for F~10MHz to 12.499 MHz
	25Ω max. for F~12.5 MHz to24 MHz
3rd Overtone	40Ω max. for F~24.01 MHz to 66 MHz
5th Overtone	80Ω max. for F~66.01MHz to 110 MHz
7th Overtone	120Ω max. for F~110.01 MHz to 160 MHz
Shunt Capacitance C_0	7pF max
Load Capacitance C_L	18 pF (Call us for options)
Drive Level	1 mW max.
Aging @25°C per Year	±5 ppm max.
Insulation Resistance	500 MΩ min. at 100 Vdc ±15 Vdc

Dimensions



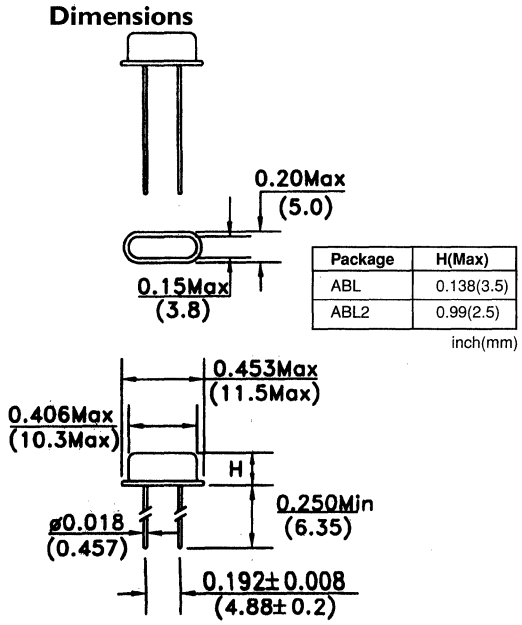
Tight frequency tolerance and stability available. Pullability for VCXO applications.

ABL, ABL2 Microprocessor Crystals AT49 (HC49/US) Low Profile

Standard Specifications

Frequency Range	**3.579545 MHz-70 MHz**
Standard Frequency	Call Factory
Operation Mode	3.579545Hz ~ 24 MHz Fundamental 24.01 MHz ~ 40.32 MHz Fundamental BT or AT 24.01 MHz ~ 70 MHz 3rd overtone
Operating Temperature	0°C to +70°c
Frequency Tolerance @ 25°C	±50ppm max.
Frequency Stability over Temp.	±100ppm max.
Equivalent Series Resistance (ESR)	200Ω max. for 3.5 MHz < F < 5.000 MHz
	150Ω max. for 5.0 MHz < F < 6.000 MHz
	120Ω max. for 6.0 MHz < F < 8.000 MHz
	90Ω max. for 8.0 MHz < F < 9.000 MHz
Fundamental	80Ω max. for 9.0 MHz < F <10.0 MHz
	70Ω max. for 10 MHz < F < 15.00 MHz
	60Ω max. for 15 MHz < F < 16.00 MHz
	50Ω max. for 16 MHz < F ≤ 24.000 MHz
	40Ω max. for 24 MHz < F ≤ 40.32 MHZ(F)
3rd Overtone	100Ω max. for 24 MHz <F ≤ 70 MHZ (OT)
Shunt Capacitance C_0	7pF max
Load Capacitance C_L	18 pF max. (Call us for options)
Drive Level	1 mW max.
Aging @25°C per Year	±5 ppm max.
Insulation Resistance	500 MΩ min. at 100 Vdc ±15 Vdc

Dimensions



Package	H(Max)
ABL	0.138(3.5)
ABL2	0.99(2.5)

inch(mm)

For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com / Internet: http://www.abracon.com

ABRACON CORPORATION • 125 Columbia, Aliso Viejo, California 92656 • 949-448-7070 • Fax 949-448-8484

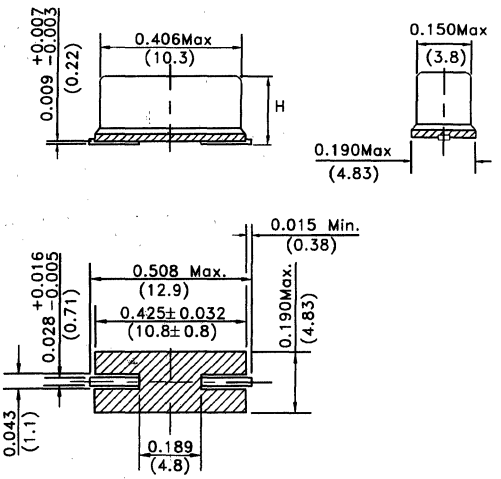
CRYSTALS/OSCILLATORS

ABLS, ABLS2 Microprocessor Crystals AT49 Low Profile Surface Mount

Standard Specifications

Frequency Range	**3.579545 MHz - 70 MHz**
Standard Frequency	Call Factory
Operation Mode	3.579545 MHz ~ 24 MHz Fundamental 24.01 MHz ~ 40.32 MHz Fundamental AT or BT 24.01 MHz ~ 70 MHz 3rd overtone
Operating Temperature	0°C to +70°c
Storage Temperature	-40°C to +85°C
	(-55°C to +125°C available)
Frequency Tolerance @ 25°C	±50ppm max. (Call us for options)
Frequency Stability over Temp.	±100ppm max. (Call us for options)
Equivalent Series Resistance (ESR)	200Ω max. for 3.57 MHz < F < 5.000 MHz 150Ω max. for 5.0 MHz < F < 6.000 MHz 120Ω max. for 6.0 MHz < F < 8.000 MHz 90Ω max. for 8.0 MHz < F < 9.000 MHz
Fundamental	80Ω max. for 9.0 MHz < F <10.000 MHz 70Ω max. for 10 MHz < F < 15.000 MHz 60Ω max. for 15 MHz < F < 16.000 MHz 50Ω max. for 16 MHz < F ≤ 24.000 MHz 40Ω max. for 24.01 MHz < F ≤ 40.32 MHZ(F)
3rd Overtone	100Ω max. for 24.01 MHz < F ≤ 70 MHZ (OT)
Shunt Capacitance C_0	7pF max
Load Capacitance C_L	18 pF (Call us for options)
Drive Level	1 mW max.
Aging @25°C per Year	±5 ppm max.
Insulation Resistance	500 MΩ min. at 100 Vdc ±15 Vdc

Dimensions



Package	H (max)
ABLS	0.20 (5.08)
ABLS2	0.130 (3.3)

ABMM Microprocessor Crystals Ceramic Surface Mount Micro Miniature

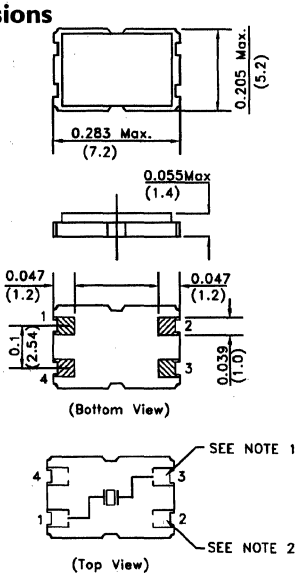
Features:

- Low in height 1.3 mm suitable for thin equipment.
- AT Strip Cut offering good tolerance and stability
- Ceramic package assures high reliability
- Suitable for solder reflow
- Ceramic Lid option (-K)

Standard Specifications

Frequency Range	**8.000 MHz - 100 MHz**
Standard Frequency	Call Factory
Operation Mode	8.0 MHz ~ 32 MHz Fundamental 28 MHz ~ 84 MHz 3rd overtone 84.01 MHz ~ 100 MHz 5th overtone
Operating Temperature	-10°C to +60°C
Storage Temperature	-40°C to +85°C
Frequency Tolerance @ 25°C	±50 ppm max. (Call us for options)
Frequency Stability over Temp.	±50 ppm max. (Call us for options) ±100 ppm max.@ -10°C to +60°C for Fund. BT
Equivalent Series Resistance (ESR) Fundamental	60Ω max. for F ~8.0 MHz to 15.999 MHz 40Ω max. for F ~16.0 MHz to 32.000 MHz
3rd Overtone	60Ω max. for F ~28 MHz to 84.000 MHz
5th Overtone	80Ω max. for F ~84.01 MHz to 100.0 MHz
Shunt Capacitance C_0	7pF max
Load Capacitance C_L	18 pF (Call us for options)
Drive Level	100 µW max.
Aging @25°C per Year	±5 ppm max.
Insulation Resistance	500 M Ω min. at 100 Vdc ±15 Vdc

Dimensions



Pads 2 & 4 are connected to ground.

NOTE 1: A longer pad may appear on pad 3 (1.6mm) for crystal connections identifications
NOTE 2: Pads 2 and 4 are connected to metal lid (GND)
Dimensions: inch (mm)

For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com / Internet: http://www.abracon.com

CRYSTALS/OSCILLATORS

ASM J-Leaded Plastic Molded, Surface Mount

Features:

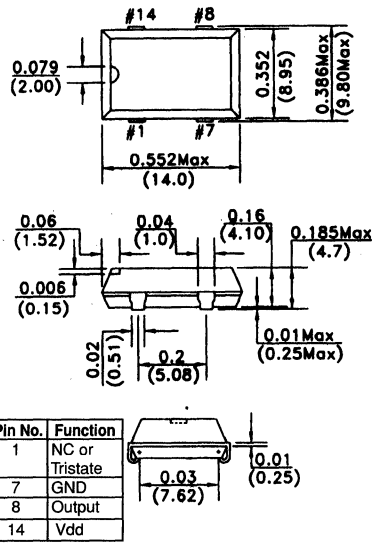
- Plastic molded SMD
- Industry standard J-leaded terminals
- HCMOS and TTL COMPATIBLE, TTL and HCMOS
- Tristate Enable/Disable Options
- Extended temperature -40°C to +85°C
- Tape and Reel packaging

Standard Specifications

Parameters	ASM	ASMT	ASMH
Frequency Range	1 MHZ to 50MHz	1 MHz to 70 MHz	
Operating Temperature (T_{OPR})	0°C to +70°C (Call us for options)		
Storage Temperature (T_{STG})	-40°C to +85°C		
Frequency Stability ($\Delta F/F_0$)	±100 ppm max. (Call us for options))		
Supply Voltage (Vdd)	5Vdc ± 10%		
Input Current (Idd)	40 mA max. 15 mA max. for ($F_0 \leq 24$ MHz) 30 mA max. for ($F_0 \leq 50$ MHz)		
Duty Cycle or Symmetry	45/55% max. for F≤ 10 MHz 40/60% max. for > 10 MHz (See Options and Note 1)		
Rise and Fall times (T_R/T_F)	8 ns max. for F= 1 MHz - 40 MHz 6 ns max. for F > 40 MHz		
Output Load	10 TTL 15 pF (50 pF max.)	10 TTL (for ≤ 50 MHz 5 TTL (for F > 50 MHz)	15 pF (50pF max.) 15 pF (30pF max. for F> 50 MHz)
Output Voltage (V_{OH}) (V_{OL})	0.9*Vdd min. 0.4 Vdc max.	2.4 Vdc min. 0.4 Vdc max.	0.9* Vdd min. 0.5V max.
Startup time (T_{OSC})	10 ms max		
Output Disable/Enable Time (option-A)	100 ns max. For Enable/Disable option (-A) only (see note 2) "1" (VIH ≥ 2.2 Vdc) or open: oscillation. "0" (V_{IL} < 0.8V) : Hi Z		

Notes: 1/ Option-S (symmetry level measured ar 1/2 VDD for ASM and ASMH, and at 1.4Vdc for ASMT.
2/ Pin 1 has internal pull-up resistor which allows pin 1 to be left floating (enable high)

Dimensions



Pin No.	Function
1	NC or Tristate
7	GND
8	Output
14	Vdd

ASL HCMOS/TTL Compatible Ceramic Surface Mount

Features:

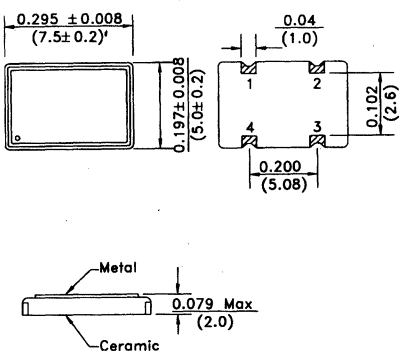
- Leadless chip carrier (LCC), low profile
- HCMOS and TTL Compatible
- Tristate Enable/Disable Option
- High Density Surface-Mount Applications
- Packaging: Tape and reel, or bulk
- Available optional -40°C to +86°C extended temperature

Standard Specifications

Parameters	Specifications
Frequency Range (F_0)	1.5 MHz to 70MHz
Operating Temperature (T_{OPR})	-10°C to +70°C (Call us for options)
Storage Temperature (T_{STG})	-55°C to +105°C
Frequency Stability ($\Delta F/F_0$)	±100 ppm max. (Call us for options)
Supply Voltage (Vdd)	5Vdc ± 10%
Input Current (Idd)	20 mA max. for F< 20 MHz 40 mA max. for F< 50 MHz 60 mA max. for F≤ 70 MHz
Duty Cycle @ 1/2 Vdd	40/60% max.
Rise and Fall times (T_R/T_F)	10 ns max. for F ≤ 20 MHz 8 ns max. for F > 20 MHz
Output Load	10 TTL or 15 pF (50 pF max.)
Output Voltage (V_{OH}) (V_{OL})	0.9*Vdd min. 0.4 Vdc max.
Startup Time (T_{OSC})	10 ms max
Tristate functions (for Option- A only)	"1" or open: oscillation — V_{IH} > 2.2V or open: Oscillation "0": output disabled in high impedance(HiZ) — V_{IL} < 0.8V: HiZ(*)
Output Disable/Enable Time (option-A)	100 ns max.

* Pin 1 has internal pull-up resistor which allows pin 1 to be left floating (enable high)

Dimensions



Pin No.	Function
1	NC or Tristate
2	GND
3	Output
4	Vdd

For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com / Internet: http://www.abracon.com

CRYSTALS/OSCILLATORS

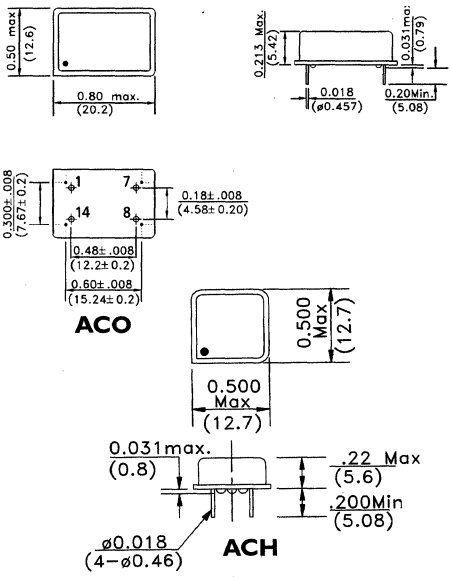
ACO, ACH HCMOS/TTL Compatible Full-Size, Half-Size Dip

Standard Specifications

Parameters	ACO	ACH
Frequency Range	250 kHz to 110 MHz*	500 kHz to 110 MHz*
Operating Temperature (T_{OPR})	0°C to +70°C (Call us for options)	
Storage Temperature (T_{STG})	-55°C to +125°C	
Frequency Stability ($\Delta F/F_0$)	±100 ppm max . (Call us for options)	
Supply Voltage (Vdd)	5Vdc ± 10%	
Input Current (Idd)	30 mA max. for F< 24 MHZ 45 mA max. for F< 50 MHZ	70 mA max. for F < 80 MHz 85 mA max. for F > 80 MHz
Duty Cycle or symmetry	45/55% max. for F < 50 MHz @ 1/2 Vdd (See Options) 40/60% max. for F > 50 MHz (See Options)	
Rise and Fall times (T_R/T_F)	10 ns max. for F ≤ 24 MHz 5 ns max. for F > 24 MHz	
Output Load	10 TTL or 15 pF (50pF max.) for $F_0 \leq 80$ MHz 5TTL or 15 pF (50pF max.) for $F_0 > 80$ MHz	
Output Voltage (V_{OH}) (V_{OL})	0.9*Vdd min. 0.4 Vdc max.	
Startup time (T_{OSC})	10 ms max	
Tristate Function (for Option-A only) Output Disable/Enable Time	"1" or open: oscillation "0": output disabled in high impedance(HiZ) 100 ns max. (-A only*)	$V_{IH} \geq 2.2V$ or open: Oscillation $V_{IL} < 0.8V$: HiZ(*)

*Pin 1 has internal pull-up resistor which allows pin 1 to be left floating (enable high)
* Please contact us for higher frequencies

Dimensions



ACT

TRUE TTL DIP
ACT (Full Size)
AHT (Half Size)

Frequency: 500kHz-70MHz
Operating temp.: 0°C-70°C
Overall stability: ±100ppm
Vcc: +5Vdc ±10%
Icc: 30-70 mA max.
Output: 10TTL
Symmetry: 40/60% max.
Tr/Tf: 6ns-10ns max.
Tristate option: -A

ACOL

LOW VOLTAGE DIP
ACOL (Full Size)
ACHL (Half Size)

Frequency: 500kHz-70MHz
Operating temp.: 0°C-70°C
Overall stability: ±100ppm
Vcc: +3.3Vdc ±10%
Icc: 10-25 mA max.
Output: 10LSTTL, 15pF
Symmetry: 40/60% max.
Tr/Tf: 10ns max.
Tristate option: -A

ACE

ECL FULL SIZE DIP
ACE

Frequency: 20 MHz-200MHz
Operating temp.: 0°C-70°C
Overall stability: ±100ppm
Vee: -5.2Vdc ±5%
Iee: 60mA max.
Output: 50 ohms to -2V
Symmetry: 40/60% max.
Tr/Tf: 4ns max.
10K and 10kH ECL

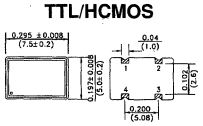
ACPE

PECL FULL SIZE DIP
ACPE

Frequency: 20 MHz-200MHz
Operating temp.: 0°C-70°C
Overall stability: ±100ppm
Vcc: +5Vdc ±5%
Icc: 60mA max.
Output: 50 ohms to +3V
Symmetry: 40/60% max.
Tr/Tf: 4ns max.
10K and 10kH PECL

ASV

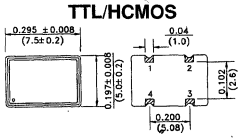
3.3VDC SMT, CERAMIC
TTL/HCMOS



Frequency: 1.5MHz-70MHz
Operating temp.: -10°C -70°C
Overall stability: ±100ppm
Vcc: +3.3Vdc ±10%
Idd: 30 mA max.
Output: 10LSTTL or 15pF
Symmetry: 45/55% max.
Tr/Tf: 5ns max.
Tristate option: -A

ASVL

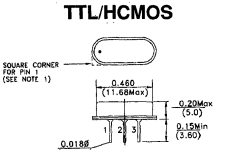
5V/3.3VDC SMT, CERAMIC
TTL/HCMOS



Frequency: 1.5MHz-70MHz
Operating temp.: -10°C -70°C
Overall stability: ±100ppm
Vcc: +5Vdc or +3.3Vdc ±10%
Idd: 10-20 mA max.
Output: 30pF
Symmetry: 45/55% max.
Tr/Tf: 10ns max.
Tristate option: -A

ACM

IN LINE PACKAGE
TTL/HCMOS



Frequency: 1MHz-70MHz
Operating temp.: -10°C -70°C
Overall stability: ±100ppm
Vdd: 5Vdc ±10%
Idd: 20-40 mA max.
Output: 10TTL or 15pF
Symmetry: 40/60% max.
Tr/Tf: 10ns max.

OPTIONS:

Temperature
-P 0°C +70°C
-D -10°C - 60°C
-E -20°C -70°C
-F -30°C -70°C
-L -40°C -85°C

Overall freq. stability:
-J ±20ppm max.
-R ±25ppm max.
-C ±50ppm max.

Symmetry:
-S 45/55%
-T 47.5/52.5%

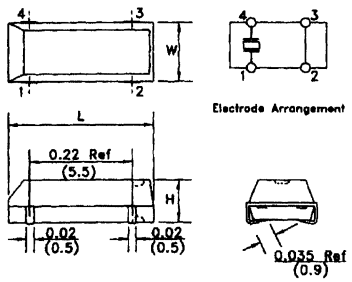
For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com / Internet: http://www.abracon.com

ABRACON CORPORATION • 125 Columbia, Aliso Viejo, California 92656 • 949-448-7070 • Fax 949-448-8484

CRYSTALS/OSCILLATORS

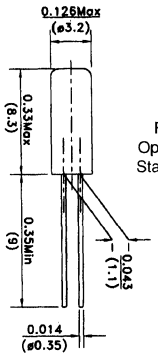
WATCH CRYSTALS

ABS25
PLASTIC MOLDED, SMT



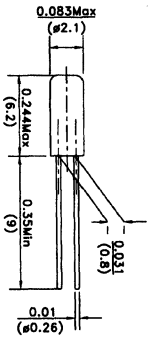
Frequency: 24kHz-1000kHz
Operating temp: -10C -60C
Stability: -0.034ppm/(25-C)²
Tolerance: ±30ppm

AB38T
3 X8mm CYLINDRICAL



Frequency: 32.768kHz
Operating temp: -10C -60C
Stability: -0.034ppm/(25-C)²
Tolerance: ±20ppm

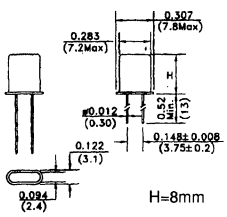
AB26T
2 X 6mm CYLINDRICAL



Frequency: 32.768kHz
Operating temp: -10C -60C
Stability: -0.034ppm/(25-C)²
Tolerance: ±20ppm

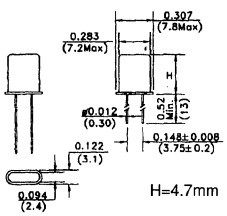
COMMUNICATION CRYSTALS

ABU (UM-1)
ULTRA MINIATURE



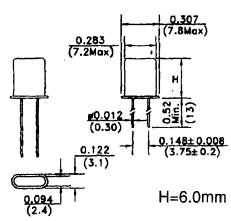
Frequency: 6.0-200MHz
Operating temp: 0C -70C
Freq. tolerance: ±50ppm
Freq. stability: ±50ppm/(*)
C0: 7pF max.
CL: 18pF
Drive level: 1mW max.
(*) Tight stability to ±3ppm

ABU4 (UM-4)
ULTRA MINIATURE



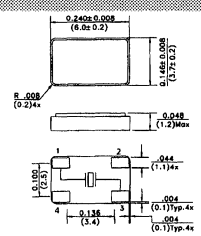
Frequency: 10-200MHz
Operating temp: 0C -70C
Freq. tolerance: ±50ppm
Freq. stability: ±50ppm/(*)
C0: 7pF max.
CL: 18pF
Drive level: 1mW max.
(*) Tight stability to ±3ppm

ABU5 (UM-5)
ULTRA MINIATURE



Frequency: 10-200MHz
Operating temp: 0C -70C
Freq. tolerance: ±50ppm
Freq. stability: ±50ppm/(*)
C0: 7pF max.
CL: 18pF
Drive level: 1mW max.
(*) Tight stability to ±3ppm

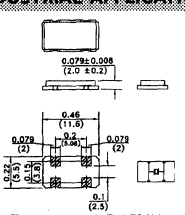
ABMM2
CERAMIC SMT, PRECISION



Frequency: 12.8-110MHz
Operating temp: -10C -60C
Freq. tolerance: ±20ppm
Freq. stability: ±20ppm/(*)
C0: 7pF max.
CL: 18pF
Drive level: 500µW max.
(*) Tight stability to ±10ppm

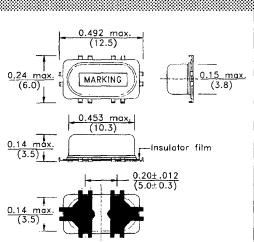
SMT MICROPROCESSOR CRYSTALS

ABC2
CERAMIC, SMT FOR INDUSTRIAL APPLICATION



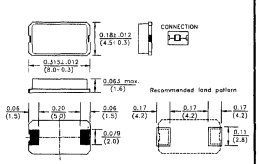
Frequency: 3.5-25MHz
Operating temp: -10C -60C
Freq. tolerance: ±50ppm
Freq. stability: ±50ppm/(*)
C0: 7pF max.
CL: 16pF
Drive level: 100 µW max.
(*) Tight stability to ±30ppm
Option-D for -40C to 85C

ABSO
OMNI PAD, SMT



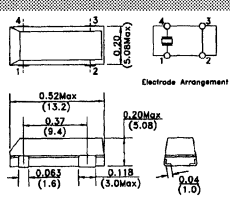
Frequency: 9.8-90MHz
Operating temp: -10C to +60C
Freq. tolerance: ±50ppm max.
Freq. stability: ±100ppm max.
C0: 7pF max.
CL: 18pF
Drive level: 500 µW max.

ABM2, ABM5
CERAMIC, SMT



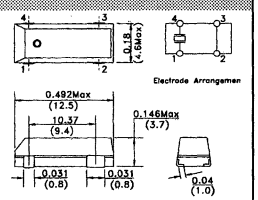
Frequency: 3.579MHz-60MHz
Operating temp: -10C to +60C
Freq. tolerance: ±50ppm max.
Freq. stability: ±100ppm max
C0: 7pF max.
CL: 18pF
Drive level:1 mW max.

ABSM
PLASTIC, SMT



Frequency: 3.57-70MHz
Operating temp: -10C -60C
Freq. tolerance: ±50ppm
Freq. stability: ±100ppm/(*)
C0: 7pF max.
CL: 18pF
Drive level: 100 µW max.
(*) Tight stability to ±25ppm

ABSM2
PLASTIC, SMT



Frequency: 3.57-70MHz
Operating temp: -10C -60C
Freq. tolerance: ±50ppm
Freq. stability: ±100ppm/(*)
C0: 7pF max.
CL: 16pF
Drive level: 100 µW max.
(*) Tight stability to ±25ppm

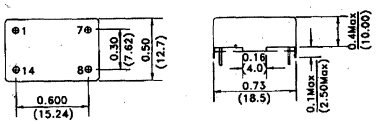
For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com / Internet: http://www.abracon.com

ABRACON CORPORATION • 125 Columbia, Aliso Viejo, California 92656 • 949-448-7070 • Fax 949-448-8484

CRYSTALS/OSCILLATORS

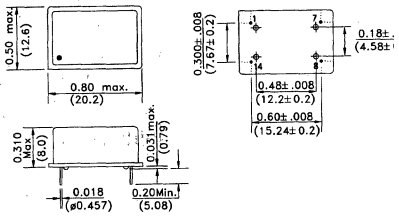
VOLTAGE CONTROLLED CRYSTAL OSCILLATORS (VCXOs)

ACVX 1019
(FULL SIZE)



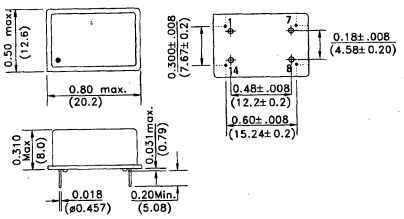
Frequency: 8MHz-36MHz
Operating temp: 0 C -70C
Overall stability: ±30ppm
Vcc: +5Vdc ±5%
Icc: 40 mA max.
Output: TTL/CMOS
Symmetry: 40/60%
Frequency pulling: ±50ppm min.

ACVX 1220
(FULL SIZE)



Frequency: 8MHz-80MHz
Operating temp: -10 C -60C
Overall stability: ±30ppm
Vcc: +5Vdc ±5%
Icc: 30 mA max.
Output: TTL/CMOS
Symmetry: 40/60%
Frequency pulling: ±50ppm min.

ACVX 1222
(FULL SIZE)



Frequency: 1MHz-36MHz
Operating temp: 0 C -70C
Overall stability: ±50ppm
Vcc: +5Vdc ±5%
Icc: 30 mA max.
Output: TTL/CMOS
Symmetry: 40/60%
Frequency pulling: ±50ppm min.

ORDERING INFORMATION

ACVX1222 - Frequency - Temperature - Stability - Duty Cycle - Control voltage - Pulling - Value Added

Series

xx.xxxxxx in MHz

-10°C to +60°C -D
-20°C to +70°C -E
-30°C to +70°C -F
-40°C to +85°C -L

±25ppm max. -R

45/55% @ 1/2Vdd -S

Pin No.	Function
1	Voltage Control VC
7	GND/Case
8	Output
14	Vdd

-G Gull wing
-QXX
(trimmed leads)

±100ppm min -N10
±150ppm min -N15
±200ppm min.-N20
±250ppm min.-N25
±300ppm min.-N30

0.5V to 4.5V -V

Phase Noise Characteristics

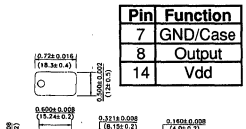
Offset Freq.	Phase Noise
10 Hz	-67dBc/Hz
100Hz	-80dBc/Hz
1kHz	-140dBc/Hz
10kHz	-150dBc/Hz
100kHz	-160dBc/Hz

Call Us For Higher Frequencies VCXOs up to 155.52 MHz and supply Vcc +3Vdc

TEMPERATURE COMPENSATED CRYSTAL OSCILLATORS (TCXOS)

ACTX1018 & ACTX1018S (sine)

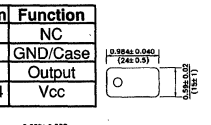
Pin	Function
7	GND/Case
8	Output
14	Vdd



Frequency: 1MHz-26MHz
Operating temp: -10 C -60C
Overall stability: ±2.5ppm
Vcc: +5Vdc ±5%
Icc: 20 mA or 3 mA max.
Output: TTL/CMOS or sine
Symmetry: 40/60%
Trimmer: ±5ppm min.

ACTX1025& ACTX1025S (sine)

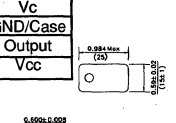
Pin	Function
1	NC
7	GND/Case
8	Output
14	Vcc



Frequency: 1MHz-26MHz
Operating temp: -10 C -60C
Overall stability: ±3.0ppm
Vcc: +5Vdc ±5%
Icc: 20 mA or 3 mA max.
Output: TTL/CMOS or sine
Symmetry: 40/60%
Trimmer: ±5ppm min.

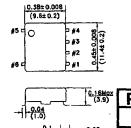
ACVTX1019

Pin	Function
1	Vc
7	GND/Case
8	Output
14	Vcc



Frequency: 9.6MHz-20MHz
Operating temp: -20 C -70C
Overall stability: ±2.5ppm
Vcc: +5Vdc ±5%
Icc: 3 mA max.
Output: Clipped Sine
Symmetry: 40/60%
Trimmer: ±5ppm min.
Pulling: ±5ppm min.

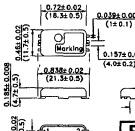
ASTX01 & ASVTX01



Pin	Function
1	Output
2	GND
3	NC or Vc
4	Vcc
5,6	GND/Case

Frequency: 10MHz-20MHz
Operating temp: -30 C -80C
Overall stability: ±2.5ppm
Vcc: +5Vdc or +3Vdc
Icc: 2 mA max.
Output: Clipped Sine
Vc: 0.5 to 4.5V
Trimmer: ±3ppm min.

ASTX03 & ASVTX03



Pin	Function
1	VCc or NC
2	GND/Case
3	Output
4	Vcc

Frequency: 9.6MHz-20MHz
Operating temp: -30 C -75C
Overall stability: ±2.5ppm
Vcc: +5Vdc ±5%
Icc: 2 mA max.
Output: Clipped Sine
Vc: 0.5 to 4.5V
Trimmer: ±5ppm min.

For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com / Internet: http://www.abracon.com

ABRACON CORPORATION • 125 Columbia, Aliso Viejo, California 92656 • 949-448-7070 • Fax 949-448-8484

CRYSTALS/OSCILLATORS/RESONATORS

LXZT, HXZT, ACR CERAMIC RESONATORS

LXZT (Low frequency)

Frequency: 190kHz - 1250kHz
Resonant Impedance: 20 ohms - 50 ohms max.
C1: 100pF - 300pF
C2: 100pF - 470pF
Frequency tolerance: ±0.5% max.
Frequency stability: ±0.3% @ -20°C to 80°C
Aging in 10 years: ±0.5% max.

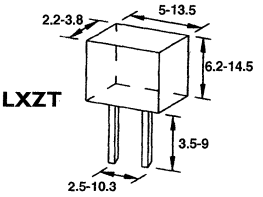
HXZT (High frequency)

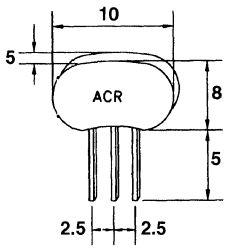
Frequency: 1.2MHz - 16MHz
C1:30pF ±10%
C2: 30pF ±10%
Frequency tolerance: ±0.3% ±0.5%max.
Frequency stability: ±0.3% @ -20°C to 80°C
Aging in 10 years: ±0.3% max.

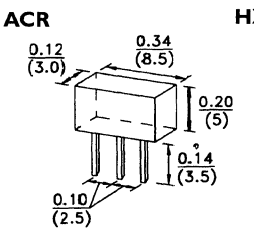
ACR (with built-in caps)

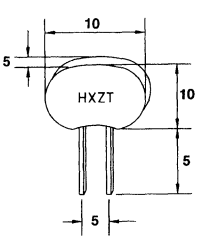
Frequency: 1.8MHz - 16MHz
C1: 30pF (or specified by customer)
C2: 30pF (or specified by customer)
Frequency tolerance: ±0.3% - ±0.5% max.
Frequency stability: ±0.3% @ -20°C to 80°C
Aging in 10 years: ±0.5% max.

Dimensions(mm)









MONOLITHIC CRYSTALS FILTERS 10.7MHZ & 21.4 MHZ

ACF 10 Series 10.7 MHz Monolithic Crystal Filters

Standard Specifications

Abracon	Channel Spacing	Pole	Passband db	Passband kHz	Stopband dB	Stopband kHz	Stopband db	Stopband kHz	Ripple dB	Loss dB	Terminating Impedance (Ω)//(pF)//(pF)	Package Configuration
ACF 10M 8A	12.5 kHz	2	3	±3.75	18	±15.0			0.5	2.0	1600//5	Fig. 1B
ACF 10M 8B		4	3	±3.75	40	±12.5			1.0	2.5	1600//2.5//16	Fig. 1Bx2
ACF 10M 8C		6	3	±3.75	45	±8.75	65	±12.5	2.0	3.5	1600//4	Fig. 2A
ACF 10M 8D		8	3	±3.75	60	±8.75	90	±12.5	2.0	4.0	1600//4	Fig. 2B
ACF 10M 8E		10	3	±3.75	75	±8.75	90	±10.5	2.0	5.0	1500//4	Fig. 2C
ACF10M 12A	20 kHz	2	3	±6.0	20	±25.0			0.5	1.5	2500//2	Fig. 1B
ACF 10M 12B		4	3	±6.0	40	±20.0			1.0	2.0	2200//1.5/5/8	Fig. 1Bx2
ACF 10M 12C		6	3	±6.0	50	±14.0	65	±20.0	2.0	3.0	3000//1.5	Fig. 2A
ACF 10M 12D		8	3	±6.0	65	±14.0	90	±20.0	2.0	3.5	3000//1.5	Fig. 2B

ACF21M Series 21.4 MHz

Standard Specifications

Abracon	Channel Spacing	Pole	Passband db	Passband kHz	Stopband dB	Stopband kHz	Stopband db	Stopband kHz	Ripple dB	Loss dB	Terminating Impedance (Ω)//(pF)//(pF)	Package Configuration
ACF 21M 8A	12.5 kHz	2	3	±3.75	20	±18.0			0.5	2.0	850//6	Fig. 1
ACF 21M 8B		4	3	±3.75	40	±14.0			1.0	2.5	850//4//16	Fig. 1x2
ACF 21M 8C		6	3	±3.75	45	±8.75			2.0	3.5	850//4	Fig. 2A
ACF 21M 8D		8	3	±3.75	65	±9.0	90	±12.5	2.0	4.0	850//4	Fig. 2B
ACF 21M 2A	20 kHz	2	3	±6.0	20	±25.0			0.5	1.5	1200//3	Fig. 1
ACF 21M 12B		4	3	±6.0	40	±20.0			1.0	2.0	1200//2/10.5	Fig. 1x2
ACF 21M 12C		6	3	±6.0	45	±14.0	65	±20.0	2.0	3.0	1200//2	Fig.2B
ACF 21M 12D		8	3	±6.0	65	±14.0	90	±20.0	2.0	3.0	100//2	Fig. 2B
ACF 21M 12E		10	3	±6.0	75	±14.0	90	±16.0	2.0	3.5	1200//2	Fig. 2C
ACF 21M 12CH		6	3	±6.0	45	±14.0	65	±20.0	2.0	2.0	1600//5	Fig. 2A
ACF 21M 12DH		8	3	±6.0	65	±14.0	90	±20.0	2.0	3.0	1600//1.5	Fig. 2B

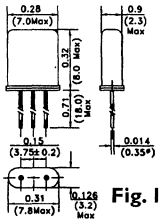


Fig. 1

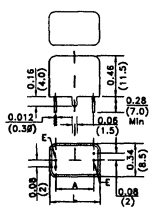


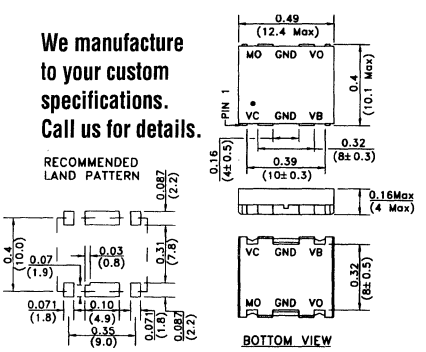
Fig. 2

Pkg. Conf	A	L
Fig. 2A	0.35 (9.0)	0.59 (15.0)
Fig. 2B	0.53 (13.3)	0.73 (18.5)
Fig. 2C	0.70 (17.8)	0.91 (23.0)

Voltage Controlled Oscillators (VCOs) ACV1012S

Frequency range: 750MHz-2.8GHz
Vdd: 4.0Vdc or 5Vdc
Idd: 10 mA max.
Po: 0dBm min. @ 50ohms
Operating temp: 0°C to 70°C

We manufacture to your custom specifications. Call us for details.



Pin No.	Function
1	Vc
2,5	GND
3	Vdd (supply voltage)
4	Vo (output)
6	Mo (Audio Modulation Input)

For Ordering Information Please Call at 949-448-7070 / Fax at 949-448-8484
e-mail: sales@abracon.com / Internet: http://www.abracon.com

Anodyne
Components Inc.

CRYSTALS & OSCILLATORS

"When timing is everything"

- SMT & Through Hole
- All Manufacturers Available
- Specializing in Short Lead Times
- Prototyping Specialist
- Value Added Services Available
- 3rd Lead, Vinyl Sleeving, Testing and Screening

24 HR
Turnaround Available

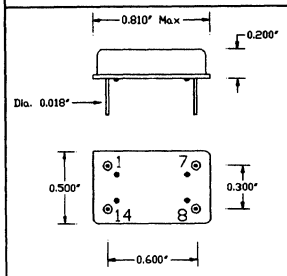
Anodyne Components Inc.
Phone: (714) 435-9530 Fax: (714) 435-9705 E-mail: anodyne@earthlink.net
3545 Cadillac Ave. Suite B, Costa Mesa, CA 92626-1401

ARDIN FREQUENCY CONTROL INC.

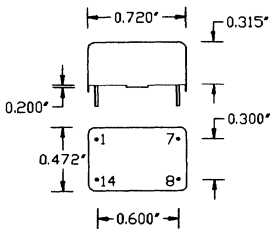
150 Paularino Ave # 166, Costa Mesa, CA 92626

714-437-9383 • 714-437-9377 Fax

Voltage Controlled Crystal Oscillator



VC200



MT200

PIN	CONNECTION
1	+Vc Control
7	GND
8	Output
14	+Vcc

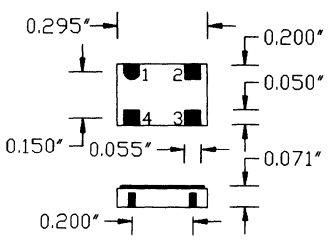
EXPEDITED MANUFACTURING AVAILABLE
(48Hr - 3Wks)

GENERAL SPECIFICATIONS	
Part Number/ Frequency Range	VC200 1M~110M, MT200 1M~70M
Frequency Stability vs Temperature	See Part Number Table
Operating Temperature Range	-10 ~ +70C
Tuning Range (Total Pullability)	See Part Number Table
Control Voltage	2.5VDC ±2VDC
Frequency Stability vs Aging	±3.0ppm / year Max
Supply Voltage (Vcc)	+5.0VDC ±5%
Current Consumption	40mA Max (Frequency Dependent)
Output Waveform / Load	Square Wave / 15pF standard
Output Voltage	Vol =0.5V Max, Voh = 4.5V Min
Symmetry	40/60% @ 1/2 VDD Max
Linearity	±15% Max, ±10% Typical

VC200 OPTION TABLE			MT200 OPTION TABLE	
VC200A1	±50ppm / ±100ppm	Stability/ Pullability	MT200A1	±50ppm / ±100ppm
VC200B1	±25ppm / ±100ppm		MT200B1	±25ppm / ±100ppm
VC200C1	±10ppm / ±100ppm		MT200A2	±50ppm / ±150ppm
VC200A2	±50ppm / ±150ppm		MT200B2	±25ppm / ±150ppm
VC200B2	±25ppm / ±150ppm		MT200C1	±50ppm / ±250ppm
VC200C2	±10ppm / ±150ppm		MT200D1	±100ppm / ±350ppm
VC200A3	±50ppm / ±200ppm		MT200E1	±100ppm / ±500ppm
VC200B3	±25ppm / ±200ppm		MT200F1	±1000ppm Pull

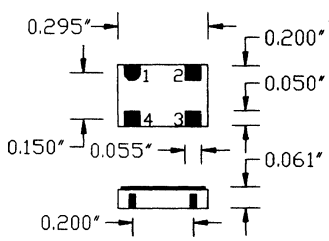
Micro-Processor Crystal Oscillators

A100



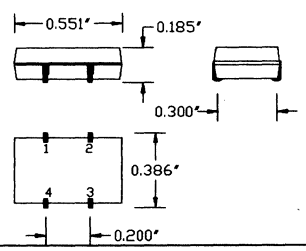
Pin1 N/C, Tristate Pin2 GND
Pin3 Output Pin4 Vcc

A101



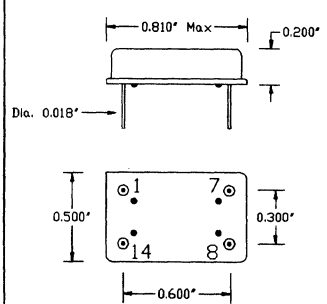
Pin1 N/C, Tristate Pin2 GND
Pin3 Output Pin4 Vcc

A107



Pin1 N/C, Tristate Pin2 GND
Pin3 Output Pin4 Vcc

A103



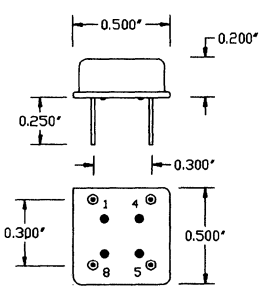
PART NUMBER GENERATION

Package • Option Code • Frequency
ex: A105AC-14.31818M
(A105, 45/55sym,50ppm -10-60C)

All Packages are available with 3.3V operation

Please contact factory for custom specifications

A105



Standard Electrical Specifications

OPTION CODE TABLE			
Code	**Specification**	**Frequency Range**	1.000MHz -160.000MHz
A	45/55% Symmetry	**Frequency Stability**	±100ppm Std, See Option Table
B	-15°C to 75°C	**Operating Temperature Range**	-10°C ~ 60°C Std, See Option Table
C	±50ppm Stability	**Supply Voltage**	+5.0VDC ±10%
C1	±25ppm Stability	**Current Consumption**	50mA Max (Frequency Dependant)
C2	±10ppm Stability	**Output Load**	15pF HCMOS 10 TTL
D	Tri-State	**Output Voltage**	Vol = 0.5V Max, Voh = 4.5V
		Symmetry	40/60% @ 1/2VDD
		Rise/Fall Time 10% to 90% of waveform	8nS Max
		Tristate (Input Pin 1)	Output Active 4.0V Min, Output High Z 0.8V Max

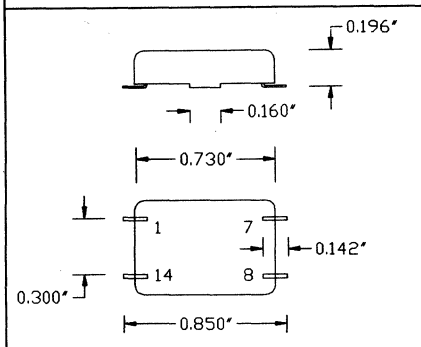
"Specializing in Precision Frequency Control Devices"

ARDIN FREQUENCY CONTROL INC.

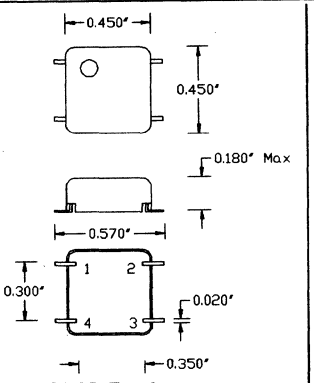
150 Paularino Ave # 166, Costa Mesa, CA 92626

714-437-9383 • 714-437-9377 Fax

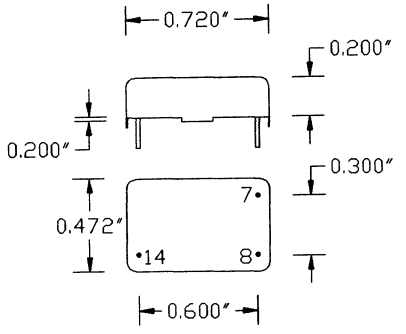
Temperature Compensated Crystal Osciilator



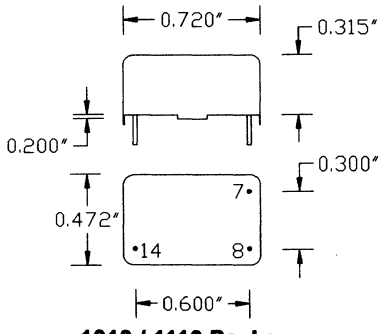
1005S / 1105S Package



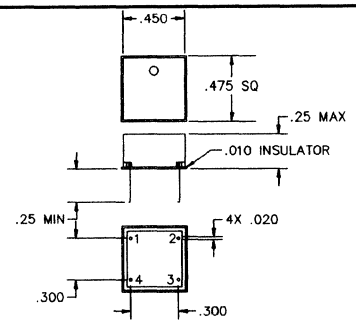
1004S Package



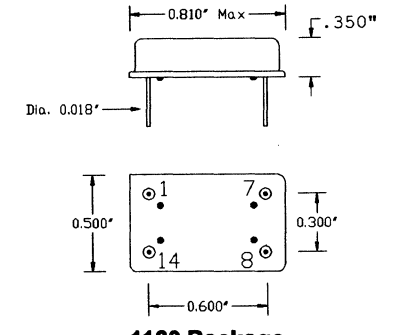
1005 / 1105 Package



1010 / 1110 Package



1115 Package



1120 Package

Part Number Series	1005S,1004S,1005, 1010 (CLIPPED SINE)
Oscillator Type	(TC) TCXO, (VT) VCTCXO
Frequency Range	8.000MHz ~ 45.000MHz
Frequency Stability vs Temp	±3.0ppm Standard See Option Table
Operating Temp Range	0°C ~ 50°C Standard See Option Table
Aging	±1.0ppm /year Max
Storage Temperature	-40 ~ +85C
Supply Voltage (Vcc)	+5.0VDC ±5%
Current Consumption	3mA Max
Output Waveform	Clipped Sine
Output Load	10KΩ / 10pF (other options available)
Output Voltage	1 Vp-p Min
Mechanical Adjustment	±3.0ppm
Pullability / Control Voltage	±5.0ppm Min / 2.5VDC ±2VDC (VT Type Only)

Part Number Series	1105S,1105, 1110,1115,1120 (HCMOS/TTL)
Oscillator Type	(TC) TCXO, (VT) VCTCXO
Frequency Range	1.8432M ~ 70.000M
Frequency Stability vs Temp	±3.0ppm Standard See Option Table
Operating Temp Range	0°C ~ 50°C Standard See Option Table
Aging	±1.0ppm /year Max
Supply Voltage (Vcc)	+5.0VDC ±5%
Current Consumption	20mA Max
Output Waveform	Square Wave
Output Load	15pF HCMOS, 10TTL
Output Voltage	Vol = 0.4V Max, Voh = Vcc -.5V Min
Symmetry	40/60% @ 1/2 Vdd
Mechanical Adjustment	±5.0ppm Typical
Pullability / Control Voltage	±5.0ppm Min / 2.5VDC ±2VDC (VT Type Only)

OPTION TABLE

OPTION CODE	SPECIFICATION
AX	±1.0ppm, 0 ~ +50C
AY	±1.0ppm, -10 ~ +65C
BX	±2.5ppm, 0 ~ +50C
BY	±2.5ppm, -10 ~ +65C
BZ	±2.5ppm, -30 ~ +75C
CX	±5.0ppm, 0 ~ +50C
CY	±5.0ppm, -10 ~ +65C
CZ	±5.0ppm, -30 ~ +75C

PART NUMBER GENERATION

Oscillator Type•Package•Option Code-Frequency

ex: VT1005SAX-12.800M

(VCTCXO,1005S package,±1.0ppm, 0-50C)

•Expedited Manufacturing Available•

(48hr - 3Wks)

Please contact factory for custom specifications

PACKAGE PIN OUT

1005 / 1105S		1004S		1005 / 1105		1115		1120	
Pin	Connection	Pin	Connection	Pin	Connection	Pin	Connection	Pin	Connection
1	N/C*(+Vc Control)	1	N/C *(+Vc Control)	1	N/C *(Vc Control)	1	N/C *(Vc Control)	1	N/C *(Vc Control)
7	GND	2	Output	7	GND	2	GND	7	GND
8	Output	3	+Vcc	8	Output	3	Output	8	Output
14	+Vcc	4	GND	14	+Vcc	4	+Vcc	14	+Vcc
* (+Vc on VT type only)		* (+Vc on VT type only)		* (+Vc on VT type only)		* (+Vc on VT type only) **(8 pin dip Compatible)		* (+Vc on VT type only)	

"Specializing in Precision Frequency Control Devices"

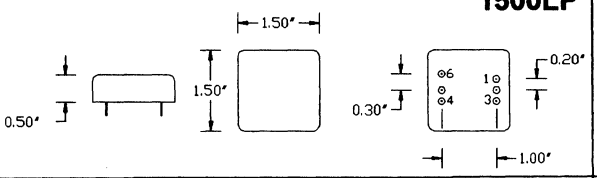
ARDIN FREQUENCY CONTROL INC.

150 Paularino Ave # 166, Costa Mesa, CA 92626

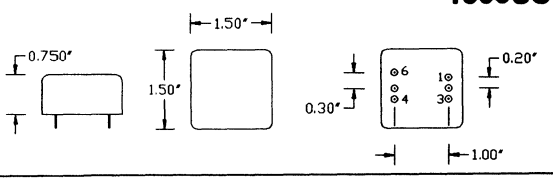
714-437-9383 • 714-437-9377 Fax

Oven Controlled Crystal Oscillator

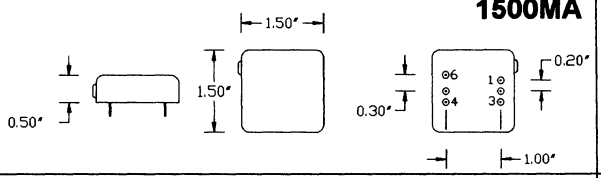
1500LP



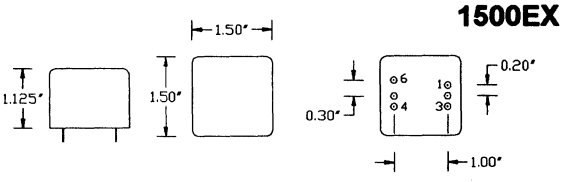
1500US



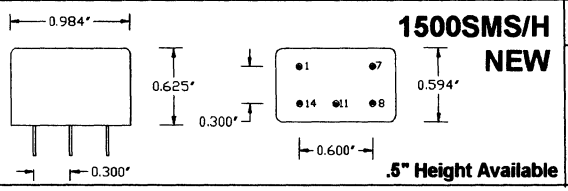
1500MA



1500EX



1500SMS/H NEW



.5" Height Available

Pin Out Configuration

	1500SMS/H
1EFC input	1 EFC Input
2 Output	7 GND
3 Case/Ground	8 Output
4 Voltage ref. output	11 Voltage Ref. Output (optional)
5 Electronic Supply	14 Supply Voltage
6 Heater Supply	

GENERAL SPECIFICATIONS

Part Number		1500LP / 1500MA (see note 1)	Part Number		1500US / 1500EX
Nominal Frequency		10.000MHz (others available)	Nominal Frequency		10.000MHz (others available)
Output Sine 50Ω Load		7dBm	Output Sine 50Ω Load		7dBm
Harmonics		-30dBc Max	Harmonics		-30dBc Max
Frequency Stability		±1 x 10^{-8} Max, 1 x 10^{-9} Typical	Frequency Stability		±1 x 10^{-8} Max, ±1 x 10^{-9} Typical
Operating Temperature Range		0 ~ +70C	Operating Temperature Range		0 ~ +70C (see note 2)
Frequency Adjustment		EFC = 0V to Vref +5 x 10^{-7}	Frequency Adjustment		EFC = 0V to Vref ±5 x 10^{-7}
Aging		1 x 10^{-7} / year Max, 5 x 10^{-8} Typ	Aging		5 x 10^{-8} Max
Phase Noise 100Hz		-140 dBc/Hz	Phase Noise 100Hz		-150 dBc/Hz
Phase Noise 1000Hz		-150 dBc/Hz	Phase Noise 1000Hz		-155 dBc/Hz
Phase Noise 10KHz		-155 dBc/Hz	Phase Noise 10KHz		-160 dBc/Hz
Short Term Stability t= 1sec		1 x 10^{-11} Max, 1 x 10^{-12} Typical	Short Term Stability t= 1sec		1 x 10^{-11} Max, 1 x 10^{-12} Typical
Heater Power (warm-up)		7W Max	Heater Power (warm-up)		7W Max
Supply Voltage 15V Steady State		3W Max	Supply Voltage 15V Steady State		3W Max
Supply Voltage	Heater	12VDC Min,15VDC Typ	Supply Voltage	Heater	12VDC Min,15VDC Typ
	Electronics	11.4VDC Min,12VDC Typ		Electronics	11.4VDC Min,12VDC Typ
Note 1 1500MA Mechanical Tune ±5 x 10^{-7}			Note 2 Operating Temp 1500EX = -55 ~ +70C		

SUB MINIATURE OCXO 14 PIN DIP COMPATIBLE

Part Number		1500SMS	Part Number		1500SMH
Frequency Range		5.000MHz ~ 30.000MHz	Frequency Range		5.000MHz ~ 30.000MHz
Temperature Stability		±3 x 10^{-7} Max, ±3 x 10^{-8} Typical	Temperature Stability		±3 x 10^{-7} Max, ±3 x 10^{-8} Typical
Operating Temperature Range		0 ~ +60C	Operating Temperature Range		0 ~ +60C
Frequency Adjustment EFC=2.5 ±2V		±10ppm Min	Frequency Adjustment EFC=2.5 ±2V		±5.0ppm Min
Supply Voltage		11.4 Min, 12.0 Typical	Supply Voltage		11.4 Min, 12.0 Typical
Frequency vs Supply Vcc =12C ±5%		±5 x 10^{-8}	Frequency vs Supply Vcc =12C ±5%		±5 x 10^{-8}
Aging		1 x 10^{-6} / year Max, 5 x 10^{-7} Typ.	Logic 1 Level / Logic 0 Level		4.75V Min / .25V Max
Phase Noise 100Hz		-120 dBc/Hz	Phase Noise 100Hz		-120 dBc/Hz
Phase Noise 1000Hz		-140 dBc/Hz	Phase Noise 1000Hz		-140 dBc/Hz
Phase Noise 10KHz		-145 dBc/Hz	Phase Noise 10KHz		-145 dBc/Hz
Harmonics		-30dBc	Warm up power/warm up time		3W / 2 minutes with in 1x10^{-7} of Freq
Warm up power/warm up time		3W / 2 minutes with in 1x10^{-7}	Output / Output Load		HCMOS / 15pF
Output / Output Load 50Ω		Sine / 7dBm	Duty Cycle Measured at 2.5V		40/60% Max, 45/55 Typical
Power	Temp = 25C	800mW Typical	Power	Temp = 25C	800mW Typical
	Temp = 0C	1.3 W Max		Temp = 0C	1.3 W Max
			Aging		1 x 10^{-6} / year Max, 5 x 10^{-7} Typical

LOOK FOR NEW OCXO PRODUCTS IN EARLY 1998

Low Cost Precision AT Cut • Fast Warm Up • Low Aging • Low Power Consumption

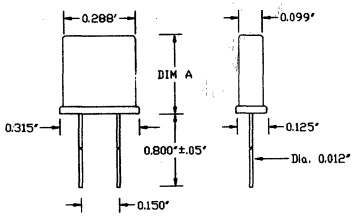
Expedited Manufacturing of Custom Specifications and Foot Prints

Watch for our New Product Releases in Electronic Products Magazine

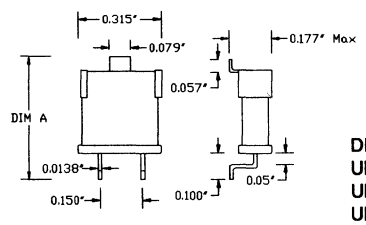
"Specializing in Precision Frequency Control Devices"

ARDIN FREQUENCY CONTROL INC.
150 Paularino Ave # 166, Costa Mesa, CA 92626
714-437-9383 • 714-437-9377 Fax

Tight Tolerance Crystal



DIM A
UM1 .315"
UM4 .190"
UM5 .240"



DIM A
UM1S .475"
UM4S .296"
UM5S .402"

GENERAL SPECIFICATIONS

Part Number Designator	UM1(S),UM4(S),UM5(S)	Code	CT	OTR	FS
Frequency Range	5 ~160MHz	A1E	±5	0~50	±3
Operation Mode	Fundmental,3rd, 5th	A2F	±5	-10~70	±5
Calibration Tolerance (CT)	See Table	A3G	±5	-30~80	±10
Operating Temp (OTR)	See Table Temp=°C	B1F	±10	0~50	±5
Frequency Stability (FS)	See Table	B2F	±10	-20~70	±5
ESR	Contact Factory	B3G	±10	-30~80	±10
Load Capacitance	16pF Standard, specify	B4H	±10	-40~90	±15
Drive Level	100nW - 1000uW	C2F	±15	-20~70	±5
Insulation Resistance	500mΩ/DC100V	C3G	±15	-30~80	±10
Aging	±3ppm/yr Std	C4I	±15	-40~90	±20

Please contact the factory for custom specifications

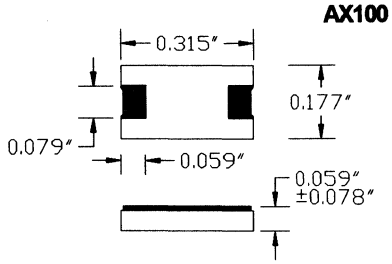
Part Number Generation

Package•Option Code•Frequency-Load Cap.
ex: UM1SA1E-10.000M-18
(UM1S,5/3ppm 0-50C 18pF)

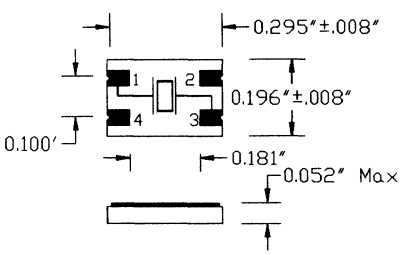
EXPEDITED MANUFACTURING AVAILABLE (48Hr to 3 Wks)

Micro-Processor Crystals

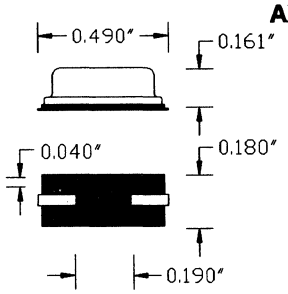
AX100



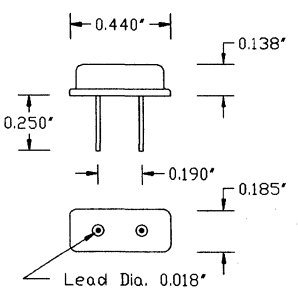
AX105



AX103



AX101

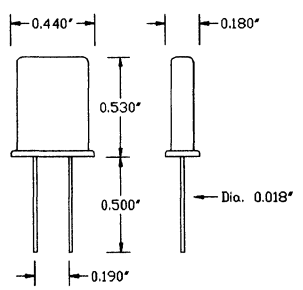


PART NUMBER GENERATION

Package • Option Code • Frequency - Load Cap
ex: AX100BE-14.31818M-18
(AX100, 30/30ppm, 0-70C 18pF)

Please contact factory for custom specifications

AX106



Standard Electrical Specifications

OPTION CODE TABLE			
Code	Specification	Frequency Range	AX101•AX103 3.5M ~ 90M AX100•AX105 10M~90M AX106 1.0M ~ 160M
A	±20PPM Stability AT	Calibration Tolerance @ 25°C	±50PPM Std, See Option Table
B	±30PPM Stability AT	Operating Temperature Range	0°C ~70°C Std, See Option Table
C	-30°C ~ 85°C Temp	Frequency Stability Over Temperature	±50PPM Std, See Option Table
D	±20PPM Tolerance @ 25C	Drive Level	100nW - 100-uW
E	±30PPM Tolerance @ 25C	Crystal Cut / Operation Mode	AT 3.5~36M Fund, 30.0~90M 3rd, BT 25M ~ 50M Fund
F	Fund. 25.0M~50M BT Cut	Shunt Capacitance (Co)	7.0pF Max
G	Fund. 24.0M~36M AT Cut	Aging	±5.0PPM/Year Std
		Equivalent Series Resistance (ESR)	Contact Factory for Complete Data Sheet

Contact factory for designators for 3rd lead, vinyl sleeve and I-Tab

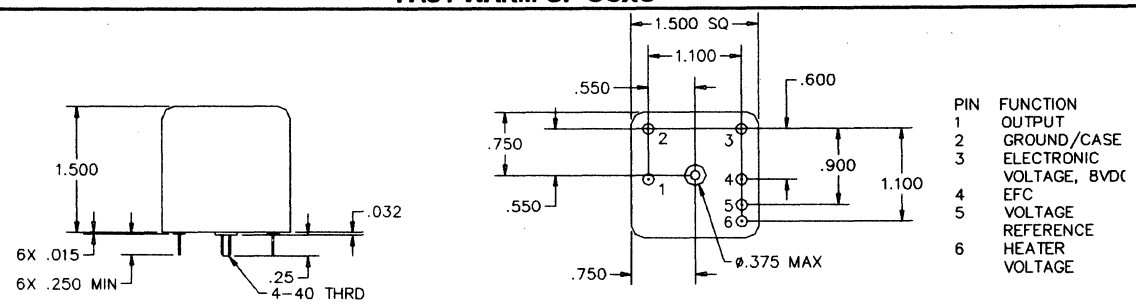
"Specializing in Precision Frequency Control Devices"

ARDIN FREQUENCY CONTROL INC.

150 Paularino Ave # 166, Costa Mesa, CA 92626

714-437-9383 • 714-437-9377 Fax

FAST WARM-UP OCXO



Part Number	1500FW
Nominal Frequency	5.000M ~ 20MHz
Output Sine 50Ω Load	7dBm
Harmonics	-30dBc Max
Frequency Stability	±1 x 10^{-8} Max, ±1 x 10^{-9} Typical
Operating Temperature Range	-55°C ~ +75°C
Frequency Adjustment	EFC = 0V to Vref ±5 x 10^{-7}
Voltage Reference	5.2VDC ±2%
Phase Noise 100Hz	-140 dBc/Hz
Phase Noise 1000Hz	-150 dBc/Hz
Phase Noise 10KHz	-155 dBc/Hz
Short Term Stability t= 1sec	1 x 10^{-11} Max, 1 x 10^{-12} Typical
Heater Power (warm-up)	10W
Supply Voltage 15V Steady State	2W @ -55°C
Supply Voltage Heater	15VDC ±10%
Supply Voltage Electronics	12VDC ±5%

Part Number		1500FW Continued..
Electronics Power		160mW
Supply Pushing (supply = 15VDC ±5%)		±5 x10^{-10} Max
Supply Ripple	10Hz ~ 100KHz	50mV Max
	100KHz ~ 1MHz	100mV Max
Ripple Rejection		-60dBc Min
Spurious Output to 1 GHz		<-90dBc Min
Warm Up to ±1 x 10^{-8}		Temp= -55°C, Time = 4 minutes
Load Stability		Sine, Load =50Ω ±5%
Aging		±5x10^{-9}/yr

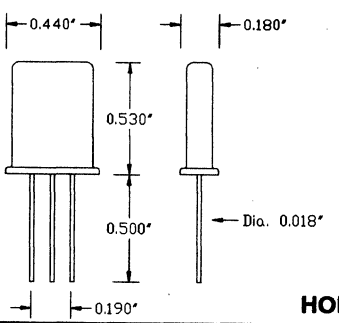
Temperature Stability <1 x 10^{-10} 0°C ~ +70°C OCXO

•••In Development (scheduled for release 4th Quarter 97)•••

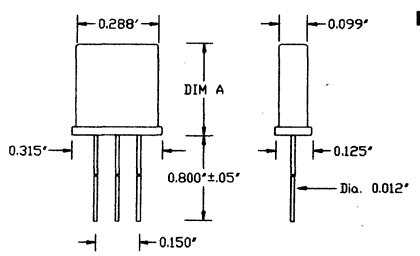
2x2x1" package.

Please contact the factory for full details.

CRYSTAL FILTERS



HOLDER H1



DIM A .32"

HOLDER H2

STANDARD 21.4MHz MCF

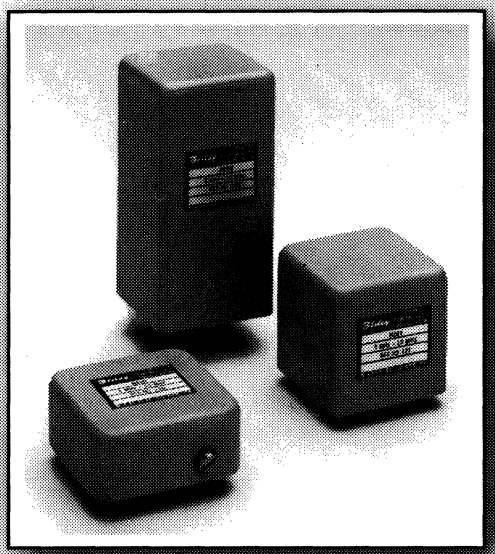
Part Number	Channel Spacing	Nominal Freq. MHz	Pole	Pass Band dB / KHz	Stop Band dB / KHz	Ripple dB	Loss dB	Attenuation dB / FO +KHz	Terminating Impedance	Operating Temp.°C	Holder
21A100	12.5KHz	21.4 ~ 21.8	2	3 / ±3.75	20 / ±18.0	0.5	1.5	35/ ±300 - ±1000	850Ω//6.0pF	-20 ~ +70	H2
21A101	12.5KHz	21.4 ~ 21.8	4	3 / ±3.75	40 / ±14.0	1.0	2.5	65/ ±300 - ±1000	850Ω//5.0pF	-20 ~ +70	H2
21B100	20.0KHz	21.4 ~ 21.8	2	3 / ±6.0	20 / ±25.0	0.5	1.5	35/ ±300 - ±1000	1.2KΩ//3.0pF	-20 ~ +70	H2
21B101	20.0KHz	21.4 ~ 21.8	4	3 / ±6.0	40 / ±20.0	1.0	2.5	65/ ±300 - ±1000	1.2KΩ//2.5pF	-20 ~ +70	H2
21C100	25.0KHz	21.4 ~ 21.8	2	3 / ±7.5	18 / ±25.0	0.5	1.5	35/ ±300 - ±1000	1.5KΩ//2.5pF	-20 ~ +70	H2
21C101	25.0KHz	21.4 ~ 21.8	4	3 / ±7.5	40 / ±25.0	1.0	2.5	65/ ±300 - ±1000	1.5KΩ//2.0pF	-20 ~ +70	H2
21D100	50.0KHz	21.4 ~ 21.8	2	3 / ±15.0	15 / ±45.0	0.5	1.5	30/ ±300 - ±1000	1.5KΩ//1pF	-20 ~ +70	H2
21D101	50.0KHz	21.4 ~ 21.8	4	3 / ±15.0	30 / ±50.0	1.0	2.5	65/ ±300 - ±1000	2.2KΩ//.5pF	-20 ~ +70	H2

STANDARD 10.7MHz MCF

Part Number	Channel Spacing	Nominal Freq. MHz	Pole	Pass Band dB / KHz	Stop Band dB / KHz	Ripple dB	Loss dB	Attenuation dB / FO ±KHz	Terminating Impedance	Operating Temp.°C	Holder
10A100	12.5KHz	10.700	2	3 / ±3.75	20 / ±18.0	0.5	1.5	35/ ±300 - ±1000	1.8KΩ//5pF	-20 ~ +70	H1
10A101	12.5KHz	10.700	4	3 / ±3.75	40 / ±14.0	1.0	2.5	65/ ±300 - ±1000	1.8KΩ//4.5pF	-20 ~ +70	H1
10B100	20.0KHz	10.700	2	3 / ±6.0	20 / ±25.0	0.5	1.5	35/ ±300 - ±1000	2.5KΩ//2.5pF	-20 ~ +70	H1
10B101	20.0KHz	10.700	4	3 / ±6.0	40 / ±20.0	1.0	2.5	65/ ±300 - ±1000	2.5KΩ//1.5pF	-20 ~ +70	H1
10C100	25.0KHz	10.700	2	3 / ±7.5	18 / ±25.0	0.5	1.5	35/ ±300 - ±1000	3.0KΩ//2.0pF	-20 ~ +70	H1
10C101	25.0KHz	10.700	4	3 / ±7.5	40 / ±25.0	1.0	2.5	65/ ±300 - ±1000	3.0KΩ//1.5pF	-20 ~ +70	H1
10D100	50.0KHz	10.700	2	3 / ±15.0	15 / ±50.0	0.5	1.5	30/ ±300 - ±1000	5.0KΩ//0pF	-20 ~ +70	H1
10D101	50.0KHz	10.700	4	3 / ±15.0	30 / ±40.0	1.0	2.5	65/ ±300 - ±1000	5.5KΩ//-1pF	-20 ~ +70	H1

please contact factory for custom specifications

"Specializing in Precision Frequency Control Devices"



BLILEY CRYSTAL OSCILLATORS

CALL (814)838-3571 FAX (814) 833-2712
BLILEY ELECTRIC COMPANY
2545 W GRANDVIEW BLVD. P.O. BOX 3428
ERIE, PA 16508-0428
WEB ADDRESS: http://www.bliley.com
E-MAIL: info@bliley.com

You Can Selectively Review BLILEY'S Broad Range of Oscillators at our Interactive Direct-to-Product Web Addresses.

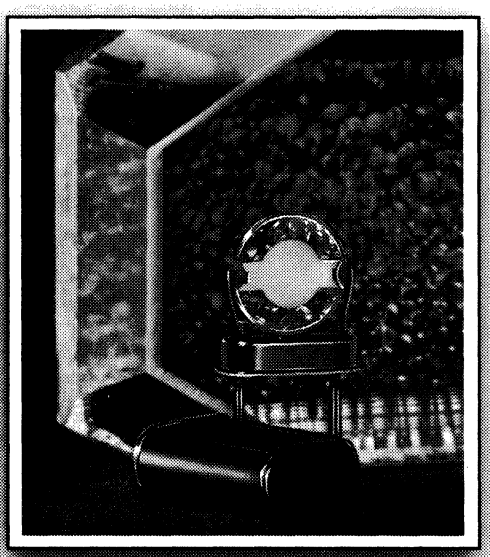
Crystal Oscillators	Product Profile	Direct-To-Product Web Address
Oven Controlled (OCXO)	**Bliley OCXO's provide excellent frequency stability with a compatible phase noise level. Flexible options include a variety of mechanical mounting methods and various styles of electical connections. Also VSAT applications.**	www.bliley.com/ocxo.htm
Temperature Compensated (TCXO)	Bliley TCXO's are designed to integrate the characteristics of high quality coldweld sealed crystals with temperature compensated circuitry. This achieves long term reliability.	www.bliley.com/tcxo.htm
Voltage Controlled (VCXO)	Bliley VCXO's combine inherent crystal stability and voltage controlled frequency deviation in these uniquely designed devices.	www.bliley.com/vcxo.htm
Temperature Compensated Voltage Controlled (TCVCXO)	Bliley TCVCXO's consolidate many of the advantages of temperature compensation and voltage control in a single design.	www.bliley.com/tcvcxo.htm
Stratum II and III Clocks (OCVCXO)	Bliley OCVCXO's are ultra stable clock oscillators which meet their designated Stratum II or Stratum III performance levels in advanced telecommunications systems.	www.bliley.com/strat.htm
General Purpose Clocks (XO)	Bliley clock oscillators combine inherent crystal stability with logic output in standard dip packages. The unique design can use a +5Vdc or +3Vdc power supply.	www.bliley.com/xo.htm

Bliley will customize any of its oscillators to meet your special requirements. Visit Bliley's Worldwide Website at http://www.bliley.com for a personal tour of our facilities.

Bliley

first name in customized frequency control

BLILEY CRYSTALS



CALL (814)838-3571 FAX (814)833-2712
BLILEY ELECTRIC COMPANY
2545 W. GRANDVIEW BLVD. P.O. BOX 3428
ERIE, PA 16508-0428
WEB ADDRESS: http://www.bliley.com
E-MAIL: info@bliley.com

You Can Interactively Detail BLILEY's Wide Variety of Quartz Crystals at our Website: http://www.bliley.com

Quartz Crystals	Holder Styles	Product Profile
Coldweld Vacuum Sealed Crystals	HC-36/U, HC-47/U, HC-46/U (size), HC-43/U & HC-45/U	Bliley's Coldweld Series featuring unexcelled process cleanliness and flux-free vacuum sealing to maximize performance. Improved aging and reliability with superior temperature stability can be provided.
Coldweld Vacuum Sealed Transistor Case Crystals	HC-40/U, HC-37/U(TO-8) & HC-35/U (TO-5)	This Bliley style is first choice in advanced military and space systems. Unmatched performance during extreme shock/vibration, superior aging, high reliability and ease of mounting are all provided at a modest price.
Vacuum Sealed Ultra High Stability Crystals (AT & SC Cuts)	HC-47/U, HC-37/U (TO-8), HC-40/U & BG61AH & SCH-5S/3S (glass enclosures)	Designed for optimum performance with temperature control. Exceptionally low aging and high Q characteristics provide precision reference for frequency standards, synthesizers and ultra stable clock systems. A Bliley hallmark crystal series.
General Purpose & Mil-Spec Crystals	HC-51/U, HC-48/U, HC-33/U, HC-6/U, HC-46/U (size), HC-49/U, HC-52/U & HC-35/U (size)	Good performance, reliability and mounting versatility make this Bliley group the preferred choice for computer, data processing and general applications. A variety of holder styles with Mil-Spec solder seal or our economy "Resistance-Weld" volume production seal.
Surface Mount Crystal Designs	BSM1 (flat pack) & HC-49/U	Available in low profile "gull-wing" style or sub-miniature ceramic configuration for pick and place assembly systems. Traditional Bliley performance and reliability for special assembly techniques.
Doubly Rotated Cut Crystals	HC-36/U, HC-35/U (TO-5) & HC-37/U (TO-8)	Bliley "stress compensated" crystal families offer improved frequency stability, fast warm-up, low phase noise, excellent aging and high drive capability. We set the standard for innovative design in this technology.
Quartz Blanks	N/A	Customized transducer and specialty blank designs available for most applications.

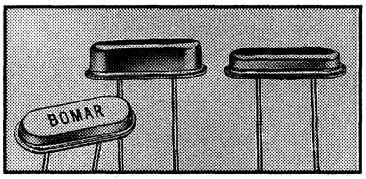
Bliley

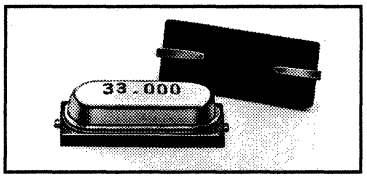
first name in customized frequency control

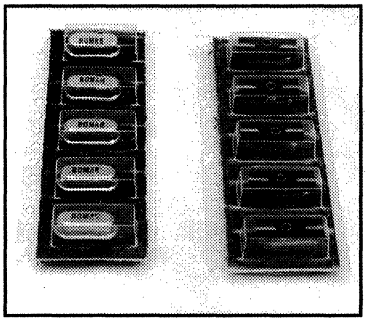
BOMAR CRYSTAL

BOMAR Crystal Company

201 Blackford Avenue, Middlesex, NJ 08846







Specifications: HC-49 / S AND HC-49 / SMD

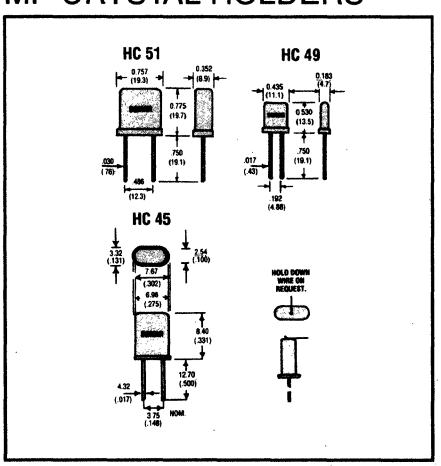
Frequency Range (MHz)	Frequency Tolerance (at 24 °C)	Max. Series Resistance (ohms)	Frequency Stability/ Temperature Range	Max Drive Level	Mode
2 . 5 - 3 . 499	±50 PPM	300	± 50 PPM / -10 to +60 °C	1mW	FUND
3 . 5 - 4. 899	±50 PPM	150	± 50 PPM / -10 to +60 °C	1mW	FUND
4 . 9 - 5 . 999	±50 PPM	100	± 50 PPM / -10 to +60 °C	1mW	FUND
6 . 0 - 7 . 999	±50 PPM	80	± 50 PPM / -10 to +60 °C	1mW	FUND
8 . 0 - 10 . 999	±50 PPM	60	± 50 PPM / -10 to +60 °C	1mW	FUND
11. 0 - 19 . 999	±50 PPM	50	± 50 PPM / -10 to +60 °C	1mW	FUND
20 . 0 - 32 . 000	±50 PPM	30	± 50 PPM / -10 to +60 °C	1mW	FUND
27 . 0 - 70 . 000	±50 PPM	100	± 50 PPM / -10 to +60 °C	1mW	3RD

FREQUENCY RANGE	HOLDER	MODE
1 . 0000 - 9 . 999 MHz .	HC / 51	FUND
1 . 8432 - 25 . 0000	HC / 49	FUND
20 . 000 - 75 . 0000	HC / 49	3 RD
60 . 000 - 125 . 000	HC / 49	5 TH
10 . 000 - 25 . 0000	HC / 45	FUND
25 . 000 - 59 . 9999	HC / 45	3 RD
60 . 000 - 125 . 000	HC / 45	5 TH

Features:

- High Stability
- Low Aging Characteristics
- Tight Tolerances
- Quick Turnaround
- Resistance Weld

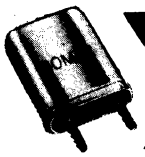
MP CRYSTAL HOLDERS



(Plastic and Ceramic Packages Available)

BOMAR CRYSTAL -- Established in 1963, has been manufacturing high precision quartz crystals designed to meet the exacting requirements of the OEM market place. Bomar has grown to be an industry leader in the production of AT-cut crystals that generate the best frequency to temperature deviation. Bomar specializes in quick turn around at competitive prices.

To Order • Phone: 1-800-526-3935 • Fax: 1-800-777-2197
www.bomarcrystal.com • E-Mail sales@bomarcrystal.com



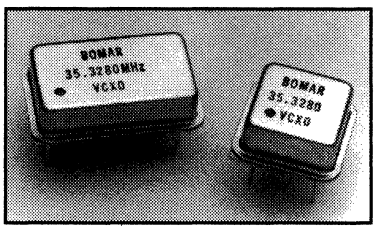
BOMAR Crystal Company

201 Blackford Avenue, Middlesex, NJ 08846

BOMAR CRYSTAL

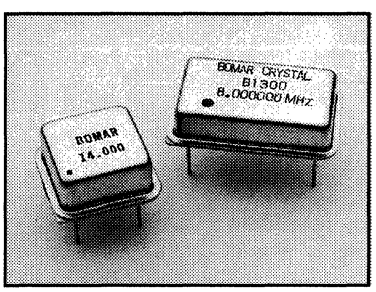
VCXO'S
(FULL & HALF SIZE)

	VCXO: STANDARD FEATURES
Frequency Range	1MHz-60MHz
Pullability	±125 PPM Typical
Package	14 Pin & 8 Pin DIP
Control	+2.5V ±2V
Temp. Characteristics	±30PPM / 0 to 70°C
VoH Level	+4.5v Min.
VoL Level	+0.4v Max.
Current Consumption	40mA max.
Output Load	TTL/CMOS = 10TTL/15pF
Symmetry	40/60
Rise & Fall Time	6nS max.
Operating Temperature	0 to + 70°C
Storage Temperature	-55 to +125°C

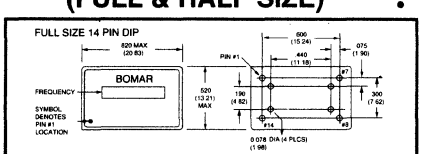


Features:
- Fast Rise & Fall Time
- Industry Standard Foot Print
- ±125PPM Pullability

Options:
- Extended Pullability Range to ± 1000PPM
- Extended Temperature Range
- CMOS Load up to 50pF
- Freq. Stability ±3PPM@5V±10% Versus Voltage
- Gull Wing



CLOCK OSCILLATORS
(FULL & HALF SIZE)



Features:
- Fast Rise & Fall Time
- Industry Standard Footprint

Options:
- Extended Temperature Range
- Tri-state Enable/ Disable Option
- 3.3 V Available
- Gull Wing

Specifications:

	TTL (Full Size)	TTL (Half Size)	HCMOS (Full/Half Size)	HCMOS/TTL (Full/Half Size)
Frequency	250KHz-125.0MHz	500 KHz-125.0MHz	200KHz-125.0MHz	200KHz-125.0MHz
Frequency Tolerance	100 PPM 50 PPM 25 PPM 10 PPM	100 PPM 25 PPM 25 PPM 10 PPM	100 PPM 25 PPM 25 PPM 10 PPM	100 PPM 25 PPM 25 PPM 10 PPM
Temp. Range: Operating	0 to +70 °C	0 to +70 °C	0 to +70 °C	0 to +70 °C
Temp. Range: Storage	-55 to +125°C	-55 to +125°C	-55 to +125°C	-55 to +125°C
Supply Voltage	+5 VDC ±10%	+5 VDC ±10%	+5 VDC ±10%	+5 VDC ±10%
Current Consumption	80mA Max. 250KHz-4.0MHz 50mA Max. 4.0MHz -50.0MHz 65mA Max. 50.0-125.0MHz	50mA Max. 500KHz-19.9MHz 30mA Max. 20.0-39.9MHz 50mA max. 40.0-125.0MHz	15mA Max. 200KHz-19.9MHz 30mA Max. 20.0-39.9MHz 50mA max. 40.0-125.0MHz	15mA. Max. 200KHz-19.9MHz 30mA Max. 20.0-39.9MHz 50mA max. 40.0-125.0MHz
Symmetry	40 / 60 % @ 1.4VDC	40 / 60% @ 1.4VDC	40 / 60 @ 50%VCC	40 / 60 @ 50%VCC
Rise & Fall Time (TR&TF)	6nS Max. 250KHz-50MHz 6ns Max. 50.0-125.0MHz	6nS Max. 250KHz-50MHz 6ns Max. 50.0-125.0MHz	4nS Max. 250KHz-50MHz 6ns Max. 50.0-125.0MHz	4nS Max. 250KHz-50MHz 6ns Max. 50.0-125.0MHz
Logic "1"	+2.4V Min.	+2.4V Min.	+4.5V Min.	+4.5V Min.
Logic "0"	+0.4V Min.	+0.4V Min.	+0.5V Min.	+0.5V Min.
Output Load	1-10TTL Gates 250KHz-50.0Mhz 1-5TTL Gates 50.0-125.0MHz	Up to 10TTL Gates	Up to 50pF	10TTL/20pF

(Plastic and Ceramic Packages Available)

To Order • Phone: 1-800-526-3935 • Fax: 1-800-777-2197
www.bomarcrystal.com • E-Mail sales@bomarcrystal.com

eem

MINIGLOSSARY ENCAPSULATION

MATERIALS/HANDLING

Catalyst: A substance which changes the *rate* of chemical reaction. Very small quantities can cause fast change.

Conformal coating Sprayed or dipped. A thin conformal jacket which protects an assembly from moisture or other degrading environments.

Curing agent: See catalyst.

Hardener: See catalyst.

Hermetic: A permanent gas-tight seal.

RTV: Room Temperature Vulcanizing. Associated with silicone rubber sealants which vulcanize at room temperature.

Thermoplastic: Plastic materials which can be made to flow *repeatedly* with the application of heat.

Thermosetting: Plastics which once cured cannot be made to flow again.

Thixotropy: The property of a coating compound which has low viscosity when agitated, but which thickens when the agitation ceases.

Viscosity: Measured in units of *poise* or *centipoise.* The property of a liquid which resists internal flow. Low viscosity equates with thin and vice-versa.

PROCESSING

Casting: Parts or assemblies are placed in a mold. Encapsulating material is added and cured. Part is then removed from the mold.

Dip coating: Part or assembly is dipped into the encapsulating material. Final thickness is determined by number of dips, viscosity, rate of withdrawal, and temperature.

Embedding: Wherein an encapsulant substantially fills all voids in and about an assembly.

Impregnation: A process of encapsulation involving evacuating all air and then allowing the encapsulating material to flow in and fill all voids.

Molding: Similar to casting except this process usually implies multicavity molds and costly machines.

Potting: Wherein the part or assembly is immersed in an encapsulating material contained in a shell which becomes a permanent outer surface after curing.

DIELECTRIC

Arc resistance: An encapsulant's resistance to the formation of a conductive path or track. Measured in time.

Breakdown voltage: The voltage at which an encapsulant fails electrically.

Capacitance: The property of conductors and dielectrics which allows the storage of an electrical charge when the voltage is applied.

Corona: A luminous discharge of electricity due to air ionization when a certain voltage is reached. Can be internal or external. The formation of ozone can cause rapid deterioration of certain materials.

Dielectric: Insulator (Nonconductor.)

Dielectric constant: The property of a material that determines its ability to store electrostatic energy.

Dielectric strength: The ratio of dielectric breakdown to the thickness of insulating material.

Dissipation factor: The ratio of a dielectric material's energy losses.

Flashover: Point at which an electric discharge occurs around an edge or across a surface. Can result in a carbon track and permanent degradation.

Insulation resistance: (IR) An insulating material's total DC leakage.

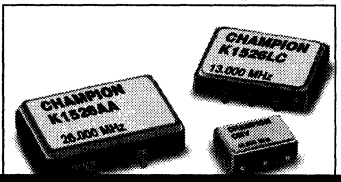
Surface resistivity: The resistance of the surface of an insulating material to the flow of direct current.

Voltage endurance: Sometimes called corona resistance. The ability of a material to withstand the application of sustained high voltage.

Volume resistivity: The resistance of a material to direct current flow as a measure of volume. Expressed as ohm-centimeters.

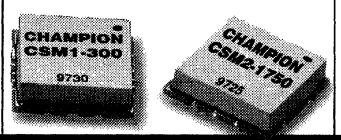
Champion
CRYSTAL OSCILLATORS

FEATURED PRODUCTS



SMT VCXOs
K1526AA/AD Series Up To 40 MHz
K1526LC/B Series Up To 55 MHz

- ▼ 2 to 55 MHz
- ▼ Custom Deviations Available
- ▼ Tape & Reel Packaging
- ▼ Enable/Disable Option (K1526B, K1526LC, CMV)
- ▼ -40°C to +85°C Option
- ▼ 3.3 Volt Operation Available



SMT VCOs
CSM/CZM Series for Commercial Wireless Applications

- ▼ Low Cost, High Performance
- ▼ Low Profile, Compact Packages
- ▼ 40 MHz to 4 GHz
- ▼ Tape & Reel Packaging
- ▼ Linear Wideband Tuning Range
- ▼ Industry-Standard Footprints

SMT OSCILLATORS
MSO2 Series (ceramic) 6-pin footprint

- ▼ ±20ppm (0°C to +70°C) ±32ppm (-40°C to +85°C)
- ▼ 1.5 to 40 MHz
- ▼ J-Leads
- ▼ Tape & Reel Packaging
- ▼ Enable/Disable Feature Standard

VCXOs (TTL/CMOS)

DIP PACKAGE (5V)	Frequency Range	Stability	Deviation	Options
K1524AA	3.0 - 35.0 MHz	±50ppm	±300ppm min.	3
K1525 Series*	2.0 - 40.0 MHz	±25ppm	±60 to ±120ppm min.	3,7
K1527 Series*	2.0 - 66.0 MHz	±45ppm	±130ppm min.	3,7
K1528 Series*	33.0 - 82.0 MHz	±25ppm	±60 to ±250ppm min.	3,7,8
K1570A/K570A Series	1.0 - 46.0 MHz	±50ppm	±100ppm min.	0
3.3 VOLT TYPES				
K1573A/K573A Series	1.0 - 46.0 MHz	±50ppm	±100ppm min.	0
SURFACE MOUNT				
K1526AA Series*	2.0 - 55.0 MHz	±25ppm	±60ppm min.	3
K1526B Series	2.0 - 55.0 MHz	±25ppm	±100ppm min.	3,8
K1526LC Series*	2.0 - 55.0 MHz	±25ppm	±60ppm min.	3
CMV Series (5x7mm)	2.0 - 45.0 MHz	±25ppm	±100ppm min.	3,8

* Standard control voltage +0.5V to +4.5V. Custom deviation, sensitivity and control voltage available.

TCXOs

DIP PACKAGE	Frequency Range	Output	Stability	Operating Temp.
K1601T Series	2.0 - 30.0 MHz	TTL/CMOS	±1.0ppm	0°C to +55°C
K1601TE Series*	2.0 - 30.0 MHz	TTL/CMOS	±1.0ppm	0°C to +55°C
K1602 Series*	16.0 - 30.0 MHz	Sinewave	±2.0ppm	-40°C to +85°C
K1602T Series	2.0 - 30.0 MHz	TTL/CMOS	±2.0ppm	-40°C to +85°C
K1602TE*	2.0 - 30.0 MHz	TTL/CMOS	±2.0ppm	-40°C to +85°C
K1603T Series	2.0 - 30.0 MHz	TTL/CMOS	<2.0ppm	-40°C to +85°C

* Electronic Modulation Capability ** Meets Stratum III requirements, ±4.6 ppm stability

VCOs

SURFACE MOUNT	Frequency Range	Mod. Sensitivity	Freq. Pushing	Freq. Pulling	Phase Noise @ 10KHz
CSM1 Series	40.0 MHz - 4 GHz	3.3 - 30.0 MHz/V	1.0 - 2.5 MHz/V	2.0 - 4.0 MHz	-120 to -98 dBc/Hz
CSM2 Series	1000 - 2500 MHz	70.0 - 90.0 MHz/V	15.0 MHz/V	30.0 MHz	-85 to -83 dBc/Hz
CZM Series	Same specifications, additional industry-standard footprint.				

TCVCXOs

DIP PACKAGE	Frequency Range	Stability	Deviation	Control Volt.
K1710	2.0 - 35.0 MHz	±10ppm	±60ppm min.	+0.5V to +4.5V
K1720**	2.0 - 35.0 MHz	±20ppm	±60ppm min.	+0.5V to +4.5V
K17255*	139.264/155.52 MHz	±20ppm	±40ppm min.	-8.0V to +8.0V

* Custom deviation, sensitivity and control voltage available. ** -40 to +85°C operating temperature range.

DATA CLOCKS

DIP PACKAGE	Frequency Range	Symmetry	Logic	Stability	Options
K11041	40.0 - 70.0 MHz	47.5/52.5%	TTL/CMOS	±100ppm	3
K1300	70.0 - 120.0 MHz	40/60%	TTL/CMOS	±100ppm	1,2
K1400A Series	up to 140 MHz	—	Sinewave	<±100ppm	1,3
K1100BA	1.0 - 70.0 MHz	40/60%	TTL/CMOS	±100ppm	1,2,8
K1100F Series	1.5 - 90.0 MHz	40/60%	TTL/CMOS	±100ppm	1,3,8
SURFACE MOUNT (CERAMIC)					
MSO2	1.5 - 40.0 MHz	45/55%	TTL/CMOS	±20ppm	3,4,8
HALF-DIP PACKAGE					
K500 Series	1.0 - 70.0 MHz	40/60%	TTL/CMOS	±100ppm	1,2,8
K500F Series	1.5 to 90.0 MHz	40/60%	TTL/CMOS	±100ppm	1,3,8
3.3 VOLT FULL & HALF-DIP PACKAGES					
K3100G/K3500G Series	1.0 - 90.0 MHz	40/60%	TTL/CMOS	±100ppm	1,3,8
TIGHT STABILITY					
K1144BM	1.75 - 35.0 MHz	40/60%	TTL/CMOS	±20ppm	3,4
K1144AM	35.1 - 66.0 MHz	40/60%	TTL/CMOS	±20ppm	1
K1110D Series	2.0 - 35.0 MHz	40/60%	TTL/CMOS	±10ppm	3,4
ECL COMPATIBLE					
K1149 Series	40.0 - 220.0 MHz	40/60%	ECL	±100ppm	1,5,6,7

Options: 1. Tighter Stability 2. Tighter Symmetry 3. Extended Temperature Range 4. Enable/Disable 5. Various Pinouts 6. Complementary Output 7. Internal Pull-Downs 8. Tri-State Operation
Note: 0.01% = 100ppm, 0.005% = 50ppm, etc.

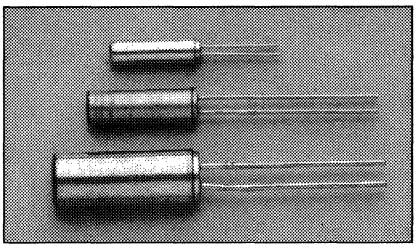
Affordable Technology ▼ High Quality Products ▼ On-time Delivery
Short Leadtimes ▼ Champion-Ship Services

ISO 9001 REGISTERED

CHAMPION TECHNOLOGIES, INC.
1-800-888-1499 ▲ www.champtech.com

CITIZEN AMERICA
831 S. DOUGLAS STREET,STE. 121, EL SEGUNDO, CA 90245
PHONE: 310-643-9825 • FAX: 310-725-0812
www.citizen-america.com

CFS SERIES



32.768 KHZ CRYSTAL

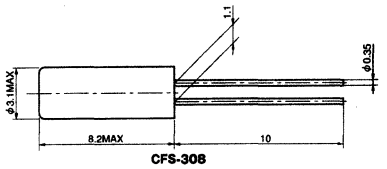
FEATURES

- Because of their excellent shock resistance and low power consumption, the units are ideal for portable equipment.
- Features superior characteristics indigenous to tuning fork type quartz crystal units

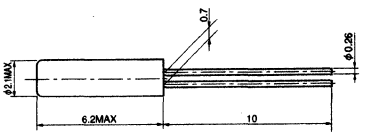
STANDARD SPECIFICATIONS

Item	Model	CFS-308	CFS-206	CFS-145	Conditions
Nominal Frequency	f_O	32.768kHz			
Frequency Tolerance	$\Delta f/f_O$	±20ppm			(25°C) Reference Temp.
Frequency vs. Temp. Characteristics	$\Delta f/f_O$	see drawing			-10°C~ +60°C
Turnover Temperature	T_m	25°C ±5°C			
Temperature Coefficient	β	-0.034 ±0.006ppm/°C²			
Operating Temperature Range	T_{OPR}	-10°C~ +60°C			
Storage Temperature Range	T_{STG}	-40°C~ +85°C			Store by one unit
Quality Factor		90,000 TYP.	70,000 TYP.	80,000 TYP.	
Equivalent Series Resistance	R_1	35kΩ MAX.		40kΩ MAX.	(25°C) Reference Temp.
Load Capacitance	C_L	12.5pF TYP.		8.0pF TYP.	Please specify.
Motional Capacitance	C_1	0.0035pF TYP.	0.0030pF TYP.	0.0025pF TYP.	
Shunt Capacitance	C_O	1.60pF TYP.	1.35pF TYP.	1.00pF TYP.	
Capacitance Ratio	γ	460 TYP.	450 TYP.	400 TYP.	
Drive Level	DL	1μW MAX.			
Insulation Resistance	IR	500MΩ MIN.			DC100V±15V
Aging (First year)	$\Delta f/f_O$	±3ppm MAX.			25°C±3°C
Hermeticity of Seal		$1x10^{-2}$μPa•m³/s MAX.			
Shock Resistance		±5ppm MAX. Drop test of 3 times on a hard board from 75cm height or shock test of 3000Gx0.3msx1/2sin wavex3 directions			Varies depending on the frequency

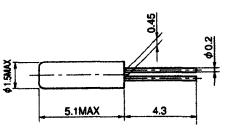
DIMENSIONS (Unit = mm)



CFS-308

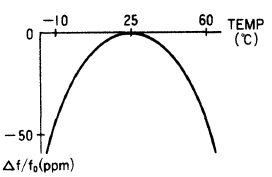


CFS-206

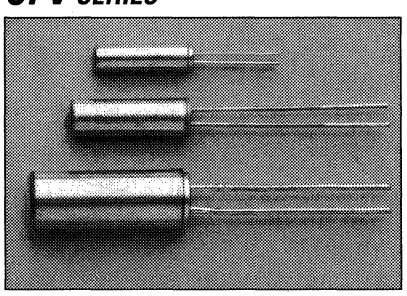


CFS-145

FREQUENCY VS. TEMPERATURE CURVE



CFV SERIES



30-150 KHZ CRYSTAL

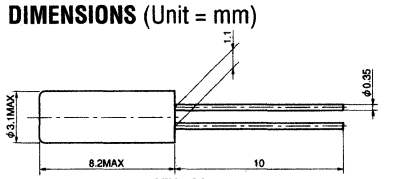
FEATURES

- Similar to CFS series, CFV series features superior characteristics of a kind that only tuning fork-type crystal units can offer. Ideal for application to compact portable equipment
- CSE-145, which adopts Citizen's unique E-shaped configuration for its crystal piece, not only boasts the world's smallest size among 1MHz-band crystals, but also feature outstanding shock resistance.

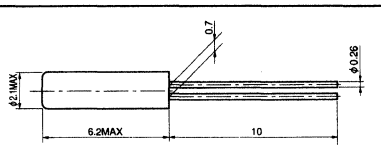
STANDARD SPECIFICATIONS

Item	Model	CFV-308	CFV-206	CFV-145	CSE-145	Conditions
Nominal Frequency	f_O	30kHz~40kHz	30kHz~150kHz	200kHz	1MHz	Contact us for changes in frequency
Frequency Tolerance	$\Delta f/f_O$	±30ppm	±30ppm	±10,000ppm	±3,000ppm	(25°C) Reference Temp
Frequency vs. Temp. Characteristics	$\Delta f/f_O$	see drawing				-10°C~ +60°C
Turnover Temperature	T_m	25°C TYP.			35°C TYP.	
Temperature Coefficient	β	-0.034ppm/°C² TYP.				Varies depending on frequency
Operating Temperature Range	T_{OPR}	-10°C~ +60°C				
Storage Temperature Range	T_{STG}	-40°C~ +85°C				Store by one unit
Equivalent Series Resistance	R_1	30kΩ~50kΩ		10kΩ	3kΩ	(25°C) Reference Temp
Load Capacitance	C_L	12.5pF TYP.			8.0pF TYP.	Please specify.
Motional Capacitance	C_1	1~4fF TYP.			1fF TYP.	Varies depending on frequency
Shunt Capacitance	C_O	0.8~1.7pF TYP.			0.4pF TYP.	
Capacitance Ratio	γ	425~800 TYP.			400 TYP.	
Drive Level	DL	1μW MAX.				
Insulation Resistance	IR	500MΩ MIN.				DC100V±15V
Aging (First year)	$\Delta f/f_O$	±5ppm MAX.				25°C±3°C
Sealing		$1x10^{-2}$μPa•m³/s MAX.				
Shock Resistance		±5ppm MAX. Drop test of 3 times on a hard board from 75cm height or shock test of 3000Gx0.3msx1/2sin wavex3 directions				Varies depending on the frequency

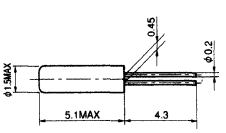
DIMENSIONS (Unit = mm)



CFV-308

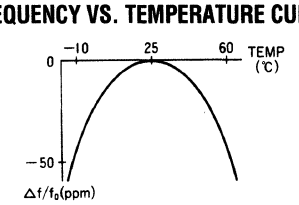


CFV-206



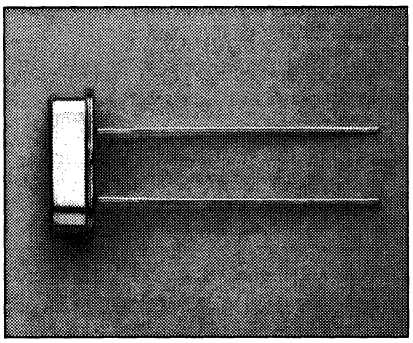
CFV-145、CSE-145

FREQUENCY VS. TEMPERATURE CURVE



CITIZEN AMERICA
831 S. DOUGLAS STREET,STE. 121, EL SEGUNDO, CA 90245
PHONE: 310-643-9825 • FAX: 310-725-0812
www.citizen-america.com

HC-49/U-S SERIES



3.5-25 MHZ CRYSTAL

FEATURES

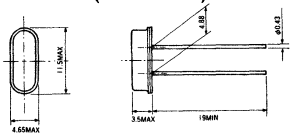
- The HC-49/U-S is a high-performance miniature crystal units manufactured with Citizen's ultrahigh-precision processing technology.
- Excellent vibration resistance, shock resistance and environmental characteristics.
- Can be automatically mounted, as units provided with taping are available by request.

(2,000pcs/Ammo Pack, reel)

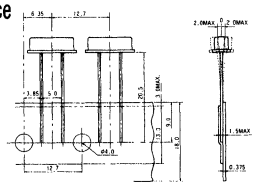
STANDARD SPECIFICATIONS

Item	Model	HC-49/U-S	Conditions
Nominal Frequency	f_0	3.5Mhz~25MHz	Contact us for changes in frequency
Frequency Tolerance	$\Delta f/f_0$	±30ppm or ±50ppm	(25°C) Reference Temp.
Frequency vs. Temp. Characteristics	$\Delta f/f_0$	±30ppm or ±50ppm	-10°C~ +60°C
Operating Temperature Range	T_{OPR}	-10°C~ +60°C	
Storage Temperature Range	T_{STG}	-40°C~ +85°C	Store by one unit
Equivalent Series Resistance	R_1	See drawing	
Load Capacitance	C_L	16pF TYP.	Please specify.
Shunt Capacitance	C_0	7.0pF TYP.	
Drive Level	DL	100μW	
Insulation Resistance	IR	500MΩ MIN.	DC100V±15V
Aging (First year)	$\Delta f/f_0$	±5ppm MAX.	25°C±3°C
Sealing		$1x10^{-2}$μPa•m³/s MAX.	
Shock Resistance	±10ppm MAX. Drop test of 3 times on a hard board from 75cm height or shock test of 3000Gx0.3msx1/2sin wavex3 directions		Varies depending on the frequency

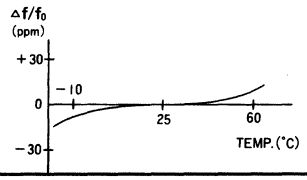
DIMENSIONS (Unit = mm)



EXTERNAL DIMENSIONS FOR TAPING (Reference Value)



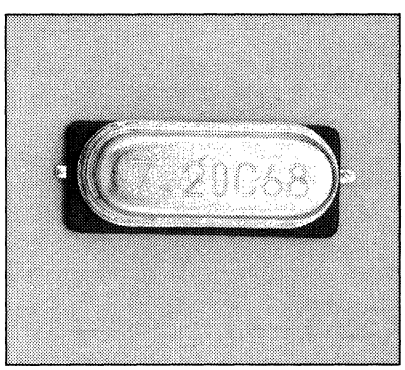
FREQUENCY VS. TEMPERATURE CURVE



EQUIVALENT SERIES RESISTANCE (ESR, R_1)

Frequency	R_1 (Ω MAX.)
3.5MHz ≤F_0 <4.0MHz	200
4.0MHz ≤F_0 <6.0MHz	150
6.0MHz ≤F_0 <10.0MHz	100
10.0MHz ≤F_0 <14.0MHz	80
14.0MHz ≤F_0 ≤25.0MHz	50

HCM49 SERIES



3.5-25 MHZ SMT CRYSTAL

FEATURES

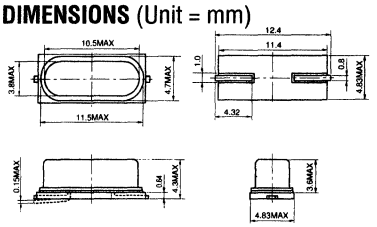
- The HCM49 is a high-performance miniature crystal units manufactured with Citizen's ultrahigh-precision processing technology.
- Excellent vibration resistance, shock resistance and environmental characteristics.
- Can be mounted automatically because of the emboss taping used

(1,000pcs/reel)

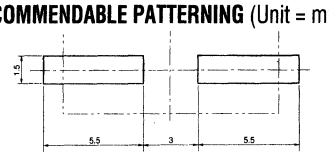
STANDARD SPECIFICATIONS

Item	Model	HCM49	Conditions
Nominal Frequency	f_0	3.5Mhz~25MHz	Contact us for changes in frequency
Frequency Tolerance	$\Delta f/f_0$	±30ppm or ±50ppm	(25°C) Reference Temp.
Frequency vs. Temp. Characteristics	$\Delta f/f_0$	±30ppm or ±50ppm	-10°C ~ +60°C
Operating Temperature Range	T_{OPR}	-10°C ~ +60°C	
Storage Temperature Range	T_{STG}	-40°C ~ +85°C	Store by one unit
Equivalent Series Resistance	R_1	See drawing	
Load Capacitance	C_L	16pF TYP.	Please specify.
Shunt Capacitance	C_0	7.0pF MAX.	
Drive Level	DL	100μW	
Insulation Resistance	IR	500MΩ MIN.	DC100V±15V
Aging (First year)	$\Delta f/f_0$	±5ppm MAX.	25°C±3°C
Sealing		$1x10^{-2}$μPa•m³/s MAX.	
Shock Resistance	±10ppm MAX. Drop test of 3 times on a hard board from 75cm height or shock test of 3000Gx0.3msx1/2sin wavex3 directions		Varies depending on the frequency

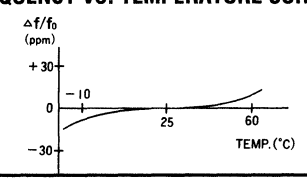
DIMENSIONS (Unit = mm)



RECOMMENDABLE PATTERNING (Unit = mm)



FREQUENCY VS. TEMPERATURE CURVE

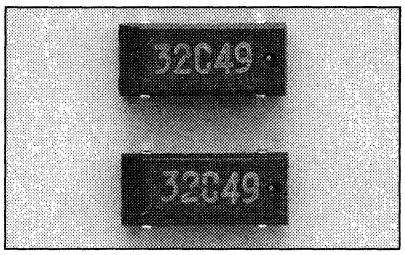


EQUIVALENT SERIES RESISTANCE (ESR, R_1)

Frequency	R_1 (Ω MAX.)
3.5MHz ≤F_0 <4.0MHz	200
4.0MHz ≤F_0 <6.0MHz	150
6.0MHz ≤F_0 <10.0MHz	100
10.0MHz ≤F_0 <14.0MHz	80
14.0MHz ≤F_0 ≤25.0MHz	50

CITIZEN AMERICA
831 S. DOUGLAS STREET,STE. 121, EL SEGUNDO, CA 90245
PHONE: 310-643-9825 • FAX: 310-725-0812
www.citizen-america.com

CM200S SERIES



32.768 KHZ SMT CRYSTAL

FEATURES

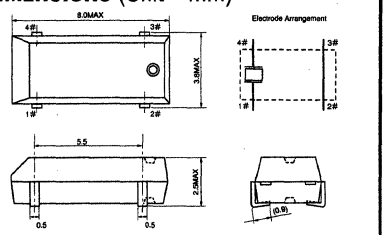
- Being of the ultra-miniature SMD type, and thus featuring excellent efficiency in mounting, the CM200S is ideal for application to high-density circuit boards.
- As it incorporates a heat-resisting packaged cylinder-type, crystal, it features highly stable characteristics-high enough to permit reflow soldering.
- Can be mounted automatically because of the emboss taping used.
- Its low power consumption makes it ideal for application to portable equipment.

(3,000pcs/reel)

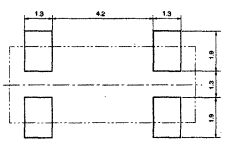
STANDARD SPECIFICATIONS

Item	Model	CM200S	Conditions
Nominal Frequency	f_O	32.768kHz	
Frequency Tolerance	$\Delta f/f_O$	±30ppm	(25°C) Reference Temp.
Frequency vs. Temp. Characteristics	$\Delta f/f_O$	See drawing	-10°C ~ +60°C
Turnover Temperature	T_m	25°C±5°C	
Frequency Temperature Coefficient	β	-0.034 ±0.006ppm/°C²	
Operating Temperature Range	T_{OPR}	-40°C ~ +85°C	
Storage Temperature Range	T_{STG}	-55°C ~ +125°C	Store by one unit
Equivalent Series Resistance	R_1	50kΩ	(25°C) Reference Temp.
Load Capacitance	C_L	12.5pF TYP.	Please specify.
Motional Capacitance	C_1	0.003pF TYP.	
Shunt Capacitance	C_O	1.35pF TYP.	
Capacitance Ratio	γ	450 TYP.	
Drive Level	DL	1μW MAX.	
Insulation Resistance	IR	500MΩ MIN.	DC100V ±15V
Aging (First year)	$\Delta f/f_O$	±3ppm MAX.	25°C±3°C
Sealing		$1x10^{-2}$μPa•m³/s MAX.	
Shock Resistance		±5ppm MAX. Drop test of 3 times on a hard board from 75cm height or shock test of 3000Gx0.3msx1/2sin wavex3 directions	

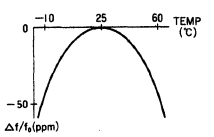
DIMENSIONS (Unit = mm)



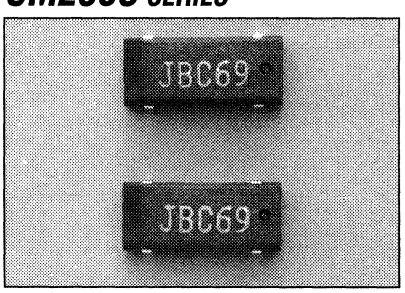
RECOMMENDABLE PATTERNING (Unit = mm)



TEMPERATURE VS. FREQUENCY CURVE



CM250S SERIES



30-150 KHZ SMT CRYSTAL

FEATURES

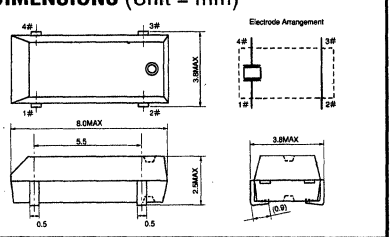
- Being of the ultra-miniature SMD type, and thus featuring excellent efficiency in mounting, the CM250S is ideal for application to high-density circuit boards.
- As it incorporates a heat-resisting packaged cylinder-type, crystal, it features highly stable characteristics-high enough to permit reflow soldering.
- Can be mounted automatically because of the emboss taping used.
- Its low power consumption makes it ideal for application to portable equipment.

(3,000pcs/reel)

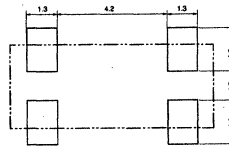
STANDARD SPECIFICATIONS

Item	Model	CM250S	Conditions
Nominal Frequency	f_O	30kHz ~ 150kHz	Contact us for changes in frequency
Frequency Tolerance	$\Delta f/f_O$	±30ppm or ±50ppm	(25°C) Reference Temp.
Frequency vs. Temp. Characteristics	$\Delta f/f_O$	see drawing	-10°C ~ +60°C
Turnover Temperature	T_m	25° TYP.	
Frequency Temperature Coefficient	β	-0.034ppm/°C² TYP.	
Operating Temperature Range	T_{OPR}	-40°C ~ +85°C	
Storage Temperature Range	T_{STG}	-55°C ~ +125°C	Store by one unit
Equivalent Series Resistance	R_1	30kΩ ~ 50kΩ	(25°C) Reference Temp.
Load Capacitance	C_L	12.5pF TYP.	Please specify.
Motional Capacitance	C_1	1 ~ 4fF TYP.	Varies depending on frequency
Shunt Capacitance	C_O	0.8 ~ 1.7pF TYP.	
Capacitance Ratio	γ	425 ~ 800 TYP.	
Drive Level	DL	1μW MAX.	
Insulation Resistance	IR	500MΩ MIN.	DC100V ±15V
Aging (First year)	$\Delta f/f_O$	±5ppm MAX.	25°C±3°C
Sealing		$1x10^{-2}$μPa•m³/s MAX.	
Shock Resistance		±5ppm MAX. Drop test of 3 times on a hard board from 75cm height or shock test of 3000Gx0.3msx1/2sin wavex3 directions	Varies depending on the frequency

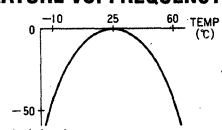
DIMENSIONS (Unit = mm)



RECOMMENDABLE PATTERNING (Unit = mm)

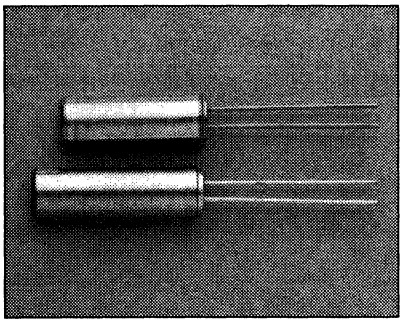


TEMPERATURE VS. FREQUENCY CURVE



CITIZEN AMERICA
831 S. DOUGLAS STREET,STE. 121, EL SEGUNDO, CA 90245
PHONE: 310-643-9825 • FAX: 310-725-0812
www.citizen-america.com

CSA SERIES

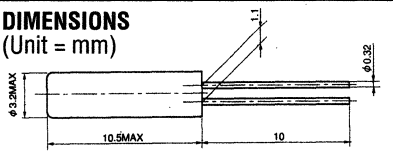


3.5-70 MHZ CRYSTAL

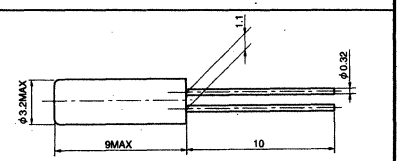
FEATURES

- The units are high-performance, miniature crystal units manufactured with Citizen's ultrahigh-precision processing technology.
- High stability has been gained through vacuum sealing.
- Outstanding vibration resistance, shock resistance and environmental characteristics.

DIMENSIONS (Unit = mm)

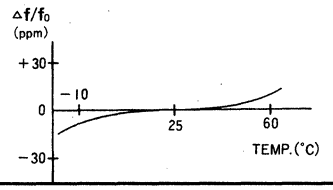


CSA-310



CSA-309

FREQUENCY VS. TEMPERATURE CURVE



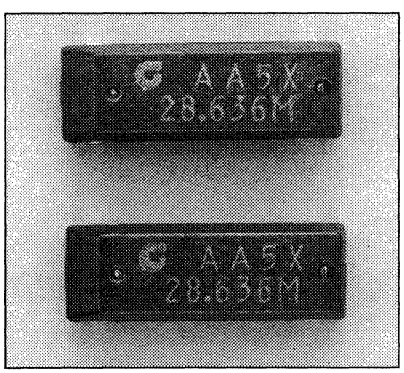
STANDARD SPECIFICATIONS

Item	Model	CSA-310	CSA-309	Conditions
Nominal Frequency	f_0	3.5MHz ~ 4MHz	4MHz ~ 30MHz (fund) 30MHz ~ 70MHz (3rd OT)	Contact us for changes in frequency
Frequency Tolerance	$\Delta f/f_0$	±30ppm or ±50ppm		(25°C) Reference Temp.
Frequency vs. Temp. Characteristics	$\Delta f/f_0$	±30ppm or ±50ppm		-10°C ~ +60°C
Operating Temperature Range	T_{OPR}	-10°C ~ +60°C		
Storage Temperature Range	T_{STG}	-40°C ~ +85°C		
Equivalent Series Resistance	R_1	See drawing		
Load Capacitance	C_L	16.0pF TYP		Please specify.
Shunt Capacitance	C_0	5.0pF MAX.		
Drive Level	DL	50μW ~ 100μW		
Insulation Resistance	IR	500MΩ MIN.		DC100V±15V
Aging (First year)	$\Delta f/f_0$	±5ppm MAX.		25°C±3°C
Sealing		$1x10^{-2}$μPa•m³/s MAX.		
Shock Resistance	±5ppm MAX. Drop test of 3 times on a hard board from 75cm height or shock test of 3000G×0.3msx1/2sin wavex3 directions			Varies depending on the frequency

EQUIVALENT SERIES RESISTANCE (ESR,R_1)

Frequency	Equiv. Series Resistance	Mode
3.5MHz ≤F_0 < 4MHz	200 (Ω Max.)	
4MHz ≤F_0< 6MHz	150 (Ω Max.)	
6MHz ≤F_0 < 10MHz	100 (Ω Max.)	
10MHz ≤F_0 ≤ 30MHz	50 (Ω Max.)	
30MHz ≤F_0 < 36MHz	100 (Ω Max.)	3rd
36MHz ≤F_0 < 70MHz	80 (Ω Max.)	OT

CM309S SERIES



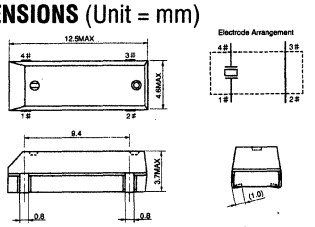
3.5-70 MHZ SMT CRYSTAL

FEATURES

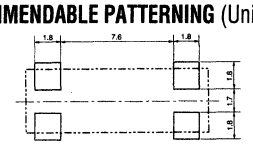
- Being of the miniature plastic SMD type and featuring high efficiency in mounting, the CM309S is ideal for application to high-density circuit boards.
- As it incorporates a heat-resisting packaged cylinder-type crystal, this crystal makes best use of the superb characteristic AT-cut crystals have, and permits reflow soldering.
- Enables automatic mounting, thanks to the adoption of the emboss taping packaging.

(1,000pcs/reel)

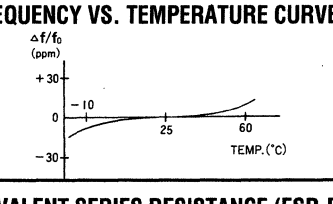
DIMENSIONS (Unit = mm)



RECOMMENDABLE PATTERNING (Unit = mm)



FREQUENCY VS. TEMPERATURE CURVE



STANDARD SPECIFICATIONS

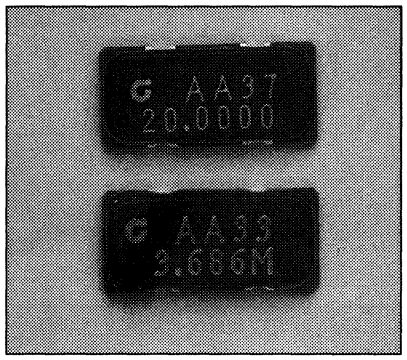
Item	Model	CM309S	Conditions
Nominal Frequency	f_0	3.5Mhz ~ 30MHz (fund), 30Mhz ~ 70MHz (3rd OT)	Contact us for changes in frequency
Frequency Tolerance	$\Delta f/f_0$	±30ppm or ±50ppm	(25°C) Reference Temp.
Frequency vs. Temp. Characteristics	$\Delta f/f_0$	±30ppm or ±50ppm	-10°C ~ +60°C
Operating Temperature Range	T_{OPR}	-40°C ~ +85°C	
Storage Temperature Range	T_{STG}	-55°C~ +125°C	Store by one unit
Equivalent Series Resistance	R_1	See drawing	
Load Capacitance	C_L	16.0pF TYP.	Please specify.
Shunt Capacitance	C_0	7.0pF MAX.	
Drive Level	DL	50μW ~ 100μW	
Insulation Resistance	IR	500MΩ MIN.	DC100V±15V
Aging (First year)	$\Delta f/f_0$	±5ppm MAX.	25°C±3°C
Sealing		$1x10^{-2}$μPa•m³/s MAX.	
Shock Resistance	±5ppm MAX. Drop test of 3 times on a hard board from 75cm height or shock test of 3000G×0.3msx1/2sin wavex3 directions		Varies depending on the frequency

EQUIVALENT SERIES RESISTANCE (ESR,R_1)

Frequency	Equiv. Series Resistance	Mode
3.5MHz ≤F_0 < 4MHz	200 (Ω Max.)	
4MHz ≤F_0< 6MHz	150 (Ω Max.)	
6MHz ≤F_0 < 10MHz	100 (Ω Max.)	
10MHz ≤F_0 ≤ 30MHz	50 (Ω Max.)	
30MHz ≤F_0 < 36MHz	100 (Ω Max.)	3rd
36MHz ≤F_0 < 70MHz	80 (Ω Max.)	OT

CITIZEN AMERICA
831 S. DOUGLAS STREET,STE. 121, EL SEGUNDO, CA 90245
PHONE: 310-643-9825 • FAX: 310-725-0812
www.citizen-america.com

CS20 SERIES

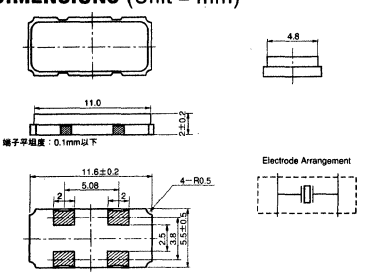


3.5-25 MHZ CERAMIC SMT CRYSTAL

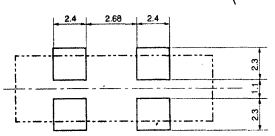
FEATURES

- Being of the small and slim size SMD type and featuring high efficiency in mounting, the CS 20 is ideal for application to high-density circuit boards.
- Excellent environmental and heat-resisting characteristics have been gained, thanks to the use of the highly reliable ceramic package.
- Enables automatic mounting, thanks to the adoption of the emboss taping packaging. *(2,000pcs/reel)*

DIMENSIONS (Unit = mm)



RECOMMENDABLE PATTERNING (Unit = mm)

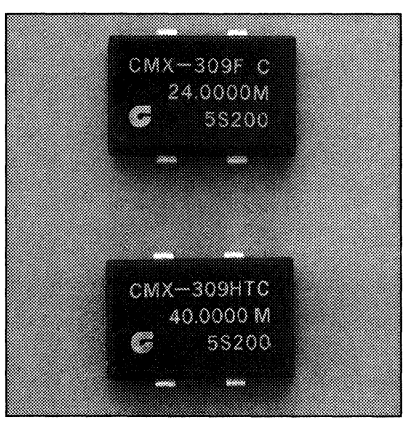


STANDARD SPECIFICATIONS

Item / Model		CS20	Conditions
Nominal Frequency	f_O	3.5Mhz ~ 25MHz	Contact us for changes in frequency
Frequency Tolerance	$\Delta f/f_O$	±30ppm or ±50ppm	(25°C) Reference Temp.
Frequency vs. Temp. Characteristics	$\Delta f/f_O$	±30ppm or ±50ppm	-10°C ~ +60°C
Operating Temperature Range	T_{OPR}	-45°C ~ +85°C	
Storage Temperature Range	T_{STG}	-55°C~ +125°C	Store by one unit

All other specs similar to HCM49 Series

CMX-309 SERIES



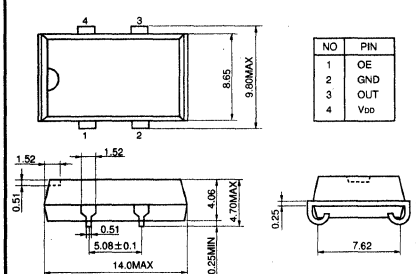
1-66.667 MHZ SMT OSCILLATOR

FEATURES

- Being of the miniature plastic SMD type and featuring high efficiency in mounting, the CMX-309 is ideal for application to high-density circuit boards
- As it incorporates a heat-resisting packaged cylinder-type crystal, it features highly stable characteristics-high enough to permit reflow soldering.
- Can be mounted automatically because of the emboss taping used.
- Low power CMOS IC.
- Provided with output enable function.

(1,000pcs/reel)

DIMENSIONS (Unit = mm)



STANDARD SPECIFICATIONS

Item / Model	CMX-309FL (FS)	CMX-309HW (HS)	CMX-309HC	CMX-309HT	CMX-309FB (FA)	CMX-309HB (HA)
Frequency Range	1.000MHz ~30.000MHz 5V TTL/CMOS	30.001MHz ~50.040MHz 5V TTL/CMOS	50.100MHz ~ 66.667MHz 5V CMOS	5V TTL	1.000MHz ~ 30.000MHz 3V CMOS	30.001MHz ~ 50.040MHz 3V CMOS
Frequency Atability	C: ±100ppm B: ±50ppm (-10°C~+70°C)					
Operating Temperature Range	-10°C ~ +70°C (-40°C ~ +85°C)					
Storage Temperature Range	-55°C ~ +125°C					
Supply Voltage	V_{DD}: 5.0V ±0.5V		V_{DD}: 5.0V ±0.5V		V_{DD}: 3.3V ±0.3V	
Supply Current	23mA Max.	35mA Max.	35mA Max.	35mA Max.	9mA Max.	20mA Max.
Duty — TTL level (1.4V)	45% ~ 55% (FS, HS: 40% ~ 60%)		-	45% ~ 55%	-	
Duty — CMOS level (V_{DD}/2)	40% ~ 60% (FS, HS: 45% ~ 55%)		40% ~ 60%	-	40% ~ 60% (FA, HA: 45% ~ 55%)	
Output Voltage — V_{OH}	V_{DD} -0.4V Min	V_{DD} -0.5V Min	V_{DD} -0.4V Min	2.4V Min	V_{DD} -0.4V Min	
Output Voltage — V_{OL}	0.4V Max	0.5V Max	0.4V Max	0.4V Max	0.4V Max	
Output Load — TTL	10TTL Max.		-	5TTL	-	
Output Load — CMOS	50pF Max.		50pF Max.	-	30pF Max.	
Rise & Fall Time — TTL	tr,tf: 8nsec Max.	tr,tf: 5nsec Max.	-	tr,tf: 5nsec Max.	-	
Rise & Fall Time — CMOS	tr,tf: 8nsec Max.	tr,tf: 7nsec Max.	tr,tf: 7nsec Max.	-	tr,tf: 6nsec Max.	
Start Up Time	4msec Max.	10msec Max.	10msec Max.		4msec Max.	10msec Max.
Input (OE) Voltage		V_{IH} :2.0V Min V_{IL} :0.8V Max	V_{IH} :2.0V Min V_{IL} :0.8V Max	V_{IH} :2.4V Min V_{IL} :0.6V Max		V_{IH} :2.4V Min V_{IL} :0.6V Max
Disable Current	12mA Max.	28mA Max.	20mA Max.	28mA Max.	5mA Max.	15mA Max.
Aging (first year)	±5ppm/year Max.					
Shock Resistance	±20ppm Max.					

COLORADO CRYSTAL CORPORATION

LEADERSHIP IN PRECISION QUARTZ RESONATORS SINCE 1968

we specialize in:

- SC and Other Doubly Rotated Cuts
- Precision Filter Crystal Sets
- Low Aging and Low Noise
- Low Perturbation TCXO Crystals
- On Time Delivery
- Quick Response to Inquiries
- Precision AT Cuts
- Engineering and Technical Assistance
- Outstanding Customer Support
- Short Lead Time on Established Products
- All Popular Glass and Metal Packages
- Low G Sensitivity Crystals
- Custom Designs
- No Minimum Order

PRODUCT LINE:

Frequency : 1 to 250 MHz
Overtone : Fundamental, 3rd, 5th, 7th, & 9th
Cuts : AT, BT, AC, IT, SC and other doubly rotated cuts
Holders : Coldweld, Glass, Resistance Weld, & Solder Seal
We also provide : Plated and un-plated blanks. Angle corrected doubly rotated blanks

Some Representative Precision Crystal Designs...

PARAMETER	1	2	3	4	5	6
Frequency MHz	5.000	5.000	10.000	10.000	10.000	26.000
Cut	SC	AT	SC	SC	AT	SC
Vibration Mode	3rd	3rd	3rd	3rd	3rd	3rd
Holder	HC37	HC40	HC37	HC43	HC37	HC37
C_o Nominal pF	2.7	3.2	3.8	2.3	3.8	4.0
C_1 Nominal fF	0.15	0.57	0.30	0.13	1.20	0.59
L_1 Nominal mHy	6540	1780	850	1950	215	64
R_1 Nominal ohms	110	30	50	108	15	30
Q Nominal	1930 K	1861 K	1061 K	1134 K	884 K	346 K
Inflection Temperature Nominal °C	99	31	93	95	30	92
Turning Point Range (±5 °C)	LTP up to 88 °C	UTP above 55 °C	LTP up to 83 °C	LTP up to 84 °C	UTP above 55 °C	LTP up to 82 °C

CALL FOR FREE BROCHURE

2303 W 8th Street Loveland Colorado 80537 USA
Telephone: 970-667-9248 FAX: 970-667-3500
WEB site: http://www.coloradocrystal.com

WHEN YOU NEED CRYSTALS THINK OF...

CAL CRYSTAL LAB

1156 North Gilbert Street, Anaheim, CA 92801

Order Placement (800) 333-9825 • (714) 991-1580 • FAX (714) 491-9825
e-mail:sales@calcrystal.com • http://www.calcrystal.com

Cal Crystal *can service your crystal requirements due to our successful combination of manufacturing and importing. Whether your need is for 1 piece or 1 million pieces, common or custom frequencies, we will fill your requirement. We will be able to meet your needs with short lead times and extremely competitive prices.*

Cal Crystal manufactures tight tolerance crystals for virtually all pager and two way radios on the market. We also provide a channel element service. Cal Crystal will recrystal and temperature compensate all major manufacturers' channel elements.

Established in 1969 and under new management since 1979, Cal Crystal Lab., Inc. supplies quartz crystals for all frequency controlled applications. We are a manufacturer dedicated to providing you with a quality product using the latest state of the art techniques and equipment.

In today's competitive business world, sound decisions are based on reliability, superior product line, and a quality company. Your interest in Cal Crystal Lab., Inc. demonstrates your commitment to quality and to finding a company that can achieve the solutions for your frequency requirements.

At Cal Crystal Lab., Inc. we are committed to these goals by making the extra effort to insure that our customers' orders are handled efficiently and in a timely manner.

Our rock solid reputation is built on reliable products, superior customer service, and the commitment to you to be the professional quality company you enjoy doing business with.

Fast Service
3 Weeks or Less

Custom Frequencies
Our Specialty

No Minimum Quantity

HOLDER STYLE

CCL-1	HC-48/U
CCL-2	HC-7/U
CCL-3	HC-51/U
CCL-6	HC-49/U
CCL-6S	HC-49/S
CCL-7	HC-50/U
CCL-7s	HC-50/S
CCL-8	UM-2
CCL-9	TO-5
CCL-10	UM-1
CCL-11	Tuning Fork
CCL-12	HC-13/U
CCL-13	HC-42/U*
CCL-14	HC-43/U*

CALIBRATION TOLERANCE @ ROOM/TEMP. RANGE

A	100ppm/100ppm
B	50ppm/100ppm
C	50ppm/50ppm
D	25ppm/100ppm
E	25ppm/50ppm
F	25ppm/25ppm
G	10ppm/50ppm
H	10ppm/25ppm
I	10ppm/15ppm
J	Other

LOAD CAPACITY

S	Series
1	50pF
2	32pF
3	30pF
4	20pF
5	18pF
6	15pF
7	10pF
8	7.5pF
P	Pullability Spec.
X	Other Specify

CCL-1 - 10.000 B 2 5 F A

OPERATING TEMP. RANGE

1	0° to +70°C
2	-10° to +60°C
3	-20° to +70°C
4	-40° to +85°C
5	Other

MODE OF OPERATION

F	Fund
3	3rd
5	5th
7	7th
9	9th

OPTIONS

A	Ground Wire
B	Vinyl Sleeve
C	Base Insulators
Z	Other Specify

* Cold Weld

WHEN YOU NEED CLOCK OSCILLATORS THINK OF...

COMCLOCK, INC.

1156 North Gilbert Street, Anaheim, CA 92801

Order Placement (800) 333-9825 • (714) 991-1580 • FAX (714) 491-9825
e-mail:sales@calcrystal.com • http://www.calcrystal.com

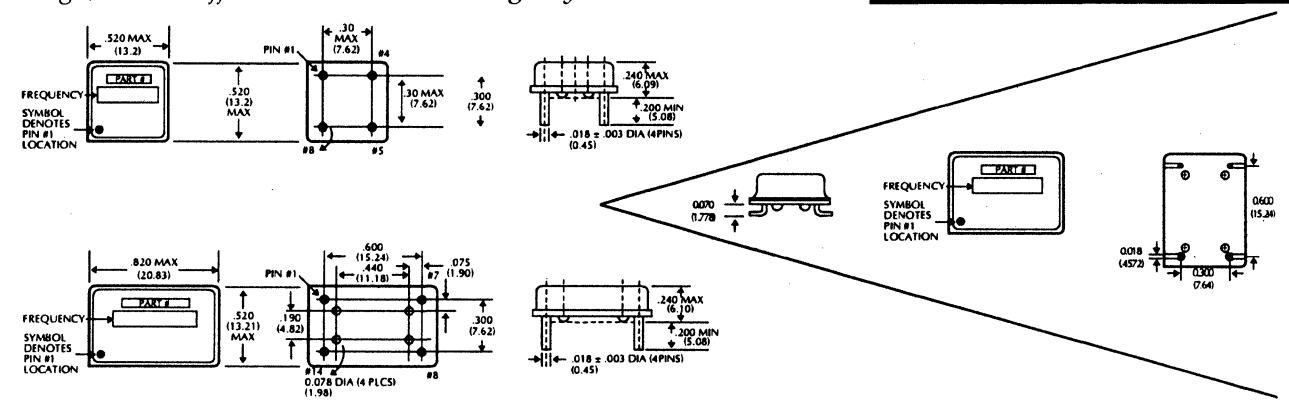
Comclock *supplies a complete line of clock oscillators for your timing applications. You can be assured of a high quality product, produced with the most modern equipment. The crystal clock oscillators are hermetically sealed by resistance welding, in a pure dry nitrogen filled chamber, after a high temperature vacuum bakeout.*

Fast Service
3 Weeks or Less

Custom Frequencies
Our Specialty

No Minimum Quantity

Comclock's very flexible manufacturing operation enables us to provide our customer with superior service. Whether your requirement is for a few pieces on a custom frequency for engineering purposes or large volume production quantities, Comclock can meet your needs quickly! We have no minimum order size, and our normal delivery time on orders from one unit to one thousand is three weeks. If that's not fast enough, we also offer one week or less emergency service.



HCMOS Clock Oscillators — Frequency Range: 1Khz - 70.00Mhz

TTL Clock Oscillators — Frequency Range: 1Khz - 70Mhz

Dual Compatible Tri-State — Frequency Range: 1Khz - 70.00Mhz

OSCILLATOR
CO .....TTL (14 & 8 pin dip comp.)
CM .....HCMOS (14 & 8 pin dip comp.)
CX .....Dual (14 & 8 pin dip comp.)
CT .....Tri-State (14 & 8 pin dip comp.)
CS .....Ceramic Tri-State SMD

SIZE/STYLE
F .....Full (14 pin)
H .....Half (8 pin)
I .....Gull Wing (14 pin)
J .....Gull Wing (8 pin)
K .....SMD (ceramic)
L .....Miniature

CM 3 2 A H

STABILITY
1 .....100ppm
2 .....50ppm
3 .....25 ppm
4 .....20ppm
5 .....15ppm
X .....Other

SYMMETRY
1 .....60/40
2 ..... 45/55
3 .....47.5/52.5

TEMP. RANGE
A .....0°C to +70°C
B .....-20° to +70°C
C .....-40° to +85°C
Z .....Other

Standard Features:

- 0.800'(L)*0.500'(W)*0.240'(H) Full Size
- 0.500'(L)*0.500'(W)*0.240'(H) Half Size
- Dual Inline Spacing
- High Reliability
- Resistance Weld

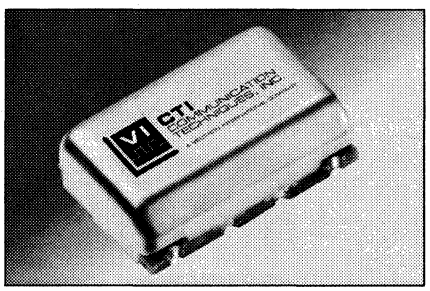
Options:

- Surface Mount (Gull Wing)
- Extended Temperature Ranges
- 45/55 Symmetry
- 50ppm
- 25ppm
- 15ppm

9 Whippany Road, Whippany NJ
Tel: 973-884-2580 • Fax: 973-887-6245
Internet: www.cti-inc.com
E-mail: sales @ cti-inc.com

CTI COMMUNICATION TECHNIQUES
A DOVER TECHNOLOGIES COMPANY

VOLTAGE CONTROLLED OSCILLATORS



SERIES VMS

Series VMS Voltage Controlled Oscillators cover the range from 120 MHz to 2500 MHz in bands. These units are designed for a wide range of commercial systems such as mobile radios. PCS and other wireless applications requiring high stability and low noise in extremely small package configurations.

Frequency Range	120 MHz to 2500 MHz
Frequency Bandwidth	30 MHz
Supply Voltage	0.5V ±0.2V
Control Voltage	2.0V to 5.5V
Power Output	>1 dBm
Supply Current	8.5mA
Operating Temperature	-30°C to +80°C
Sensitivity	2 to 15 MHz/Volt

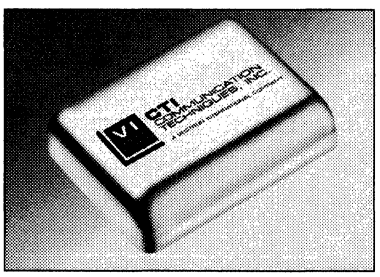
Frequency Range (MHz)	120-690	690-890	890-1020	1020-1320	1320-1500	1500-1980	1980-2500
Phase Noise (cBc/Hz) @ 25 kHz Offset	-110	-110	-110	-105	-100	-90	-90
2nd Harmonic (dBc)	-20	-20	-20	-20	-10	-10	-10
Pushing	±500K	±500K	±500K	±500K	±500K	±500K	±500K
Pulling	±500K	±500K	±500K	±750K	±750K	±1M	±1M
Packaging Styles	A, E	A, E, F	A, E, F	A, F	A, F	A, F, B	F, B

See page A•1420 for outline drawings

9 Whippany Road, Whippany NJ
Tel: 973-884-2580 • Fax: 973-887-6245
Internet: www.cti-inc.com
E-mail: sales @ cti-inc.com

CTI COMMUNICATION TECHNIQUES
A DOVER TECHNOLOGIES COMPANY

VOLTAGE CONTROLLED OSCILLATORS



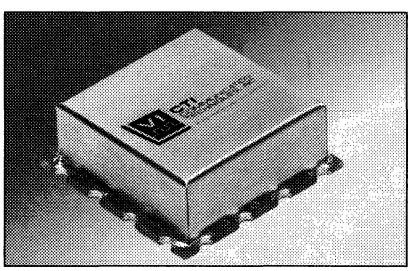
SERIES VMM

Frequency Range	700 MHz to 1100 MHz
Frequency Bandwidth	3 to 30 MHz
Supply Voltage	3.8V 7.5V
Control Voltage	1.5V to 3.5V
Power Output	>2V dBm
Supply Current	8mA
Operating Temperature	-35°C to +80°C
Sensitivity	2 to 15 MHz/Volt
Phase Noise @ 25kHz Offset	-115 dB/Hz
2nd Harmonic	-10 dBc
Package Style	C & D
Pushing	±500K
Pulling VSWR = 2.1	±500K

Series VMM Voltage Controlled Oscillators cover the range from 700 MHz to 1100 MHz in bands. These units find application in a wide range of wireless applications requiring high stability and low noise in extremely small package configurations.

SERIES CVCO

Frequency Range	800 MHz to 2000 MHz
Frequency Bandwidth	2.5% of the Output Freq.
Frequency Stability	±0.25%
Tuning Linearity	<1.1:1
Control Voltage Range	+1.0 to +4.0V, +2.0 to +2.0 to 8.0V, +3.0 to 10.0V
Supply Voltage Range	+5.0 ±0.25V, +10.0 ±0.25V, +12.0 ±0.25V
Power Output	>0 dBm
Supply Current	<18mA (15mA typ.)
Operating Temperature	-30°C to +75°C
Packaging Style	G
2nd Harmonic	-20 dBc
Bandswitching (optional)	5% frequency shift via optional band switch port



Series CVCO Voltage Controlled Oscillators incorporated low phase noise transistors and metalized high-Q coaxial resonators. Units cover the frequency range of 800MHz to 2000MHz in bands and are designed for use in both digital and analog equipment.

See page A•1420 for outline drawings

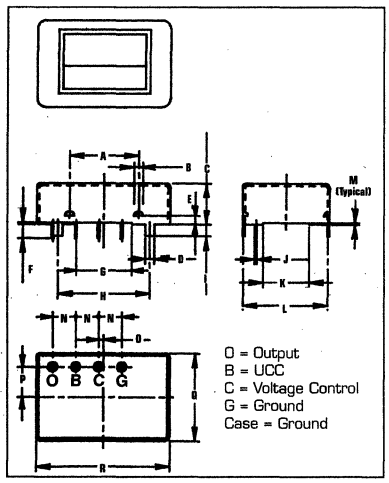
9 Whippany Road, Whippany NJ
Tel: 973-884-2580 • Fax: 973-887-6245
Internet: www.cti-inc.com
E-mail: sales @ cti-inc.com

CTI COMMUNICATION TECHNIQUES
A DOVER TECHNOLOGIES COMPANY

VOLTAGE CONTROLLED OSCILLATORS

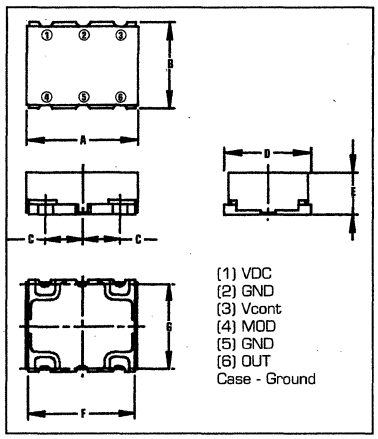
PACKAGE STYLES

Dimensions in inches (mm)



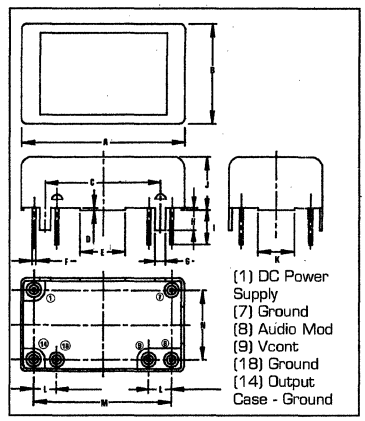
A	B	C	D	E	F	G	H	I
.591	.079	.374	.079	.067	.118	.472	.787	.098
15.0	2.0	9.5	2.0	1.7	3.0	12.0	20.0	2.5

J	K	L	M	N	O	P	Q	R
.020	.394	.728	.012	.197	.039	.256	.748	1.14
0.5	10.0	18.5	0.3	5.0	1.0	6.5	19.0	29.0

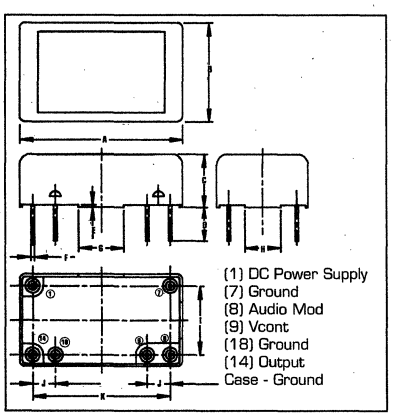


A	B	C	D	E	F	G
.728	.433	.5	.012	.197	.020	.047
18.5	11.0	12.7	0.3	5.0	0.5	1.2

H	I	J	K	L	M	N
.098	.157	.236	.157	0.1	.598	0.3
2.5	4.0	6.0	4.0	2.54	15.2	7.62

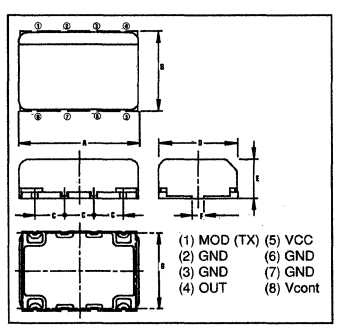


A	B	C	D	E	F	G
.354	.276	.118	.276	.015	.339	.264
9.0	7.0	3.0	7.0	3.8	8.6	6.7

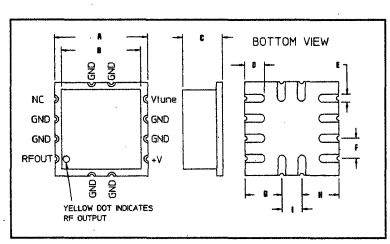


A	B	C	D	E	F
.728	.433	.236	.157	.012	.019
18.5	11.0	6.0	4.0	0.3	0.5

G	H	I	J	K
.197	.157	0.3	0.1	.598
5.0	4.0	7.62	2.54	15.2



A	B	C	D	E	F	G
.594	.409	.146	.934	.193	.059	.374
15.1	10.4	3.7	10.0	4.9	1.5	9.5



A	B	C
.94sq max	.80sq max	.40 sq max
23.88	20.32	10.16

D	E	F
.200TYP	.060 TYP.	.200TYP
5.08	1.52	5.08

G	H	I
.370	.370	.200
9.4	9.4	5.08

CONNOR-WINFIELD

Frequency Control Solutions

From Crystals To Integrated Timing Modules And Subsystems

Surface Mount Crystal Units
- SMD Low Profile
- SMD Low cost

Surface Mount Clock Oscillators
- HCMOS
- 3.3V HCMOS
- ACMOS
- BICMOS
- ECL
- 3.3V PECL

Oscillators Traditional Logic
- CMOS Squarewave
- TTL Squarewave

High Frequency Hybrid Clocks
- ACMOS Squarewave
- BICMOS Squarewave
- ECL/PECL Squarewave

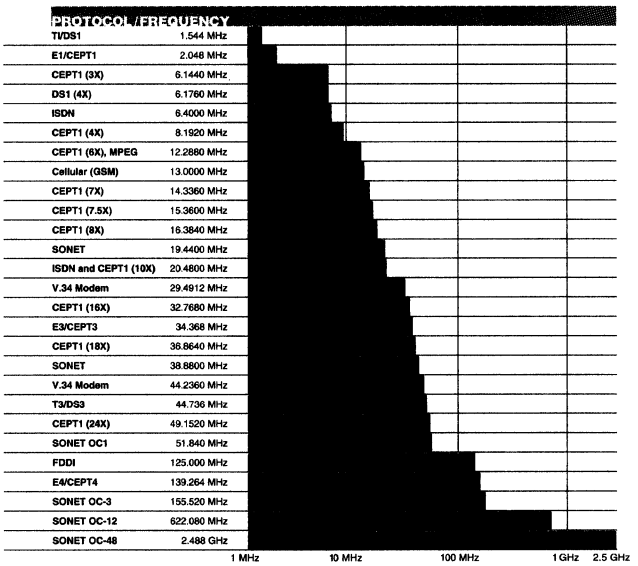
ECL Clock Oscillators
- Surface Mount
- 8-pin DIP
- 14-pin DIP

VCXO Clock Oscillators
- High Frequency
- Wide Deviation
- 3.3 V Operation
- HCMOS
- ACMOS
- TTL
- ECL
- PECL

TCXO
- DIP HCMOS TCXO
- DIP HCMOS DCXO

VCO
- DIP VCO
- HCMOS, ACMOS, TTL
- Low Frequency Sinewave
- High Frequency Sinewave
- Very High Frequency Sinewave

Oscillators for Telecommunications Applications



Connor-Winfield has the capacity and experience to process quartz crystals specifically for telecommunications applications. Our experience covers fundamental frequencies up to 240 MHz and 3rd overtone up to 720 MHz.

This core quartz expertise allows us to design and manufacture frequency control products up to 2.5 GHz, covering most telecommunications applications.

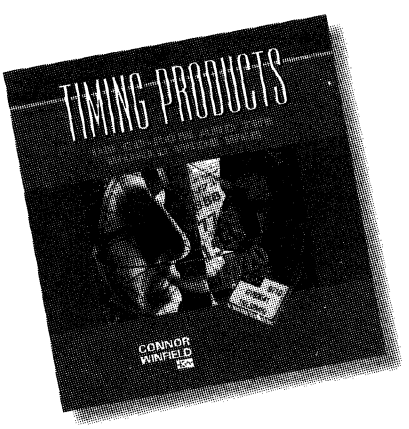
This graph shows the standard telecom frequencies that have been built in production quantities by Connor-Winfield. These are readily available as stand-alone Crystals, fixed frequency Oscillators, VCXOs, VCOs, or integrated Timing Modules.

Full array of products to meet your Stratum 3 and Sonet Minimum Clock (20 ppm) timing requirements.

- Timing modules
- Sonet/SDH Clocks
- VCXO (20 ppm Inclusive)
- TCXO (4.6 ppm Inclusive)
- HCMOS Clocks (20 ppm Inclusive)
- ECL Clocks (20 ppm Inclusive)
- PECL Fixed Frequency
- ACMOS VCXO High Frequency / Tight stability
- PECL VCXO 14-pin DIP High Frequency
- ECL VCXO High Frequency

CONNOR WINFIELD

ISO 9001 CERTIFIED



For CD-ROM Catalog:

e-mail: info@conwin.com

Phone: 630.851.4722

Fax: 630.851.5040

Mail: Connor-Winfield
2111 Comprehensive Dr.
Aurora, IL 60505

For detailed information and printable specifications, visit our web site at

www.conwin.com

CTS Reeves
FREQUENCY PRODUCTS

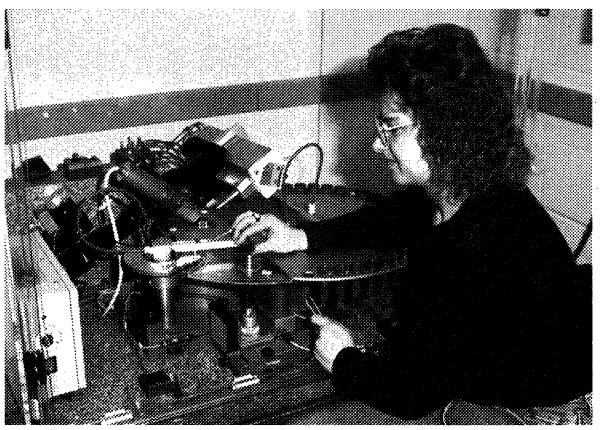
Quartz Crystals

Crystal Product Summary

The following is a brief summary of the crystal units offered by CTS Reeves. We offer a broad range of crystal products that include:

- **Low Frequency Crystals; NT, DT, 5X 10 kHz to 1 MHz**
- **High Frequency Crystals; AT 1 MHz to 250 MHz**
- **High Frequency Fundamental Crystals; AT-30 MHz to 300 MHz**

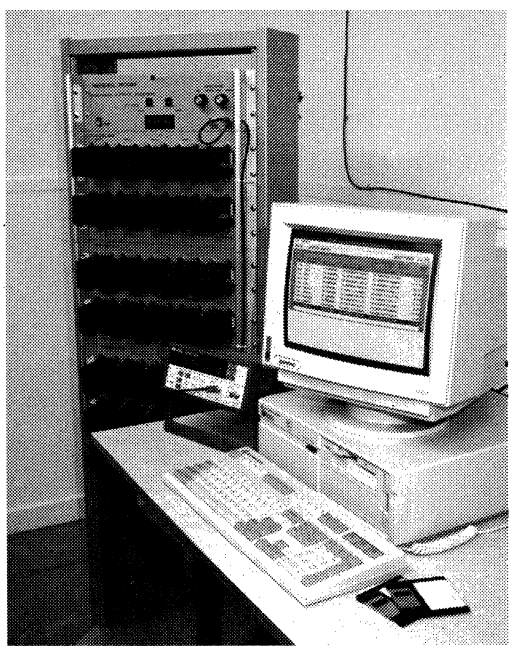
These products are available either in blank form (plated or unplated) or complete in packages. Choose from one of our standard crystal types or specify the custom design that your application demands.



Automatic Crystal Measurement & Sorting

No matter what your selection is you can be assured that it will be manufactured under strict quality control procedures with the latest in automated manufacturing techniques. Over the past two years CTS Reeves has invested almost one million dollars in the latest manufacturing equipment. Plating and x-ray equipment specially designed for crystal processing, allowing for high precision and statistical control.

Automatic Crystal Plating



Precision Crystal Aging

CTS Reeves has been manufacturing quartz crystals for more than 50 years.

Contact us for a prompt quotation. Visit us at our Web site at: www.ctsreeves.com

400 REIMANN AVE. • SANDWICH, IL 60548 • 815-786-8411 • 815-786-3600 (FAX)

CTS Reeves FREQUENCY PRODUCTS

Quartz Crystals

LOW FREQUENCY CRYSTALS (1 kHz TO 1 MHz)

FREQUENCY RANGE	TEMP. RANGE	RESISTANCE
1 kHz to 15 kHz	-40° to +95°C	1250 ohms
15 kHz to 100 kHz	-40° to +95°C	50K to 90K ohms
100 kHz to 200 kHz	-40° to +95°C	5000 ohms
200 kHz to 450 kHz	-40° to +95°C	2K to 5K ohms
450 kHz to 1 MHz	-40° to +95°C	1K to 2K ohms

HIGH FREQUENCY CRYSTALS (1 MHz TO 200 MHz)*

FREQUENCY RANGE	MODE	TEMP. RANGE	RESISTANCE
1 MHz to 3 MHz	FUND.	-55°C to +105°C	50 to 500 ohms
3 MHz to 10 MHz	FUND.	-55°C to +105°C	15 to 50 ohms
10 MHz to 30 MHz	FUND.	-55°C to +105°C	15 to 50 ohms
10 MHz to 29 MHz	3rd	-55°C to +105°C	35 ohms max.
30 MHz to 70 MHz	3rd	-55°C to +105°C	35 ohms max.
50 MHz to 125 MHz	5th	-55°C to +105°C	50 ohms max.
100 MHz to 200 MHz	7th	-55°C to +105°C	125 ohms max.

HIGH FREQUENCY FUNDAMENTAL CRYSTALS (30 to 300 MHz)*

FREQUENCY RANGE	MODE	TEMP. RANGE	RESISTANCE
30 MHz to 60 MHz	Fund.	-55° to +105°C	25 ohms
60 MHz to 90 MHz	Fund.	-55° to +105°C	30 ohms
90 MHz to 160 MHz	Fund.	-55° to +105°C	35 ohms
90 MHz to 300 MHz			

* NOTE: Numerous temperature range/stability options are available (for example, 4 to 200 MHz, 0° to 50°C ±1- ppm) Please contact factory for details.

MILITARY CRYSTALS

CTS Reeves offers QPL'd, MIL-C-3098G crystals. Following is a list of CTS QPL'd part numbers:

- CR-60A/U (5.0-20.0 MHz)
- CR-64/U (2.9-20.0 MHz)
- CR-78A/U (4.2-20.0 MHz)
- CR-79/U (2.9-20.0 MHz)
- CR-97/U (8.0-10.0 MHz)
- CR-106/U (10.5-11.5 MHz)
- CR-139/U (20.0-22.0 MHz)

CTS Reeves offers a variety of holders with improved sealing techniques designed to reduce frequency changes of the crystal overtime, more commonly known as AGING. Typical aging rates for various sealing methods are as follows:

SOLDER SEAL HOLDERS:	± 5 ppm per year
RESISTANCE WELD HOLDERS:	± 3 ppm per year
COLD WELD HOLDERS:	± 1 ppm per year

400 REIMANN AVE. • SANDWICH, IL 60548 • 815-786-8411 • 815-786-3600 (FAX)

CTS Reeves
FREQUENCY PRODUCTS

Quartz Crystals

MP Series:

PART NUMBER	FREQUENCY (MHz)	MODEL	LOAD/ SERIES	PART NUMBER	FREQUENCY (MHz)	MODEL	LOAD/ SERIES	PART NUMBER	FREQUENCY (MHz)	MODEL	LOAD/ SERIES
MP010	1.000000	HC/33-51	13pF	MP05A	5.000000	HC/49	20pF	MP120	12.000000	HC/49	SERIES
MP018	1.843200	HC/33-51	13pF	MP05B	5.000000	HC/49	SERIES	MP122	12.288000	HC/49	32pF
MP018S	1.843200	HC/49	13pF	MP060	5.068800	HC/49	SERIES	MP143	14.318180	HC/49	SERIES
MP020	2.000000	HC/33-51	20pF	MP060	6.000000	HC/49	20pF	MP147	14.745600	HC/49	SERIES
MP020S	2.000000	HC/49	20pF	MP061	6.144000	HC/49	20pF	MP150	15.000000	HC/49	SERIES
MP024	2.457600	HC/33-51	32pF	MP073	7.372800	HC/49	SERIES	MP160	16.000000	HC/49	SERIES
MP024S	2.457600	HC/49	32pF	MP080	8.000000	HC/49	SERIES	MP184	18.432000	HC/49	SERIES
MP036	3.579545	HC/33/51	18pF	MP080A	8.000000	HC/49	20pF	MP196	19.660800	HC/49	SERIES
MP036S	3.579545	HC/49	18pF	MP098	9.830400	HC/49	20pF	MP200	20.000000	HC/49	SERIES
MP037	3.686400	HC/49	20pF	MP100	10.000000	HC/49	SERIES	MP221	22.118400	HC/49	SERIES
MP040	4.000000	HC/49	20pF	MP101	10.000000	HC/49	30pF	MP240	24.000000	HC/49	SERIES
MP04A	4.000000	HC/49	SERIES	MP107	10.738635	HC/49	32pF	MP245	24.576000	HC/49	SERIES
MP041	4.194304	HC/49	12pF	MP110	11.000000	HC/49	18pF	MP250	25.000000	HC/49	SERIES
MP042	4.915200	HC/49	20pF	MP111	11.059200	HC/49	SERIES				

ATS/ATS-SM Series:

PART NUMBER	FREQUENCY(MHz)	LOAD/SERIES	PART NUMBER	FREQUENCY(MHz)	LOAD/SERIES
ATS036	3.579545	18pF	ATS060	6.000000	20pF
ATS036SM	3.579545	18pF	ATS060SM	6.000000	20pF
ATS037	3.686400	20pF	ATS08A	8.000000	20pF
ATS037SM	3.686400	20pF	ATS08ASM	8.000000	20pF
ATS040	4.000000	20pF	ATS098	9.830400	20pF
ATS040SM	4.000000	20pF	ATS098SM	9.830400	20pF
ATS042	4.915200	20pF	ATS10ASM	10.000000	20pF
ATS042SM	4.915200	20pF	ATS100	10.000000	SERIES
ATS050	5.068800	SERIES	ATS100SM	10.000000	SERIES
ATS050SM	5.068800	SERIES			

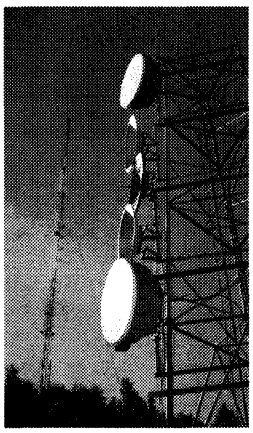
ATP-SM Series:

PART NUMBER	FREQUENCY(MHz)	LOAD/SERIES	PART NUMBER	FREQUENCY(MHz)	LOAD/SERIES
ATP036SM	3.579545	18 pF	ATP111SM	11.059200	20 pF
ATP037SM	3.686400	20 pF	ATP120SM	12.000000	SERIES
ATP040SM	4.000000	20 pF	ATP122SM	12.288000	20 Pf
ATP042SM	4.915200	20 pF	ATP143SM	13.318180	SERIES
ATP050SM	5.068800	SERIES	ATP15ASM	15.360000	20 pF
ATP060SM	6.000000	20 pF	ATP160SM	20.000000	SERIES
ATP08ASM	8.000000	20 pF	ATP204SM	20.480000	20 pF
ATP098SM	9.830400	20 pF	ATP245SM	24.576000	SERIES
ATP100SM	10.000000	SERIES			

400 REIMANN AVE. • SANDWICH, IL 60548 • 815-786-8411 • 815-786-3600 (FAX)

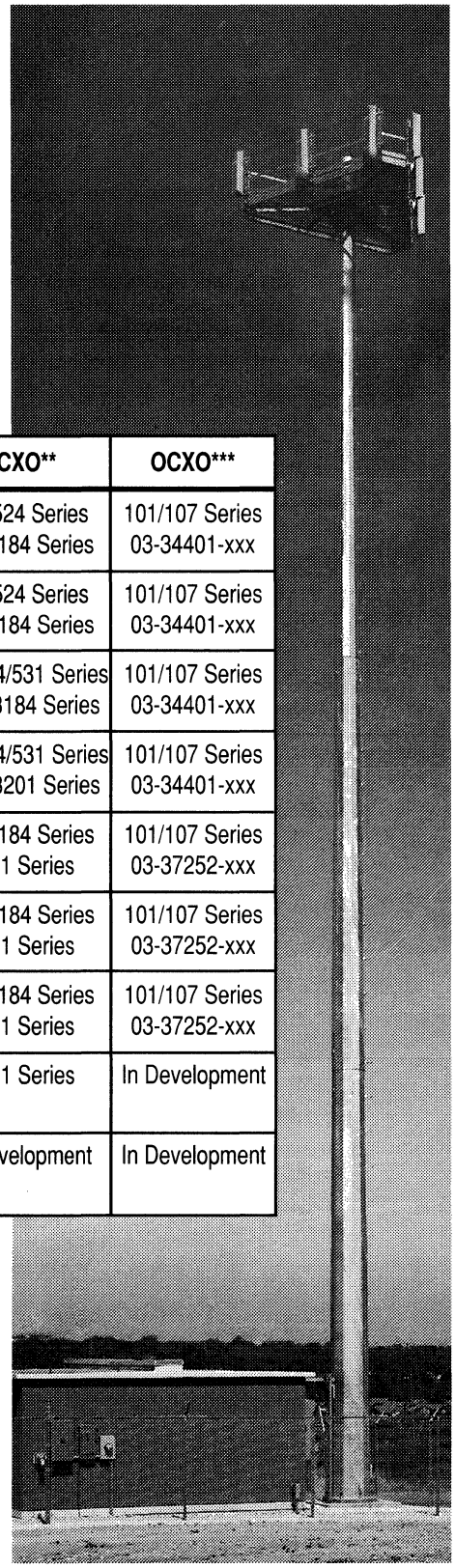
CTS Reeves
FREQUENCY PRODUCTS

Oscillators

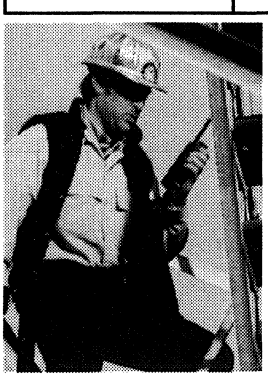


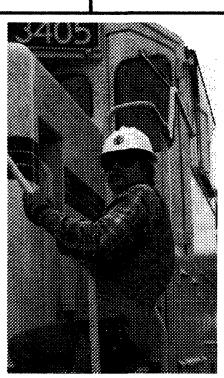
Telecom Applications

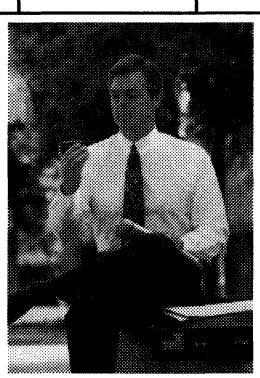
Oscillator Product Solutions



Applications	Freq (MHz)	XO*	VCXO*	TCXO**	OCXO***
T-1, DS-1	1.544, 6.176	MXO45/ MXO45HS - CB3	322/324 Series 386 Series	522/524 Series 531/3184 Series	101/107 Series 03-34401-xxx
CEPT	2.048,8.192	MXO45/ 03-33350-xxx	322/324 Series 386 Series	522/524 Series 531/3184 Series	101/107 Series 03-34401-xxx
T-1, DS-1	12.352	MXO45/ 03-33350-xxx	322/324 Series 386 Series	522/524/531 Series 3184/3184 Series	101/107 Series 03-34401-xxx
SDH, ISDN, SONET	16.384	MXO45/ 03-33350-xxx	322/324 Series 386 Series	522/524/531 Series 3184/3201 Series	101/107 Series 03-34401-xxx
SDH, E-3, STM-1	38.88	MXO45/ 03-33350-xxx	322/324 Series 386 Series	531/3184 Series 3201 Series	101/107 Series 03-37252-xxx
ATM, T-3, DS-3	44.736	MXO45/ 03-33350-xxx	322/324 Series 386 Series	531/3184 Series 3201 Series	101/107 Series 03-37252-xxx
SONET, OC-1, STS-1	51.84	MXO45/ 03-33350-xxx	322/324 Series 386 Series	531/3184 Series 3201 Series	101/107 Series 03-37252-xxx
ATM, STM-1, STS-3c SONET, OC-3c	155.52	EXO-55 Series	345 Series	3201 Series	In Development
SDH-STM-4, STS-12 SONET, OC-12	622.08	In Development	345 Series	In Development	In Development







400 REIMANN AVE. • SANDWICH, IL 60548 • 815-786-8411 • 815-786-3600 (FAX)

CTS Reeves
FREQUENCY PRODUCTS

Oscillators

DUAL IN LINE CLOCK OSCILLATORS

CMOS OUTPUT: 1 TO 120 MHz

CTS Reeves CMos oscillators utilize a custom ASIC design to provide the highest possible reliability through reduced parts count and improved process controls. These oscillators are TTL and CMos compatible for improved versatility. The high output drive capability provides improved symmetry control. Tristate output control is standard for use with automated test systems and in frequency switching applications.

MODEL TYPE	FREQ. RANGE	STABILITY*	TEMP. RANGE	LOAD	INPUT VOLTAGE	INPUT CURRENT	PACKAGE
MXO45 MX)45HS	1 to 105 MHz	±100 PPM	0 to 70°C	50 PF	5V, ±5% 3.3V, ±10%	40 ma (max)	14 PIN DIP
CB3LV	1 to 80 MHz	±25 PPM	-40 to 85°C	50 PF	5V, ±5%	40 ma (max)	5 x 7mm Ceramic
MXO72	25 to 120 MHz	±50 PPM	0 to 70°C	35 PF	5V, ±5% 3.3V, ±10%	80 ma (max)	14 x 9mm **Plastic**

3.3V SMT

TTL OUTPUT: 1 TO 115 MHz

CTS Reeves TTL oscillators utilize a highly reliable transistor oscillator circuit to provide a true TTL output. The proprietary oscillator configuration also provides controlled rise and fall times for logic applications that are EMI sensitive.

MODEL TYPE	FREQ. RANGE	STABILITY*	TEMP. RANGE	LOAD	INPUT VOLTAGE	INPUT CURRENT	PACKAGE
MXO45T	50 to 105 MHz	±25 PPM	0 to 70°C	10 TTL	5V, ±5%	85 ma (max)	14 PIN DIP
03-32295-XXX	6 to 60 MHz	±32 PPM for 20 yrs.	-40 to 85°C	10 TTL	5V, ±5%	40 ma (max)	14 PIN DIP

ECL OUTPUT: 4 TO 200 MHz

CTS Reeves ECL oscillators utilize a proprietary circuit design to provide improved output performance with the best possible reliability. These oscillators are 10 kH ECL compatible and options for +5 volt operation are available for improved versatility. The 3108 also provides an output disable control for use with automated test systems.

MODEL TYPE	FREQ. RANGE	STABILITY*	TEMP. RANGE	LOAD	INPUT VOLTAGE	INPUT CURRENT	PACKAGE
EXO55	4 to 200 MHz	±50 PPM*	0 to 85°C	50 ohm /-2v	-5.2V, ±5%	70 ma (max)	14 PIN DIP (Pkg A)

LOW EMI: 14 to 120 MHz

The wide band output allows forimproved system EMI performance.

MODEL TYPE	FREQ. RANGE	STABILITY*	TEMP. RANGE	LOAD	INPUT VOLTAGE	INPUT CURRENT	PACKAGE
350	14 - 120 MHz 200 MHz	±50 PPM*	0 to 70°C	50 ohm /-2v	-5.2	100 ma (max)	14 PIN DIP

* Stability includes calibration tolerance, frequency stability vs. temperature, supply voltage and load changes, and first year aging

400 REIMANN AVE. • SANDWICH, IL 60548 • 815-786-8411 • 815-786-3600 (FAX)

CTS Reeves
FREQUENCY PRODUCTS

Oscillators

VOLTAGE CONTROLLED CRYSTAL OSCILLATORS

MINIATURE PACKAGES: 1.5 TO 100 MHz

CTS Reeves dual in-line Voltage controlled oscillators are designed for use in communication and instrumentation applications. Proprietary crystal designs and the use of high frequency fundamental mode crystals provide the right combination of stability and pullibility. They are ideal for use in Phase Lock Loop circuitry. Surface mount designs are also available. These are just a few options available. See our complete catalog for more details.

MODEL TYPE	FREQ. RANGE	STABILITY*	TEMP. RANGE	OUTPUT	FREQUENCY DEVIATION	INPUT CURRENT	INPUT CURRENT
322AB	1.5 to 100 MHz	±20 PPM	0 to 70C	TTL / CMOS	±75 PPM, MIN .5 to 4.5V	5V, ±5%	40 ma (max)
SMT 324CD	1.5 to 100 MHz	±50 PPM	0 to 70C	TTL / CMOS	±200 PPM, MIN .5 to 4.5V	5V, ±5%	60 ma (max)
3.3V 324LDC 386LV	1.5 to 155 MHz	±25 PPM	-40 to 85C	TTL / CMOS	±100 PPM, MIN .5 to 4.5V	3.3V, ±10%	60 ma (max)

* Stability includes calibration tolerance, frequency stability vs. temperature, supply voltage and load changes, and first year aging
** See Data Sheet for Dimension and Frequency Deviation options

HIGH FREQUENCY: 80 TO 160 MHz

The CTS Reeves 344 series of Voltage controlled oscillators was designed to meet the specific needs of telecommunications systems. The use of high frequency crystals and high performance designs provide low phase jitter making them ideal for SONET applications.

MODEL TYPE	FREQ. RANGE	PACKAGE	TEMP. RANGE	OUTPUT	FREQUENCY DEVIATION	INPUT VOLTAGE	INPUT CURRENT
334C	**80 to 160 MHz**	14 PIN DIL	-30 to 70C	ECL or PECL	±100 PPM, MIN .5 to 4.5V	-5.2V, ±5%	75 ma (max)
346DC	**80 to 160 MHz**	16 PIN DIL**	-30 to 70C	ECL	±100 PPM, MIN .5 to 4.5V	-5.2V, ±5%	75 ma (max)

* Stability includes calibration tolerance, frequency stability vs. temperature, supply voltage and load changes, and first year aging
** See package style H for outline dimensions

DISCRETE PACKAGES: 1 TO 30 MHz

CTS Reeves Voltage controlled oscillators can be optimized to support a variety of applications and designed to meet the specific needs of almost any system. The following are two examples of this dynamic capability. Challenge us with your VCXO requirement.

MODEL TYPE	FREQ. RANGE	STABILITY*	TEMP. RANGE	OUTPUT	FREQUENCY DEVIATION	INPUT CURRENT	PACKAGE TYPE*
355AB	1.0 to 20 MHz	±20 PPM	0 to 70C	TTL / CMOS	±1000 PPM, MIN .5 to 4.5V	12V, ±5%	F
366AB	5 to 30 MHz	±5 PPM	0 to 50C	TTL / CMOS	±50 PPM, MIN .5 to 4.5V	5V, ±5%	F

** See package for outline dimensions

400 REIMANN AVE. • SANDWICH, IL 60548 • 815-786-8411 • 815-786-3600 (FAX)

CTS Reeves
FREQUENCY PRODUCTS

Oscillators

TEMPERATURE COMPENSATED CRYSTAL OSCILLATORS

14 PIN DIL PACKAGES**: 6 TO 60 MHz

Packaged in an all metal hermetically sealed case, these oscillators provide good long term stability with improved temperature stability. They are ideal for any application requiring moderate stability in a small package. Available with either TTL or CMos output, other options include external frequency adjust.

MODEL TYPE	FREQ. RANGE	STABILITY*	TEMP. RANGE	OUTPUT	FREQUENCY DEVIATION	INPUT CURRENT	INPUT CURRENT
533BD	6 to 60 MHz	±3 PPM	0 to 70°C	TTL	5V, ±5%	40 ma (max)	1 PPM / yr
524DD	10 to 20 MHz	±2.5 PPM	-30 TO +75C	CLIPPED SINE	5V, ±5%	3 ma (max)	1 PPM / yr
525CE	10 to 125 MHz	±2 PPM	-40 to 85°C	CMOS	5V, ±5%	40 ma (max)	1 PPM / yr

High Freq.

SURFACE MOUNT PACKAGES: 10 to 125 MHz

CTS Reeves blends high performance with Mini Packages. ASIC design and miniature components allow for higher frequencies and better temperature performance. Electrical frequency adjust allows for easier setting.

MODEL TYPE	FREQ. RANGE	STABILITY*	TEMP. RANGE	OUTPUT	INPUT VOLTAGE	INPUT CURRENT	PACKAGE TYPE**	AGING (1ST YR)
522	3.2 to 16 MHz	±2.5 PPM	-20 to 70°C	CLIPPED SINE	5V, ±5%	3 ma (max)	0.72 x .46	1 PPM
535	3.2 to 16 MHz	±2.5 PPM	-20 to 70°C	CLIPPED SINE	3.3V, ±5%	3 ma (max)	10mm X 10mm	1 PPM
525	10 to 125 MHz	±2 PPM	-40 to +85°C	TTL	5V, ±5%	40 ma (max)	/80 c /5-	1 PPM

SMT
3.3V

DISCRETE PACKAGES: 1 TO 160 MHz

CTS Reeves TCXO's use a variety of compensation techniques to provide a wide range of options and sizes. These oscillators provide excellent performance at the most economical cost. In house control over the most critical operations and extensive use of process controls insures a high quality product on-time. Available with either TTL or CMos output, other options include Tristate output and electrical frequency adjust.

MODEL TYPE	FREQ. RANGE	STABILITY*	TEMP. RANGE	OUTPUT	INPUT VOLTAGE	INPUT CURRENT	PACKAGE TYPE**	AGING (1ST YR)
2155A	3.2 to 16 MHz	±1 PPM	0 to 55°C	TTL	5V, ±5%	10 ma (max)	C	1 PPM
3115B	4 to 20 MHz	±1 PPM	-40 to 85°C	TTL	5V, ±5%	25 ma (max)	E	1 PPM
531	3.0 to 50 MHz	±0.5 PPM	0 to 70°C	TTL	5V, ±5%	35 ma (max)	16 PIN DIP	1 PPM
455AA	10 to 155 MHz	±1 PPM	0 to 70°C	ECL	-5.2V, ±5%	85 ma (max)		1 PPM
3201A	10 to 160 MHz	±1 PPM	-30 to 70°C	SINE	5V, 12V or 15V	35 ma (max)		1 PPM

400 REIMANN AVE. • SANDWICH, IL 60548 • 815-786-8411 • 815-786-3600 (FAX)

CTS Reeves
FREQUENCY PRODUCTS

Oscillators

OVEN CONTROLLED CRYSTAL OSCILLATORS

THE 100 SERIES

The 100 Series of ovenized oscillators provides excellent performance at an economical price. The oven's innovative thermal/mechanical design is the key. This design is an excellent choice for use in GPS, Communications and Instrumentation applications.

	MODEL 101	MODEL 105	MODEL 106	MODEL 107	MODEL 108
FREQUENCY RANGE	4.0 MHz to 10.5 MHz	10.0 to 20.0 MHz	9.0 to 15.0 MHz	5.0 to 50.0 MHz	5.0 to 50.0 MHz
OUTPUT TYPE	TTL / CMOS	TTL/ CMOS	Sinewave: +5 ohm (±2 db)	TTL / CMOS	Sinewave or HCMOS
DIMENSIONS (max.)	1.42 in. X 1.01 in. X 0.75 in.*	1.5 in. X 1.5 in x 53 in*	1.42 in. X 1.01 in. X 0.75 in.*	1.42 in. X 1.03 in. X 0.625 in.	1.0 in. X 1.0 in. X .5 in.
TEMP. STABILITY:		See chart below	See chart below		
0° to +50°C	±1 X 10^{-8}			±5 X 10^{-8}	±2 X 10^{-8}
-40° to +85°C	±1 X 10^{-7}			±2.5 X 10^{-8}	±1.0 X 10^{-7}
POWER; TURN-ON	1.2 WATTS max.	7.6 WATTS max.	7.6 WATTS max.	6.0 WATTS	5.0 WATTS
STEADY STATE	750 mW max. @ -40°C	0.75 WATT max. @ 25°C	0.75 WATT max. @ 25°C	1.2 WATT max. @ 25°C	1.0 WATT max. @ 25°C
INPUT VOLTAGE	+5 VDC to -12 VDC	+5 VDC to -12 VDC	+5 VDC to -12 VDC	+5 VDC	+12 VDC
PHASE NOISE: OFFSET	10Hz 100Hz 1kHz 1kHz	10Hz 100Hz 1kHz 10kHz	10Hz 100Hz 1kHz 10kHz	10Hz 100Hz 1kHz 10kHz	10Hz 100Hz 1kHz 10kHz
dBc / Hz (TUP.)	-110 -140 -152 -155	-110 -140 -152 -160	-110 -140 -152 -160	95 130 140 150	120 143 155 160
AGING PER YEAR	±5 X 10^{-7}	See chart below	See chart below	5 X 10^{-8}	±5 X 10^{-8}
TRIM RANGE	±5 X 10-4 min. (internal trim)	Ext. (Sufficient for 5 years)	Ext. (Sufficient for 5 years)	Ext. (Sufficient for 5 years)	Ext. (Sufficient for 5 years)

* See package style A for outline dimensions

TEMPERATURE STABILITY OPTION CHART FOR 101 MODEL OCXO'S

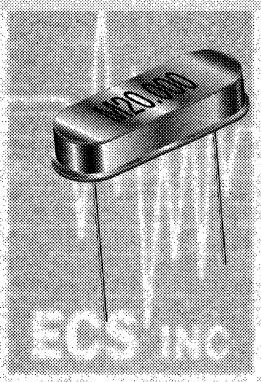
TEMP. RANGE			
-40° to +70°C	±1.0 x 10^{-7} (0P5. AA)	±5.0 x 10^{-8} (OPT. AB)	±2.0 x 10^{-8} (OPT. AC)
-30° to +70°C	±1.0 x 10^{-7} (0P5. BA)	±5.0 x 10^{-8} (OPT. BB)	±2.0 x 10^{-8} (OPT. BC)
0° to +70°C	±7.0 x 10^{-8} (0P5. CA)	±3.5 x 10^{-8} (OPT. CB)	±1.5 x 10^{-8} (OPT. CC)
+10° to +50°C	±5.0 x 10^{-8} (0P5. DA)	±2.5 x 10^{-8} (OPT. BB)	±1.0 x 10^{-8} (OPT. DC)
AGING PER YEAR	7 x 10^{-7}	±5 x 10^{-7}	3 x 10^{-7}

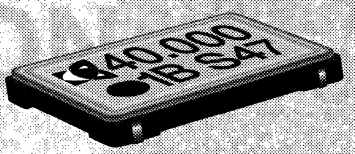
TELECOMMUNICATIONS STRATUM 2 APPLICATIONS

The new STRATOSC 3 and STRATOSC 3E Series of Oscillators provide the ultimate in stability and performance for Stratum 3 and 3E applications. Innovative Electrical and Mechanical design coupled with surface mount manufacturing methods produce highly reliable, cost effective components for all applications. Optimal performance for the frequency range specified above is achieved using 3rd Overtone precision resonators manufactured under Clean Room conditions using proprietary cleaning processes. STRATOSC Series oscillator performance is available in other frequency ranges, using multiplication techniques and in different enclosures.

	STRATOSC 3	STRATOSC 3E
FREQUENCY RANGE (MHz)	5 TO 15	
TEMPERATURE STABILITY 0° TO +70°C	±.3 PPM	±7 x 10^{-9}
OUTPUT TYPE	5-TTL Loads. Duty Cycle ±5% Level 0.4V TO +3.0V Min.	
SHORT TERM AGING (24 Hrs)	±1 x 10^{-10}	±5 x 10^{-11}
VOLTAGE STABILITY (±5%)	±3 x 10^{-9}	±1 x 10^{-9}
HOLDOVER (24 Hrs)	±0.37 PPM	±1 x 10^{-9}
ACCURACY FOR 20 YEARS	±4.6 PPM	±1 PPM
ELECTRICAL TRIM (Minimum)	±5 PPM	±1 PPM
SUPPLY VOLTAGE	+12 VDC ±5%	
TURN-ON POWER (Watts)	5.0 Maximum	
STEADY STATE POWER (Watts)	1.0 Maximum @ +25°C	
MECHANICAL SIZE	1.5" x 1.5" x 1.0" Nominal	

400 REIMANN AVE. • SANDWICH, IL 60548 • 815-786-8411 • 815-786-3600 (FAX)



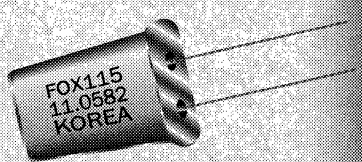


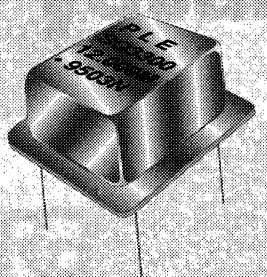
DOVE
Electronic Components, Inc.

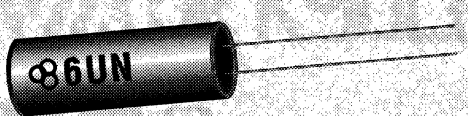
The most popular products ▶ from the leader in crystal and oscillator distribution.

ISO 9002

Quality System Registered to ISO9002







- Abracon
- AVX
- Champion
- C-MAC
- Crystek Crystals
- CTS
- ECS Inc.
- EDCC
- Epson
- Fox
- IC Works
- IQD
- KDS

NOW AVAILABLE: IN-HOUSE PROGRAMMING...
FOR MORE INFORMATION PLEASE CONTACT US AT:

Dove...The Crystal and Oscillator Specialist

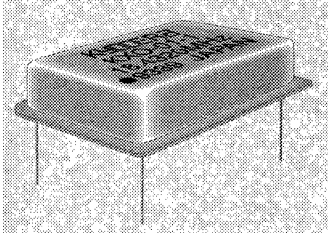
ECS INC INTERNATIONAL

Pletronic

MF Electronic
Mercury
Monitor
M-tron
NEL
PDI
Pletronics
Raltron
RXD
SaRonix
Standard Crystal Corp.
Statek
Valpey-Fisher

OSCILLATORS

Programmables with Short Lead Time
High Stability/Frequency
TTL, HCMOS,SINE,ACMOS,ECL Outputs
VCXO,TCXO,OCXO, TCVCXO
SONET
Wide Frequency Range
Thru-Hole, Surface Mount
Metal, Plastic, Ceramic Miniature Packages Available
Low Voltage, Current, Power
Tight Tolerances
Extended Temperature Ranges



CRYSTALS

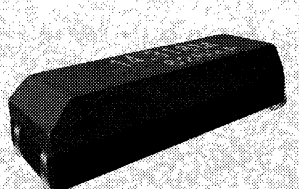
Thru-hole, Low Profile, Surface Mount, Cylindrical, Metal, Plastic, and Ceramic Packages Available
Military
Wide Frequency Range

ALSO. . .

Frequency Generators
Real Time Clocks

APPLICATIONS. . .

Phase Lock Loops
Wireless/Telecommunications
Instrumentation
Computer/Peripherals
Medical



SAMPLES AVAILABLE
QUICK TURN AVAILABLE

(800) 232-9825

Fax 516-689-7362
http://www.dove-electronic.com
E-Mail: sales@dove-electronic.com

DOVE Electronic Components, Inc.

ECLIPTEK® CORPORATION
3545 Cadillac Avenue • Costa Mesa • CA 92626-1401
(800) 325-4783 • (714) 433-1200 • (714) 433-1234 FAX
Internet: www.ecliptek.com • E-mail: sales@ecliptek.com

Crystal and Oscillator Product Selection Guide

Crystals

Series	Package Description	Frequency Range	Tolerance/Stability	Load Capacitance	Shunt Capacitance	Drive Level
EC	HC-49/U	1.8432 to 65MHz	15/30, 30/50, or 50/100 (±ppm)	18pF	7pF	2 mWatt
EC2	HC-49/US	3.579 to 60MHz	15/30, 30/50, or 50/100 (±ppm)	18pF	7pF	1 mWatt
EC2SM	HC-49/UP SMT	3.579 to 60MHz	15/30, 30/50, or 50/100 (±ppm)	18pF	7pF	1 mWatt
EC1	HC-49/US	3.579545 to 60MHz	15/30, 30/50, or 50/100 (±ppm)	18pF	7pF	1 mWatt
EC1SM	HC-49/UP SMT	3.579545 to 60MHz	15/30, 30/50, or 50/100 (±ppm)	18pF	7pF	1 mWatt
ECUM	UM-1, 2, 4 & 5	10 to 150MHz	5/5 through 100/100 (±ppm)	8.0 to 50.0pF	7pF	10,50, or 100µWatt
EC38	Cylindrical	3.579545 to 70MHz	30/50 or 50/100 (±ppm)	18pF	7pF	1 mWatt
ECSM	Plastic SMT	3.579545 to 70MHz	30/50 or 50/100 (±ppm)	18pF	7pF	1 mWatt
ECP1SM	Plastic SMT	3.579545 to 70MHz	30/50 or 50/100 (±ppm)	18pF	7pF	1 mWatt
ECCM1	Ceramic SMT	9.5 to 150MHz	15/30, 30/50, or 50/100 (±ppm)	18pF	7pF	50 µWatt
ECCM2	Ceramic SMT	3.579545 to 70MHz	30/50 or 50/100 (±ppm)	18pF	7pF	1 mWatt
ECCM3	Glass SMT	11 to 120MHz	10/5 through 30/30 (±ppm)	18pF	5pF	100 µWatt
ECCM4	Glass SMT	11 to 120MHz	10/5 through 30/30 (±ppm)	18pF	5pF	100 µWatt
ECCM5	Ceramic SMT	10 to 150MHz	10/5 through 50/50 (±ppm)	18pF	5pF	100 µWatt
ECCM6	Ceramic SMT	9.8304 to 70MHz	15/30, 30/50, or 50/100 (±ppm)	18pF	7pF	100 µWatt
EC38T	Watch Crystal	32.768kHz	±20ppm/Parabolic -0.042 ppm/$(\Delta°C)^2$	12.5pF	0.85pF	1 µWatt
EC26T	Watch Crystal	32.768kHz	±20ppm/Parabolic -0.042 ppm/$(\Delta°C)^2$	6.0 or 12.5pF	0.85pF	1 µWatt
ECPSM29T	Watch Crystal SMT	32.768kHz	±20ppm/Parabolic -0.042 ppm/$(\Delta°C)^2$	12.5pF	0.85pF	1 µWatt
ECPSM310T	Watch Crystal SMT	32.768kHz	±20ppm/Parabolic -0.042 ppm/$(\Delta°C)^2$	6.0 or 12.5pF	0.85pF	1 µWatt

Oscillators

Series	Package Description	Frequency Range	Frequency Stability	Logic Type	Supply Voltage
EC11	Full Size DIP	250kHz to 100MHz	20, 25, 50, or 100 (±ppm)	HCMOS/TTL	$5.0V_{DC}$±10%
EC1100HS	Half Size DIP	250kHz to 100MHz	20, 25, 50, or 100 (±ppm)	HCMOS/TTL	$5.0V_{DC}$±10%
ECH11	Full Size DIP	70 to 155.520MHz	20, 25, 50, or 100 (±ppm)	HCMOS/TTL	$5.0V_{DC}$±10%
ECH1100HS	Half Size DIP	70 to 155.520MHz	20, 25, 50, or 100 (±ppm)	HCMOS/TTL	$5.0V_{DC}$±10%
EC16	Full Size DIP	1 to 46MHz	7 or 10 (±ppm)	HCMOS/TTL	$5.0V_{DC}$±10%
ET11	Full Size DIP	4 to 70MHz	25, 50, or 100 (±ppm)	True TTL	$5.0V_{DC}$±10%
EC13	Full Size DIP	500kHz to 70MHz	20, 25, 50, or 100 (±ppm)	HCMOS/TTL	$3.3V_{DC}$±$0.3V_{DC}$
EC1300HS	Half Size DIP	500kHz to 70MHz	20, 25, 50, or 100 (±ppm)	HCMOS/TTL	$3.3V_{DC}$±$0.3V_{DC}$
ECH13	Full Size DIP	70 to 155.520MHz	20, 25, 50, or 100 (±ppm)	HCMOS/TTL	$3.3V_{DC}$±$0.3V_{DC}$
ECH1300HS	Half Size DIP	70 to 155.520MHz	20, 25, 50, or 100 (±ppm)	HCMOS/TTL	$3.3V_{DC}$±$0.3V_{DC}$
ELF11	Full Size DIP	32.768kHz	50 or 100 (±ppm)	HCMOS/TTL	$5.0V_{DC}$±5%
E11	Full Size DIP	6 to 140MHz	25, 50, or 100 (±ppm)	ECL	$5.2V_{DC}$±5% or -$5.2V_{DC}$±5%
EC14	Plastic SMT	1 to 66.667MHz	50 or 100 (±ppm)	HCMOS/TTL	$5.0V_{DC}$±10%
EC15	Plastic SMT	1 to 66.667MHz	50 or 100 (±ppm)	HCMOS/TTL	$3.3V_{DC}$±$0.3V_{DC}$
EC25	Ceramic SMT	1.544 to 100MHz	25, 50, or 100 (±ppm)	HCMOS/TTL	$5.0V_{DC}$±10%
EC26	Ceramic SMT	1.544 to 100MHz	25, 50, or 100 (±ppm)	HCMOS/TTL	$3.3V_{DC}$±10%
EC31	Full Size DIP	1.5 to 155.520MHz	20, 25, 50, or 100 (±ppm)	HCMOS/TTL	$5.0V_{DC}$±5%
EC51	Metal TCXO	9.6 to 30MHz	1.5 to 5.0 (±ppm)	HCMOS/TTL	$5.0V_{DC}$±5%
ES51	Metal TCXO	9.6 to 30MHz	1.5 to 5.0 (±ppm)	Sinewave	$5.0V_{DC}$±5%
ES63	Metal VCTCXO SMT	10 to 22MHz	1.5 to 3.0 (±ppm)	Sinewave	$5.0V_{DC}$±5% or $3.0V_{DC}$±5%
ES64	Metal VCTCXO SMT	10 to 22MHz	1.5 to 3.0 (±ppm)	Sinewave	$5.0V_{DC}$±5% or $3.0V_{DC}$±5%

Create your own part number on our interactive web site at www.ecliptek.com.
Visit our site for the latest crystal and oscillator information from Ecliptek!

ECLIPTEK® CORPORATION
3545 Cadillac Avenue • Costa Mesa • CA 92626-1401
(800) 325-4783 • (714) 433-1200 • (714) 433-1234 FAX
Internet: www.ecliptek.com • E-mail: sales@ecliptek.com

Through Hole and Surface Mount Crystals

Standard Specifications

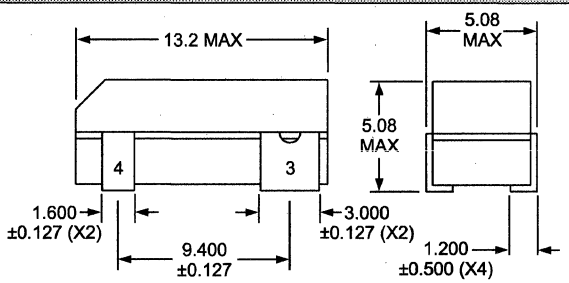
	ECSM	EC2/EC2SM	EC1/EC1SM
Frequency Range	3.579545 to 70.000MHz	3.579 to 60.000MHz	3.579545 to 60.000MHz
Frequency Tolerance/ Stability	±50ppm/±100ppm (Std.) or ±30ppm/±50ppm	±50ppm/±100ppm (Std.), ±30ppm/±50ppm (AT Cut) or ±15ppm/±30ppm (AT Cut)	
Operating Temperature Range	0°C to 70°C (Std.), -20°C to 70°C (AT Cut), or -40°C to 85°C (AT Cut)		
Aging (at 25°C)	±5ppm/year Maximum		
Storage Temperature	-40°C to 85°C		
Shunt Capacitance	7pF Maximum		
Insulation Resistance	500 Megaohms Minimum at $100V_{DC}$		
Drive Level	1 mWatt Maximum		
Load Capacitance	18pF (Std.), Series Resonant, or Custom $C_L \geq 12pF$ (ECSM), Custom $C_L \geq$ (EC2&EC1)		

Equivalent Series Resistance

	ECSM	EC2/EC2SM	EC1/EC1SM
Mode/ESR (Ω)	Frequency Range		
Fundamental/AT			
200 Max	≤ 4.999MHz		
150 Max	5.000 to 5.999MHz		
120 Max	6.000 to 7.999MHz		
90 Max	8.000 to 8.999MHz		
80 Max	9.000 to 9.999MHz		
70 Max	10.000 to 14.999MHz		
60 Max	15.000 to 15.999MHz		
50 Max	16.000 to 30.000MHz	16.000 to 23.999MHz	
40 Max	N/A	24.000 to 30.000MHz	
Fundamental/BT			
40 Max	N/A	24.000 to 50.000MHz	24.000 to 40.320MHz
Third Overtone/AT			
150 Max	N/A	24.576 to 29.999MHz	
100 Max	N/A	30.000 to 60.000MHz	
80 Max	30.000 to 70.000MHz	N/A	

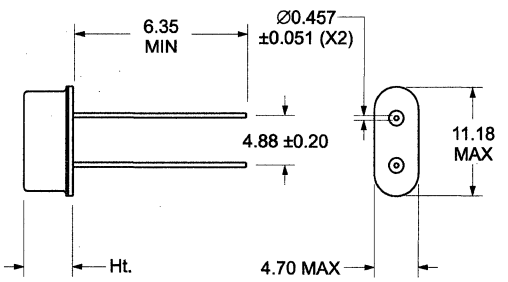
AT and BT cut are not applicable to the ECSM series.

ECSM



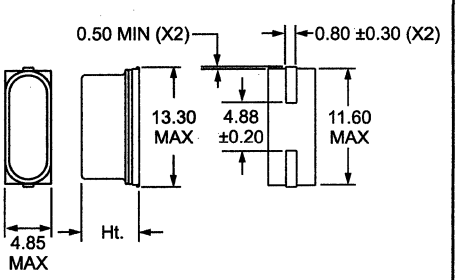
EC2/EC1

Package Type	Maximum Height (Ht.)
EC1	2.50mm
EC2	3.68mm



EC2SM/EC1SM

Package Type	Maximum Height (Ht.)
EC1SM	3.30mm
EC2SM	5.08mm



Create your own part number on our interactive web site at www.ecliptek.com.
Visit our site for the latest crystal and oscillator information from Ecliptek!

ECLIPTEK® CORPORATION
3545 Cadillac Avenue • Costa Mesa • CA 92626-1401
(800) 325-4783 • (714) 433-1200 • (714) 433-1234 FAX
Internet: www.ecliptek.com • E-mail: sales@ecliptek.com

Surface Mount Crystals

Standard Specifications

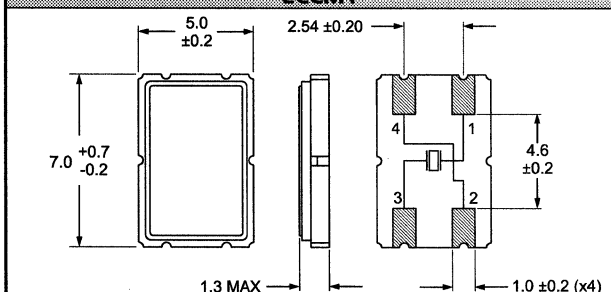
	ECCM1	ECCM6	ECCM5
Frequency Range	9.500 to 150.000MHz	9.8304 to 70.000MHz	10.000 to 150.000MHz
Frequency Tolerance/ Stability	±50ppm/±100ppm (Std.), ±30ppm/±50ppm, or ±15ppm/±30ppm		Tolerance: ±10ppm, ±15ppm, ±20ppm, ±30ppm or ±50ppm
			Stability: ±5ppm to ±50ppm**
Operating Temperature Range	0°C to 70°C (Std.), -20°C to 70°C, or -40°C to 85°C	-10°C to 60°C	-10°C to 60°C through -20°C to 80°C**
Aging (at 25°C)	±3ppm/year Maximum	±5ppm/year Maximum	±2ppm/year Maximum
Storage Temperature	-40°C to 85°C		
Shunt Capacitance	7pF Maximum		5pF Maximum
Insulation Resistance	500 Megahoms Minimum at 100V_{DC}		
Drive Level	50 µWatt Maximum	100 µWatt Maximum	
Load Capacitance	18pF (Std.), Series Resonant, or Custom C_L≥12pF (ECCM1), Custom C_L≥ (ECCM5&6)		

Equivalent Series Resistant

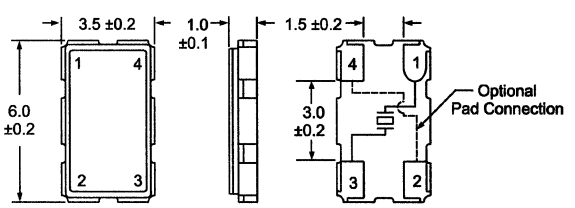
	ECCM1	ECCM6	ECCM5
Mode/ESR (Ω)	Frequency Range		
Fundamental			
60 Max	9.500 to 10.999MHz	9.8304 to 15.999MHz	N/A
50 Max	11.000 to 13.999MHz	N/A	N/A
40 Max	14.000 to 15.999MHz	16.000 to 41.000 MHz	N/A
30 Max	16.000 to 40.000MHz	N/A	10.000 to 45.000MHz
Third Overtone			
100 Max	35.000 to 39.999MHz	28.000 to 34.999MHz	N/A
80 Max	40.000 to 49.999MHz	N/A	N/A
60 Max	N/A	35.000 to 70.000MHz	N/A
50 Max	50.000 to 89.999MHz	N/A	40.000 to 150.000MHz
Fifth Overtone			
100 Max	90.000 to 150.000MHz	N/A	N/A

** = Please contact factory for details on available stability and operating temperature range.

ECCM1

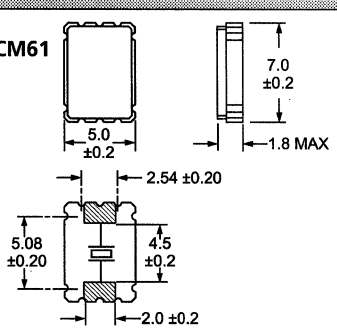


ECCM5

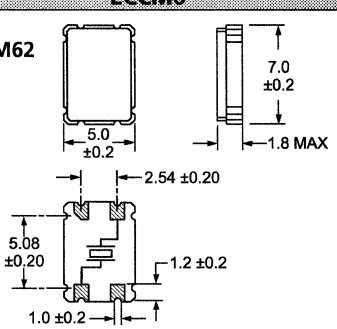


ECCM6

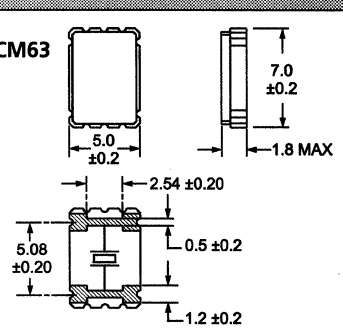
ECCM61



ECCM62



ECCM63



Create your own part number on our interactive web site at www.ecliptek.com.
Visit our site for the latest crystal and oscillator information from Ecliptek!

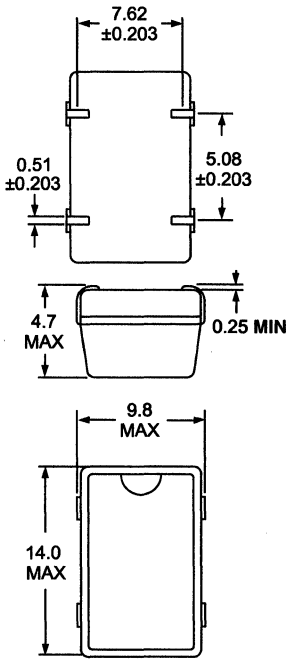
ECLIPTEK® CORPORATION
3545 Cadillac Avenue • Costa Mesa • CA 92626-1401
(800) 325-4783 • (714) 433-1200 • (714) 433-1234 FAX
Internet: www.ecliptek.com • E-mail: sales@ecliptek.com

Surface Mount Oscillators

Standard Specifications

	EC1400SJ	EC1500SJ
Frequency Range	1.000 to 66.667MHz	
Operating Temp. Range	0°C to 70°C	
Storage Temperature	-55°C to 125°C	
Supply Voltage (V_{DD})	5.0V_{DC}±10%	3.3V_{DC}±0.3V_{DC}
Aging (at 25°C)	±5ppm/year Maximum	
Pin 1 Tri-State Input Voltage	No Connection to Enable Output	
	V_{IH}: 2.0V_{DC} Minimum to Enable Output	
	V_{IL}: 0.8V_{DC} Maximum to Disable Output	V_{IL}: 0.2V_{DC} Maximum to Disable Output
Start Up Time	4 mSeconds Max. (1.000 to 26.000MHz)	
	10 mSeconds Max. (26.001 to 66.667MHz)	
Input Current	23 mA Max. (1.000 to 27.000MHz)	10 mA Max. (1.000 to 27.000MHz)
	30 mA Max. (27.001 to 30.000MHz)	20 mA Max. (27.001 to 50.000MHz)
	35 mA Max. (30.001 to 50.000MHz)	25 mA Max. (50.001 to 66.667MHz)
	45 mA Max. (50.001 to 66.667MHz)	
Frequency Tolerance/Stability	±100ppm Maximum or ±50ppm Maximum	
Duty Cycle	50±10(%) (Std.) or 50±5(%) (Optional)	
Output Voltage Logic High (V_{OH})	2.4V_{DC} Min. w/TTL Load (≤50.000MHz)	
	V_{DD} -0.5V_{DC} Min. w/HCMOS Load	V_{DD} -0.4V_{DC} Minimum
Output Voltage Logic Low (V_{OL})	0.4V_{DC} Max. w/TTL Load (1.000 to 30.000MHz)	
	0.5V_{DC} Max. w/TTL Load (30.001 to 50.000MHz)	
	0.5V_{DC} Max. w/HCMOS Load	0.4V_{DC} Maximum
Rise Time/Fall Time	8 nSeconds Maximum (≤50.000MHz 20% to 80% of waveform w/HCMOS Load, 0.4V_{DC} to 2.4V_{DC} w/TTL Load)	
	7 nSeconds Maximum (>50.000MHz 20% to 80% of waveform w/HCMOS Load)	6 nSeconds Maximum (20% to 80% of waveform)
Load Drive Capability	10TTL or 50pF HCMOS Load Max. (1.000 to 50.000MHz)	
	30pF HCMOS Load Max. (50.001 to 66.667MHz)	15pF HCMOS Load Max.

EC1400SJ/EC1500SJ



	EC2500	EC2600
Frequency Range	1.544 to 100.000MHz	
Operating Temp. Range	-10°C to 70°C or -40°C to 85°C	
Storage Temperature	-55°C to 125°C	
Supply Voltage (V_{DD})	5.0V_{DC}±10%	3.3V_{DC}±10%
Aging (at 25°C)	±5ppm/year Maximum	
Start Up Time	10 mSeconds Maximum	
Input Current	10 mA Max. (1.544 to 32.000MHz)	
	30 mA Max. (32.001 to 50.000MHz)	18 mA Max. (32.001 to 50.000MHz)
	50 mA Max. (50.001 to 66.667MHz)	20 mA Max. (50.001 to 66.667MHz)
	60 mA Max. (66.668 to 100.000MHz)	40 mA Max. (66.668 to 100.000MHz)
Frequency Tolerance/Stability	See Table 1	
Duty Cycle	50±10(%) (Std.) or 50±5(%) (Optional)	
Output Voltage Logic High (V_{OH})	V_{DD} -0.5V_{DC} Min. w/HCMOS Load	90% of V_{DD} Min. w/HCMOS or TTL Load
	2.4V_{DC} Min. w/TTL Load	
Output Voltage Logic Low (V_{OL})	0.5V_{DC} Max. w/HCMOS Load	10% of V_{DD} Max. w/HCMOS or TTL Load
	0.4V_{DC} Max. w/TTL Load	
Rise Time/Fall Time	10 nSeconds or 5 nSeconds (Depending upon Load Option)	5 nSeconds Maximum (10% to 90% of waveform w/HCMOS Load; 0.4V_{DC} to 2.4V_{DC} w/TTL Load)
Load Drive Capability	10LSTTL or 30pF HCMOS Load (1.544 to 100.000MHz)	10LSTTL or 15pF HCMOS Load (1.544 to 66.667MHz)
	10TTL or 50pF HCMOS Load (1.544 to 66.667MHz)	15pF HCMOS Load (66.668 to 100.000MHz)

EC2500/EC2600

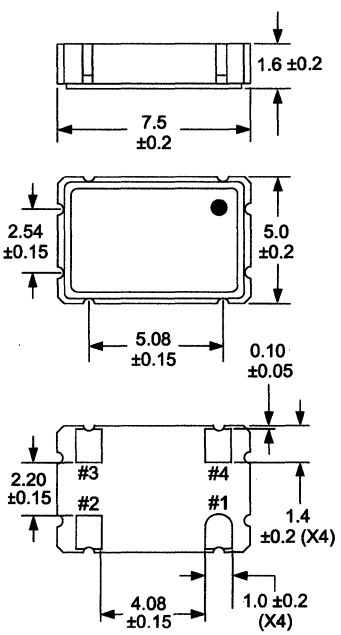


Table 1	±100ppm		±50ppm		±25ppm	
	00		45		25	
Frequency Range	-10°C to 70°C	-40°C to 85°C	-10°C to 70°C	-40°C to 85°C	-10°C to 70°C	-40° to 85°C
1.8432 to 66.666MHz	X	X	X	X	X	
66.667 to 69.999MHz	X	X	X		X	
70.000 to 100.000MHz	X					

X Denotes Availability.

Create your own part number on our interactive web site at www.ecliptek.com.
Visit our site for the latest crystal and oscillator information from Ecliptek!

ECLIPTEK® CORPORATION
3545 Cadillac Avenue • Costa Mesa • CA 92626-1401
(800) 325-4783 • (714) 433-1200 • (714) 433-1234 FAX
Internet: www.ecliptek.com • E-mail: sales@ecliptek.com

Through Hole Oscillators and SMT VCTCXOs

Standard Specifications

	EC11	ECH11
Frequency Range	250.000kHz to 100.000MHz	70.000MHz to 155.520MHz
Operating Temp. Range	0°C to 70°C (Std.) or -40°C to 80°C	
Storage Temperature	-55°C to 125°C	
Supply Voltage (V_{DD})	5.0V_{DC}±10%	
Aging (at 25°C)	±5ppm/year Maximum	
Pin 1 Tri-State Input Voltage	No Connection to Enable Output	
	V_{IH}: 3.6V_{DC} Minimum to Enable Output	V_{IH}: 2.4V_{DC} Minimum to Enable Output
	V_{IL}: 0.8V_{DC} Maximum to Disable Output	
Start Up Time	Not Specified	10 mSeconds Max.
Input Current	45 mA Max. (250kHz to 24.000MHz)	
	55 mA Max. (24.001 to 50.000MHz)	
	65 mA Max. (50.001 to 70.000MHz)	
	85 mA Max. (70.001 to 100.000MHz)	50 mA Max.
Frequency Tolerance/Stability	±100ppm (Std.), ±50ppm, ±25ppm, or ±20ppm Maximum	
Duty Cycle	50±10(%) (Std.) or 50±5(%) (Optional)	
Output Voltage Logic High (V_{OH})	2.4V_{DC} Minimum w/TTL Load	
	V_{DD} -0.5V_{DC} Minimum w/HCMOS Load	
Output Voltage Logic Low (V_{OL})	0.4V_{DC} Maximum w/TTL Load	
	0.5V_{DC} Maximum w/HCMOS Load	
Rise Time/Fall Time	6 nSeconds Max. (0.4V_{DC} to 2.4V_{DC} w/TTL Load; 20% to 80% of waveform w/HCMOS Load)	3 nSeconds Max. (0.4V_{DC} to 2.4V_{DC} w/TTL Load; 20% to 80% of waveform w/HCMOS Load)
Load Drive Capability	10TTL or 50pF HCMOS Load Max. (250kHz to 24.000MHz)	
	10TTL or 15pF HCMOS Load Max. (24.001 to 100.000MHz)	10TTL or 50pF HCMOS Load

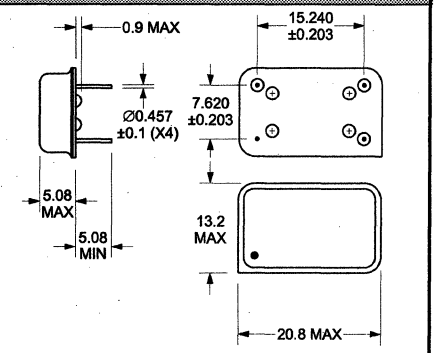
EC11 and ECH11 are available in a full size or half size DIP.

ES6300 and ES6400		
Frequency Range	10.000 to 22.000MHz (Consult Factory for Std. Frequencies)	
Operating Temp. Range	See Table 1	
Storage Temperature	-30°C to 85°C	
Supply Voltage (V_{DD})	5.0V_{DC}±5% or 3.0V_{DC}±5%	
Input Current	2.0 mA Max.	
Aging (at 25°C)	±1ppm/year Maximum	
Frequency Deviation Options	w/Internal Trim Only	±3ppm Minimum
	w/External and Internal Trim	±5ppm Max. w/Control Voltage of 2.5V_{DC} ±2.0V_{DC} (w/5.0V_{DC} Supply Voltage); 1.5V_{DC}±1.0V_{DC} (w/3.0V_{DC} Supply Voltage); Positive Transfer Characteristic; ±3ppm Min. (Internal Trim)
	w/External Trim Only	±8pm Min. w/Control Voltage of 2.5V_{DC} ±2.0V_{DC} (w/5.0V_{DC} Supply Voltage); 1.5V_{DC}±1.0V_{DC} (w/3.0V_{DC} Supply Voltage); Positive Transfer Characteristic.
Frequency Stability	vs. Temperature	See Table 1
	vs. Frequency Tolerance (25±2°C)	±0.5ppm Max. (w/Internal Trim Only or w/Internal and External Trim), ±2ppm Max. (w/External Trim Only)
	vs. Input Voltage (±5%)	±0.3ppm Max.
	vs. Load (±1kΩ // ±1pF)	±0.3ppm Max.
Output Voltage	1.0Vp-p Clipped Sinewave Min. w/5.0V_{DC}±5% Supply Voltage	
	0.7Vp-p DC Cut Clipped Sinewave Min. w/3.0V_{DC}±5% Supply Voltage	
Load Drive Capability	10kOhms // 10pF	

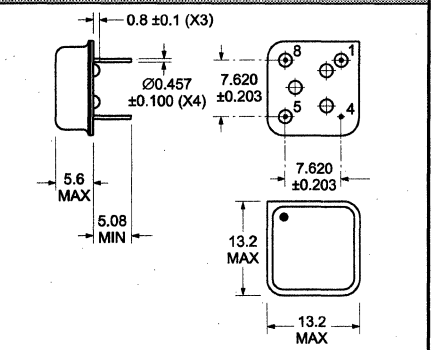
Table 1		Frequency Stability			
		±1.5ppm	±2.0ppm	±2.5ppm	±3.0ppm
Operating Temp.	CODE	15	20	25	30
0°C to 50°C	A	O	X	X	X
-10°C to 60°C	B	O	X	X	X
-20°C to 70°C	C	O	X	X	X
-30°C to 60°C	D		X	X	X
-30°C to 75°C	E		X	X	X

X Denotes Availability, O Denotes Standard Frequency Availability Only.

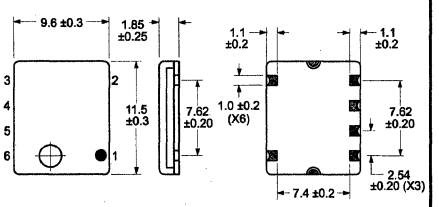
Full Size DIP



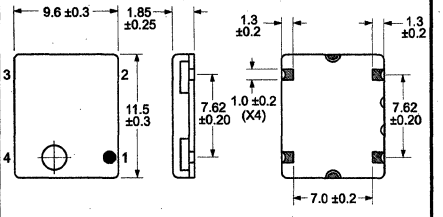
Half Size DIP



ES6300



ES6400



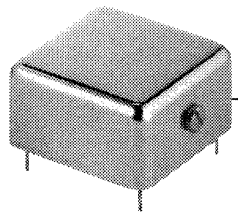
Create your own part number on our interactive web site at www.ecliptek.com.
Visit our site for the latest crystal and oscillator information from Ecliptek!

Electronic Research Co. ERC

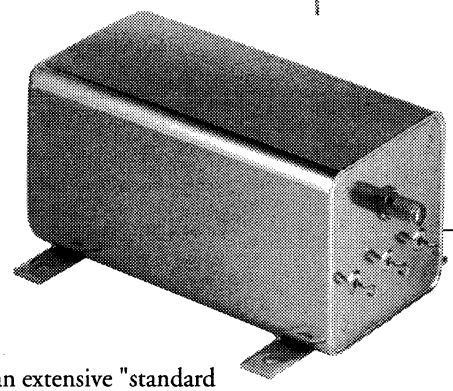
Precision Crystal Oscillators

Established in 1958, Electronic Research Company has grown with a firm commitment to design and produce reliable precision crystal oscillators for both military and commercial applications. We are cost competitive in the production of both small and large quantities.

Precision Crystal Oscillators are most often unique to the particular application, requiring a custom design. In order to provide for the flexibility necessary in custom designs, Electronic Research Company manufactures its own precision crystals and has in-house mechanical packaging and printed circuit board facilities.



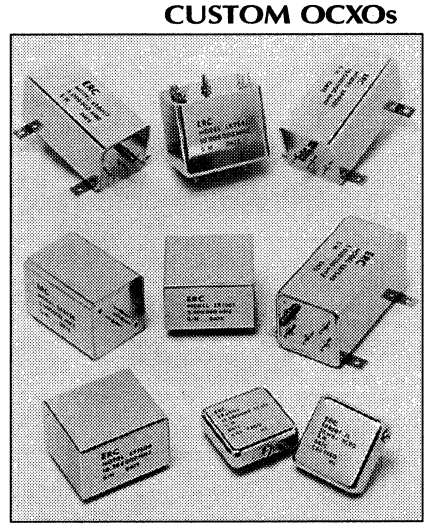
PCB MOUNT OCXO



CHASIS MOUNT OCXO

Electronic Research Company does not have an extensive "standard off-the-shelf" product line. Our expertise is in **custom design** and manufacturing according to individual customer specifications. We specialize in *Precision High-Stability Oven-Controlled Crystal Oscillators* in the 1.00 to 120 MHz range. Our **OCXOs** operate over wide temperature ranges and exhibit long-term stabilities of a few parts in $1X10^{-9}$ to $1X10^{-11}$ per day and exhibit excellent phase noise characteristics. Our designs use both discrete thru-hole and surface mount techniques.

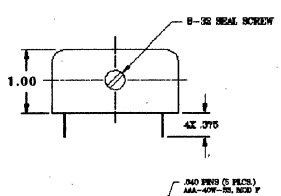
CUSTOM OCXOs

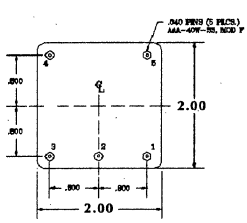


We will assist you in designing the right oscillator for your particular application and specific set of needs.

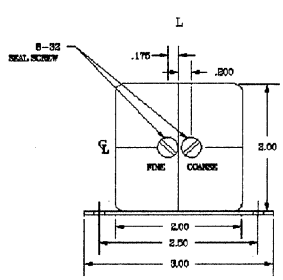
HIGH ACCURACY CUSTOM DESIGNS

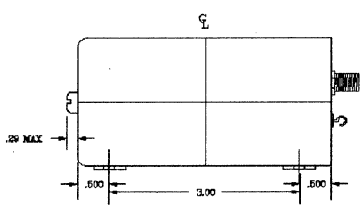
PCB MOUNT

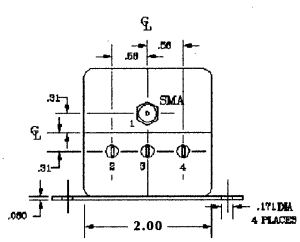




CHASIS MOUNT







Electronic Research Co. ERC
Precision Crystal Oscillators
7618 Wedd Avenue
Overland Park, KS
66204-2259 U.S.A.
Phone:(913)631-6700 • Fax:(913)631-7849

fordahl
FREQUENCY CONTROL PRODUCTS

Fordahl USA, Inc., 8875 Knoll Drive Extension, Gainesville, GA 30506
Tel: (770) 888-0104 • FAX: (770) 888-4451
Web Site: www.fordahl.com • E-Mail: mnewcome@fordahl.com

Precision Oscillators

TYPE	DFN S11-B	DFN S11-BL
Package	Package 7.5 x 5.0 x 2.0 mm	
FREQ. RANGE	1.8 to 100 MHz	1.8 to 70 MHz
supply voltage	5V ± 10%	3.3V ± 0.3V
output load	HCMOS 50 pF or 10 TTL	HCMOS 15 pF or 10 LSTTL
FREQ. STABILITY	Includes 25°C calibration, temp, 1st year aging. Vcc and load changes	
temp. range	stability	stability
-10 to 70°C	± 50 ppm	±100 ppm
-40 to 85°C	± 100 ppm	
OPTIONS	tri-state output on pin 1	

TYPE	DFN 14-B	DFN 4-B	DFN 14-H	DFN 4-H
Package	20.2 x 12.6 x 5.1 mm 14 Pin dip/dil	12.6 x 12.6 x 6.1 mm 8 pin dip/dil	20.2 x 12.6 x 5.1 mm 14 Pin dip/dil	12.6 x 12.6 x 6.1 mm 8 pin dip/dil
FREQ. RANGE	1 to 100 MHz	1 to 70 MHz	1 to 100 MHz	1 to 70 MHz
supply voltage	5V ± 5%		5V ± 5%	
output load	HCMOS 15 pF or 10 TTL		HCMOS 50 pF up to 25 MHz, 15 pF above	
FREQ. STABILITY	includes 25°C calibration, temp. 1st year aging, Vcc and load changes			
temp. range	stability	stability	stability	
0 to 70°C	±25 ppm	±50 ppm	±100 ppm	
-40 to 85°C	±50 ppm	±75 ppm	±100 ppm	
remarks	Models > 70 MHz only available as XB50 or XB100 models			
OPTIONS	tighter symmetry, tri-state output on pin 1			

TYPE	DFN 14-E	DFN 14-EC	DFN 14-O
Package	20.2 x 12.6 x 7.0 mm 14 Pin dip/dil		
FREQ. RANGE	30 to 175 MHz	30 to 175 MHz	30 to 180 MHz
supply voltage	-5.2V ± 5%	5V ± 5%	5V ± 5%
output load	ECL 10KH (50 Ω to -2V)	ECL 10 KH (50 Ω to 3V)	50 Ω clipped sine wave
FREQ. STABILITY	Includes 25°C calibration, temp. 1st year aging. Vcc and load changes		
temp. range	stability	stability	stability
0 to 70°C	±25 ppm	±50 ppm	±100 ppm
-40 to 85°C	±50 ppm	±100 ppm	
OPTIONS	inverted pin-out, second output on pin 1		

TYPE	DFN S1-KH	DFN S1-LH
FREQ. RANGE	1 to 70 MHz	1 to 50 MHz
Package	15.00 x 9.2 x 6.0 SMD	
supply voltage	5V ± 10%	3.3V ± 5%
output load	HCMOS 50 pF up to 25 MHz, 15 pF above	HCMOS 15pF
FREQ. STABILITY	Includes 25°C calibration, temp. 1st year aging, Vcc and load changes	
temp. range	stability	stability	stability
0 to 70°C	± 15 ppm	± 25 ppm	± 50 ppm
-40 to 85°C	± 25 ppm	± 50 ppm	± 75 ppm
-55 to 125°C	± 50 ppm	± 75 ppm	± 100 ppm
remarks	XH codes only available as DFN S1-KH or KB model		
OPTIONS	tight symmetry (f ≤ 50 MHz), tri-state output on pin 1		

TYPE	DFN 14-KH & DFN 114-KH	DFN 14-KT & DFN 114-KT
FREQ. RANGE	1 to 70 MHz	1 to 70 MHz
Package	20.2 x 12.6 x 7.0 mm 14 Pin dip/dil	
supply voltage	5V ± 10%	5V ± 10%
output load	HCMOS 50 pF up to 25 MHz, 15 pF above	10 TTL
FREQ. STABILITY	Includes 25°C calibration, temp. 1st year aging, Vcc and load changes	
temp. range	stability	stability	stability
0 to 70°C	± 15 ppm	± 25 ppm	
-40 to 85°C	± 25 ppm	± 50 ppm	
-55 to 125°C	± 50 ppm	± 75 ppm	± 100 ppm
OPTIONS	low power, external trimmer, internal trimmer, tighter symmetry, tri-state control		

TYPE	DFN 4-KH
Package	12.6 x 12.6 x 6.1 mm 8 Pin dip/dil
FREQ. RANGE	1 to 70 MHz
Supply Voltage	5V ± 10%
Output Load	HCMOS 50 pF up to 25 MHz. 15 pF above, or 10 TTL
FREQ. STABILITY	Includes 25°C calibration, temp, 1st year aging, Vcc and load changes
temp. range	stability	stability	stability
0 to 70°C	± 15 ppm	± 25 ppm	
-40 to 85°C	± 25 ppm	± 50 ppm	
-55 to 125°C	± 50 ppm	± 75 ppm	± 100 ppm
OPTIONS	tight symmetry (f ≤ 50 MHz), tri-state output on pin 1

TYPE	DFN 14-KB	DFN 4-KB
FREQ. RANGE	1 to 70 MHz	1 to 70 MHz
Package	20.2 x 12.6 x 5.1 mm 14 Pin dip/dil	12.6 x 12.6 x 6.1 mm 8 Pin dip/dil
Supply Voltage	5V ± 5%	
Output Load	HCMOS 15 pF or 10 TTL	
FREQ. STABILITY	Includes 25°C calibration, temp. 1st year aging. Vcc and load changes	
temp. range	stability	stability	stability
0 to 70°C	± 15 ppm	± 25 ppm	
-40 to 85°	± 25 ppm	± 50 ppm	
-55 to 125°	± 50 ppm	± 75 ppm	± 100 ppm
OPTIONS	tri-state output on pin 1		

TYPE	DFN 14-SH	DFN 4-SH
FREQ. RANGE	1 to 70 MHz	4 to 25 MHz
Package	20.2 x 12.6 x 5.1 mm 14 Pin dip/dil	12.6 x 12.6 x 6.1 mm 8 Pin dip/dil
supply voltage	5V ± 5%	
output load	HCMOS 50 pF up to 25 MHz, 15 pF above	
FREQ. STABILITY	Detailed tolerances stability versus (all values ≤)	
temp. range	temp.	Vcc ± 5%	load ± 10%	pulling range
-10 to 60°C	± 3 ppm			
0 to 70°C	± 4 ppm	± 1.5 ppm	± 0.5 ppm	≥ ± 5 ppm
-20 to 70°C	± 5 ppm			
OPTIONS	low power, external trimmer, internal trimmer, tight symmetry, enable/disable on pin 1			

VC-TCXO's

TYPE	DFAV S7-KH	DFAV S7-KO	DFAV S7-LH	DFAV S7-LO
FREQ. RANGE	2 to 35 MHZ			
Package	20.0 x 13.0 x 7.8 mm SMD			
supply voltage	5V ± 5%	5V ± 5%	3.2V to 3.6V	3.2V to 3.6V
output load	HCMOS 15 pF or 2 TTL	clipped sine 20kΩ/5 pF	HCMOS 15 pF or 1 TTL	clipped sine 20kΩ/5 pF
FREQ. STABILITY	detailed tolerances stability versus (all values ≤)			
temp. range	@ 25°C	temp.	Vcc range	load ± 10%	pulling range
-10 to 60°C	± 1 ppm	± 1 ppm	± 0.2 ppm	± 0.3 ppm	≥ ± 40 ppm
-20 to 70°C	± 1 ppm	± 2 ppm			

TYPE	DFAV 14-KH	DFAV 14-KO	DFAV 14-LH	DFAV 14-LO
FREQ. RANGE	2 to 35 MHZ			
Package	20.0 x 12.6 x 8.5 mm 14 Pin dip/dil			
supply voltage	5V ± 5%	5V ± 5%	3.2V to 3.6V	3.2V to 3.6V
output load	HCMOS 15 pF or 2 TTL	clipped sine 20kΩ/5 pF	HCMOS 15 pF or 1 TTL	clipped sine 20kΩ/5 pF
FREQ. STABILITY	detailed tolerances stability versus (all values ≤)			
temp. range	@ 25°C	temp.	Vcc range	load ± 10%	pulling range
-10 to 60°C	± 1 ppm	± 1 ppm	± 0.2 ppm	± 0.3 ppm	≥ ± 40 ppm
-20 to 70°C	± 1 ppm	± 2 ppm			

TYPE	DFAV 20-H	DFAV 20-MH
FREQ. RANGE	1 to 27 MHz	25 to 52 MHz
Package	20.2 x 20.2 x 9.6 mm	
supply voltage	5 to 15V ±5%	
output load	HCMOS 15 pF	
FREQ. STABILITY	detailed tolerances stability versus (all values ≤)	
temp. range	@ 25°C	temp.	Vcc ± 5%	load ± 10%	pulling range
0 to 70°C	≤ ± 1 ppm	≤ ± 1 ppm	≤ ± 0.2 ppm	≤ ± 0.3 ppm	≥ ± 40 ppm
-20 to 70°C	≤ ± 1 ppm	≤ ± 2 ppm			

TYPE	DFAV 36-H	DFAV 36-MH	DFAV 36-SW	DFAV 36-MSW
FREQ. RANGE	4 to 27 MHz	25 to 70 MHz	4 to 27 MHz	25 to 70 MHz
Package	36 x 27 x 10 mm			
supply voltage	5 to 15V ± 5%		5 to 15V ± 5%	
output load	HCMOS 15 pF		50 Ω ± 10%	
FREQ. STABILITY	detailed tolerances stability versus (all values ≤)			
temp. range	@ 25°C	temp.	Vcc ± 5%	load ± 10%	pulling range
0 to 70°C	≤ ± 1 ppm	≤ ± 1 ppm	≤ ± 0.2 ppm	≤ ± 0.3 ppm	≥ ± 40 ppm

TYPE	DFAV 36-MEC	DFAV 36-MSWH
FREQ. RANGE	25 to 160 MHz	
Package	36 x 27 x 9.7 mm	
supply voltage / output load	5V ± 5% / ECL 100K (50 Ω to 3V)	5 to 12V ± 5% / Sine 50 Ω ± 10%
FREQ. STABILITY	detailed tolerances stability versus (all values ≤)	
temp. range	@ 25°C	temp.	Vcc ± 5%	load ± 10%	pulling range
0 to 70°C	≤ ± 1 ppm	≤ ± 1 ppm	≤ ± 0.2 ppm	≤ ± 0.3 ppm	≥ ± 40 ppm
-20 to 70°C	≤ ± 1 ppm	≤ ± 2 ppm			

VCXO's

TYPE	DFV S1-KH/KHZ				DFV S1-LH/LHZ		
FREQ. RANGE	1 to 55 MHz				2 to 50 MHz (LHZ ≤ 33 MHz)		
Package	15.0 x 9.2 x 6.0 mm SMD						
supply voltage	5V ± 5%				3.3V ± 5%		
output load (HCMOS)	50 pF up to 25 MHz, 15 pF above				25 pF up to 25 MHz, 15 pF above		
FREQ. STABILITY	detailed tolerances stability (all values ≤)						
type	temp. range	@ 25°C	Temp.	Vcc	Load	pulling range/ function	control voltage
DFV S1-KH	0 to 70°C -40 to 85°C	± 10 ppm	± 15, 25 ppm ± 25, 50 ppm	± 2 ppm	± 1 ppm	≥ ± 100 ppm positive	0.5 to 5V center @ 2.5V
DFV S1-LH	0 to 70°C -20 to 70°C		± 15, 25 ppm ± 25 ppm				0 to 3V center @ 1.5V
OPTIONS	tighter symmetry (f ≤ 40 MHz). Tri-state control on pin 2						

TYPE (Preliminary Data)	DFV S7-MH					
FREQ. RANGE	30 to 70 MHz					
Package	20 x 13 x 9.3 mm SMD					
supply voltage	5V ± 5%					
output load	HCMOS 15 pF					
FREQ. STABILITY	detailed tolerances stability versus (all values ≤)					
Temp. range	@ 25°C	Temp.	Vcc	Load	pulling range	control voltage
0 to 70°C	± 10 ppm	± 10, 15, 25 ppm	± 2 ppm	± 1 ppm	≥ ± 100 ppm	.5 to 4.5V center @ 2.5V
-40 to 85°C		± 20, 25, 50 ppm				
OPTIONS	tighter symmetry					

TYPE (Preliminary Data)	DFV S7-ME	DFV S7-MEC	DFV S7-MO
FREQ. RANGE	30 to 160 MHz	30 to 160 MHz	30 to 160 MHz
Package	20 x 13 x 9.3 mm SMD		
supply voltage	-5.2V ± 5%	5V ± 5%	5V ± 5%
output load	ECL 10KH (50Ω to -2V)	ECL 10 KH (50Ω to 3V)	50Ω, clipped sine wave
FREQ. STABILITY	detailed tolerances stability versus (all values ≤)		
Temp. Range	@ 25°C	Temp.	Vcc	Load	pulling range	linearity
0 to 70°C	± 10 ppm	± 10, 15, 25 ppm	± 2 ppm	± 1 ppm	≥ ± 100 ppm	± 20%
OPTIONS	positive pulling slope, negative pulling slope, inverted pin-out					

TYPE	DFV 14-H		
FREQ. RANGE	2 to 35 MHz		
Package	20.2 x 12.6 x 7.0 mm 14 Pin dip/dil		
supply voltage	5V ± 5%		
output load (HCMOS)	HCMOS 50 pF up to 25 MHz. 15 pF above		
FREQ. STABILITY	Includes 25°C calibration, temp. 1st year aging. Vcc and load changes		
temp. range	overall stability	pulling range	control voltage
0 to 70°C	≤ ± 50 ppm	≥ ± 100, 150 ppm	2.5V ± 2V

TYPE	DFV 14-LH						
FREQ. RANGE	2 to 33 MHz						
Package	20.2 x 12.6 x 7.0 mm 14 Pin dip/dil						
supply voltage	3.3V ± 5%						
output load	HCMOS 25 pF up to 25 MHz. 15 pF above						
FREQ. STABILITY	detailed tolerances stability versus (all values ≤)						
temp. range	@ 25°C	Temp.	Vcc	Load	pulling range	control voltage
0 to 70°C	± 10 ppm	± 15, 25 ppm	± 2 ppm	± 1 ppm	≥ ± 100 ppm	0 to 3V center @ 1.5V
0 to 70°C	± 25 ppm	± 50 ppm	± 5 ppm		≥ ± 200 ppm	
-20 to 70°C	± 10 ppm	± 20, 30 ppm	± 2 ppm		≥ ± 100 ppm	
-20 to 70°C	± 25 ppm	± 50 ppm	± 5 ppm		≥ ± 200 ppm	
OPTIONS	control voltage 0.5 to 4.5V, center @ 2.5V						

fordahl
FREQUENCY CONTROL PRODUCTS

Fordahl USA, Inc., 8875 Knoll Drive Extension, Gainesville, GA 30506
Tel: (770) 888-0104 • FAX: (770) 888-4451
Web Site: www.fordahl.com • E-Mail: mnewcome@fordahl.com

VCXO's cont'd.

TYPE		DFV 14-KH				DFV 14-MH	
FREQ. RANGE		1 to 40 MHz				30 to 70 MHz	
Package		20.2 x 12.6 x 7.0 mm 14 Pin dip/dil				20.2 x 12.6 x 8.5 mm 14 Pin dip/dil	
supply voltage		5V ± 5%					
output load (HCMOS)		50 pF up to 25 MHz, 15 pF above					
FREQ. STABILITY		detailed tolerances stability versus (all values ≤)					
Type	temp. range	@ 25°C	Temp.	Vcc	Load	pulling range	control voltage
DFV 14-KH & DFV 14-MH 1 to 70 MHz	0 to 70°C	± 10 ppm	± 10, 15, 25 ppm	± 2 ppm	± 1 ppm	≥ ± 100 ppm	0.5 to 5V center @ 2.5V
	-40 to 85°C		± 20, 25, 50 ppm				
DFV 14-KH & DFV 14-MH 2 to 70 MHz	0 to 70°C	± 25 ppm	± 25, 50 ppm	± 5 ppm	± 1 ppm	≥ ± 250, 500 ppm	0 to 5V center @ 2.5V
	-40 to 85°		± 75 ppm			≥ ± 250 ppm	
OPTIONS	tighter symmetry, control voltage 0.5 to 4.5V, center @ 2.5V high load output						

TYPE		DFV 114-KH				DFV 314-KH	
FREQ. RANGE		1 to 40 MHz				1 to 40 MHz	
Package		20.2 x 12.6 x 7.0 mm 14 Pin dip/dil					
supply voltage		5V ± 5%					
output load		HCMOS 50 pF up to 25 MHz, 15 pF above					
FREQ. STABILITY		detailed tolerances stability versus (all values ≤)					
Type	temp. range	@ 25°C	Temp.	Vcc	Load	pulling range function positive	control voltage
DFV 114-KH	0 to 70°C	± 10 ppm	± 10, 15, 25 ppm	± 5 ppm	± 1 ppm	≥ ± 90 ppm	0 to 5V center @ 2.5V
	-40 to 85°C		± 20, 25, 50 ppm			≤ ± 110 ppm	
	linearity	33 to 54 ppm/V					
DFV 314-KH	0 to 70°C	± 15 ppm	± 20 ppm	± 1 ppm	± 1 ppm	≥ ± 150 ppm negative	-4 to 4V center @ 0V
	0 to 70°C		± 25 ppm				

TYPE		DFV 14-KE	DFV 14-KEC	DFV 14-KO
FREQ. RANGE		30 to 160 MHz	30 to 160 MHz	30 to 160 MHz
Package		20.2 x 12.6 x 8.5 mm 14 Pin dip/dil		
supply voltage		-5.2V ± 5%	5V ± 5%	5V ± 5%
output load		ECL 10KH (50 Ω to -2V)	ECL 10KH (50 Ω to 3V)	50 Ω, clipped sine wave
FREQ. STABILITY		detailed tolerances stability versus (all values ≤)		
Type	temp. range	@ 25°C	Temp.	Vcc	Load	pulling range	linearity
ALL TYPES	0 to 70°C	± 10 ppm	± 10, 15, 25 ppm	± 2 ppm	± 1 ppm	≥ ± 100 ppm	± 20%
OPTIONS	positive pulling slope, negative pulling slope, inverted pin-out						

TYPE		DFV 14-MSW					
FREQ. RANGE		16 to 160 MHz					
Package		20.2 x 12.6 x 8.5 mm 14 Pin dip/dil					
supply voltage		5V ± 5%					
output load		Sine 50 Ω ± 10%					
FREQ. STABILITY		detailed tolerances stability versus (all values ≤)					
temp. range	@ 25°C	Temp.		Vcc	Load	pulling range	linearity
0 to 70°C	± 10 ppm	± 10, 15, 25 ppm		± 3 ppm	± 1 ppm	≥ ± 100 ppm	± 10%
-40 to 85°C		± 25 ppm					

TYPE (Prelim. Data)		DFV 14-PEC		DFV 14-PO			
FREQ. RANGE		450 to 821 MHz		450 to 821 MHz			
Package		20.2 X 12.6 X 8.5 MM 14 PIN DIP/DIL					
supply voltage		5V ± 5%		5V ± 5%			
output load		ECL 100 K (50 Ω to 3V)		50Ω clipped sine wave			
FREQ. STABILITY		detailed tolerances stability versus (all values ≤)					
Type	temp. range	@ 25°C	Temp.	Vcc	load	pulling range	linearity
ALL TYPES	0 to 70°C	± 15 ppm	± 15, 25 ppm	± 3 ppm	± 1 ppm	≥ ± 100 ppm	± 20%
OPTIONS	2nd output on additional pin, 180° phase shifted						

TYPE		DFV 36-E	DFV 36-EC	DFV 36-O
FREQ. RANGE		30 to 160 MHz	30 to 160 MHz	30 to 160 MHz
Package		36 x 27 x 10 mm		
supply voltage		-5.2V ± 5%	5V ± 5%	5V ± 5%
output load		ECL 10KH (50 Ω to -2V)	ECL 10KH (50 Ω to 3V)	50 Ω clipped sine wave
FREQ. STABILITY		detailed tolerances stability versus (all values ≤)		
type	Temp. Range	@ 25°C	Temp.	Vcc	load	pulling range	linearity
ALL TYPES	0 to 70°C	± 10 ppm	± 10, 15, 25 ppm	± 2 ppm	± 1 ppm	≥ ± 100 ppm	± 20%
OPTIONS	positive pulling slope, negative pulling slope, 2nd output on additional pin						

TYPE		DFV 236-PEC	DFV 236-PO
FREQ. RANGE		113 to 821 MHz	113 to 821 MHz
Package		36 x 27 x 10 mm	
supply voltage		5V ± 5%	5V ± 5%
output load		ECL 100K (50 Ω to 3V)	50 Ω square wave AC coupled
FREQ. STABILITY		detailed tolerances stability versus (all values ≤)	
type	Temp. Range	@ 25°C	Temp.	Vcc	load	pulling range/ function	linearity
ALL TYPES	0 to 70°C	± 10 ppm	± 12, 15, 25 ppm	± 2 ppm	± 1 ppm	≥ ± 100 ppm	± 10%
OPTIONS	negative pulling slope, second output						

TCXO's

TYPE		DFA S7-KHA	DFA S7-KOA	DFA S7-LHA	DFA S7-LOA
FREQ. RANGE		2 to 35 MHz			
Package		20 x 13 x 7.8 mm SMD			
supply voltage		5V ± 5%	5V ± 5%	3.2V ± 3.6V	3.2V ± 3.6V
output load		HCMOS 15 pF or 2 TTL	clipped sine 20kΩ//5 pF	HCMOS 15 pF OR 1 TTL	clipped sine 20kΩ//5 pF
FREQ. STABILITY		detailed tolerances stability versus (all stabilities ≤)			
type	temp. range	temp.	Vcc. range	load ± 10%	int. trimmer pulling range
ALL MODELS	-10 to 60°C	≤ ± 1 ppm	≥ ± 0.1 ppm	≥ ± 0.1 ppm	≥ ± 5 ppm
	-20 to 70°C	≤ ± 1 ppm			
	-20 to 70°C	≤ ± 2 ppm			
	-30 to 75°C	≤ ± 2 ppm			
DFA S7-K	-40 to 85°C	≤ ± 2, 3, 5 ppm			
OPTIONS	external voltage control, external potentiometer				

TYPE		DFA 14-KHA	DFA 14-KOA	DFA 14-LHA	DFA 14-LOA
FREQ. RANGE		2 to 35 MHz			
Package		20 x 12.6 x 8.5 mm 14 pin dip/dil			
supply voltage		5V ± 5%	5V ± 5%	3.2V ± 3.6V	3.2V ± 3.6V
output load		HCMOS 15 pF or 2 TTL	clipped sine 20kΩ/5pF	HCMOS 15 pF or 1 TTL	clipped sine 20kΩ/5 pF
FREQ. STABILITY		detailed tolerances stability versus (all stabilities ≤)			
type	temp. range	temp.	Vcc. range	load ± 10%	int. trimmer pulling range
ALL MODELS	-10 to 60°C	≤ ± 1 ppm	≤ ± 0.1 ppm	≤ ± 0.1 ppm	≥ ± 5 ppm
	-20 to 70°C	≤ ± 1 ppm			
	-20 to 70°C	≤ ± 2 ppm			
	-30 to 75°C	≤ ± 2 ppm			
DFA 14-K ONLY	-40 to 85°C	≤ ± 2,3,5 ppm			
OPTIONS	external voltage control, external potentiometer				

TYPE		DFA 20-HA	DFA 20-MHA	DFA 20-SWA	DFA 20-OA
FREQ. RANGE (MHz)		1 to 27	25 to 52	4 to 27	1 to 27
Package		20.2 x 20.2 x 9.6 mm			
supply voltage		5 to 15V ± 5%		5 to 15V ± 5%	5 to 15V ± 5%
output load		HCMOS 15 pF or 2 TTL		sine 50 Ω ± 10%	clipped sine 20kΩ/5 pF
FREQ. STABILITY		detailed tolerances stability versus (all stabilities ≤)			
temp.range	temp.	Vcc. ± 5%	load ± 10%	int. trimmer pulling range	
0 to 50°C	≤ ± 0.5 ppm	≤ ± 0.1 ppm	≥ ± 0.1 ppm	≥ ± 5 ppm	
-10 to 60°C	≤ ± 1 ppm				
-20 to 70°C	≤ ± 1,2 ppm				
-30 to 75°C	≤ ± 2 ppm				
-40 to 85°C	≤ ± 3 ppm				
OPTIONS	external voltage control, external potentiometer				

TYPE		DFA 36-H	DFA 36-MH	DFA 36-SW	DFA 36-SW
FREQ. RANGE (MHz)		1 to 27	25 to 70	3 to 27	25 to 70
Package		36 x 27 x 10 mm			
supply voltage		5 to 15V ± 5%		5 to 15V ± 5%	
output load		HCMOS 15 pF or 2 TTL		sine 50 Ω ± 10%	
FREQ. STABILITY		detailed tolerances stability versus (all stabilities ≤)			
temp. range	temp.	Vcc. ± 5	load ± 10%	potentiometer pulling range	
-10 to 60°C	≤ ± 0.5, 1 ppm	≤ ± 0.1 ppm	≤ ± 0.1 ppm	≥ ± 5 ppm	
-20 to 70°C	≤ ± 1, 2 ppm				
-40 to 85°C	≤ ± 2, 3 ppm				
OPTIONS	internal trimmer, external 2 point potentiometer				

TYPE		DFA 36-MSWH	DFA 36-MEC
FREQ. RANGE (MHz)		25 to 160	25 to 160
Package		36 x 27 x 10 mm	
supply voltage		5 to 12V ± 5%	5V ± 5%
output load		sine 50 Ω ± 10%	ECL 100 K(50 Ω to 3V)
FREQ. STABILITY		detailed tolerances stability versus (all stabilities ≤)	
temp. range	temp.	Vcc. ± 5%	load ± 10%	potentiometer pulling range
-10 to 60°C	≤ ± 0.5, 1 ppm	≤ ± 0.2 ppm	≥ ± 0.2 ppm	≥ ± 5 ppm
-20 to 70°C	≤ ± 1, 2 ppm			
-40 to 85°C	≤ ± 2, 3 ppm			
OPTIONS	internal trimmer, external 2 point potentiometer			

OCXO's

TYPE		DFO 236-LSW	DFO 236-LH
FREQ. RANGE		4 to 60 MHz	
Package		36 x 27 x 12 mm	
supply voltage		5V ± 5% to 15V ± 10%	5V ± 5% to 15V ± 10%
output load		sine 50 Ω ± 10%	HCMOS 15 pF or 2 TTL
FREQ. STABILITY		detailed tolerances stability versus	
temp. range	temp.	aging/day	aging/year	short term	10 kΩ pot. pull range
-20 to 70°C	≤ ± 1x10E-7	≤ 1x10E-9	≤ 1x10E-7	≤ 1x10E-10	≥ ± 1x10E-6
-20 to 70°C	≥ ± 5x10E-8	≤ 1x10E-9	≤ 1x10E-7	≤ 1x10E-10	≥ ± 1x10E-6
stability vs. supply voltage		≤ 1 x 10E-9 for Vcc ± 10% (% V ± 5%)			
OPTIONS	external voltage control				

TYPE		DFO 236-MSW	DFO 236-MSSW	DFO 236-MH	DFO 236-MSH
FREQ. RANGE		4 to 60 MHz	4 to 20 MHz	4 to 60 MHz	4 to 20 MHz
Package		36 x 27 x 17.5 mm			
supply voltage		5V ± 5% to 15V ± 10%		5V ± 5% to 15V ± 10%	
output load		sine 50 Ω ± 10%	sine 50 Ω ± 10%	HCMOS 15 pF or 2 TTL	
FREQ. STABILITY		detailed tolerances stability versus			
temp. Range	type	temp.	aging/day	aging/year	short term	10 kΩ pot. pull range
-20 to 70°C	DFO 236-M	≤ ± 1x10E-7	≤ 1x10E-9	≤ 1x10E-7	≥ 1x10E-10	≥ ± 1x10E-6
-20 to 70°C	DFO 236-M	≤ ± 5x10E-8	≤ 1x10E-9	≤ 1x10E-7	≤ 1x10E-10	≥ ± 1x10E-6
-20 to 70°C	DFO 236-MS	≤ ± 1x10E-8	≤ 1x10E-9	≤ 1x10E-7	≤ 5x10E-11	≥ ± 5x10E-7
stability vs. supply voltage		≤ 1 x 10E-9 for Vcc ± 10% (% 5V ± 5%)				

TYPE	DFO S7-H
FREQ. RANGE	4 to 25 MHz
Package	20.2 x 15.0 x 12.0 mm SMD or 20.2 x 12.6 mm x 12.0 14 Pin dip/dil
supply voltage	5 V ± 5%
supply pwr (no load) @ 25°C	≤1W
supply pwr during warm up	≤5W
output load	HCMOS 15 pF or 2TTL

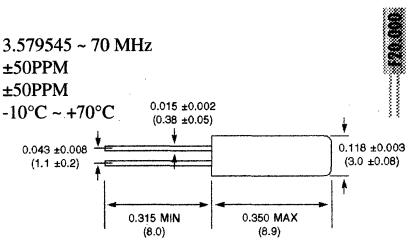
FREQ. STABILITY	detailed tolerances/stability versus				
temperature range	temp.	aging/day	aging/year	short term	10 kΩ pot pulling range
-20 to 70°C	≤ ± 1 x 10E-7	≤ ± 1 x 10E-9	≤ ± 1 x 10E-7	≤ ± 1 x 10E-10	≤ ± 1 x 10E-6
stability versus supply voltage	≥ ±2 x 10E-8 for Vcc ±5%				
OPTIONS	external voltage, 2.5V ± 2V ≥ ± 1 ppm, positive slope				

QUARTZ CRYSTAL

• PIN THRU SELECTION GUIDE — STANDARD CRYSTALS

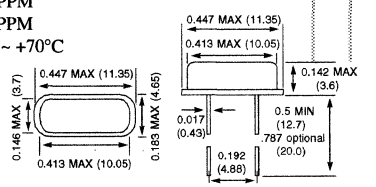
FX-3

Frequency Range 3.579545 ~ 70 MHz
Frequency Tolerance ±50PPM
Frequency Stability ±50PPM
Temperature Range -10°C ~ +70°C
• Miniature Package
• Very Small Footprint
• Cost Effective
• "AT" Strip



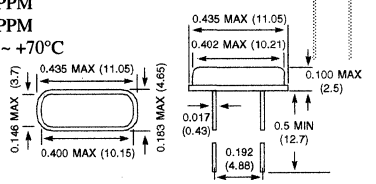
HC49S

Frequency Range 3.200 ~ 70 MHz
Frequency Tolerance ±30PPM
Frequency Stability ±50PPM
Temperature Range 0°C ~ +70°C
• 3.6mm Profile
• Industry Standard
• Cost Effective
• "AT" Strip



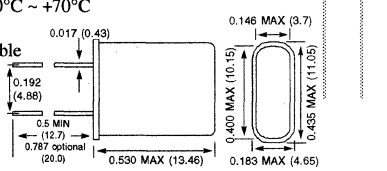
HC49SS

Frequency Range 8.000 ~ 70 MHz
Frequency Tolerance ±50PPM
Frequency Stability ±50PPM
Temperature Range 0°C ~ +70°C
• 2.5mm Profile
• Wide Freq. Range
• Standard Footprint
• "AT" Strip



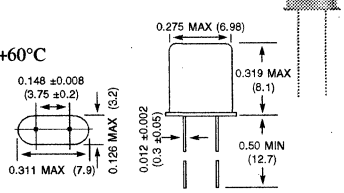
HC49U

Frequency Range 1.800 ~ 200 MHz
Frequency Tolerance ±30PPM
Frequency Stability ±50PPM
Temperature Range -20°C ~ +70°C
• Industry Standard
• Tighter Tolerances Available
• Wide Freq. Range
• **Low Cost**



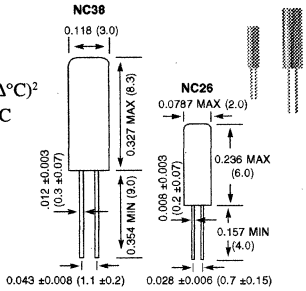
HC80

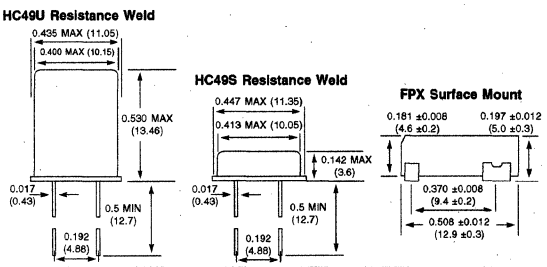
Frequency Range 3.579545 ~ 200 MHz
Frequency Tolerance ±30PPM
Frequency Stability ±50PPM
Temperature Range -10°C ~ +60°C
• Miniature Package
• Wide Frequency Range
• Tighter Tolerances Available
• Small Footprint
• Excellent Aging



NC26/NC38

Frequency Range 32.768kHz
Frequency Tolerance ±20PPM
Frequency Stability -0.04PPM / $(\Delta°C)^2$
Temperature Range -10°C ~ +60°C
• Tuning Fork
• Miniature Package
• Cold Weld Design
• Long Term Stability
• Tighter Tolerances Available
• **Low Cost**





Frequency	CL	HC49U	HC49S	FPX
1.000 **	SERIES	FOX010S	---	---
1.8432	13PF	FOX018S	---	---
2.000	20PF	FOX020S	---	---
2.097152	20PF	FOX021S	---	---
2.4576	32PF	FOX024S	---	---
3.579545	18PF	FOX036S	FOXS/036S	FPX036S
3.6864	SERIES	FOX0368S	FOXS/0368S	FPX0368S
3.6864	20PF	FOX0368-20	FOXS/0368-20	FPX0368-20
4.000	SERIES	FOX040A	FOXS/040A	FPX040A
4.000	20PF	FOX040	FOXS/040	FPX040
4.096	20PF	FOX0496-20	FOXS/0496-20	---
4.194304	12PF	FOX041	FOXS/041	---
4.433619	20PF	FOX0443	FOXS/0443	---
4.9152	SERIES	FOX049	FOXS/049	FPX049
4.9152	20PF	FOX049-20	FOXS/049-20	---
5.000	20PF	FOX05A	---	---
5.0688	SERIES	FOX050	---	---
6.000	SERIES	FOX060	---	---
6.000	20PF	FOX060-20	---	---
6.144	30PF	FOX061	---	---
6.144	20PF	FOX061-20	---	---
7.3728	SERIES	FOX073	FOXS/073	FPX073
7.3728	20PF	FOX073-20	FOXS/073-20	FPX073-20
8.000	SERIES	FOX080	FOXS/080	FPX080
8.000	20PF	FOX080-20	FOXS/080-20	FPX080-20
8.192	SERIES	FOX081	---	---
8.192	20PF	FOX081-20	FOXS/081-20	---
9.216	SERIES	FOX092	---	---
9.8304	SERIES	FOX098	FOXS/098	---
9.8304	20PF	FOX098-20	FOXS/098-20	FPX098-20
10.000	SERIES	FOX100	FOXS/100	FPX100
10.000	20PF	FOX100-20	FOXS/100-20	FPX100-20
11.000	SERIES	FOX111	---	---
11.000	20PF	FOX111-20	---	---
11.0592	SERIES	FOX115	FOXS/115	FPX115
11.0592	20PF	FOX115-20	FOXS/115-20	FPX115-20
12.000	SERIES	FOX120	FOXS/120	FPX120
12.000	20PF	FOX120-20	FOXS/120-20	FPX120-20
12.288	SERIES	FOX128	FOXS/128	FPX128
12.288	20PF	FOX128-20	FOXS/128-20	FPX128-20
14.31818	SERIES	FOX143	FOXS/143	FPX143
14.31818	20PF	FOX143-20	FOXS/143-20	FPX143-20
14.7456	SERIES	FOX147	FOXS/147	FPX147
14.7456	20PF	FOX147-20	FOXS/147-20	FPX147-20
16.000	SERIES	FOX160	FOXS/160	FPX160
16.000	20PF	FOX160-20	FOXS/160-20	FPX160-20
18.432	SERIES	FOX184	---	---
18.432	20PF	FOX184-20	---	FPX184-20
19.6608	SERIES	FOX196	---	---
19.6608	20PF	FOX196-20	---	FPX196-20
20.000	SERIES	FOX200	FOXS/200	FPX200
20.000	20PF	FOX200-20	FOXS/200-20	FPX200-20
22.1184	SERIES	FOX221	---	FPX221
22.1184	20PF	FOX221-20	---	---
24.000	SERIES	FOX240F	FOXS/240F	---
24.000	20PF	FOX240F-20	FOXS/240F-20	FPX240F-20
32.000	SERIES	FOX320 ***	---	---
32.000	20PF	FOX320-20 ***	---	---

** Frequency Tolerance = ±1000 PPM, Frequency Stability over -10°C to 60°C = ±1000 PPM (SL Cut)
*** 3rd Overtone Rev. 10/1/96

FASTFOX is a quick delivery service. Check with Fox for available frequencies.

1-888-GET-2-FOX

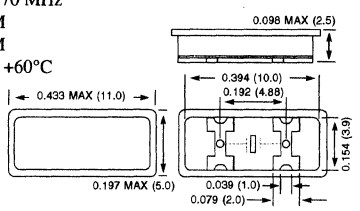
FOXElectronics 5570 Enterprise Parkway Fort Myers, Florida 33905 941-693-0099 FAX 941-693-1554 http://www.foxonline.com

QUARTZ CRYSTAL

• SURFACE MOUNT SELECTION GUIDE

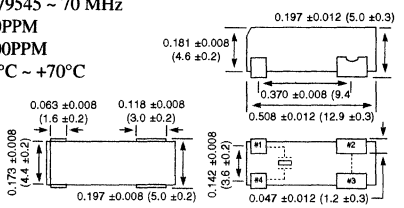
FC

Frequency Range 3.200 ~ 70 MHz
Frequency Tolerance ±50PPM
Frequency Stability ±50PPM
Temperature Range -10°C ~ +60°C
• 2.5mm Profile
• High Reliability
• Competitive Pricing



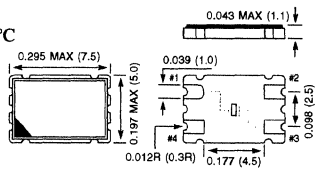
FPX

Frequency Range 3.579545 ~ 70 MHz
Frequency Tolerance ±50PPM
Frequency Stability ±100PPM
Temperature Range -10°C ~ +70°C
• Industry Standard
• Cost Effective



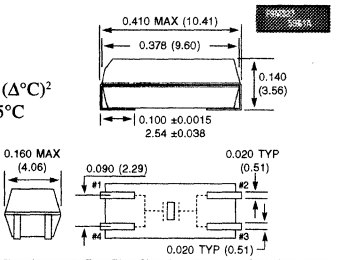
FD

Frequency Range 9.8304 ~ 100 MHz
Frequency Tolerance ±50PPM
Frequency Stability ±50PPM
Temperature Range -10°C ~ +60°C
• 1.1mm Profile
• Wide Frequency Range
• Tight Stability Option
• "AT" Cut



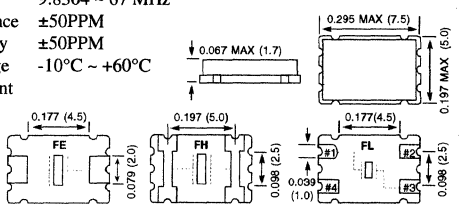
FSM327

Frequency Range 32.768 kHz
Frequency Tolerance ±20PPM
Frequency Stability -0.04PPM / (Δ°C)²
Temperature Range -40°C ~ +85°C
• SMD Watch Crystal
• Long Term Stability
• Industry Standard
• 3.56mm Profile



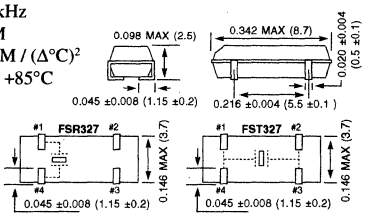
FE/FH/FL

Frequency Range 9.8304 ~ 67 MHz
Frequency Tolerance ±50PPM
Frequency Stability ±50PPM
Temperature Range -10°C ~ +60°C
• Versatile Footprint
• 1.7mm Profile
• Miniature Size
• **Low Cost**



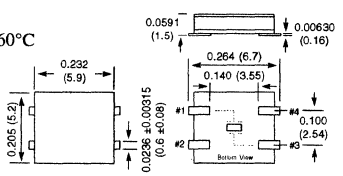
FSR327/FST327

Frequency Range 32.768 kHz
Frequency Tolerance ±20PPM
Frequency Stability -0.04PPM / (Δ°C)²
Temperature Range -40°C ~ +85°C
• SMD Watch Crystal
• Miniature Package
• Long Term Stability
• 2 Pin Connection Options



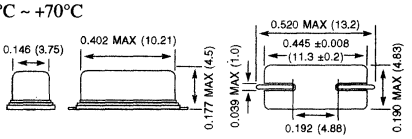
FG

Frequency Range 10.000 ~ 200 MHz
Frequency Tolerance ±10PPM
Frequency Stability ±10PPM
Temperature Range -10°C ~ +60°C
Key Features
• Wide Freq. Range
• Very Tight Stability
• 1.5mm Profile



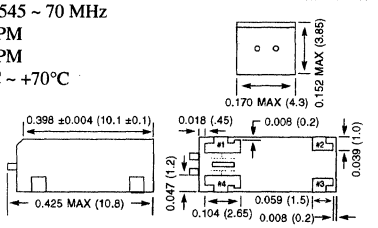
HC49SD

Frequency Range 3.200~70 MHz
Frequency Tolerance ±30PPM
Frequency Stability ±50PPM
Temperature Range 0°C ~ +70°C
Key Features
• Cost Effective
• "AT" Strip
• 4.5 mm Profile



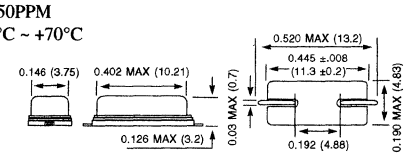
FK

Frequency Range 3.579545 ~ 70 MHz
Frequency Tolerance ±20PPM
Frequency Stability ±30PPM
Temperature Range -10°C ~ +70°C
Key Features
• Tight Tolerance
• Cost Effective
• 3.85mm Profile



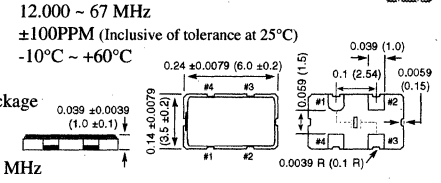
HC49SSD

Frequency Range 8.000~70 MHz
Frequency Tolerance ±50PPM
Frequency Stability ±50PPM
Temperature Range 0°C ~ +70°C
Key Features
• Cost Effective
• "AT" Strip
• 3.2 mm Profile



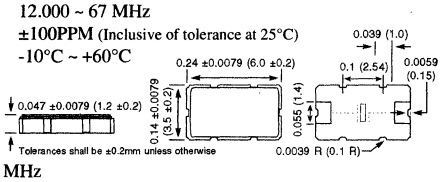
FM

Frequency Range 12.000 ~ 67 MHz
Frequency Stability ±100PPM (Inclusive of tolerance at 25°C)
Temperature Range -10°C ~ +60°C
Key Features
• Ultra Miniature Package
• 1.1mm Profile
• 2.1cc Volume
• Fundamental to 40 MHz



FQA

Frequency Range 12.000 ~ 67 MHz
Frequency Stability ±100PPM (Inclusive of tolerance at 25°C)
Temperature Range -10°C ~ +60°C
Key Features
• Cost Effective
• Resin Sealed
• 1.4mm Profile
• Fundamental to 40 MHz



1-888-GET-2-FOX

IMPORTANT

When ordering any non-standard crystals, please specify series or parallel resonance. If parallel, the load capacitance (CL) needs to be specified in picofarads _____pF.

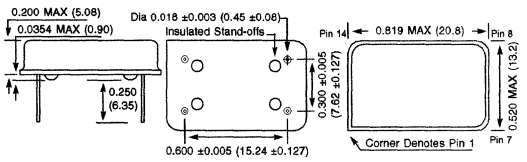
FOXElectronics 5570 Enterprise Parkway Fort Myers, Florida 33905 941-693-0099 FAX 941-693-1554 http://www.foxonline.com

CLOCK OSCILLATORS

• PIN THRU SELECTION GUIDE

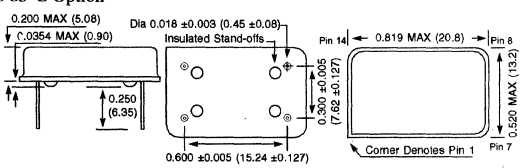
F1100E

Frequency Range 1.000~100.000MHz
Frequency Stability ±100PPM
• 10TTL
• Industry Standard
• **Low Cost**



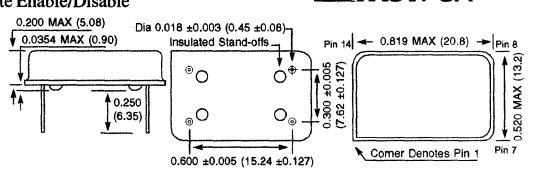
F1100H

Frequency Range 1.800~80.000MHz
Frequency Stability ±100PPM
• 10TTL
• 45/55 Symmetry
• -40°C to 85°C Option



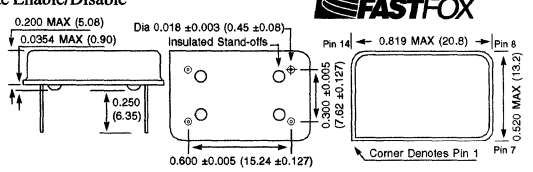
F3000

Frequency Range 1.800~120.000MHz
Frequency Stability ±100PPM (1.8~100MHz)
• HCMOS - 50pF Load
• 10TTL Fanout
• Tri-State Enable/Disable



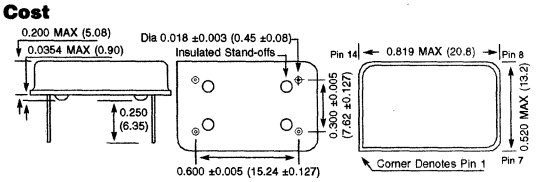
F5C-2

Frequency Range 1.800~100.000MHz
Frequency Stability ±100PPM
• 45/55 Symmetry
• Tri-state Enable/Disable



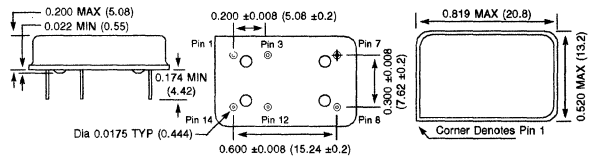
F5C-2E

Frequency Range 1.000~70.000MHz
Frequency Stability ±100PPM
• 15pF HCMOS Load
• 40/60% Symmetry
• 10TTL Fanout
• Tri-state Enable/Disable
• **Low Cost**



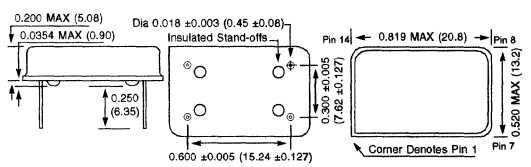
F6053A

Frequency Range 0.360~120.000MHz
Frequency Stability ±100PPM
• User Programmable
• Glitch-Free Freq. Transition
• Tri-state Enable/Disable



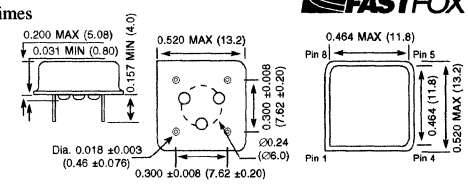
F6233

Frequency Range 0.900~135.000MHz
Frequency Stability ±100PPM
• Quick Delivery
• HCMOS/TTL
• Tri-state Enable/Disable



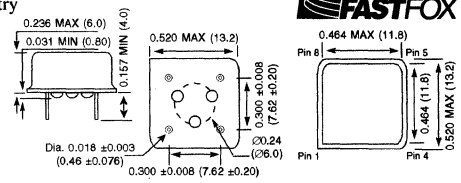
H5C-2

Frequency Range 1.8000~100.000MHz
Frequency Stability ±100PPM
• 8 Pin Dip
• Tri-state Enable/Disable
• Fast Rise/Fall Times
• HCMOS



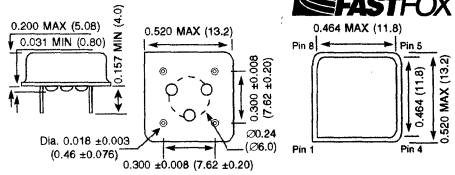
H5C-2E

Frequency Range 1.000~70.000MHz
Frequency Stability ±100PPM
• Tri-state Enable/Disable
• 40/60% Symmetry
• HCMOS
• 8 Pin Dip
• **Low Cost**



F3020

Frequency Range 1.800~100.000MHz
Frequency Stability ±100PPM
• Tri-state Enable/Disable
• 8 Pin Dip
• 10TTL Fanout
• 50pF Load



FASTFOX is a quick delivery service. Check with Fox for available frequencies.

1-888-GET-2-FOX

FOXElectronics 5570 Enterprise Parkway Fort Myers, Florida 33905 941-693-0099 FAX 941-693-1554 http://www.foxonline.com

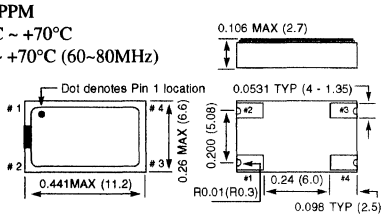
CLOCK OSCILLATORS

• SURFACE MOUNT SELECTION GUIDE

F3160/F3165

Frequency Range F3160 1.800~80.000MHz
F3165 1.800~50.000MHz
Frequency Stability ±100PPM
Temperature Range -10°C ~ +70°C
0°C ~ +70°C (60~80MHz)

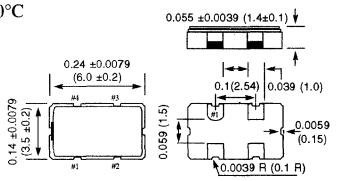
- HCMOS/TTL
- Wide Frequency Range
- F3160 up to 80 MHz
- Tri-state Enable/Disable
- Tape and Reel
- F3160 - 50pF
- F3165 - 15pF



F4200

Frequency Range 1.800~50.000MHz
Frequency Stability ±100PPM
Temperature Range -10°C ~ +70°C

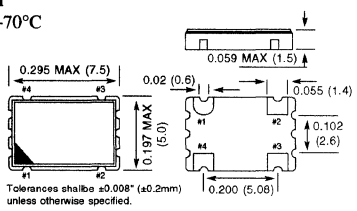
- 3.3V Operation
- Ultra-Miniature SMD
- Lower Current Standby Function (10µA MAX)
- Tape and Reel



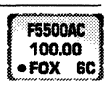
F3345/F3355

Frequency Range F3345 1.800~80.000MHz
F3355 1.800~50.000MHz
Frequency Stability ±100PPM
Temperature Range -10°C ~ +70°C

- Miniature Package
- Tri-State Enable/Disable
- Available -40° ~ +85°C
- 3000 G Shock Resistance
- F3345 - 50pF
- F3355 - 15pF
- Tape and Reel

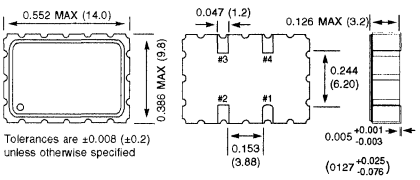


F5500



Frequency Range 30.000 ~ 170.000 MHz
Frequency Stability ±100PPM
Temperature Range -10°C ~ 70°C

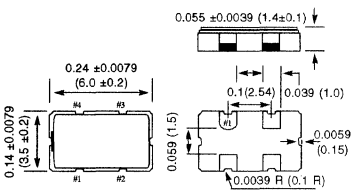
- SMD ECL
- Low Profile
- Complementary Output
- PECL Option



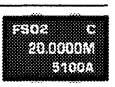
F3400/F3410

Frequency Range 1.800~50.000MHz
Frequency Stability ±100PPM
Temperature Range -10°C ~ +70°C

- TTL / HCMOS
- Ultra Miniature Pkg.
- Tri-state Enable/Disable
- F3400 - 50pF
- F3410 - 15pF
- Tape and Reel

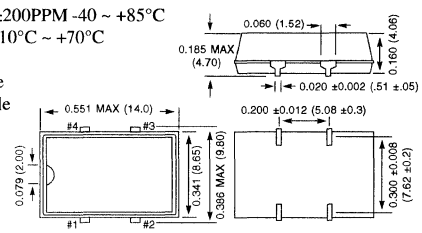


FSO-2



Frequency Range 1.025~66.667MHz
Frequency Stability ±100PPM -10 ~ +70°C
±200PPM -40 ~ +85°C
Temperature Range -10°C ~ +70°C

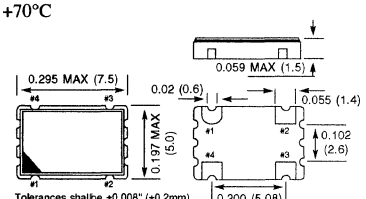
- Extended Temp. Range
- Tri-state Enable/Disable
- Solderable @ 260°C for 10 sec.
- Tape and Reel



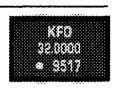
F4100

Frequency Range 1.800~67.000MHz
Frequency Stability ±100PPM
Temperature Range -10°C ~ +70°C

- 3.3V Operation
- Miniature Profile
- Lower Power Consumption
- Standby Function
- Tape & Reel

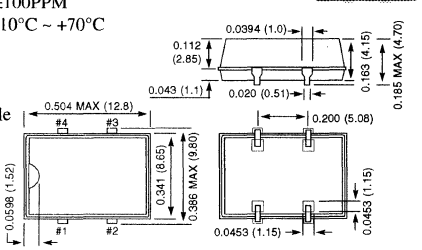


KFO90AT



Frequency Range 1.800~67.000MHz
Frequency Stability ±100PPM
Temperature Range -10°C ~ +70°C

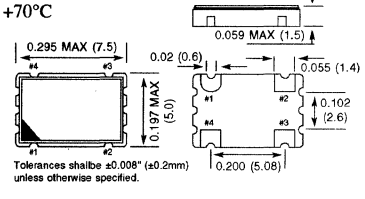
- 50pF / 10TTL
- Industry Std Footprint
- Tri-state Enable/Disable
- Fast Rise/Fall Times
- Tape and Reel



F4101

Frequency Range 1.800 ~ 67.000MHz
Frequency Stability ±100PPM
Temperature Range -10°C ~ +70°C

- 5.0V Operation
- Miniature Profile
- Standby Function
- Tape & Reel (2,000 pcs. STD)



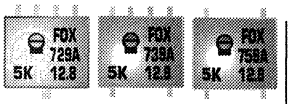
JITO™
JUST-IN-TIME OSCILLATORS™
CUSTOM AND STANDARD FREQUENCIES IN 10 DAYS
THREE PACKAGE TYPES AVAILABLE
1-888-GET-2-FOX

FOX Electronics 5570 Enterprise Parkway Fort Myers, Florida 33905 941-693-0099 FAX 941-693-1554 http://www.foxonline.com

TCXO & VCXO OSCILLATORS

• SURFACE MOUNT & PIN THRU SELECTION GUIDE

• SMD TCXO



FOX729/739/759
Frequency Range
9.600 ~ 20.000 MHz
Frequency Stability
±2.5PPM -30°C ~ 75°C

- Low Profile
- Wide Temp. Range
- Optional Voltage Control
- Optional 3.0V Supply Voltage

FOX789A
Frequency Range
9.600 ~ 20.000 MHz
Frequency Stability
±2.5PPM -30°C ~ 75°C

- Wide Temp. Range
- Standard Footprint
- Optional Voltage Control

FOX790A
Frequency Range
9.600 ~ 20.000 MHz
Frequency Stability
±1PPM -30°C ~ 80°C

- DTCXO
- 2.2mm Max Height
- Tight Stability
- Low Power Consumption
- AFC Option - 790B
- VCXO Option - 790C

FOX801
Frequency Range
10.000 ~ 22.000MHz
Frequency Stability
±2.5PPM -30°C ~ 75°C

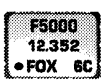
- Supply Voltage 3.0 Volts
- Clipped Sine Output
- Tight Stability
- VCTCXO Option
- **Low Cost**

• PIN THRU

FOX781B
Frequency Range
9.600 ~ 20.000MHz
Frequency Stability
±2.0 PPM -20°C ~ +70°C
±2.5 PPM -30°C ~ +70°C

- Tight Stability over Wide Temperature Range
- Adjustable Frequency
- Superior Quality

• SMD VCXO



F5000
Frequency Range
1.000 ~ 30.000 MHz
Frequency Stability ±50PPM

- Temperature Range -10 to 70 °C
- HCMOS/TTL Output
- Pullability ±100PPM
- Smaller Package than Traditional Through-Hole VCXO's
- Low Power Consumption

• PIN THRU VCXO

- HCMOS/TTL Output
- Pullability Options
- Tight Stabilities
- Low Power Consumption
- Rugged Resistance Weld

VCXO-B
Frequency Range
1.000 ~ 45.000MHz
Frequency Stability

VCXO-B1	±100 PPM	Pullability	±200 PPM
VCXO-B2	±50 PPM	Pullability	±200 PPM
VCXO-B3	±50 PPM	Pullability	±100 PPM
VCXO-B4	±25 PPM	Pullability	±100 PPM
VCXO-B5	±20 PPM	Pullability	±50 PPM

- HCMOS/TTL Output
- Pullability Options
- Tight Stabilities
- Low Power Consumption
- Rugged Resistance Weld
- **Low Cost**

VCXO-C
Frequency Range
1.000 ~ 30.000MHz
Frequency Stability

VCXO-C3	±50 PPM	Pullability	±100 PPM
VCXO-C4	±25 PPM	Pullability	±100 PPM
VCXO-C7	±25 PPM	Pullability	±50 PPM
VCXO-C8	±100 PPM	Pullability	±100 PPM

DELIVERY 5 TO 30 WORKING DAYS

FASTFOX

Fast Delivery

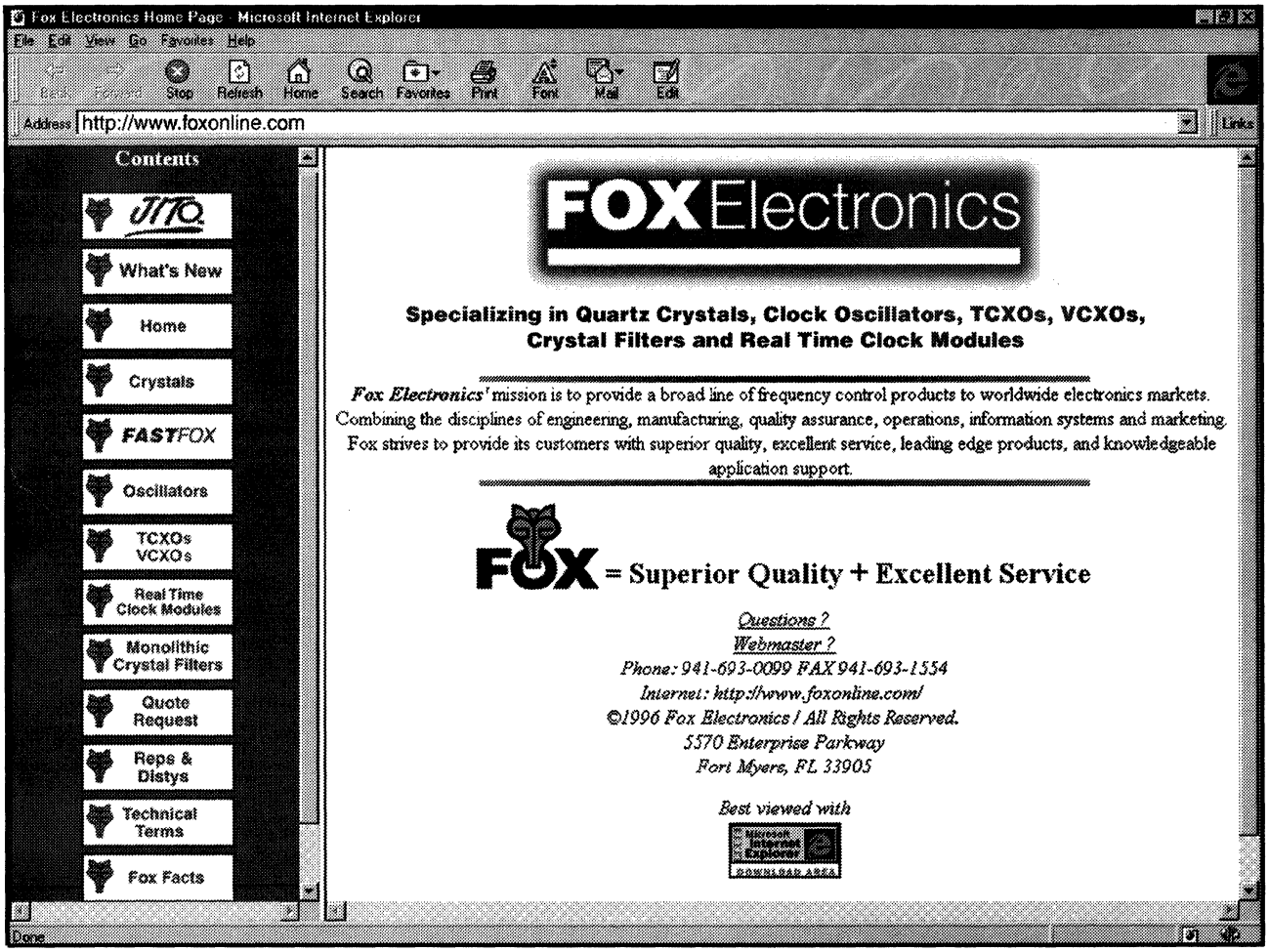
Superior Quality

Quartz Crystals
HC49U and HC50U
3 ~ 27 MHz fundamental
30 ~ 60 MHz 3rd overtone

Oscillators
F1100E 4 ~ 25 MHz
F1100H 4 ~ 70 MHz *
F3000 / F3020 1.8432 ~ 70 MHz *
F5C-2 / F5C-2E 1.8432 ~ 50 MHz
H5C-2 / H5C-2E 1.8432 ~ 50 MHz
F6053A 360 kHz ~ 120 MHz
F6233 900 kHz ~ 135 MHz
Selected frequencies between 61~70MHz

FOX WILL SOLVE YOUR "RUSH" REQUIREMENTS
1-888-GET-2-FOX

FOXElectronics 5570 Enterprise Parkway Fort Myers, Florida 33905 941-693-0099 FAX 941-693-1554 http://www.foxonline.com


Fox Electronics Home Page - Microsoft Internet Explorer
File Edit View Go Favorites Help
Stop Refresh Home Search Favorites Print Font Mail Edit
Address http://www.foxonline.com
Links
Contents
What's New
Home
Crystals
FASTFOX
Oscillators
TCXOs VCXOs
Real Time Clock Modules
Monolithic Crystal Filters
Quote Request
Reps & Distys
Technical Terms
Fox Facts
FOXElectronics
Specializing in Quartz Crystals, Clock Oscillators, TCXOs, VCXOs, Crystal Filters and Real Time Clock Modules
Fox Electronics' mission is to provide a broad line of frequency control products to worldwide electronics markets. Combining the disciplines of engineering, manufacturing, quality assurance, operations, information systems and marketing, Fox strives to provide its customers with superior quality, excellent service, leading edge products, and knowledgeable application support.
FOX = Superior Quality + Excellent Service
Questions ?
Webmaster ?
Phone: 941-693-0099 FAX 941-693-1554
Internet: http://www.foxonline.com/
©1996 Fox Electronics / All Rights Reserved.
5570 Enterprise Parkway
Fort Myers, FL 33905
Best viewed with
Done

Fox Electronics - Crystals & Oscillators
File Edit View Go Bookmarks Options Directory Window Help
CRYSTALS & OSCILLATORS
FPX060
FST327
F345 5D 40.000
F3160 16.000 5K FOX
KFO 32.0000 9517
Leading Edge Frequency Control Products
TTL/HCMOS VCXO TCXO ECL
Surface Mount and Pin Thru
FOX Electronics 5570 Enterprise Parkway Fort Myers, Fl 33905 941-693-0099 FAX 941-693-1554 http://www.foxonline.com

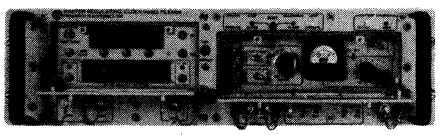
Frequency Electronics

From the basic quartz crystal, to complete time and frequency systems.

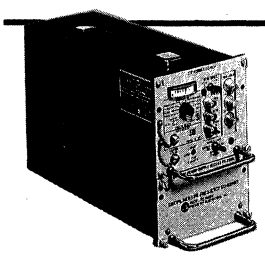
Timekeeper for Outer Space... Ask anyone who knows anything about this nation's deep space probe and satellite programs to mention any 10. Our instruments or equipment are aboard at least 8.

Hybridized Cesium Beam Primary Frequency Standard

Model FE-5440A, Option FH
Military Nomenclature (0-1824A/U)

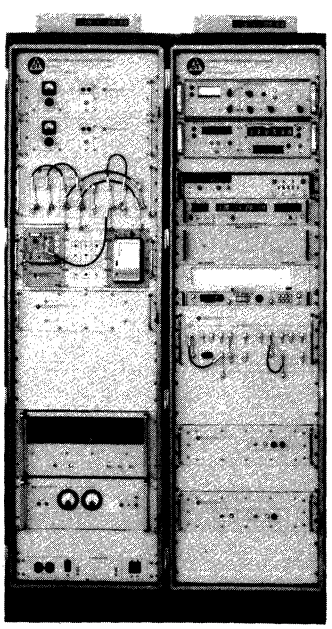


High Reliability, Militarized Cesium Beam Frequency Standards for aerospace, shipboard, laboratory and mobile applications.



Instruments

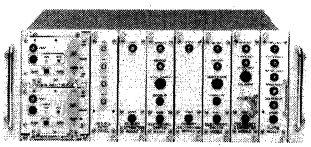
Disciplined Time Frequency Standard
Model FE-1050A
(AN/URQ-23)



Systems Capability

Communication Time and Frequency Standards
Model FE-5054A
(CTFS)

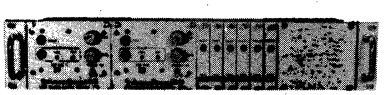
Frequency Distribution Systems



Models FE-798A/FE-799A. A militarized, high reliability RF distribution system for satellite ground stations, and shipboard, mobile, and laboratory applications.

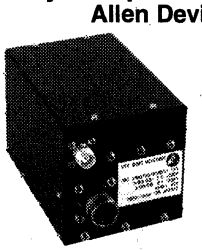
Low Cost, High Isolation Distribution Amplifier
Model FE-7923A

Low Noise, High Isolation Signal Distribution Systems
Model FE-7913A
Model FE-7914A



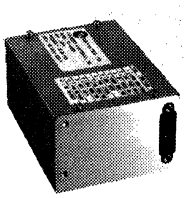
Rubidium Standards

Any Frequency from 1 Hz to 20 MHz
Allen Deviation: to 1 x $10^{-12}/\sqrt{\tau}$

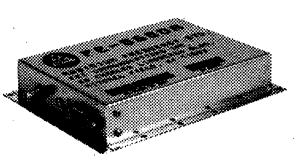


Model FE-5600M
Militarized with Excellent Environmental Specifications

Model FE-5650A
Smallest Package 3" x 3" x 1.4"



Model FE-5660A
Fits Existing Sockets



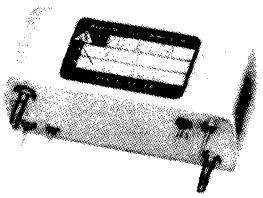
Model FE-5680A
Lowest Silhouette
Less Than 1" High

FREQUENCY ELECTRONICS, INC.
55 Charles Lindbergh Blvd., Mitchel Field, NY 11553
516-794-4500 • FAX: 516-794-4340

Frequency Electronics

Quartz Oscillators — Rubidium Standards
Cesium Standards Complete Systems

Crystal Filters And Discriminators



Class S & B Custom Hybrid Capability

Multiple Technologies - DC to 22 GHz

Thick Film - DC to 2.5 GHz
Thin Film - 100 MHz to 22 GHz
Microwave, RF, Power,
Analog, Digital
MIL-M-38510 Level "S"
or Level "B"

Satellite Frequency Generation And Distribution Equipment

Frequency synthesis, processing, and distribution of low noise reference signals have been applied to the development of high reliability hardware for satellite applications. Precision oscillators and distribution equipment configured as redundant assemblies are presently being used on a wide variety of space programs. FEI's high reliability hybrid techniques result in light weight and low power consumption.

DC/DC Converter

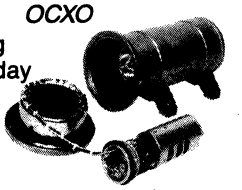
For Satellite Applications

- S Level
- 1 W-100W Output Power
- Multiple Output Capability
- Custom Designs

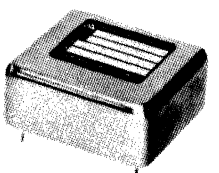
High Reliability Crystal Oscillators

OCXO

Daily Aging
$<1 \times 10^{-11}$/day

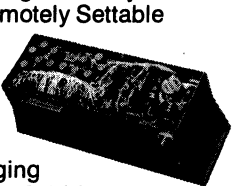


TCXO and TCVCXO



Temperature Compensated/
Voltage Controlled
Crystal Oscillators

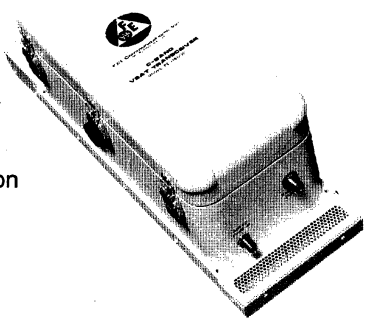
Space Application
High Stability
Remotely Settable



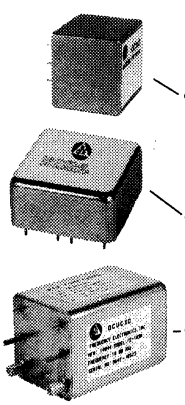
Daily Aging
< 2 to 3×10^{-11}/day

VSAT Transceiver

- Full 10 Watts at C-Band (options for 5 & 20 Watts)
- Ku Band available
- Rugged weatherproof construction
- 50,500 hours MTBF per Bellcore TR-NWT-000332



Low Noise Oscillators 5 to 20 MHz



- **FE-101A**
  Subminiature Oven Controlled Design
  Warm up less than 2 min.
- **FE-102A**
  Operation @ 100 MHz
  Phase Noise: -172 dBc
- **FE-103A**
  Double Oven Design
  Excellent Stability: 1×10^{-11}/sec

INSTRUMENTS
Disciplined Time Frequency Standards
High Stability Frequency Standards
Digital Phase Comparators
Frequency Error Analyzers
Distribution Amplifiers
Passive Combiners • Digital Clocks
Microwave Frequency Multipliers

OSCILLATORS
Ovenized Crystal Oscillators
Ovenized Voltage Controlled Crystal Oscillators
Temperature Compensated Voltage Controlled Crystal Oscillators
Non-Ovenized Crystal Oscillators
Precision Low Power Oscillators

CRYSTAL FILTERS AND DISCRIMINATORS
Narrow Band Crystal Filters
Intermediate Wide Band Crystal Filters
Band Reject Crystal Filters
Single Side Band Crystal Filters
Discriminators

SYSTEMS
Time & Frequency Control Systems
UHF Synthesizers
Frequency Generators
Coherent Microwave Synthesizers
Low Phase-Noise Frequency Sources To 20 GHz

VSAT TRANSCEIVERS & SUBCOMPONENTS

QUALIFIED DC-DC CONVERTERS
Multiple Outputs
Hybrid Switching Converters
Hybrid Linear Regulators
High Efficiency Designs

55 Charles Lindbergh Blvd., Mitchel Field, NY 11553 • 516-794-4500 • FAX: 516-794-4340

Frequency Management

A Division of The D.W. Thomas Companies, Inc.

- Fast Delivery
- Micro "P" to tight tolerances
- Prototype ➡ Production

(800) 800-9825

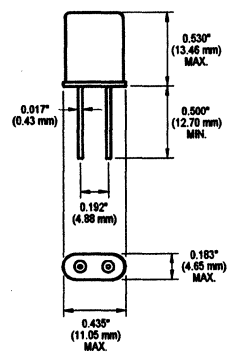
WEBSITE: www.frequencymanagement.com

"We Speak Engineering"...

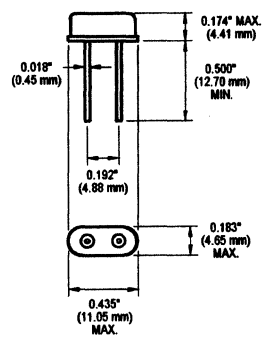
Frequency Management specializes in fast deliveries, tight tolerances, difficult designs and *we speak "engineering"*. Let our technical, sales specialists help you with your design questions. We can produce samples for evaluation and qualification, with full test and parameter data available, in as little as 24 hours. Call, fax or email your requirements and let us go to work for you! With standard deliveries of 15 working days or less you can move rapidly from prototype to production and beat your competition to market.

Crystals

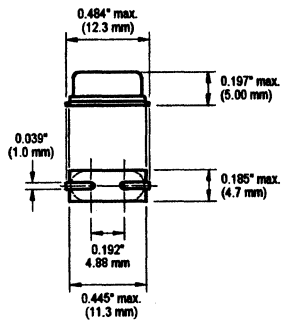
CRYSTAL PACKAGE DIMENSION



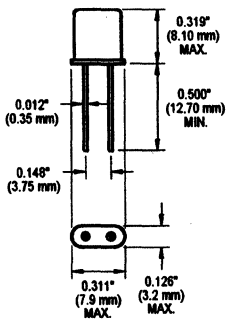
HC-49/U



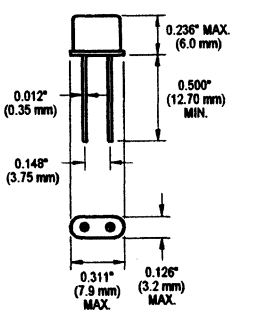
HC-49/US



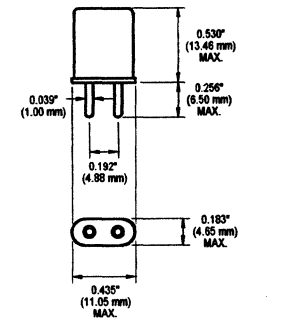
HC-49/US-SMD



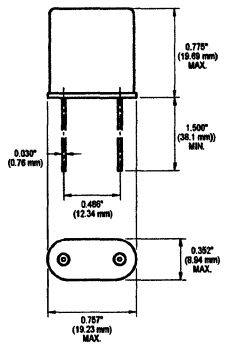
UM-1



UM-5



HC-50/U



HC-51/U

CRYSTAL PART NUMBERING SYSTEM

FMXM A1 1 18 H J A - xx.xxxxxx - CMBI

Product Family	
FMXM	Xtl MicroP
FMXT	Xtl Tight Tol.
FMXF	Xtl Filter
FMXV	Xtl VCXO
FMXX	Xtl Custom

Package Type	
A1	HC-49/U
A2	HC-49/US
A3	HC-49/US-SMD
U1	UM-1
U5	UM-5
P1	HC-50/U
L1	HC-51/U

Mode of Osc	
1	Fundamental
3	3rd Overtone
5	5th Overtone
7	7th Overtone

Load Capacitance	
18	18.0 pF (Standard CL)
00	Series Resonance
nn	Custom Spec CL in pF

Calibration Tol.	
A	±2.5 ppm
B	±5 ppm
C	±7.5 ppm
D	±10 ppm
E	±15 ppm
F	±20 ppm
G	±25 ppm
H	±30 ppm
I	±40 ppm
J	±50 ppm
K	±100 ppm
X	Custom

Temperature Tol.	
A	±2.5 ppm
B	±5 ppm
C	±7.5 ppm
D	±10 ppm
E	±15 ppm
F	±20 ppm
G	±25 ppm
H	±30 ppm
I	±40 ppm
J	±50 ppm
K	±100 ppm
X	Custom

Temp. Range Code	
A	0°C~+70°C
B	-20°C~+70°C
C	-40°C~+85°C
D	-10°C~+50°C
E	-10°C~+60°C
F	-30°C~+60°C
G	+15°C~+35°C
H	+10°C~+40°C
I	+5°C~+45°C
J	0°C~+50°C
K	-5°C~+55°C
L	-15°C~+65°C
M	-25°C~+75°C
N	-30°C~+80°C
O	-35°C~+85°C
P	-40°C~+90°C
Q	-55°C~+105°C
X	Custom

Frequency in MHz: See chart below for freq. ranges supported by Package types

Options	
TR	Tape & Reel
BI	Base Insulator
VS	Vinyl Sleeve
GB	Ground Lead-Base
GT	Ground Lead-Top
LT	Lead Trimming
LF	Lead Forming
PD	Parameter Data
TD	Temp Data
CG	Calib Grading
TG	Temp Grading
CM	Custom Mark

Frequency Ranges Supported vs. Package Types

Mode of Oscillation	HC-49/U, HC-50/U HC-51/U	HC-49/US HC-49/US-SMD	UM-1 UM-5
Fundamental	1.0 MHz - 35.0 MHz	4.0 MHz - 24.0 MHz	10.0 MHz - 65.0 MHz
3rd Overtone	24.0 MHz - 80.0 MHz	24.0 MHz - 60.0 MHz	24.0 MHz - 90.0 MHz
5th Overtone	60.0 MHz - 125.0 MHz	Not Available	60.0 MHz - 125.0 MHz
7th Overtone	120.0 MHz -150.0 MHz	Not Available	120.0 MHz - 150.0 MHz

The part numbering system lists only the most common crystal specifications.
Tighter tolerances, custom configurations, and additional requirements are all fully available.
Simply note any special requirements when placing your order or fax us your internal specification and we'll translate it all for you.

15302 Bolsa Chica Street ■ Huntington Beach, CA 92649 ■ TEL: 714-892-3234 ■ FAX: 714-890-1832 ■ E-MAIL: sales@frequencymanagement.com

(800) 800-9825

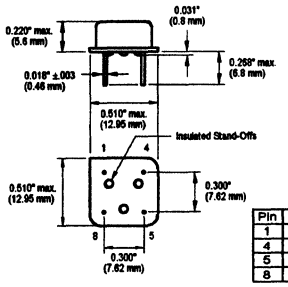
- Fast Delivery
- Micro "P" to tight tolerances
- Prototype ➡ Production

WEBSITE: www.frequencymanagement.com

Frequency Management

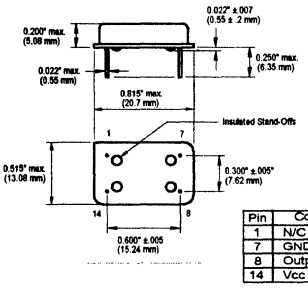
A Division of The D.W. Thomas Companies, Inc.

Oscillators



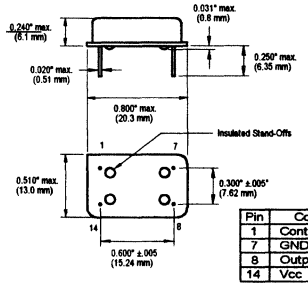
Pin	Connection
1	N/C or Tristate
4	GND
5	Output
8	Vcc

HCMOS/TTL • Half Size (8 pin DIP)



Pin	Connection
1	N/C or Tristate
7	GND
8	Output
14	Vcc

HCMOS/TTL • Full Size (14 pin DIP)



Pin	Connection
1	Control Voltage
7	GND
8	Output
14	Vcc

VCXO • Full Size (14 pin DIP)

FMOC SERIES CLOCK OSCILLATORS

General Information

Product Type	HCMOS/TTL Compatible Clock Oscillator			
Model No.	FMOC1100 Series	FMOC1800 Series	FMOC3100 Series	FMOC3800 Series
Package	14 pin DIP, .200" / 5.08mm max. ht.	8 pin DIP, .220" / 5.60mm max. ht.	14 pin DIP, .200" / 5.08mm max. ht.	8 pin DIP, .220" / 5.60mm max. ht.

Electrical Specifications

Frequency	500 kHz to 80.0 MHz	500 kHz to 60.0 MHz
Frequency Stability*	FMOC1100 / FMOC1800 ±100 ppm FMOC1150 / FMOC1850 ±50 ppm FMOC1125 / FMOC1825 ±25 ppm	FMOC3100 / FMOC3800 ±100 ppm FMOC3150 / FMOC3850 ±50 ppm FMOC3125 / FMOC3825 ±25 ppm
Operating Temperature	0°C to +70°C normal (-40°C to +85°C - Option Code "E")	0°C to +70°C normal (-40°C to +85°C - Option Code "E")
Storage Temperature	-55°C to +125°C	-55°C to +125°C
Supply Voltage (VDD)	+5.0 Vdc ±0.5 Vdc	+3.3 Vdc ±0.3 Vdc
Supply Current	15 mA max. @ 500 kHz to 24 MHz 40 mA max. @ 24 MHz to 50 MHz 50 mA max. @ 50 MHz to 75 MHz	10 mA max. @ 500 kHz to 24 MHz 25 mA max. @ 24 MHz to 60 MHz
Symmetry	40/60% normal (45/55% - Option Code "S")	40/60% normal (45/55% - Option Code "S")
Rise & Fall Time	10 ns max.	10 ns max.
Output "0" Level	0.4 Vdc max. w/TTL load, 0.5 Vdc max. w/HCMOS load	0.4 Vdc max. w/TTL load, 0.4 Vdc max. w/HCMOS load
Output "1" Level	2.4 Vdc min. w/TTL load, 4.5 Vdc min. w/HCMOS load	2.4 Vdc min. w/TTL load, 2.7 Vdc min. w/HCMOS load
Output Load	10 TTL gates / 15 pF HCMOS	10 TTL gates / 15 pF HCMOS
Start-Up Time	10 ms max.	10 ms max.
Tristate Function	Only when Tristate Function Ordered (Option Code "T") Pin 1 Level > 2.2 Vdc, Output=Enabled Pin 1 Level < 0.5 V, Output=Disabled	Only when Tristate Function Ordered (Option Code "T") Pin 1 Level > 2.2 Vdc, Output=Enabled Pin 1 Level < 0.5 V, Output=Disabled

* Inclusive of calibration tol. at 25°C, operating temperature range input, voltage change, load change, aging, shock and vibration.
For specifications deviating from those listed, please consult Frequency Management's Engineering Department.

FMVC 46 SERIES VCXO'S

General Information

Product Type	HCMOS/TTL Compatible VCXO
Model No.	FMVC46 Series
Package	14 pin DIP, .240"/6.1mm max. height

Electrical Specifications

Frequency Range	1.0MHz to 65.0 MHz			
Frequency Stability*	FMVC4600 ±100 ppm FMVC4650 ±50 ppm FMVC4625 ±25 ppm			
Operating Temperature	0°C to +70°C			
Pullability Options (Select the 2 proper min/max letter codes to be used as a part number suffix.) Deviation listed in PPM from the nominal over range. Control voltage: Nominal: 2.5 Vdc Range: 0.5-4.5 Vdc	Code	Min. Pullability	Code	Max. Pullability
	A	± 50 ppm	A	± 50 ppm
	B	± 75 ppm	B	± 75 ppm
	C	± 100 ppm	C	± 100 ppm
	D	± 125 ppm	D	± 125 ppm
	E	± 150 ppm	E	± 150 ppm
	F	± 175 ppm	F	± 175 ppm
	G	± 200 ppm	G	± 200 ppm
	—	———	H	±250ppm
	Z	Not Specified	X	Custom
Linearity	±20% max. (±10% - Option Code "L")			
Storage Temperature	-55°C to +125°C			
Supply Voltage	+5.0 Vdc ±0.5 Vdc			
Supply Current	50 mA max.			
Symmetry	40/60% normal (45/55% - Option Code "S")			
Rise & Fall Time	10 ns max.			
Output "0" Level	0.4 Vdc max. w/TTL load, 0.5 Vdc max. w/HCMOS load			
Output "1" Level	2.4 Vdc min. w/TTL load, 4.5 Vdc min. w/HCMOS load			
Output Load	10 TTL gates / 15 pF HCMOS			
Start-Up Time	10 ms max.			

* Inclusive of calibration tol. at 25°C, operating temperature range, input voltage change, load change, aging, shock & vibration.
For specifications deviating from those listed, please consult Frequency Management's Engineering Department.

OSCILLATOR PART NUMBERING SYSTEM

FMOC11 00 S/E/T - xx.xxxxxx

Frequency in MHz

Overall Stability	
00	±100 ppm
50	±50 ppm
25	±25 ppm
nn	Custom Value Customer Specified

Options	
S	Tight Symmetry 45 / 55%
E	Extended Temp. Range -40°C / +85°C
T	Tristate

Product Family	
FMOC11	HCMOS/TTL Compatible Osc., 5.0V, Full Size
FMOC18	HCMOS/TTL Compatible Osc., 5.0V, Half Size
FMOC31	HCMOS/TTL Compatible Osc., 3.3V, Full Size
FMOC38	HCMOS/TTL Compatible Osc., 3.3V, Half Size

VCXO PART NUMBERING SYSTEM

FMVC46 25 B F S/L - xx.xxxxxx

Product Family	
FMVC46	HCMOS/TTL Compatible VCXO, 5.0V, Full Size

Overall Stability	
00	±100 ppm
50	±50 ppm
25	±25 ppm
nn	Custom Value Customer Specified

Frequency in MHz

Options	
S	Tight Symmetry 45/55%
L	Linearity @ ±10%

Min. Pullability			
A	±50 ppm	F	±175 ppm
B	±75 ppm	G	±200 ppm
C	±100 ppm	—	———
D	±125 ppm	X	Custom
E	±150 ppm	Z	Not Specified

Max. Pullability			
A	±50 ppm	F	±175 ppm
B	±75 ppm	G	±200 ppm
C	±100 ppm	H	±250 ppm
D	±125 ppm	X	Custom
E	±150 ppm	Z	Not Specified

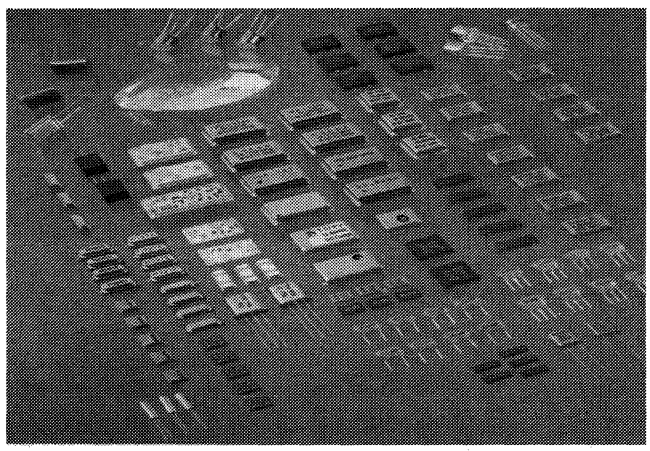
15302 Bolsa Chica Street ■ Huntington Beach, CA 92649 ■ TEL: 714-892-3234 ■ FAX: 714-890-1832 ■ E-MAIL: sales@frequencymanagement.com

hec, inc.

HOORAY ELECTRONICS CO. USA

PH: 818-879-7414 / FAX: 818-879-7417
sales@hoorayusa.com / www.hoorayusa.com

YOUR #1 DIRECT SOURCE FOR CRYSTALS OSCILLATORS RESONATORS FILTERS



CALL, FAX, OR E-MAIL US FOR A CATALOG OR QUOTE TODAY!

CRYSTAL PRODUCT SELECTION GUIDE

(not all products shown)

H-Type Crystal - UM-1 & UM-5 Pager Crystals

HC49/U	HC49/US (USS)	HC49/USM (USSM)	UM-1 PAGER XTAL	UM-5 PAGER XTAL
Very wide frequency range Industry standard Cost effective Many options available Some stock - quick delivery	Low profile Industry standard Cost effective Avail. in 3 mm H max (USS) Many options available Some stock - quick delivery	Surface mount Industry standard Cost effective Avail. in 3 mm H max (USSM) Many options available Some stock - quick delivery	HEC Specialty Low frequency Excellent reliability Third lead option Quick lead-times	HEC Specialty Miniature Package Wide frequency range Tight specification option Quick lead-times
1.00 ~ 200.00 MHz	3.2 ~ 70.00 MHz	3.2 ~ 70.00 MHz	3.6864 ~ 225.00 MHz	10.00 ~ 225.00 MHz

Surface Mount Crystals

HE3A / HE309	HE-T1-32 (S)	HE-T3-32	HE-MCC-110/125/170/250
Plastic molded SMD XTAL 4.2 mm H. max. Solder reflow Tape & Reel Slim-line profile	Surface mount watch xtal 3.56 mm or 2.5 mm (S) H Plastic molded Tape & Reel Solder re-flow	Surface mount watch xtal 2.0 mm H Plastic molded Tape & Reel Solder re-flow	Miniature ceramic base crystal unit 1.1 mm / 1.25 mm / 1.7 mm / 2.5 mm H max Tape & Reel packaging Cost effective Industry standard
3.5 ~ 60.00 MHz	32.768 kHz	32.768 kHz	Request specs. per package

Leaded Cylinder Package Crystals

HE310	HE39	HE26	HE15/HE26A	HE-CTF
Micro Miniature Size 3 x 10 mm cylinder Very slim line profile Cost effective	Micro Miniature Size 3 x 9 mm cylinder Very slim line profile Cost effective	Micro miniature size 2 x 6 mm cylinder Very slim line profile Cost effective	Miniature cylinder 1.5x5 mm / 2x6 mm Excellent Aging Cost effective	Micro miniature size Wide frequency range Very slim line profile
3.579545 ~ 4.00 MHz	4.00 ~ 60.00 MHz	12.00 ~ 30.00 MHz	32.768 kHz	20.00 ~ 615.00 kHz

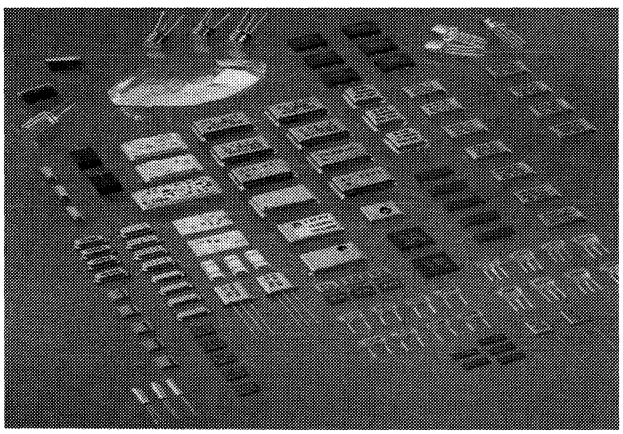
HEC, INC. HOORAY ELECTRONICS CO. USA
30961 W. AGOURA RD., SUITE 311, WESTLAKE VILLAGE, CA 91361
PHONE: 818-879-7414 / FAX: 818-879-7417 / www.hoorayusa.com

hec, inc.

HOORAY ELECTRONICS CO. USA

PH: 818-879-7414 / FAX: 818-879-7417
sales@hoorayusa.com / www.hoorayusa.com

YOUR #1 DIRECT SOURCE FOR CRYSTALS OSCILLATOR RESONATORS FILTERS



CALL, FAX, OR E-MAIL US FOR A CATALOG OR QUOTE TODAY!

OSCILLATORS, RESONATORS, FILTERS, & OTHER PRODUCT

(not all products shown)

HE SERIES DIP OSCILLATORS	HE-SMO-180 / 190	HE-SMO-120
Full or half size, HCMOS/TTL, Tristate Option	Surface mount oscillator	Surface mount oscillator
Industry standard	1.8 mm H max - lowest profile	4.7 mm H max.
Cost effective	TTL/CMOS compatible	SMD Standard Housing
Wide frequency range	Enable /disable function	TTL / CMOS Compatible
Frequency stability +/- 5 PPM ~ +/- 100 PPM	3.3 V / 5 V Operation	Enable / Disable function
Wide temperature range available	Some stock available	Some stock available
Some stock available or short lead-time		

ALL TYPES OF TCXO, VCXO, TCVCXO, AND OCXO OSCILLATORS
ECL TYPE OSCILLATORS
MONOLITHIC CRYSTAL FILTERS
CERAMIC RESONATORS: ALL PACKAGES WITH OR WITHOUT CAPACITORS
CERAMIC FILTERS
SAW CRYSTAL FILTERS
ALL OTHER TYPES OF FREQUENCY CONTROL PRODUCTS!

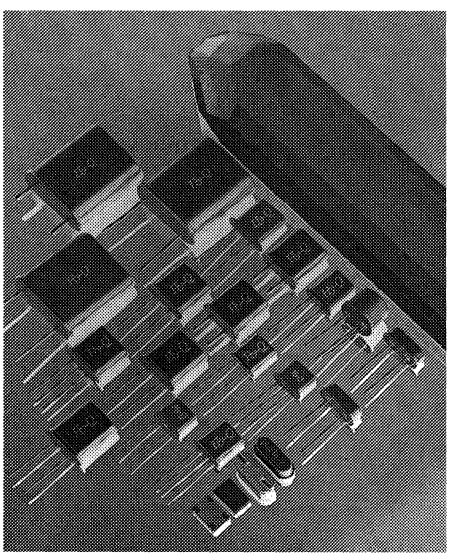
HEC MANUFACTURES TO YOUR SPECIFICATIONS. FOR COMPLETE PRODUCT GUIDE, SPECIFICATIONS, AND QUOTATION - CALL, FAX OR WRITE US AND WE WILL PROVIDE YOU WITH A QUICK RESPONSE!

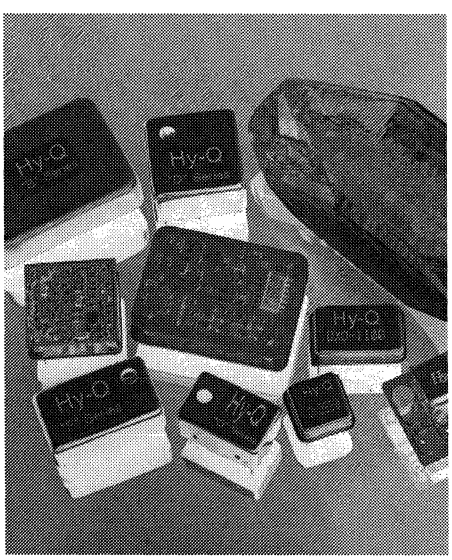
www.hoorayusa.com
sales@hoorayusa.com

HEC, INC. HOORAY ELECTRONICS CO. USA
30961 W. AGOURA RD., SUITE 311, WESTLAKE VILLAGE, CA 91361
PHONE: 818-879-7414 / FAX: 818-879-7417 / www.hoorayusa.com

Hy-Q International

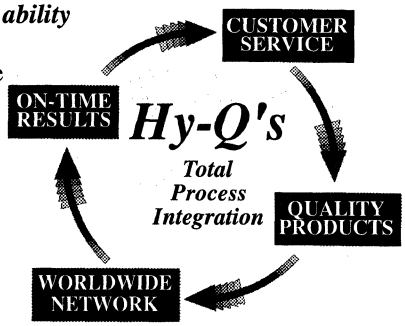
Manufacturers of Quartz Crystals, Oscillators and Filters





What gives Hy-Q International the ability to meet your requirements?
Quality and customer service are the criteria in everything we do.

What makes Hy-Q International different from the others?
While our factories and products are state-of-the-art, we still prefer to maintain personal contact with our customers. Hy-Q believes in a one-on-one approach to service. You will never have to speak to a voicemail system at Hy-Q. Our customers come back to us again and again. They know that they will talk with an efficient professional who will get them answers in the shortest possible time. An additional advantage we provide is the ability to work with your professional to design the appropriate frequency control product for your needs.
Hy-Q offers guidance from the start of the project to the fully functioning application and beyond, whether it's crystals, oscillators or filters. Our products are well-designed for the performance you want and the tolerances you need.



From Design To Prototype To Production

REGISTERED ISO 9001

SURFACE MOUNT and THROUGH HOLE

- **QUARTZ CRYSTAL**
  1-200 MHz
- **CLOCK OSCILLATORS**
  1-80 MHz
- **TCXO'S**
  4-40 MHz
- **VCXO'S**
  1-120 MHz
- **TCVCXO'S**
  4-40 MHz
- **MONOLITHIC CRYSTAL FILTERS**
  10.7; 21.4; 45; 70 & 90 MHz

APPLICATIONS

Wireless Communications
Telecommunications
Instrumentation
Satellite Communication
Avionics
Computers and Computer Peripherals

Hy-Q *International (USA), Inc.*
1438 Cox Avenue
Erlanger, KY 41018
Phone: (606) 283-5000
Fax: (606) 283-0883
www.hyqusa.com

Hy-Q International

Manufacturers of Quartz Crystals, Oscillators and Filters

Hy-Q International (USA), Inc. • 1438 Cox Ave. • Erlanger, KY 41018 • TEL: 606-283-5000 • Fax: 606-283-0883

QUARTZ CRYSTALS — *Ordering Information*

Fig. 1

	A ±100	B ±50	C ±30	D ±25	E ±20	F ±15	G ±10	H ±7.5	J ±5	M ±4	K ±3	L ±2
A -55 to +105												
B -40 to +90												
C -30 to +80												
D -25 to +75												
E -20 to +70												
F -15 to +65												
G -10 to +60												
H -5 to +55												
J 0 to +50												
K +5 to +45												
L +10 to +40												

Degree of Manufacturing Difficulty (– to +)

* Consult our technical department

Holder		Frequency Range (MHz)				
Style (QC)	Group	Fundamental	3rd Overtone	5th Overtone	7th Overtone	9th Overtone
39, 69, 61, 62, 63	A	8 to 45	25 to 90	60 to 150	125 to 175	175 to 200
36	B	1.5 to 30	15 to 90	60 to 150	125 to 175	175 to 200
38, 68	C	16 to 45	40 to 90	70 to 150	125 to 175	not available
41, 44, 45, 46	D	8 to 45	25 to 90	60 to 150	125 to 175	175 to 200
49, 50, 53, 55, 56, 59	E	3 to 45	18 to 90	60 to 150	125 to 175	175 to 200
51, 48	F	1 to 30	15 to 90	60 to 150	125 to 175	175 to 200
52, 57	G	4 to 30	18 to 90	60 to 150	125 to 175	175 to 200

Fig. 2 - 3 Column Code Ordering System

First Column (see Fig. 4) First Letter (operating temp. range in °C)	Second Letter (frequency stability in ppm)
A -55 to +105	A ±100
B -40 to +90	B ±50
C -30 to +80	C ±30
D -25 to +75	D ±25
E -20 to +70	E ±20
F -15 to +65	F ±15
G -10 to +60	G ±10
H -5 to +55	H ±7.5
J 0 to +50	J ±5
K +5 to +45	M ±4
L +10 to +40	L ±2

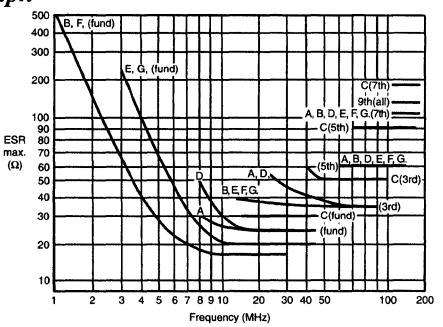
Second column (Calibration tolerance in ppm)	
01	±50
02	±30
03	±20
04	±15
05	±10
06	±7.5
07	±5
08	+45 to +65
09	+35 to +55
10	+25 to +45
11	+20 to +40
12	+15 to +35
13	+10 to +30
14	+5 to +25
15	0 to +20
16	-5 to +15
17	-15 to +5
18	-20 to 0
19	-25 to -5
20	-30 to -10
21	-35 to -15
22	-40 to -20
23	-45 to -25
24	-50 to -30
25	-55 to -35
26	-60 to -40
27	-65 to -45
28	-70 to -50
29	-75 to -55

Third column (load capacitance in pF)	
A	10
B	15
C	20
D	25
E	30
F	32
G	40
H	45
J	50
K	60
L	70
M	80
N	90
P	100
Q	18
R	150
S	series -resonant
T	35
U	55
V	65
W	75
X	85
Y	95
Z	12

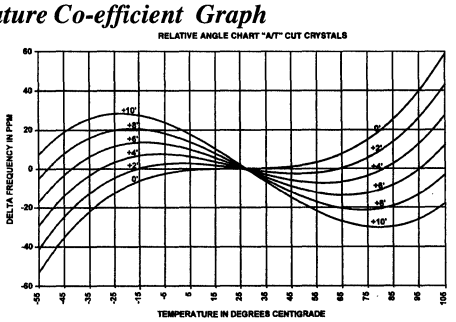
Ovenized crystal codes
stability ±0.5ppm per °C over ±2°C

code	temp(°C)
TR	45
TS	50
TT	55
TU	60
TV	65
TW	70
TX	75
TY	80
TZ	85

ESR Graph



Temperature Co-efficient Graph



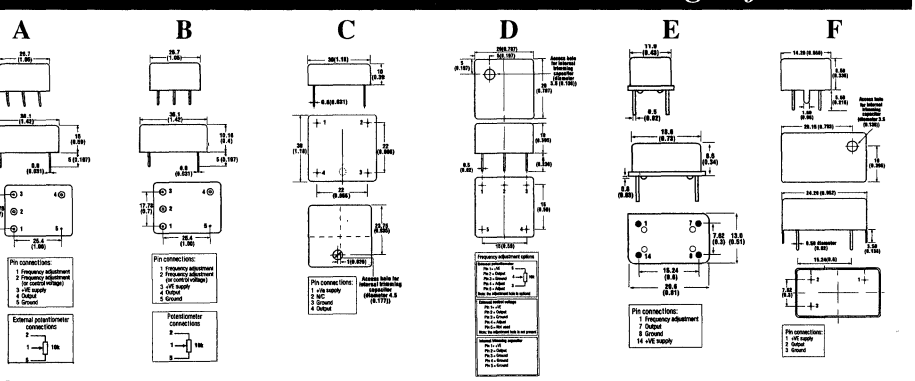
OSCILLATORS — *Ordering Information*

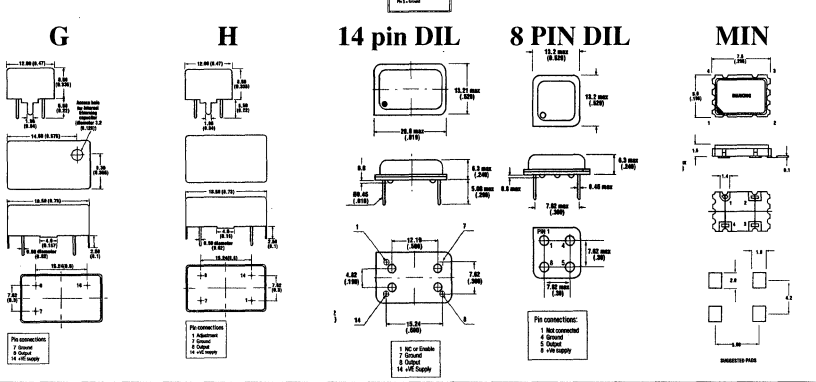
Hy-Q will give you an appraisal based on your specifications and requirements or you can use Hy-Q's unique 6 column code ordering systems detailed below:

Example:

An oscillator ordered as *A-05-PSC-2.5* means:

- package style A
- supply voltage 5V
- external potentiometer adjustment
- sinewave output stage
- operating temperature range -20 to +70°C
- frequency stability ±2.5ppm over the operating temperature range





First Column Package Style	Second Column Supply voltage (Vdc)	Third Column Adjustment method	Fourth Column Output type	Fifth Column Temperature range (°C)	Sixth Column Frequency stability (±ppm)
A	05	P external	S sinewave	A -40 to +85	0.5
B	08	pot.	T TTL	B -30 to +70	1.0
C	09		H HCMOS	C -20 to +70	1.5
D	10	V voltage		D -10 to +60	2.0
E	12	control		E 0 to +60	2.5
F	12			F 0 to +50	3.0
G		I internal	C CMOS		5.0
H		trimmer	compatible		7.5
					10
		N none			15
					20
		X Internal &			25
		External			50
		Control			

CRYSTAL OSCILLATORS
AND OVENS

ISOTEMP RESEARCH, INC.

"Your Source for Quality Oscillators"

- **Many packages and options available**
- **Stabilities from 1x10-6 to 1x10-10**
- **OCXO, TCXO, VCXO and more...**
- **OVENS for TO5, TO18, and HC-43**
- **Oscillator applications include:**
  - ✓ Cellular Base Stations
  - ✓ Paging Transmitters
  - ✓ Global Positioning Systems

P.O. BOX 3389
Charlottesville, VA. 22903
Phone: 804-295-3101
Fax: 804-977-1849
Web: www.isotemp.com
E-mail: info@isotemp.com

CERTIFIED ISO9001 MANUFACTURER

ISOTEMP RESEARCH, INC.

CRYSTAL OSCILLATORS

- Many configurations available with Printed Circuit Board or other mechanical mounts.
- AT-Cut and SC-Cut resonators are used to provide a wide range of cost and performance options.
- All new designs use surface mount technology to reduce cost, Improve quality and performance.
- A few popular models are listed below. Call, Fax or E-Mail our Sales Engineers for technical assistance.

Model / Series	Size (inches) L x W x H	Frequency Range	Features
		OCXO's	
OCXO 23	2.00 x 1.13 x 0.95	5 MHz to 50 MHz	Small size, Mech. Trim
OCXO 31	2.00 x 2.00 x 1.00	5 MHz to 20 MHz	Mechanical mounting
OCXO 33	2.00 x 2.00 x 1.00	5 MHz to 50 MHz	High stability options
OCXO 36	2.00 x 2.00 x 4.00	1 kHz to 100 MHz	Most versatile
OCXO 59	1.50 x 1.50 x 0.50	5 MHz to 50 MHz	New smaller size
OCXO 82	2.00 x 2.00 x 0.75	1 kHz to 50 MHz	Popular size, many options
OCXO 91	2.00 x 2.80 x 1.50	3 MHz to 50 MHz	High performance
OCXO 107	4.00 x 2.72 x 2.35	5 MHz to 50 MHz	Specials, dual oven
OCXO 126	2.00 x 2.00 x 2.37	0.5 MHz to 50 MHz	PCB mount or connectors
OCXO 127	2.80 x 2.40 x 1.75	1 kHz to 100 MHz	PCB mount versatile
OCXO 131	1.42 x 1.00 x 1.00	5 MHz to 30 MHz	Small European package
OCXO 134	2.91 x 2.00 x 1.40	1 kHz to 50 MHz	High stability, mechanical mount
OCXO 140	1.41 x 1.19 x 0.75	5 MHz to 50 MHz	Small size, fast warm up
OCXO 143	1.00 x 1.00 x 0.48	5 MHz to 50 MHz	Smallest size, low price
OCXO 144	1.00 x 1.00 x 0.48	5 MHz to 50 MHz	Surface Mount Package
		TCXO's	
TCXO 35	2.00 x 2.00 x 0.75	1 kHz to 100 MHz	Versatility
TCXO 50	1.80 x 1.20 x 0.60	100 kHz to 20 MHz	Lowest cost
TCXO 65	1.00 x 1.00 x 0.50	5 MHz to 20 MHz	Small size
TCXO 74	1.50 x 1.50 x 0.50	1 kHz to 50 MHz	Popular size, many options
TCXO 128	0.73 x 0.47 x 0.37	5 MHz to 40 MHz	Small size, dip pin out
TCXO 130	1.29 x 0.90 x 0.50	1 kHz to 50 MHz	Small size, dip pin out
TCXO 141	1.42 x 1.00 x 0.75	1 kHz to 50 MHz	Versatile
		VCXO's	
VCXO 105	1.50 x 1.50 x 0.50	1 kHz to 50 MHz	Custom tuning features
VCXO 129	2.00 x 2.00 x 0.90	120 MHz to 130 MHz	Low harmonics
VCXO 139	1.29 x 0.90 x 0.50	1 kHz to 50 MHz	Small size, dip pin out

OVENS

- Ovens for stabilizing quartz crystals and semiconductors.
- High gain proportional circuits operate from -30°C to +85°C.
- Your choice of input voltages and set point temperatures. Adjustable models available.
- Call, Fax or E-Mail for free application note and engineering assistance.

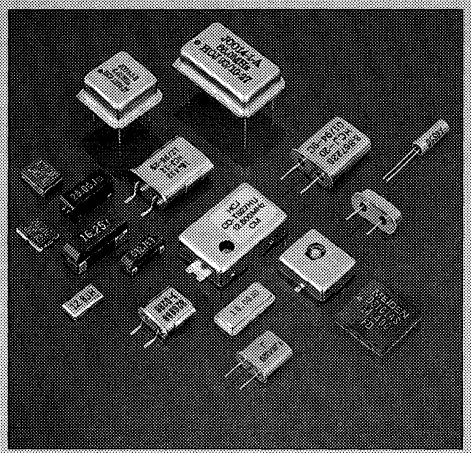
MODEL	DESCRIPTION	CRYSTAL HOLDERS
M05	PCB mount over crystal	TO-5, HC-35/U, TO-39
M18	PCB mount over crystal	TO-18, TO-72
M43	PCB mount over crystal	HC-18/U, HC-25/U, HC-42/U, HC-49/U, HC-50/U
MAJ43	PCB mount over crystal, adjustable temperature	HC-18/U, HC-25/U, HC-42/U, HC-49/U, HC-50/U
MC49	Slide on mount with connecting wire leads, positive voltage	HC-18/U, HC-25/U, HC-42/U, HC-49/U, HC-50/U
MCAJ49	Same as MC49 with adjustable temperature	HC-18/U, HC-25/U, HC-42/U, HC-49/U, HC-50/U
MC50	Slide on mount with connecting wire leads, negative voltage	HC-18/U, HC-25/U, HC-42/U, HC-49/U, HC-50/U

P.O. BOX 3389
Charlottesville, VA. 22903
Phone: 804-295-3101

Fax: 804-977-1849
Web: www.isotemp.com
E-mail: info@isotemp.com

CERTIFIED ISO9001 MANUFACTURER

MAKE IT CRYSTAL CLEAR...
MAKE IT Jauch



QTJ

Quartz-Technolgie Jauch – high-technology quartz products from Germany. Research, development and sophisticated production are brought together at QTJ to provide professional solutions. A specialized development team supported by modern production facilities, regulated by the most progressive standards, are ready to turn your needs into reality.

Hooray Electronics Co., Ltd.

Our China production plants with German technology and ISO-9002 certification.

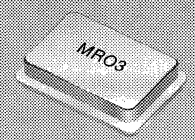
How can we help you?

By providing a first class pre and post design service which is specific to your needs. Our support teams are committed to providing solutions for you, the customer. So the sooner you contact us the better we can help you.

e-mail: **info@jauchusa.com**
web page: **www.jauchusa.com**

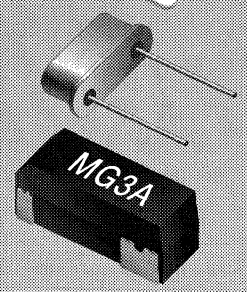
Jauch
The pulse of progress

8126 Brookwood Farm Rd.
Fulton, MD 20759-9658
Tel: 301.497.7670
Fax: 301.776.7979



Quartz Crystals in through-hole and SMD

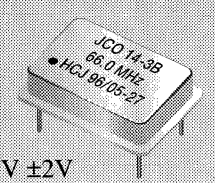
- 32.768 KHz to 250 MHz
- From ± 3ppm over 0 to +60°C
- From ±25ppm over -55 to 105°C
- Low & high profile in SMD packages
- Tape & reel
- High shock resistance



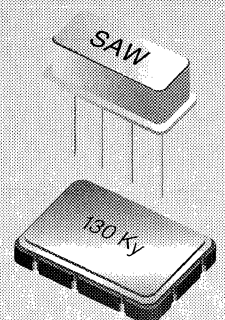
QUARTZ CRYSTALS

Oscillators in a comprehensive range of standard DIL and SMD packages.

- SMD, 7x5mm, 1.5 to 80 MHz low power, heavy load, tri-state, or 3-5V
- Full or half-size DIL, 1.0 to 100 MHz, HCMOS/TTL
- VCXO, DIL or SMD, 1.5 to 54 MHZ, ±100 ppm min pulling range from 0 to 5V
- TCXO, DIL or SMD, 9.6 to 21.25 MHz ±2.5ppm from -30 to 75°C, 3.0V, 3.2V, 5.0V
- VCTCXO, as per TCXO, control voltage: 2.5V ±2V
- DCTCXO, ±1ppm from -30 to 75°C, 9.6x11.4mm



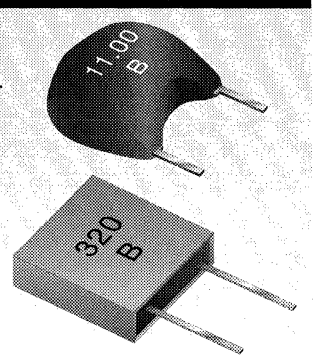
OSCILLATORS



Filter Products with high quality for modern telecommunications

- MCF filters of 10.7 MHz and 21.4 MHz
- Saw filters 82 MHz to 470 MHz

FILTERS



Ceramic Resonators that are ideal for telecom's high performance

- 190 KHz to 40 MHz
- Miniature packaging in through-hole and SMD
- Optimum size and cost for any oscillating circuit

CERAMIC RESONATORS

Crystal Clock Oscillators from MF ELECTRONICS

We guarantee specifications so you don't have to make allowances

Technology pioneers in miniature (5 x 7 x 1.9 mm) surface mount crystal clock oscillators and VCXOs.

Fast delivery on a wide range of crystal oscillators, including:

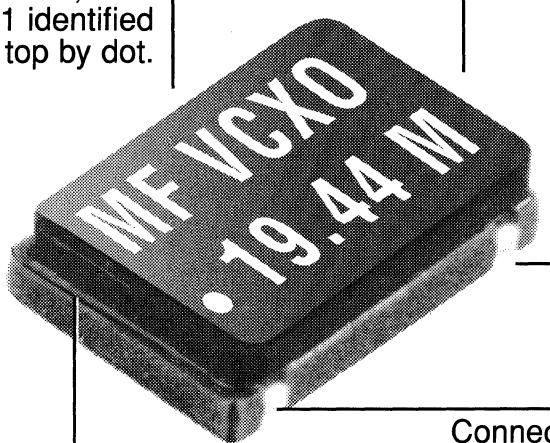
- High linearity VCXOs
- Industrial grade (-40 to +85 Deg. C)
- Extended temp range (-55 to +200 Deg. C)
- MIL and COTS versions of clocks and VCXOs
- Fast delivery on custom frequencies

Example of the leading edge technology from MF

Fixed Frequency "T"-Oscillator VCXO

Size:5x7x1.9mm
Surface Mount Package

Marking shows part number, date code and frequency. Pin 1 identified on top by dot.



Castellations enhance solder filet visibility

Connection to PCMCIA or other high density SMD circuit board.

Ceramic cover bonded with glass hermetic seal at 420º C.

MF ELECTRONICS
10 Commerce Drive, New Rochelle, NY 10801
Tel: (914) 576-6570 • Fax: (914) 576-6204
http://www.mfelectronics.com • email:mfsales@mfelec.com

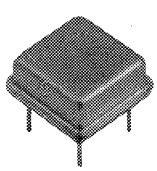
MF ELECTRONICS

Crystal Clock Oscillators

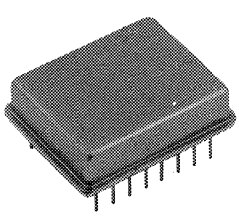
NEW! **CHECK WITH FACTORY FOR NEW 3.3V MODELS**

	Page
FIXED FREQUENCY OSCILLATORS	
5V and 3.3V, 0 - 70 Deg C Full Size DIL, Half Size DIL, Plastic Surface Mount 5 x 7 mm Tiny T Ceramic Surface Mount	2, 3
Extended Temperature Ranges thru 200 Deg C Full Size DIL, Half Size and 5 x 7 mm Tiny T Surface Mount	4
Hi Rel Military Oscillators, 1 KHz thru 125 MHz Full Size 14 pin DIL, Full Size 4 pin Dil and 5 x 7 mm Tiny-T Surface Mount	5
ECL, and PECL 0 to 75 Deg C, Full Size DIL and Half Size DIL Programable ECL, 20 to 220 MHz	6
VOLTAGE CONTROLLED OSCILLATORS	
VCXOs, 0 to 70 and -40 to +85 Deg C 5 x 7 mm Tiny-T Ceramic Surface Mount	7
VCXOs, 0 to 70 and -40 to 85 Deg C Full Size DIL	8
VCXO, Tristate, 3 to 175 MHz Full Size and Half Size	9
VCXOs, ECL Complementary thru 175 MHz Full Size and Double Size	10
OTHER OSCILLATORS	
Programmable, ECL, thru 220 MHz, Full Size DIL	11
Clockchip - Add a crystal and make your oscillator	11
PACKAGING and ENVIRONMENTAL INFORMATION	12

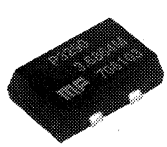
Full Size DIL



Half Size DIL



Double Dip



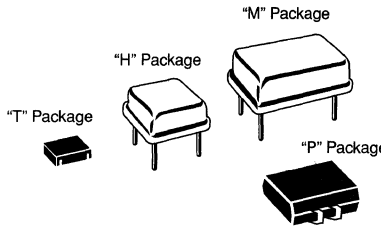
Plastic Surface Mount

Tiny-T, 5 x 7 mm Surface Mount

Half Size Gull Wing

MF ELECTRONICS
10 Commerce Drive, New Rochelle, NY 10801
Tel: (914) 576-6570 • Fax: (914) 576-6204
http://www.mfelectronics.com • email:mfsales@mfelec.com

0 to 70°C



See Page 12 for Package Outlines

5 Volts
'1280 thru '1299
'1290 thru '1299
'3290 thru '3299

3.3 Volts
'1380 thru '1399
'3390 thru '3399

GUARANTEED
CRYSTAL CLOCK OSCILLATORS
HCMOS/TTL,1 KHz to 175 MHz, 5V
HCMOS/TTL,1 KHz to 125 MHz, 3.3V
FIXED and TRISTATE
3.3 V and 5 V

FIXED FREQUENCY
These oscillators are a full range of seven stability choices, with choice of tristate, and choice of either 5 or 3.3 V operation.

TRISTATE
Tristate models are tristated from Pin 1. When Pin 1 is floating or "1", the output is normal. When Pin 1 is returned to "0", the output is tristated.

GUARANTEED JITTER
The jitter of the negative transition with respect to the positive transition (pulse width) has a standard deviation of less than 100 ps.

AGING
Less than 3 ppm first year, 1 ppm every year thereafter.

- Fixed frequency or Tristate
- Very low power when tristated
- Frequency from 1 KHz to 175 MHz (5 V) or 125 MHz at 3.3V
- Choice of
  DIL Full Size ("M"),
  Half Size DIL ("H")
  Tiny "T" 5 x 7 mm Surface Mount
  Gull Wing SMT
  "P" Plastic SMT
- Start up time less than 5 ms.
- Stability options thru .001% (10 ppm)
- Guaranteed start-up with ramping DC Supply
- 45/55 symmetry available in 5 V models
- 45/55 is standard for 3.3V models
- Internal bypass in all models except "P"

For Part Number, put package type before model number,and add frequency in MHz, for example:

M 1287 - 44.736 M

"M" is full size DIL
"H" is half size DIL
"T" is SMT "T" package
"P" is plastic package

"1287" is model type

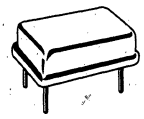
"44.736 M" frequency in MHz

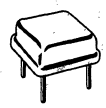
5 Volt									3.3 Volt				
40/60 Symmetry					45/55 Symmetry				45/55 Symmetry				
Fixed	T Letter ID	Enable/ Disable	Tristate	T Letter ID	Fixed	T Letter ID	Tristate	T Letter ID	Fixed	T Letter ID	Tristate	T Letter ID	Frequency Stability
'1280	A	'1290	'3290*	C	'1286	AM	'3296	AN	'1380	E	'3390	G	±100 ppm
'1281	O	'1291	'3291	P	'1991	BB	'3991	BA	'1381	AL	'3391	Q	±25 ppm
'1282	B	'1292	'3292*	D	'1992	BD	'3992	BC	'1382	F	'3392	H	±50 ppm
'1287	R	'1297	'3297	S	'1997	BN	'3997	BO	'1387	U	'3397	AC	±10 ppm
'1295	BQ	'1295	'3295	BS	'1995	BR	'3995	BT	'1385	BU	'3395	BX	±15 ppm
'1298	BF	'1298	'3298	BE	'1998	BH	'3998	BG	'1388	BV	'3398	BY	±20 ppm
'1299	BJ	'1299	'3299	BM	'1999	BK	'3999	BL	'1389	BW	'3399	BZ	±32 ppm

* "P", Plastic package in these models only

MF ELECTRONICS
10 Commerce Drive, New Rochelle, NY 10801
Tel: (914) 576-6570 • Fax: (914) 576-6204
http://www.mfelectronics.com • email:mfsales@mfelec.com

See Page 12 for Package Outlines





GUARANTEED
CRYSTAL CLOCK OSCILLATORS

EXTENDED TEMPERATURE RANGE 20 KHz to 100 MHz

Extended Temperature Range versions of our popular HCMOS/TTL model are characterized in temperatures suitable for harsh environment. Each unit undergoes rigorous testing to ensure full compliance with the specification. Unit data is available at additional cost.

- Surface Mount T package available
- Many stability/package options
- Hermetically sealed
- Low supply current

Surface Mount		DIL Full Size		DIL Half Size		Frequency Range	Frequency Stability	Temperature
Tristate	Fixed	Tristate	Fixed	Tristate	Fixed			
T3254	T1254	M3254	M1254	H3254	H1254	20 KHz to 100 MHz	±50 ppm	0 to 175°C
T3256	T1256	M3256	M1256	H3256	H1256		±75 ppm	-55 to +85°C
T3258	T1258	M3258	M1258	H3258	H1258		±100 ppm	-40 to +85°C
T4301	T4001	M4301	M4001	H4301	H4001		±500 ppm	-55 to 200°C
T4302	T4002	M4302	M4002	H4302	H4002		±500 ppm	0 to 200°C
T4303	T4003	M4303	M4003	H4303	H4003		±250 ppm	-55 to 200°C
T4304	T4004	M4304	M4004	H4304	H4004		±250 ppm	0 to 200°C
T4305	T4005	M4305	M4005	H4305	H4005		±250 ppm	-55 to 175°C
T4306	T4006	M4306	M4006	H4306	H4006		±250 ppm	0 to 175°C
T4307	T4007	M4307	M4007	H4307	H4007		±150 ppm	-55 to 175°C
T4308	T4008	M4308	M4008	H4308	H4008		±150 ppm	0 to 175°C
T4309	T4009	M4309	M4009	H4309	H4009		±100 ppm	-55 to 125°C

CRYSTALS

All crystals are processed in-house with tight angle control to assure best frequency-temperature characteristics.

PRE-SEAL BAKE

All units are vacuum baked before sealing at 175°C for 16 hours to eliminate moisture traces and pre-age units for superior aging.

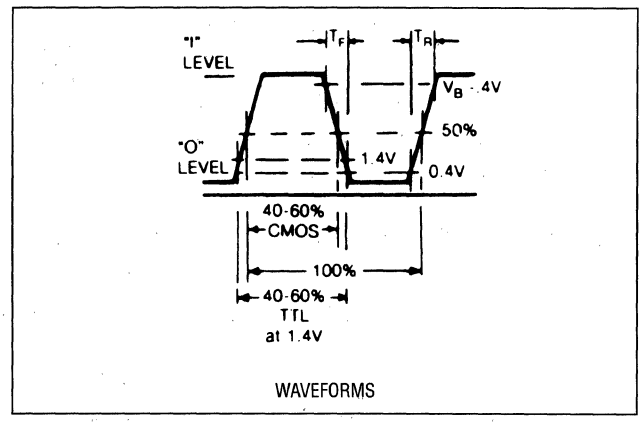
CONNECTIONS

T Package	M Package	H Package	
Pad 1.	Pin 1.	Pin 1.	NC
Pad 2.	Pin 7.	Pin 4.	Ground
Pad 3.	Pin 8.	Pin 5.	Output
Pad 4.	Pin 14.	Pin 8.	$+V_{DD}$

AGING

3 to 5 ppm, first year, typ.

1 ppm per year thereafter, typ.



WAVEFORMS

SPECIFICATIONS

Frequency 20 KHz to 100 MHz

Frequency Stability Includes calibration at 25°C, operating temperature, change of input voltage, change of load, shock and vibration.

Input Current 40 ma., max.

Output

All units, full range
Loads 3 TLL loads, or 10 LSTTL loads, or 15 pf CMOS

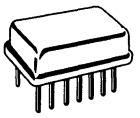
Rise and Fall Time	Maximum	Units
TTL and LSTTL from 0.4 to 2.4V	10	ns
CMOS, 15pf, from 0.4 to (V_{DD} -0.4) V	10	ns
CMOS, 30pf, from 0.4 to (V_{DD} -0.4) V	20	ns

Symmetry*

TTL and LSTTL @ 1.4V	40/60	percent
CMOS @50% V_{DD}	40/60	percent

*Superior symmetry available on all models.

MF ELECTRONICS
10 Commerce Drive, New Rochelle, NY 10801
Tel: (914) 576-6570 • Fax: (914) 576-6204
http://www.mfelectronics.com • email:mfsales@mfelec.com


"M-2" Package

"M" Package

"T" Package

GUARANTEED
CRYSTAL CLOCK OSCILLATORS

HIGH-REL MILITARY OSCILLATORS
1 KHz - 125 MHz

See Page 12 for Package Outlines

The M5500, M5516, M5622 and M5623 are DIP oscillators (XO) in a completely hermetic-sealed metal case which are sealed by resistance-weld. They are optimized for reliability by virtue of their simplicity. The T5622 and T5623 are surface mount oscillators with ceramic hermetic glass seals.

All units are intended for the most stringent application requiring the utmost in reliability. Each unit undergoes extensive screening. Test data on individual units may be had for additional cost.

- Hermetically sealed package
- Crystal specifically manufactured for oscillator with angle of cut controlled within ± 1 minute
- 168 hour Class B burn-in
- Start up time less than 10 ms.
- Extensive environment testing
- Serialized test data available
- Surface mount oscillators are T5622 and T5623

Series	Temperature of Operation	Frequency Accuracy, All Conditions
M5622, T5622	-55 to +85°C	±.005% (±50 ppm)
M5500, M5516 M5623, T5623	-55 to +125°C	±.0075% (±75 ppm)

The M5500 is a 14-pin device with case ground on Pin 1, while the M5516 has case ground on Pin 7.

CONNECTIONS

Pin	M5500	M5516	M5622, M5623	T5622, T5623
1.	Case	N.C.	Case & Electrical Ground	N.C.
2.	N.C.	N.C.	Pins 2 thru 6 are not present	Ground
3.	N.C.	N.C.		Output
4.	N.C.	N.C.		+5V
5.	N.C.	N.C.		
6.	N.C.	N.C.		
7.	Electrical Ground	Case & Electrical Ground	Case & Electrical Ground	
8.	Output	N.C.	Output Pins 9 thru 13 are not present	
9.	N.C.	N.C.		
10.	N.C.	N.C.		
11.	N.C.	N.C.		
12.	N.C.	N.C.		
13.	N.C.	N.C.		
14.	+5V	+5V	+5V	

Each unit undergoes the following:

1. Stabilization Bake	MIL-STD-883 Method 1008, Cond. B
2. Temperature Cycling	MIL-STD-883 Method 1010, Cond. B
3. Centrifuge	MIL-STD-883 Method 2001, Cond. A
4. Fine Leak	MIL-STD-883 Method 1014, Cond. A[1]
5. Gross Leak	MIL-STD-883 Method 1014, Cond. C
6. Temperature Stability	Within 75 ppm from -55 to +125°C (M5500, M5516, M5623, T5623) Within 50 ppm from -55 to +85°C (M5622 and T5622)
7. Electrical Test at 25°C	Table 1

TABLE 1 — ELECTRICAL TESTS

1. Frequency
2. Current
3. Rise Time (NL)
4. Fall Time (NL)
5. Rise Time (FL)
6. Fall Time (FL)
7. Duty Cycle (NL)
8. Duty Cycle (FL)
9. Frequency at 5.5 V
10. Frequency at 4.5 V
11. Overvoltage (6.5 volts for 30 ec.)
12. "Zero" logic level
13. "One" logic level

SPECIFICATIONS

	MIN.	TYP	MAX	UNITS
Input Voltage	4.50	5.0	5.5	volts
Frequency				
M5500, M5516, M5622, M5623	As specified from 1 KHz to 125 MHz			
T5622, T5623	As specified from 3 MHz to 80 MHz			
Input Current				
All except T		30	55	ma
T Models		20	35	ma
Frequency Accuracy	See preceding Table			
Waveform Symmetry, Measured at 1.5V	40/60		60/40	percent
Rise & Fall Times				
Below 10 MHz 0.8 to 2.4 volts		5	15	ns
10 MHz and above 0.8 to 2.4 volts		2	5	ns
"Zero" Level				
Sinking 16 ma			0.5	volts
"One" Level				
Sourcing 400 microamps	2.4			volts
Sourcing 10 ma (T, only)	4.5			volts
Frequency Change from +4.5 to +5.5V		±10		ppm

ENVIRONMENTAL DATA

See specifications on page **A**•1460.

AGING

3 to 5 ppm, first year, typ. • 1 ppm per year thereafter, typ.

MECHANICAL DESCRIPTION

Case Stainless Steel (all except T)
Ceramic, Glass Seal (T only)

Marking (All except T) MF part number, date code, serial number and description

Model	Marking Letter
T5622	V
T5623	W

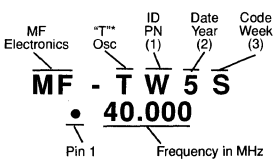
Marking will withstand MIL-STD 202, Method 215

Optional Marking Customer part number if required

Leads Alloy 52, nickel plated, gold flash

Marking (T Models) Marking will withstand MIL-STD 202, Method 215

The format for the marking is:



NOTES:
(1) One or two letters are used to identify the model. See Table 1.
(2) Number in date code is year. In example, "5" is 1995.
(3) Letter in date code is one two-weekperiod. Year is divided into 26 two-week intervals. Each two-week interval is represented by one letter of the alphabet, in sequence.

* When Marking Letter ID is two letters, the "T" is deleted.

Model	T5622 / T5623	Letter ID
	V / W	

Pads 30 microinch of gold over nickel

THE FOLLOWING APPLIES TO ALL THE DEVICES

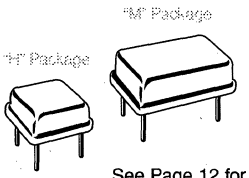
Shock MIL-STD 202, Method 213A, Test Condition 1

Vibration MIL-STD 202, Method 204B, Test Condition B

MF ELECTRONICS
10 Commerce Drive, New Rochelle, NY 10801
Tel: (914) 576-6570 • Fax: (914) 576-6204
http://www.mfelectronics.com • email:mfsales@mfelec.com

ECL OSCILLATORS in 10K LOGIC 10 MHz to 125 MHz

10 KH ,10E and ECLPS Lite LOGIC 10 MHz to 410 MHz



See Page 12 for Package Outlines

The new M2900 models feature ultra-fast ECLPS Lite logic with complementary outputs of 350 ps rise and fall times

The MF ECL oscillators are available in four common configurations. Series M1400 and M1500, use10 K logic, with and without complementary outputs are in frequencies from 10 MHz to 125 MHz.
The Models M2600, '1700, M1800 and '1900 are in 10KH or 10E logic (above 210 MHz) .

Frequency tolerances have been extended to be choice of 200ppm to 20 ppm include all effects of voltage, load and aging.

- New ECLPS Lite rise/fall times less than 350 ps
- DIL - full size or half size
- Single or dual complementary outputs
- H1900 and M1900 have Enable/Disable, reducing noise of unwanted frequency and allowing wired OR (to 210 MHz)
- Start up time less than 5 ms.
- Stability options from .02% (200 ppm) to .002% (20 ppm)
- Guaranteed start-up with ramping DC Supply
- Specified for extended temperature to 85°C, to allow for additional heat rise in confined space
- Terminating resistor may be internal - consult factory

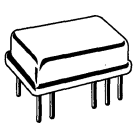
LOGIC FAMILY AND POWER CONNECTIONS

	–5 Volt Power on Pin 14		+5 Volt Power on Pin 14 (PECL)			–5 Volt Power on Pin 7		Vdd on 14 and Vee on 7	
	Single Output	Complementary Output	Single Output	Complementary Output	Enable/Disable Output	Single Output	Complementary Output	Single Output	Frequency Stability
10K Logic 10 MHz thru 125 MHz	M1400	M2400	M1500	M2500	—	—	—		±100 ppm
	M1410	M2410	M1510	M2510	—	—	—		±200 ppm
	M1436*	M2436*	M1536*	M2536*	—	—	—		±100 ppm
	M1444	M2444	M1544	M2544	—	—	—		±25 ppm
	M1445	M2445	M1545	M2545	—	—	—		±50 ppm
10KH Logic 10 MHz thru 210 MHz	M1600	M2600	M1700, H1700	M2700, H2700	M1900, H1900	M1800	M2800		±100 ppm
	M1610	M2610	M1710, H1710	M2710, H2710	M1910, H1910	M1810	M2810		±200 ppm
	M1636*	M2636*	M1736*, H1736*	M2736*, H2736*	M1936*, H1936*	M1836*	M2836*	M1850**	±100 ppm
	M1644	M2644	M1744, H1744	M2744, H2744	M1944, H1944	M1844	M2844		±25 ppm
10E Logic 210.1 to 410 MHz	M1645	M2645	M1745, H1745	M2745, H2745	M1945, H1945	M1845	M2845		±50 ppm
	M1647	M2647	M1747, H1747	M2747, H2747	M1947, H1947	M1847	M2847		±10 ppm
			M1748, H1748	M2748, H2748					±20 ppm
ECLPS Lite Logic 10 MHz thru 410 MHz				M2900 H2900					±100 ppm
				M2936*, H2936*					±100 ppm
				M2944, H2944					±25 ppm
				M2945, H2945					±50 ppm
				M2948, H2948					±20 ppm

*Guaranteed Superior Symmetry 45/55

** For M1850 only, pin 1 only is connected to case. Pin 14 is Vdd and pin 7 is Vee

"M-1" Package



See Page 12 for Package Outlines

GUARANTEED

CRYSTAL CONTROLLED OSCILLATORS

20 to 220 MHz PROGRAMMABLE ECL

MF Crystal Controlled Programmable Oscillators are programmed by user-software to generate any frequency within its range with high accuracy. The frequency may be changed at any time during power-on, by loading new vectors and the transition is smooth with minimal overshoot.

USES

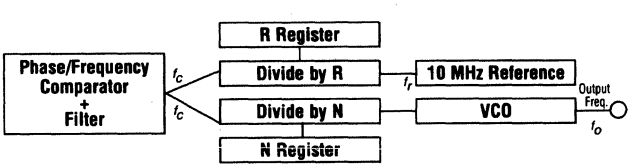
- To replace several oscillators when only one frequency is required at a time
- To reduce inventory requirements, since one device can be used for different boards requiring different frequencies
- To optimize the frequency for a system after it is assembled
- To lower the clock frequency under software control for use with ATE
- To obtain exact frequency locked to external standard

FEATURES

- Any frequency programmable from 20 MHz to 220 MHz within ±20 ppm (16 bits), often within 1 ppm
- New frequency output in less than 5 ms after data input
- Operating temperature to 85°C, to allow for additional heat rise in confined space
- Exceptionally low jitter
- 2 to 1 ratio of high frequency to low frequency
- Complementary ECL output available
- TTL/HCMOS programmable
- AC coupled external reference
- Max. programmable frequencies from 20 MHz to 220 MHz
- *Frequency = (Frequency Reference) ✶ (N ÷ R)*

  N = 16 bits, R = 15 bits

CONTROLLING THE FREQUENCY



MF ELECTRONICS
10 Commerce Drive, New Rochelle, NY 10801
Tel: (914) 576-6570 • Fax: (914) 576-6204
http://www.mfelectronics.com • email:mfsales@mfelec.com

TINY SURFACE MOUNT VCXO'S

3 MHz to 45 MHz, 5V
0 to 70° C & -40 to +85° C

5 x 7mm
x 1.9mm
Actual Size

"T" package

Surface Mount "T" Package
0 to 70° C
2002, 2006, 2008, 2021, 2022, 2024, 2031, 2032, 2034
-40 to +85° C
6002, 6021,

CAPTURE RANGE

The Frequency-Capture range is equal to the (Center-Frequency ± the Frequency Deviation), because every MF VCXO is ATE-tested to meet the Frequency-Deviation over the temperature range.
It is not necessary to reduce the capture range by the stability.

0 to 70° C OPERATING TEMPERATURE

Center Frequency is Between Two Voltages with ±50 ppm stability

MODEL	Letter ID	Control Voltage (Volts)	Guaranteed Frequency Deviation (ppm)	Control Capture Range (ppm)	Center Voltage at Center Frequency	Frequency Stability (ppm)
'2002	VA	0.3 to 4	± 75 min	± 75	1.3 to 2.3	50, max
'2006	VB	0 to 5	± 150 min	± 150	–	

Center Frequency is at 2.5 V

MODEL for ±50 ppm Guaranteed Center Stability		MODEL for ±25 ppm Guaranteed Center Stability		Control Voltage (Volts)	Frequency Deviation (ppm)	Capture Range (ppm)	Guaranteed Center Frequency Voltage (Volts)
	Letter ID		Letter ID				
'2021	VC	2031	VF	0.5 to 4.5	± 75 to 150	± 75	2.5
'2022	VD	2032	VG	0.5 to 4.5	± 100 to 200	± 100	2.5
'2024	VE	2034	VH	0 to 5	± 150 to 300	± 150	2.5

CHECK WITH FACTORY FOR NEW 3.3V MODELS

FEATURES

- Frequency from 3 MHz to 45 MHz
- 50 ppm, 75 ppm, 100 ppm and 150 ppm guaranteed pull ranges
- Start-up time less than 5 ms
- Jitter is less than 80 ps peak-to-peak
- Choice of 0 to 70°C or -40 to +85°C temperature grades
- Excellent incremental and best-straight-line linearity

-40 to +85° C OPERATING TEMPERATURE

Center Frequency is Between Two Voltages with ±50 ppm stability

MODEL	Letter ID	Control Voltage (Volts)	Guaranteed Frequency Deviation (ppm)	Control Capture Range (ppm)	Center Voltage at Center Frequency	Frequency Stability (ppm)
'6002	VL	0.3 to 4	± 75 min	± 75	1.3 to 2.3	50
'6006	VM	0 to 5	± 150 min	± 150	–	

Center Frequency is at 2.5 V with ±50 ppm stability

MODEL	Letter ID	Control Voltage (Volts)	Guaranteed Frequency Deviation (ppm)	Control Capture Range (ppm)	Center Frequency Voltage (Volts)	Frequency Stability (ppm)
'6020	VO	0.5 to 4.5	± 50 to 150	± 50	2.5	± 30 typ
'6021	VN	0.5 to 4.5	± 75 to 150	± 75	2.5	± 50

ORDERING INFORMATION

For Part Number, put package type before model number, and add frequency in MHz, as:

T 2024 – 12.352 M

"T" is SMT "T" package

"2024" is model number

"12.352 M" frequency in MHz

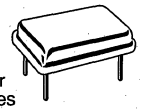
CONNECTIONS

Pad 1. Control Voltage
Pad 2. Ground
Pad 3. Output
Pad 4. +5 Volts, V_{dd}

MF ELECTRONICS
10 Commerce Drive, New Rochelle, NY 10801
Tel: (914) 576-6570 • Fax: (914) 576-6204
http://www.mfelectronics.com • email:mfsales@mfelec.com

VOLTAGE CONTROLLED CRYSTAL OSCILLATORS

1 MHz to 175 MHz, 5V
0 to 70° C & -40 to +85° C



See Page 12 for Package Outlines

Thru-hole DIL

0 to 70° C	-40 to +85° C
M2001 thru M2007	M6001 thru M6007
L2001 thru L2007	L6001 thru L6007
M2021 thru M2023	M6021 thru M6023
L2021 thru L2023	L6021 thru L6023
M2031 thru M2033	M6051 thru M6057
L2031 thru L2033	L6051 thru L6057
M2051 thru M2057	M6061 thru M6063
L2051 thru L2057	L6061 thru L6063
M2061 thru M2063	
L2061 thru L2063	M2008
M2071 thru M2073	
L2071 thru L2073	

NEW!

CHECK WITH FACTORY FOR NEW 3.3V MODELS

Generates an HCMOS or ECL frequency output which is controlled by an input voltage. The end-point frequency/voltage parameters are defined, as is the center frequency voltage range.

CAPTURE RANGE

The Frequency-Capture range is equal to the (Center-Frequency ± the Frequency Deviation), because every MF VCXO is ATE-tested to meet the Frequency-Deviation over the temperature range. ***It is not necessary to reduce the capture range by the stability.***

FEATURES

- Frequency from 1 MHz to 175 MHz
- Capture-range is fully defined, under all conditions
- Start-up time less than 5 ms.
- Low profile ECL or HCMOS above 60 MHz
- Choice of 0 to 70°C or -40 +85°C

0 to 70° C OPERATING TEMPERATURE

Center Frequency is Between Two Voltages with ±50 ppm stability

HCMOS/TTL		ECL						
1 MHz to 175 MHz				Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center Frequency	Center Frequency Stability (ppm)
Full Height	Low Profile	Full Height	Low Profile					
M2001	L2001	M2051	L2051	0.3 to 10	± 175 min	± 175	2.5 to 5.0	± 30, typ ± 50, max
M2002	L2002	M2052	L2052	0.3 to 4	± 75 min	± 75	1.3 to 2.3	
M2003	L2003	M2053	L2053	0.3 to 10	± 175 to 300	± 175	2.5 to 5.0	
M2004	L2004	M2054	L2054	0.3 to 4	± 125 min	± 125	1.3 to 2.3	
M2005	L2005	M2055	L2055	1.0 to 4	± 75 to 300	± 75	1.8 to 3.0	
M2006	L2006	M2056	L2056	0 to 5	± 150 min	± 150	—	
M2007	L2007	M2057	L2057	0.5 to 4.5	± 125 to 250	± 125	1.8 to 3.0	

Center Frequency is at 2.5 V with ±50 ppm stability

HCMOS/TTL		ECL						
1 MHz to 175 MHz		12.1 MHz to 175 MHz	60 MHz to 175 MHz	Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center Frequency	Center Frequency Stability (ppm)
Full Height	Low Profile	Full Height	Low Profile					
M2021	L2021	M2061	L2061	0.5 to 4.5	± 75 to 150	± 75	2.5	± 30, typ ± 50, max
M2022	L2022	M2062	L2062	0.5 to 4.5	± 100 to 200	± 100	2.5	
M2023	L2023	M2063	L2063	0.5 to 4.5	± 150 to 300	± 150	2.5	

Center Frequency is at 2.5 V with ±25 ppm stability

HCMOS/TTL		ECL						
1 MHz to 175 MHz		12.1 MHz to 175 MHz	60 MHz to 175 MHz	Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center Frequency	Center Frequency Stability (ppm)
Full Height	Low Profile	Full Height	Low Profile					
M2031	L2031	M2071	L2071	0.5 to 4.5	± 75 to 150	± 75	2.5	± 20, typ ± 25, max
M2032	L2032	M2072	L2072	0.5 to 4.5	± 100 to 200	± 100	2.5	
M2033	L2033	M2073	L2073	0.5 to 4.5	± 150 to 300	± 150	2.5	

-40 to +85° C OPERATING TEMPERATURE

Center Frequency is Between Two Voltages with ±50 ppm stability

HCMOS/TTL		ECL						
1 MHz to 175 MHz		12.1 MHz to 175 MHz	60 MHz to 175 MHz	Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center Frequency	Center Frequency Stability (ppm)
Full Height	Low Profile	Full Height	Low Profile					
M6001	L6001	M6051	L6051	0.3 to 10	± 175 min	± 175	2.5 to 5.0	± 40, typ ± 50, max
M6002	L6002	M6052	L6052	0.3 to 4	± 75 min	± 75	1.3 to 2.3	
M6003	L6003	M6053	L6053	0.3 to 10	± 175 to 300	± 175	2.5 to 5.0	
M6004	L6004	M6054	L6054	0.3 to 4	± 125 min	± 125	1.3 to 2.3	
M6005	L6005	M6055	L6055	1.0 to 4	± 75 to 300	± 75	1.8 to 3.0	
M6006	L6006	M6056	L6056	0 to 5	± 150 min	± 150	—	
M6007	L6007	M6057	L6057	0.5 to 4.5	± 125 to 250	± 125	1.8 to 3.0	

Center Frequency is at 2.5 V with ±50 ppm stability

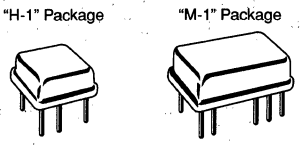
HCMOS/TTL		ECL						
1 MHz to 175 MHz		12.1 MHz to 175 MHz	60 MHz to 175 MHz	Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center Frequency	Center Frequency Stability (ppm)
Full Height	Low Profile	Full Height	Low Profile					
M6021	L6021	M6061	L6061	0.5 to 4.5	± 75 to 150	± 75	2.5	± 40, typ ± 50, max
M6022	L6022	M6062	L6062	0.5 to 4.5	± 100 to 200	± 100	2.5	
M6023	L6023	M6063	L6063	0.5 to 4.5	± 150 to 300	± 150	2.5	

M2008 and M2009

SPECIFICATIONS	M2008
Temperature of Operation	0 to 70°C (25 ppm)
	–40 to +85°C (50 ppm)
Supply Voltage	5V ± 5%
Supply Current	(CL = 15 pf)
≤10 MHz	13 ma.
≤20 MHz	17 ma.
≤25 MHz	19 ma.
Phase Jitter	<100 ps.
Output Symmetry	45/55 @ CMOS/TTL levels (<16 MHz)
	40/60 @ CMOS/TTL levels (16-25 MHz)
TR & TF (max.) (CL = 15 pf)	TR / TF
Cmos (20 to 80%)	5ns / 4ns
TTL (.5 to 2.5V)4ns	4ns / 4ns
Load	10 TTL gates, CMOS compatible
Start-up time	<10 ms
Frequency Control	
Control Voltage	0.5 – 2.5 – 4.5 Vdc
Deviation	±100 ppm min., ±150 ppm max.
Sensitivity	+50 to +75 ppm/V
Linearity	<±5%
Input Impedance	≥50 K ohms at ≤10 KHz
Modulation BW	≥20 KHz (-3db, Vc=2.5V)

MF ELECTRONICS
10 Commerce Drive, New Rochelle, NY 10801
Tel: (914) 576-6570 • Fax: (914) 576-6204
http://www.mfelectronics.com • email:mfsales@mfelec.com

NEW



See Page 12 for Package Outlines

5 Volts
'3201 thru '3207
'3220 thru '3223
'3230 thru '3233
'3240 thru '3243

GUARANTEED
CRYSTAL CLOCK OSCILLATORS

VOLTAGE CONTROLLED CRYSTAL OSCILLATORS (VCXO), 0 to 70 Deg C HCMOS *TRISTATE*, 3 MHZ to 175 MHZ, 5V

These VCXOs generates an HCMOS/TTL frequency output which is controlled by an input control voltage. The endpoint voltage/frequency parameters and the center frequency point are defined.

TRISTATE
VCXOS are tristated from Pin 1. When Pin 1 is floating or "1", the output is normal. When Pin 1 is returned to "0", the output is tristated.

JITTER
The jitter of the negative transition with respect to the positive transition (pulse width) is less than 80 ps peak to peak (15 ps RMS, typ)

CAPTURE RANGE
The frequency capture range is equal to the (Center Frequency ± Frequency Deviation), because every MF VCXO is ATE-tested to meed the Frequency-Deviation over the temperature range. **It is not necessary to reduce the capture range by the temperature stability, or aging, as in other VCXO specifications.**

FEATURES

- Very low power when tristated
- Choice of DIL Full Size ("M-1") or Half Size DIL ("H-1")
- Start up time less than 5 ms.
- Stability options thru .002% (20 ppm)
- Guaranteed start-up with ramping DC Supply
- Internal bypass in all models except "P"

For Part Number, put package type before model number,and add frequency in MHz, for example:

M 3320 - 44.736 M

"M" is full size DIL
"H" is half size DIL

"3320" is model type

"44.736 M" frequency in MHz

CENTER FREQUENCY BETWEEN TWO VOLTAGES
Center Frequency is Between Two Voltages

Model	Control Voltage (Volts)	Frequcncy Deviation (±ppm)	Guaranteed Capture Range (ppm)	ControlVoltage at Center Frequency	Center Frequency Stability (ppm)
'3201	0.3 to 10	±175 min	±175	2.5 to 5.0	
3202	0.3 to 4.0	±75 min	±75	1.3 to 2.3	±30, typ
'3203	0.3 to 10.0	±175 to 300	±175	2.5 to 5.0	
'3204	0.3 to 4.0	±125 min	±125	1.3 to 2.3	±50 max
'3205	1.0 to 4.0	±75 to 300	±75	1.8 to 3.0	
'3206	0 to 5.0	±150 min	±150	-	
'3207	1.8 to 3.0	±125 to 250	±125	2.5 to 5.0	

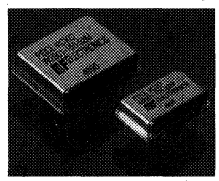
NEW!

CHECK WITH FACTORY FOR NEW 3.3V MODELS

CENTER FREQUENCY IS 2.5 VOLTS

Control Voltage (Volts)	Frequency Deviation (ppm)	Guaranteed Capture Range (ppm)	Control Voltage at Center (Volts)	MODEL Center Frequency Stability is ±50 ppm	MODEL Center Frequency Stability is ±25 ppm	MODEL Center Frequency Stability is ±20 ppm
0.5 to 4.5	±50 to 150	±50	2.5	'3220	'3230	'3240
0.5 to 4.5	±75 to 150	±75	2.5	'3221	'3231	'3241
0.5 to 4.5	±100 to 200	±100	2.5	'3222	'3232	'3242
0.5 to 4.5	±150 to 300	±150	2.5	'3223	'3233	'3243

MF ELECTRONICS
10 Commerce Drive, New Rochelle, NY 10801
Tel: (914) 576-6570 • Fax: (914) 576-6204
http://www.mfelectronics.com • email:mfsales@mfelec.com



See Page 12 for Package Outlines

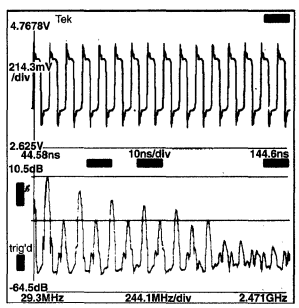
COMPLEMENTARY PECL OUTPUT
VOLTAGE CONTROLLED CRYSTAL OSCILLATORS
15 MHz to 175 MHz

These oscillators are VCXO's with complementary PECL outputs primarily designed for use thru 175 MHz with extremely fast rise and fall times. Each oscillator is computer tuned and computer tested to guarantee stability and frequency pull at 0, 25 and 70 degrees C. All oscillators will capture the rated pull at all operating temperatures.

- Used in Sonet ST33 interface for generation of the transmitter data clock.
- Will drive standard interface chips in complementary PECL.
- Duty Cycle is typically 48/52
- Three frequency deviation choices.
- Output is PECL with typical rise and fall times of 225 ps.
- Exceptional linearity with Deviation Sensitivity Ratio not exceeding 2.0.
- Package is choice of double DIL, standard DIL, with 7 pins (M1) or low profile (L1).

Waveforms taken on TEK 11801B with SD-22 Head

155.52 MHz oscillator showing no lower frequency component below 155.52 MHz. Second, and even harmonics are 21 db below fundamental. Odd harmonics which support the excellent square wave are present through the 11th harmonic.



MECHANICAL SPECIFICATIONS

Shock	1000 g's, 0.35 ms. 1/2 sine wave, 3 shocks in each plane
Vibration	10-2000 Hz of .06" d.a. or 20 g's, whichever is less
Humidity	Resistant to 85% RH at 85°C
Gross Leak	Each unit is checked in 125°C flourocarbon
Fine Leak	Mass spectrometer leak rate less than 2×10^{-8} atmos, cc/sec of helium
Pins	Alloy 52 nickel plated with 60/40 solder coat or 7 microinch gold over nickel
Bend Test	Will withstand two bends of 90° from reference
Header	Steel with nickel plate
Case	Stainless steel, type 304
Marking	Resistant to 85% RH at 85°C
Resistance to Solvents	MIL STD 202, Method 215
Storage Temperature	-55 to +125°C

CONNECTIONS

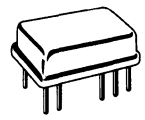
	Pin	Used For	Pin	Used For
All single DIL models	1	Control Voltage Input	8	Output 1
	2	Not Used	9	Output 2 (Complement)
	5	Not Used	14	$+V_{DD}$ (5 volts)
	7	Ground		
W2901-W2903	1	Control Voltage Input	9	Output 1
	2	Not Used	10	Output 2
	3	Not Used	11	Not used
	4	Not Used	12	Not used
	5	Not Used	13	Not used
	6	Not Used	14	Not used
	7	Not Used	15	Not used
	8	Ground, V_{SS}	16	+5 volts, V_{DD}
W2961-W2963	1	Control Voltage Input	9	Output 1
	2	Not Used	10	Output 2
	3	Not Used	11	Not used
	4	Not Used	12	Not used
	5	Not Used	13	Not used
	6	Control Voltage Input	14	Not used
	7	Not Used	15	Not used
	8	Ground, V_{SS}	16	+5 volts, V_{DD}

ELECTRICAL SPECIFICATIONS

Input Voltage, V_{DD}	+5 VDC (PECL)			
Temperature of Operation	0 to 70°C			
Input Current, including load current of both outputs	MIN.	TYP	MAX	UNITS
at 4.5 V		60		ma
at 5.0 V		68		ma
at 5.5 V		76	82	ma
Output Levels (PECL), at 5.0 V_{DD}				
"0" Level		3.2	3.37	volts
"1" Level	4.02	4.1		volts
Symmetry, differential		48/52	45/55	
Input Impedance	50	1000		Kohms
Control Voltage Bandwidth	10	20		Khz
Frequency Stability				
Pull Voltage, all models	0	0.5 to 4.5	15	Volts, DC
Jitter, with Tektronix 11801B & SD22 in jitter color measurement (at 155.52M)		80	100	ps, Pk-Pk
Linearity, from best staight line, percent of total		5	10	%
Rise Time (20 to 80%)	100	225	350	ps
Fall Time (20 to 80%)	100	225	350	ps
Deviation Sensitivity Ratio, maximum, worst case			20	

Part Number				Control Voltage for Nominal (Center) Freq	Frequency Stability @ Center	Frequency Deviation	
One DIL Wide		Double DIL Wide					
Standard Height	Low Profile	V control on Pin 1	V control on Pin 6			0.5 volts	4.5 volts
M2901	L2901	W2901	W2961	2.5 volts	±20 ppm	-50 to -100 ppm	50 to 100 ppm
M2902	L2902	W2902	W2962			-75 to -150 ppm	75 to 150 ppm
M2903	L2903	W2903	W2963			-100 to -200 ppm	100 to 200 ppm

MF ELECTRONICS
10 Commerce Drive, New Rochelle, NY 10801
Tel: (914) 576-6570 • Fax: (914) 576-6204
http://www.mfelectronics.com • email:mfsales@mfelec.com



"M-1" Package

See Page 12 for Package Outlines

GUARANTEED
CRYSTAL CLOCK OSCILLATORS

PHASE-LOCKED VCXO
10 MHz to 32.768 MHz

PHASE-LOCKED VCXO

Used to lock a stable frequency to a reference, the M2010 & M2015 combine the essential elements of a phase-locked-loop: the voltage controlled crystal oscillator and the phase detector. The crystal-controlled center-frequency is specified usually as a multiple of the reference frequency. To complete the loop, external dividers are required to match the frequency of the VCXO with the incoming signal. M2011 & M2016 have cases grounded.

DESCRIPTION

Both the reference frequency, or a submultiple, and a submultiple of the oscillator frequency are input to the device. The two similar frequencies are compared, and an error signal is obtained which is applied to the VCXO. The VCXO frequency is then corrected and "locked" to the reference frequency.

The VCXO frequency, usually chosen at a convenient frequency higher than the reference frequency, may then be used to generate desired timing waveforms.

- Center Frequency chosen from 10 MHz to 32.768 MHz
- Saving of the phase detector eliminates one IC
- Center frequency may be chosen at convenient frequency to create edges for desired timing waveforms
- Simplicity of design - requires only dividers to complete the loop
- Guaranteed start-up with ramping DC Supply • Start up time less than 10 ms.
- Inputs are TTL/HCMOS compatible

Frequency Capture Range		
M2010, M2011	Center Frequency	±125 ppm
M2015, M2016	Center Frequency	±150 ppm

APPLICATIONS

- Regenerating noisy signal
- Frequency multiplication

PACKAGE

The package is DIL with correct pin locations for a standard 14-pin DIL package, using only 7 of the pins. It is a true hermetic, with glass-metal seals, but without glass standoffs. Please consult factory, if a plastic insulator is desired.

SPECIFICATIONS

Temperature
Operating 0 to 70°C
Storage -55 to +125°C

Frequency Range 10 MHz to 32.768 MHz.

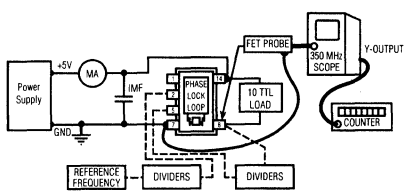
	MIN.	TYP	MAX	UNITS
Input Voltage	4.5	5.0	5.50	volts
Input Current (max. @ 5.5 VDC)		42	50	ma
Output Levels				
"0" Level, sinking 16 ma.		0.4	0.5	volts
"1" Level, sourcing 8 ma.	V_{DD} -.4			volts
Rise & Fall Times				
from 0.8 to 2.4 V, 10 TTL		2.5	4	ns
Symmetry				
10 TTL, @ 1.4 V		45/55	40/60	percent
Input Requirements for Pins 2 and 5				
Input Frequency, square wave, 60 KHz*				
Sinking at 0.4 V		0.6	1.6	ma
Sourcing at 2.4 V		100	400	microamp.

* For higher frequency, please consult factory.

CONNECTIONS

Pin 1.	Not Used
Pin 2.	Frequency Input #1
Pin 5.	Frequency Input #2
Pin 7.	Ground return *
Pin 8.	Output Frequency
Pin 9.	+5 V
Pin 14.	+5 V
All other pins are not present	

* M2011 and M2016 have case connected to pin 7.



When ordering please specify both reference frequency and output frequency

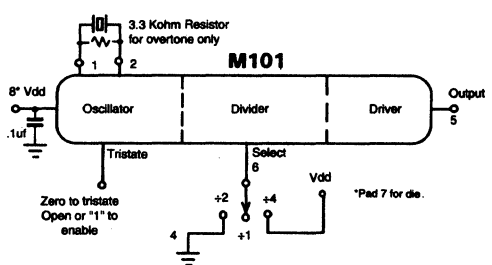
IC CLOCKCHIP®
CRYSTAL CLOCK OSCILLATOR CHIP M101
1.5 to 50 MHz

APPLICATIONS

- PCMCIA Cards
- Chip-on-Board (COB)
- Cost and space reduction
- Frequency flexibility

FEATURES

- Micropackage for surface mount is only 1.07 mm, max. seated height (.042")
- Required PCB area is only .118 x .193"
- Crystal frequency from 1.5 to 50 MHz
- Typical symmetry of 48/52 or better
- High drive capability



The M101 is a crystal oscillator IC chip which delivers voltages for HCMOS and/or TTL for 5 volt or 3 volt systems. With the required bypass capacitor and crystal, it will generate a clock at any frequency from 1.5 MHz to 36 MHz, using crystals in the range from 6 to 36 MHz, and with the addition of a resistor, any overtone crystal may be used to generate from 20 to 50 MHz. Tristate is standard, but if not needed, it may be left unconnected.

Two frequency dividers allow user-selectable division by 2 or 4 by on-board dividers. The robust output is identical with or without division, driving HCMOS or TTL.

M101M Plastic Miniature — **MSOP-8** .118 x .193 x .044" high

M101P Plastic — **SOIC-8** .196 x .244 x .068" high

M101C Chip in Waffle Pack

M101W Wafer

MF ELECTRONICS
10 Commerce Drive, New Rochelle, NY 10801
Tel: (914) 576-6570 • Fax: (914) 576-6204
http://www.mfelectronics.com • email:mfsales@mfelec.com

PACKAGING AND ENVIRONMENTAL INFORMATION

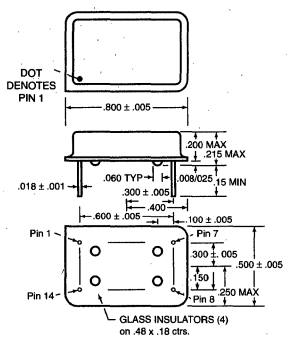
ENVIRONMENTAL SPECIFICATIONS, ALL PACKAGES

Temperature Cycle
Not to exceed ±5 ppm change when exposed to 2 hours maximum at each temperature from 0 to 120°C, with 25°C reference.

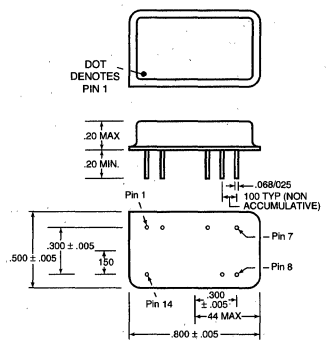
Shock
1000 G's, 0.35 ms, 1/2 sine wave, 3 shocks in each plane

Vibration
10-2000 Hz of .06" d.a. or 20 G's, whichever is less

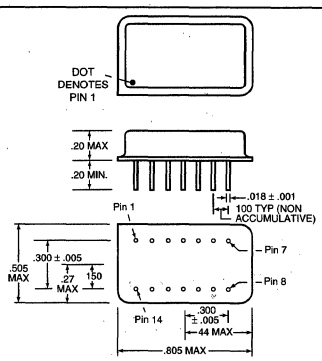
Humidity
Resistant to 85° R.H. at 85°C



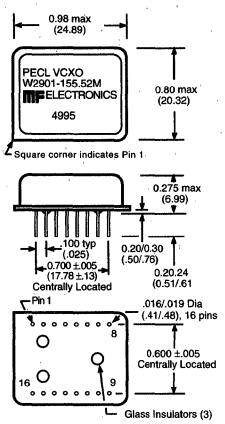
"M" Package - "L" Package is same as "M" but seated height is 0.190"



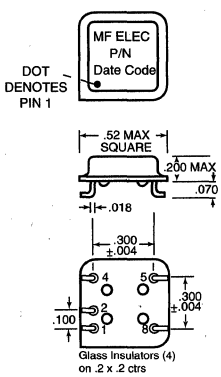
"M-1" Package



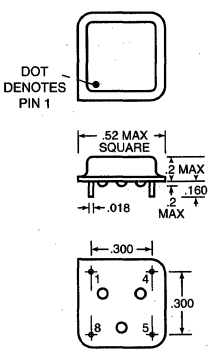
"M-2" Package



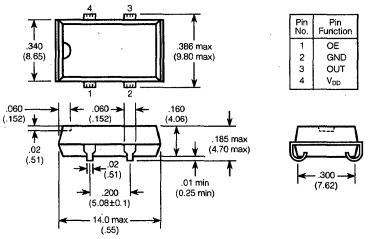
"W" Package



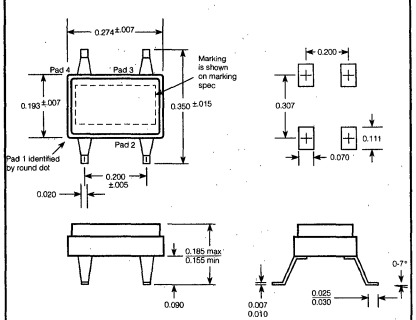
"H-1" with Gull Wing



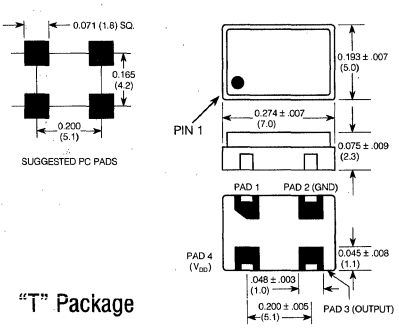
"H" Package



"P" Package

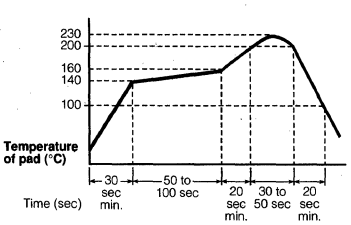


"I" Package



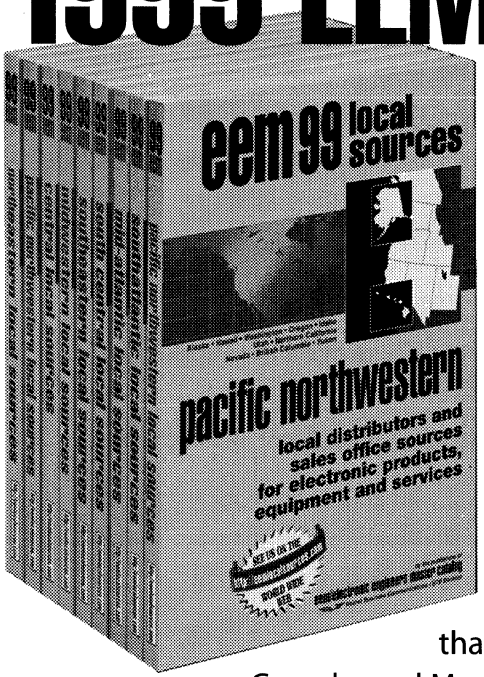
"T" Package

Soldering Profile for "T" Package



MF ELECTRONICS
10 Commerce Drive, New Rochelle, NY 10801
Tel: (914) 576-6570 • Fax: (914) 576-6204
http://www.mfelectronics.com • email:mfsales@mfelec.com

1999 EEM Local Sources



You found the part, now you can find the localsource... in print and on-line!

You use EEM/Electronic Engineers Master all the time to find the components you need. But what about a local source for the part?

Now you can turn to **EEM Local Sources** for all your local distributors. This valuable time saver is printed in nine regional editions that cover the United States, Canada, and Mexico, and is on the World Wide Web at **http://eemlocalsources.com.**

EEM Local Sources is a comprehensive directory to local distributors and sales offices for the manufacturers listed in EEM and in EEM's sister publication, the IC MASTER. For easy reference, the **EEM Local Sources** product index lists the products in both EEM and the IC MASTER.

You found the part, now you can find the local source in EEM Local Sources!

EEM Local Sources is your direct link to the distributors and sales offices in your local area. In print, there are nine regional editions:

- ▶ Northeastern
- ▶ Midwestern
- ▶ Mid Atlantic
- ▶ Central
- ▶ South Atlantic
- ▶ Pacific Northwestern
- ▶ Southeastern
- ▶ Pacific Southwestern
- ▶ South Central

To order

a printed copy of the **1999 EEM Local Sources** for your region, contact Marie Botta at:

Hearst Business Communications, Inc.
645 Stewart Avenue
Garden City, NY 11530
(516) 227-1314 • FAX (516) 227-1453
Credit Card Hotline: 1-800-833-7138

See us on the World Wide Web at http://eemlocalsources.com

EEM Local Sources is published annually in October.

micro networks corporation

Master Clock Oscillators
Programmable Clock Oscillators
Frequency Multipliers
Voltage Controlled Crystal Oscillators
Custom Frequency Control Products

Micro Networks Corporation 324 Clark Street, Worcester, MA 01606 Tel: (508) 852-5400 Fax (508) 853-8296
Email: sales@mnc.com Web site: http://www.mnc.com

Our family of precision frequency control products provide high accuracy, stability and low jitter performance required by high performance computer, ATE and communications systems (SONET/SDH). Our standard products include master clock synthesizers, both fixed-frequency and programmable, phase-locked frequency multipliers and VCXO's covering the 60MHz to 1000MHz frequency range. In addition, Micro Networks can also address your semi-custom and custom frequency control product needs for digitally-controlled VCXO's, synchronous clock distribution systems and other clock functions via our stable of standard clock oscillator architectures.

Micro Networks, your source for high-performance, low-jitter clock circuits.

Programmable Master Clock Synthesizers (No Software Required)

HyperCLK!™

Model	M115-2	M115-3	M115-4	M115-5	M115-6	M115-7	M115-8	UNITS
Frequency Range	60-100	115-175	175-225	225-335	350-535	525-819	819-1000	MHz
Frequency Resolution	100	100	100	200	200	200	200	kHz

- All devices are programmed via a static parallel word and can be implemented with hardwiring, jumpers, DIP switches, or via digital control
- Devices offer 15ppm stability over a 0°C to +70°C range
- Devices provide PECL-compatible, single-ended AC outputs
- Devices are packaged in a standard 24-pin DIP configuration

Master Clock Oscillators

Model	Frequency	Stability Options	Phase Jitter (RMS)	Temperature Range (°C)	Output Format	Package Type
M101 Series	300MHz to 1GHz	10ppm to 40ppm	3psec	0 to +70 -25 to +85	ECL or PECL	24-pin DIP
HyperCLK!™ M102 Series	200MHz to 1GHz	10ppm to 40ppm	3psec	0 to +70 -25 to +85	ECL or PECL	24-pin DIP

HyperCLK!™ - Micro Networks' HyperCLK™ series features fixed-frequency and programmable low-noise oscillators which are available in as little as a few weeks! Products include master clock oscillators and VCXOs ranging from 200MHz to 1GHz in ECL or PECL as well as programmable master clock synthesizers ranging from 60MHz to 1GHz. Please contact the factory for more information regarding the HyperCLK™ program.

micro networks corporation

Visit our Web site http//:www.mnc.com
for full data on our complete product line

nsai
I.S. EN ISO 9001

324 Clark Street, Worcester, MA 01606-1293 Tel: (508) 852-5400 • FAX: (508) 853-8296
Email: sales@mnc.com • Web site: http://www.mnc.com

micro networks corporation

Master Clock Oscillators
Programmable Clock Oscillators
Frequency Multipliers
Voltage Controlled Crystal Oscillators
Custom Frequency Control Products

Micro Networks Corporation 324 Clark Street, Worcester, MA 01606 Tel: (508) 852-5400 Fax (508) 853-8296
Email: sales@mnc.com Web site: http://www.mnc.com

Phase-Locked Frequency Multipliers

Model	Output Frequency	Multiplication Factor	Skew Fout to Fref	Phase Jitter (RMS)	Output Format	Package Type
M200/210 Series	200MHz to 650MHz	2-255	1.5nsec	3psec	ECL or PECL	24-pin DIP
M201/211 Series	200MHz to 1GHz	32, 33, 64, or 65	1.5nsec	3psec	ECL or PECL	24-pin DIP

VCXO's

Model	Center Frequency Range	Sensitivity	Modulation Bandwidth	Phase Jitter (RMS)	Accuracy @ Vc=2.5V	Temperature Range (°C)	Logic Format	Package Type
M300 SONET/SDH Series	350-650MHz	30ppm/V	DC to 5kHz	2.5psec	10ppm	0 to +70 -40 to +85	ECL or PECL	24-pin or SMT
M302 Series	200MHz to 1GHz	30ppm/V	DC to 2kHz	2psec	10ppm	0 to +70 -25 to +85	ECL or PECL	24-pin DIP or SMT

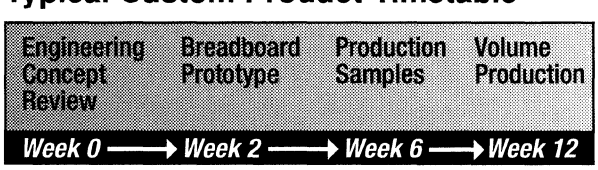
M500 Low Skew, Clock Distribution Models

Model	Frequency	Reference	Control Functions	Output	Package Type
M500	to 1000MHz	External References	Ref Select, Freq Margin, Output Enable, External Clock	Skew-controlled Synchronous Outputs	SMT

Custom Product Development

Need a custom design ASAP? We can respond in *weeks*, instead of months. That's because we've developed a variety of standard clock architecture "building blocks" which can be modified or adapted to your individual application quickly and painlessly.

Typical Custom Product Timetable



In just a few, short weeks you have a fully tested and characterized breadboard prototype to validate your clock system concept. Production sample quantities are then available in just a few more weeks, with volume production scheduled according to your needs.

micro networks corporation

Visit our Web site http//:www.mnc.com for full data on our complete product line

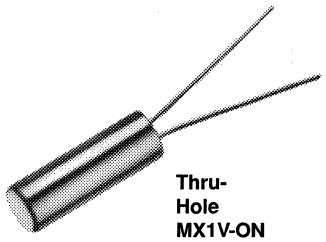
nsai
I.S. EN ISO 9001

324 Clark Street, Worcester, MA 01606-1293 Tel: (508) 852-5400 • FAX: (508) 853-8296
Email: sales@mnc.com • Web site: http://www.mnc.com

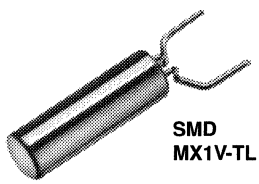
VISA MasterCard

MICRO QUARTZ CRYSTAL RESONATORS

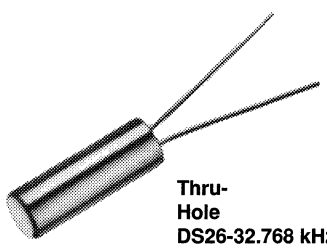
Round Metal Can, Tuning Fork Resonator SMD & Thru-Hole
Frequency Range: 30 - 200 kHz
MX1V-ON, MX1V-TL & DS26-32.768 kHz



Thru-Hole MX1V-ON



SMD MX1V-TL



Thru-Hole DS26-32.768 kHz

FEATURES:
- Small metal package 2 x 6 mm
- Very price competitive
- SMD-version in tape and reel
- High stability
- Low aging
- Low power consumption
- High shock and vibration resistance
- DS26-32.768 kHz watch crystal

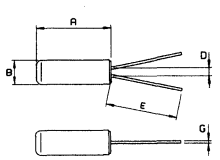
SPECIFICATIONS:
Typical Frequency Adjustment:
±30 ppm (Tighter or wider tolerances available on request)
Operating Temperature Range:
MX1V-ON & MX1V-TL
Industrial: – 40° to + 85°C
Military: – 55° to + 85°C
DS26-32.768 kHz: –10° to + 60°C
Shock Resistance:
5000 g, 0.3 ms, ½ sine
Vibration Resistance:
20 g/10 - 2000 Hz
Aging: ±3 ppm maximum first year

VERSIONS:
* MX1V-ON: For Pierce oscillators-Thru-Hole
** MX1V-TL: For Pierce oscillators-SMD
* DS26-32.768 kHz

* For thru-hole mounting
** For surface mounting at max. 260°C/20 sec.

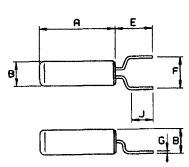
DIMENSIONS:

Thru-hole MX1V-ON



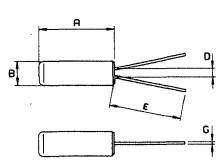
Dim.	Inches	mm
A	0.24	6.1
B	0.08	2.0
D	0.03	0.7
E	0.23	5.9
G	0.01	0.2

SMD MX1V-TL



Dim.	Inches	mm
A	0.24	6.1
B	0.08	2.0
E	0.12	3.0
F	0.10	2.54
G	0.01	0.2
J	0.08	2.0

DS26-32.768 kHz



Dim.	Inches	mm
A	0.24	6.1
B	0.08	2.0
D	0.03	0.7
E	0.23	5.9
G	0.01	0.2

FOR DESIGN AND ORDERING ASSISTANCE CONTACT:

Phone: 847-818-9825
Fax: 847-818-9915
e-mail: sales@mcrystal.com

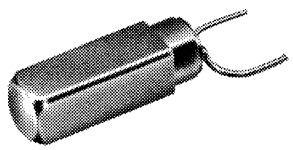
Micro Crystal a Division of SMH (U.S.), Inc.
601 Campus Drive, Suite B4
Arlington Heights, IL 60004

MICRO QUARTZ CRYSTAL RESONATORS

Square Metal Can, Tuning Fork Resonator
Frequency Range: 30 - 200 kHz

SMD

MS1V-TK



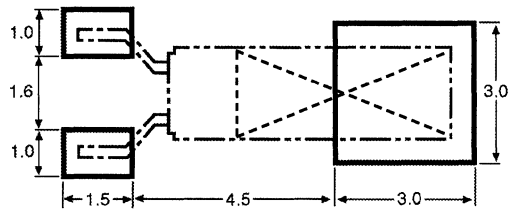
NEW!

FEATURES:

- Small 2 × 2 × 6 mm rectangular metal package facilitates pick-and-place
- Very price competitive
- In tape and reel
- High stability
- Low aging
- Low power consumption
- High shock and vibration resistance

Recommended Solder Pad Layout:

MSIV-TK



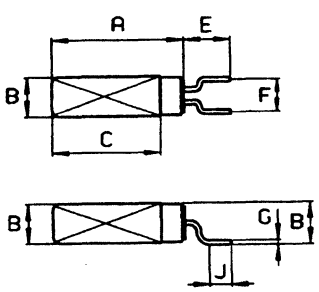
Dimensions in mm

SPECIFICATIONS:

Typical Frequency Adjustment:
±30 ppm (Tighter or wider tolerances available on request)
Operating Temperature Range:
Industrial: – 40° to + 85°C
Military: – 55° to + 85°C
Shock Resistance:
5000 g, 0.3 ms, ½ sine
Vibration Resistance:
20 g/10 - 2000 Hz
Aging: ±3 ppm maximum first year

DIMENSIONS:

MSIV-TK



Dim.	Inches	mm
A	0.24	6.1
B	0.08	2.0
C	0.19	4.9
E	0.08	2.0
F	0.10	2.54
G	0.01	0.2
J	0.04	1.0

VERSION:

MS1V-TK: For Pierce oscillators.
0.10" (2.54 mm) lead spacing
For surface mounting at
max. 260°C/20 sec.

FOR DESIGN AND ORDERING ASSISTANCE CONTACT:

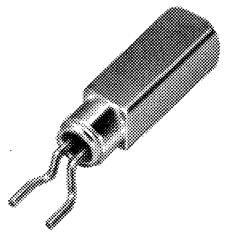
Phone: 847-818-9825
Fax: 847-818-9915
e-mail: sales@mcrystal.com

Micro Crystal a Division of SMH (U.S.), Inc.
601 Campus Drive, Suite B4
Arlington Heights, IL 60004

MICRO QUARTZ CRYSTAL RESONATORS

Miniature Square Metal Can, Tuning Fork Resonator — SMD
Frequency Range: 32 - 200 kHz

MS2V-TS

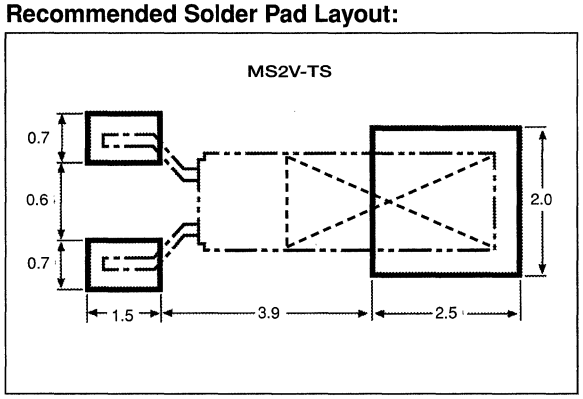


NEW!

FEATURES:

- Miniature 1.5 × 1.5 × 5 mm rectangular metal package facilitates pick-and-place
- Very price competitive
- In tape and reel
- High stability
- Low aging
- Low power consumption
- High shock and vibration resistance

Recommended Solder Pad Layout:

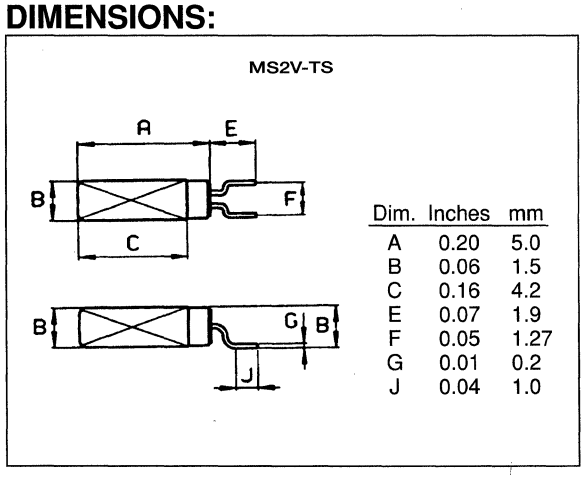


Dimensions in mm

SPECIFICATIONS:

Typical Frequency Adjustment:
± 30 ppm (Tighter or wider tolerances available on request)
Operating Temperature Range:
Industrial: – 40° to + 85°C
Military: – 55° to + 85°C
Shock Resistance:
5000 g, 0.3 ms, ½ sine
Vibration Resistance:
20 g/10 - 2000 Hz
Aging: ± 3 ppm maximum first year

DIMENSIONS:



Dim.	Inches	mm
A	0.20	5.0
B	0.06	1.5
C	0.16	4.2
E	0.07	1.9
F	0.05	1.27
G	0.01	0.2
J	0.04	1.0

VERSION:

MS2V-TS: For Pierce oscillators.
0.05" (1.27 mm) lead spacing
For surface mounting at
max. 260°C/20 sec.

FOR DESIGN AND ORDERING ASSISTANCE CONTACT:

Phone: 847-818-9825
Fax: 847-818-9915
e-mail: sales@mcrystal.com

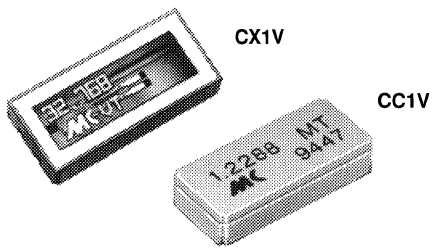
Micro Crystal a Division of SMH (U.S.), Inc.
601 Campus Drive, Suite B4
Arlington Heights, IL 60004

MICRO QUARTZ CRYSTAL RESONATORS

Ceramic Package
Frequency Range: 10 kHz - 2.1 MHz

SMD

CX1V & CC1V Series



FEATURES:
- 1.5 mm Thickness
- Miniature hermetically sealed ceramic package
- Available with glass or ceramic lid
- SMD-version in tape and reel
- MIL temperature range version
- High stability
- Low aging
- Low power consumption
- High shock & vibration resistance
- Withstands max. 260°C/20 sec. processing temp.

SPECIFICATIONS:

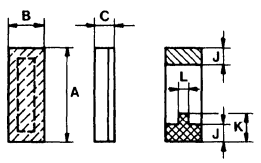
Typical Frequency Adjustment:
±30 ppm
(Tighter or wider tolerances available on request)
Operating Temperature Ranges:
Industrial: – 40° to + 85°C
Military: – 55° to + 125°C

Shock Resistance:
5000 g, 0.3 ms, ½ sine
Vibration Resistance:
20 g/10 - 2000 Hz
Aging: ±3 ppm maximum first year

VERSIONS:

Glass lid Ceramic lid
CX1V-T1 CC1V-T1: For Pierce oscillators, gold plated pads
CX1V-T2 CC1V-T2: For Pierce oscillators, Ni+Sn plated pads

DIMENSIONS:



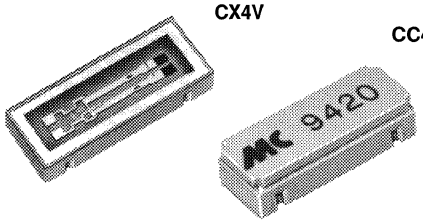
Dim.	Inches	mm
A	0.32	8.1
B	0.15	3.8
C (CX1)	0.06	1.5
C (CC1)	0.07	1.8
J	0.04	1.1
K	0.11	2.7
L	0.06	1.5

Ceramic Package
Frequency Range: 32 kHz - 1.0 MHz

SMD

World's Smallest SMD Crystal

CX4V & CC4V Series



FEATURES:
- 1.0 mm Thickness
- Miniature hermetically sealed ceramic package
- Available with glass or ceramic lid
- SMD-version in tape and reel
- MIL temperature range version
- High stability
- Low aging
- Low power consumption
- High shock & vibration resistance
- Withstands max. 260°C/20 sec. processing temp.

SPECIFICATIONS:

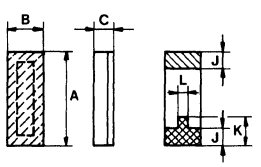
Typical Frequency Adjustment:
±30 ppm
(Tighter or wider tolerances available on request)
Operating Temperature Ranges:
Industrial: – 40° to + 85°C
Military: – 55° to + 125°C

Shock Resistance:
5000 g, 0.3 ms, ½ sine
Vibration Resistance:
20 g/10 - 2000 Hz
Aging: ±3 ppm maximum first year

VERSIONS:

Glass lid Ceramic lid
CX4V-T1 CC4V-T1: For Pierce oscillators, gold plated pads
CX4V-T2 CC4V-T2: For Pierce oscillators, Ni+Sn plated pads

DIMENSIONS:



Dim.	Inches	mm
A	0.20	5.0
B	0.08	1.9
C (CX4)	0.04	1.0
C (CC4)	0.05	1.2
J	0.04	0.9
K	0.06	1.5
L	0.02	0.5

FOR DESIGN AND ORDERING ASSISTANCE CONTACT:

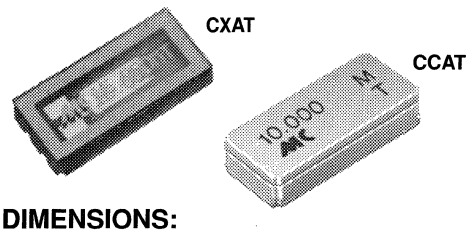
Phone: 847-818-9825
Fax: 847-818-9915
e-mail: sales@mcrystal.com

Micro Crystal a Division of SMH (U.S.), Inc.
601 Campus Drive, Suite B4
Arlington Heights, IL 60004

AT STRIP QUARTZ CRYSTAL RESONATORS

Ceramic Package AT Strip Resonators — SMD
Frequency Range: Fundamental Mode, 8 - 30 MHz

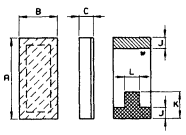
CXAT & CCAT Series



FEATURES:
- 1.5 mm Thickness
- Miniature hermetically sealed ceramic package
- Available with glass or ceramic lid
- SMD-version in tape and reel
- MIL temperature range version
- High stability
- Low aging
- Low power consumption
- High shock and vibration resistance
- Withstands max. 260°C/20 sec. processing temp.

DIMENSIONS:

SMD



Dim.	Inches	mm
A	0.32	8.1
B	0.15	3.8
C (CXAT)	0.06	1.5
C (CCAT)	0.07	1.8
J	0.04	1.1
K	0.11	2.7
L	0.06	1.5

SPECIFICATIONS:

Typical Frequency Adjustment:
±50 ppm
(Tighter or wider tolerances available on request)
Operating Temperature Ranges:
Industrial: – 40° to + 85°C
Military: – 55° to + 125°C

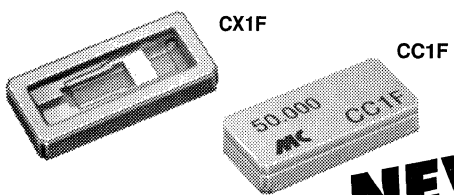
Shock Resistance:
5000 g, 0.3 ms, ½ sine
Vibration Resistance:
20 g/10 - 2000 Hz
Aging: ±3 ppm maximum first year

VERSIONS:

Glass lid	Ceramic lid
CXAT-T1	CCAT-T1: gold plated pads
CXAT-T2	CCAT-T2: Ni+Sn plated pads

Ceramic Package High Frequency — SMD
Fundamental Thickness Shear Mode
Frequency Range: 30 - 160 MHz

CX1F & CC1F Series

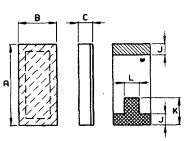


NEW!

FEATURES:
- Large pulling range
- 1.5 mm Thickness
- Miniature hermetically sealed ceramic package
- Available with glass or ceramic lid
- SMD-version in tape and reel
- MIL temperature range version
- High stability
- Low aging
- Low power consumption
- High shock & vibration resistance
- Withstands max. 260°C/20 sec. processing temp.

DIMENSIONS:

SMD



Dim.	Inches	mm
A	0.32	8.1
B	0.15	3.8
C (CX1F)	0.06	1.5
C (CC1F)	0.07	1.8
J	0.04	1.1
K	0.11	2.7
L	0.06	1.5

SPECIFICATIONS:

Typical Frequency Adjustment:
±50 ppm
(Tighter or wider tolerances available on request)
Operating Temperature Ranges:
Industrial: – 40° to + 85°C
Military: – 55° to + 125°C

Shock Resistance:
5000 g, 0.3 ms, ½ sine
Vibration Resistance:
20 g/10 - 2000 Hz
Aging: ±3 ppm maximum first year

VERSIONS:

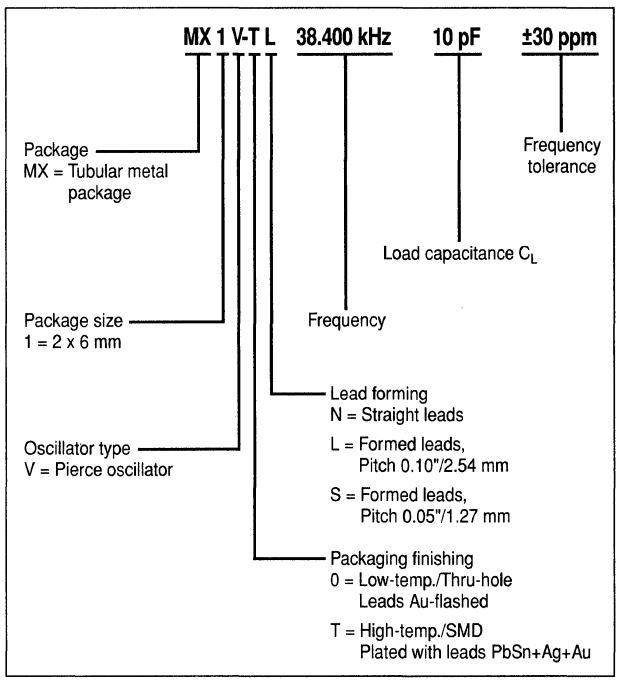
Glass lid	Ceramic lid
CX1F-T1	CC1F-T1: gold plated pads
CX1F-T2	CC1F-T2: Ni+Sn plated pads

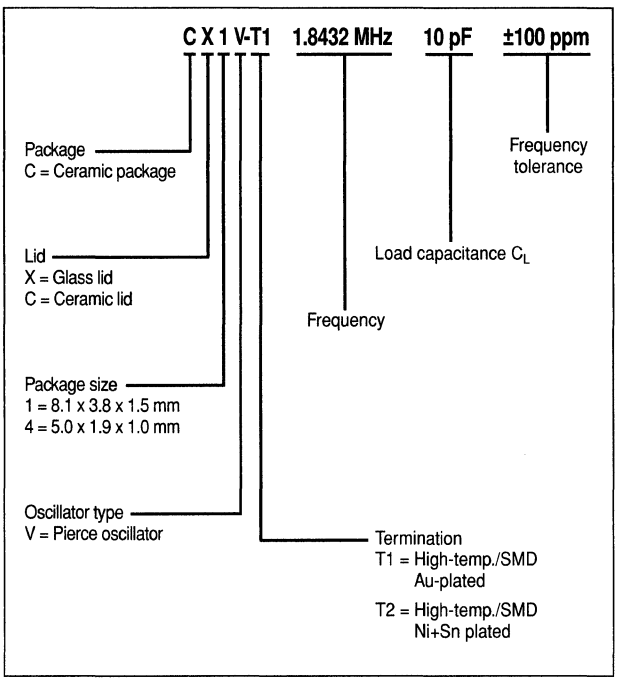
FOR DESIGN AND ORDERING ASSISTANCE CONTACT:

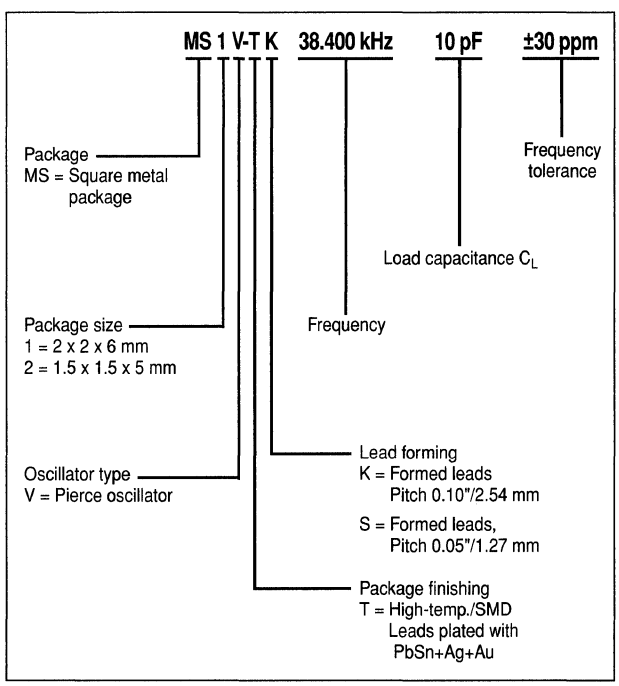
Phone: 847-818-9825
Fax: 847-818-9915
e-mail: sales@mcrystal.com

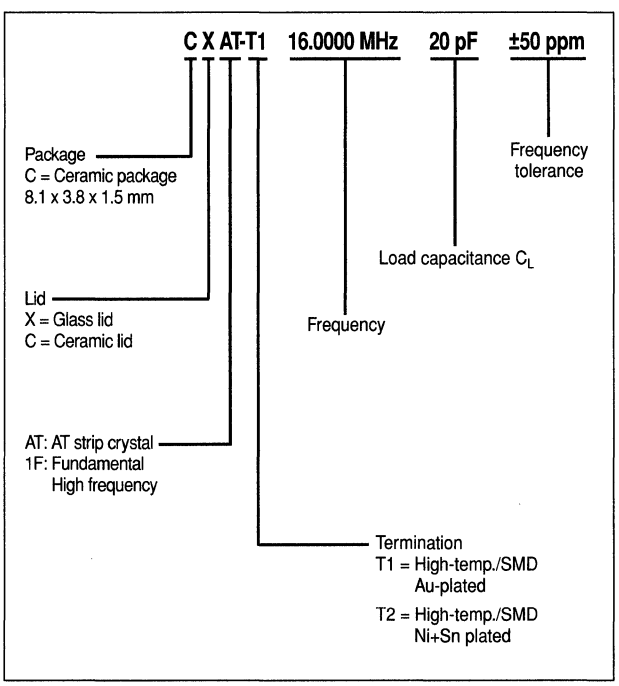
Micro Crystal a Division of SMH (U.S.), Inc.
601 Campus Drive, Suite B4
Arlington Heights, IL 60004

CRYSTAL PART NUMBER/ORDERING INFORMATION









Oscillator Part Number/Ordering Information

Please contact local representative or manufacturer for detailed information.

FOR DESIGN AND ORDERING ASSISTANCE CONTACT:

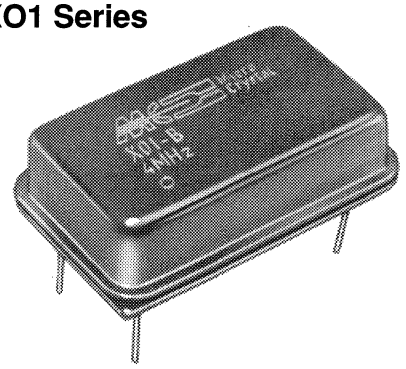
Phone: 847-818-9825
Fax: 847-818-9915
e-mail: sales@mcrystal.com

Micro Crystal a Division of SMH (U.S.), Inc.
601 Campus Drive, Suite B4
Arlington Heights, IL 60004

CLOCK OSCILLATORS

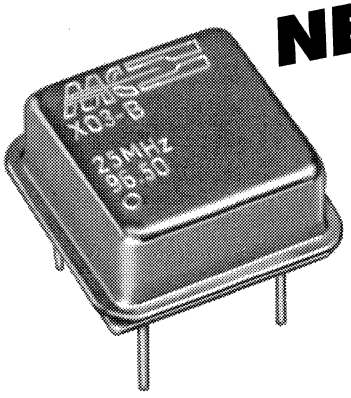
Clock Oscillator in 14 Pin DIL Package (XO1) and 8 Pin DIL Package (XO3) Clock Oscillator in Ceramic SMD Package (MCSO) Frequency Range: Up To 160 MHz

XO1 Series

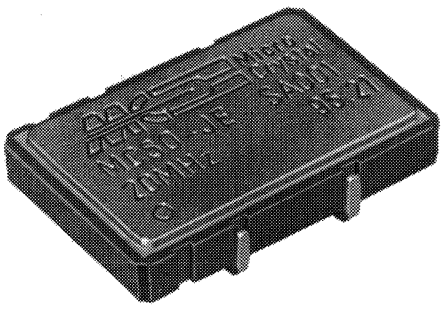


XO3 Series

NEW!



MCSO Series



FEATURES:

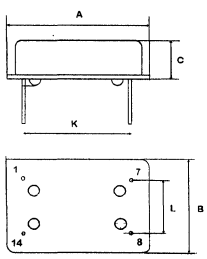
- Custom specifications
- HC-MOS technology
- Extremely wide temp. range
- Excellent temperature and shock stability
- 3.3 Vdc version available
- Surface mountable ceramic package MCSO

SPECIFICATIONS:

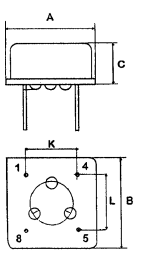
- Frequency Stability (Overall): ±20 ppm to ±100 ppm (tighter tolerance available on request)
- Supply Voltage: 3.3 Vdc to 5 Vdc
- Output: HC-MOS Compatible Load 10 TTL
- Operating Temperature Ranges: Industrial: –40° to + 85°C Military: –55° to + 125°C
- Shock Resistance: 5000 g, 0.3 ms, ½ sine
- Vibration Resistance: 10 g/10 - 2000 Hz

DIMENSIONS AND PINOUT:

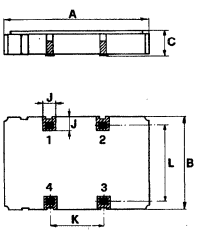
XO1



XO3



MCSO



XO1

PINOUT	
1	N.C./OPTION: ENABLE/DISABLE
7	GND
8	OUTPUT
14	VCC

Dim.	Inches	mm
A	0.80	20.3
B	0.52	13.2
C	0.20	5.1
K	0.60	15.2
L	0.30	7.6

XO3

PINOUT	
1	N.C. OPTION: ENABLE/DISABLE
4	GND
5	OUTPUT
8	VCC

Dim.	Inches	mm
A	0.52	13.2
B	0.52	13.2
C	0.20	5.1
K	0.30	7.6
L	0.30	7.6

MCSO

PINOUT	
1	N.C. OPTION: ENABLE/DISABLE
2	GND
3	OUTPUT
4	VCC

Dim.	Inches	mm
A	0.55	14.1
B	0.36	9.1
C	0.10	2.4
K	0.20	5.1
L	0.29	7.3
J	0.05	1.3

FOR DESIGN AND ORDERING ASSISTANCE CONTACT:

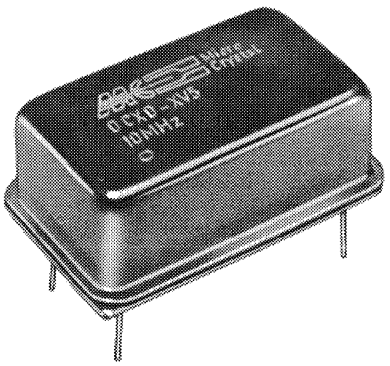
Phone: 847-818-9825
Fax: 847-818-9915
e-mail: sales@mcrystal.com

Micro Crystal a Division of SMH (U.S.), Inc.
601 Campus Drive, Suite B4
Arlington Heights, IL 60004

OVEN & VOLTAGE CONTROLLED OSCILLATORS

Oven Controlled Oscillator in 14 Pin DIL Package Frequency Range: Up to 80 MHz

OCXO Series



World's smallest and lightest OCXO!

SPECIFICATIONS:

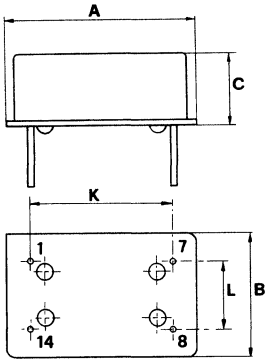
- Frequency Stability (Over Temperature Range): ± 0.1 ppm (typ.)
- Supply Voltage: 12 Vdc ± 0.5V*
- Output: HC-MOS Compatible
- Operating Temp. Ranges: Standard: 0° to + 60°C to – 40° to + 85°C
- Shock Resistance: 3000 g, 0.3 ms, ½ sine
- Vibration Resistance: 10 g/10 - 2000 Hz

* 5 Vdc available upon request

FEATURES:

- Standard 10 MHz version available
- Extremely small dimensions
- Very fast warm up
- Low power consumption

DIMENSIONS AND PINOUT:

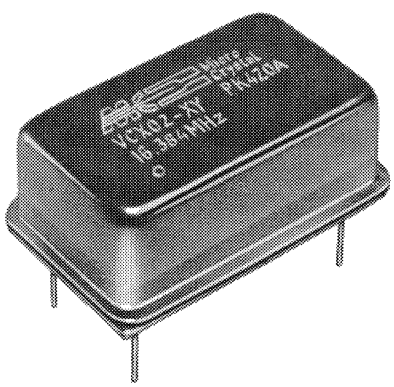


PINOUT	
1	Voltage/resistance control
7	GND
8	OUTPUT
14	Vcc

Dim.	Inches	mm
A	0.80	20.3
B	0.52	13.2
C	0.30	7.6
K	0.60	15.2
L	0.30	7.6

Voltage Controlled Oscillator in 14 Pin DIL Package Frequency Range: Up to 160 MHz

VCXO Series



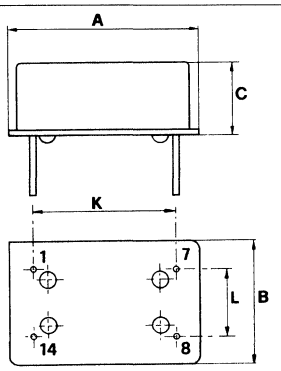
SPECIFICATIONS:

- Frequency Stability (Over Temperature Range): ± 20 ppm (typ.)
- Supply Voltage: 5 Vdc ± 10%
- Frequency Control Range: Up to ± 250 ppm (100 ppm/V)
- Output: HC-MOS Compatible
- Operating Temp. Range: – 40° to + 85°C
- Shock Resistance: 10 g, 0.3 ms, ½ sine
- Vibration Resistance: 1 g/10 - 2000 Hz

FEATURES:

- Good linearity
- Tight thermal stability
- Excellent consistency

DIMENSIONS AND PINOUT:



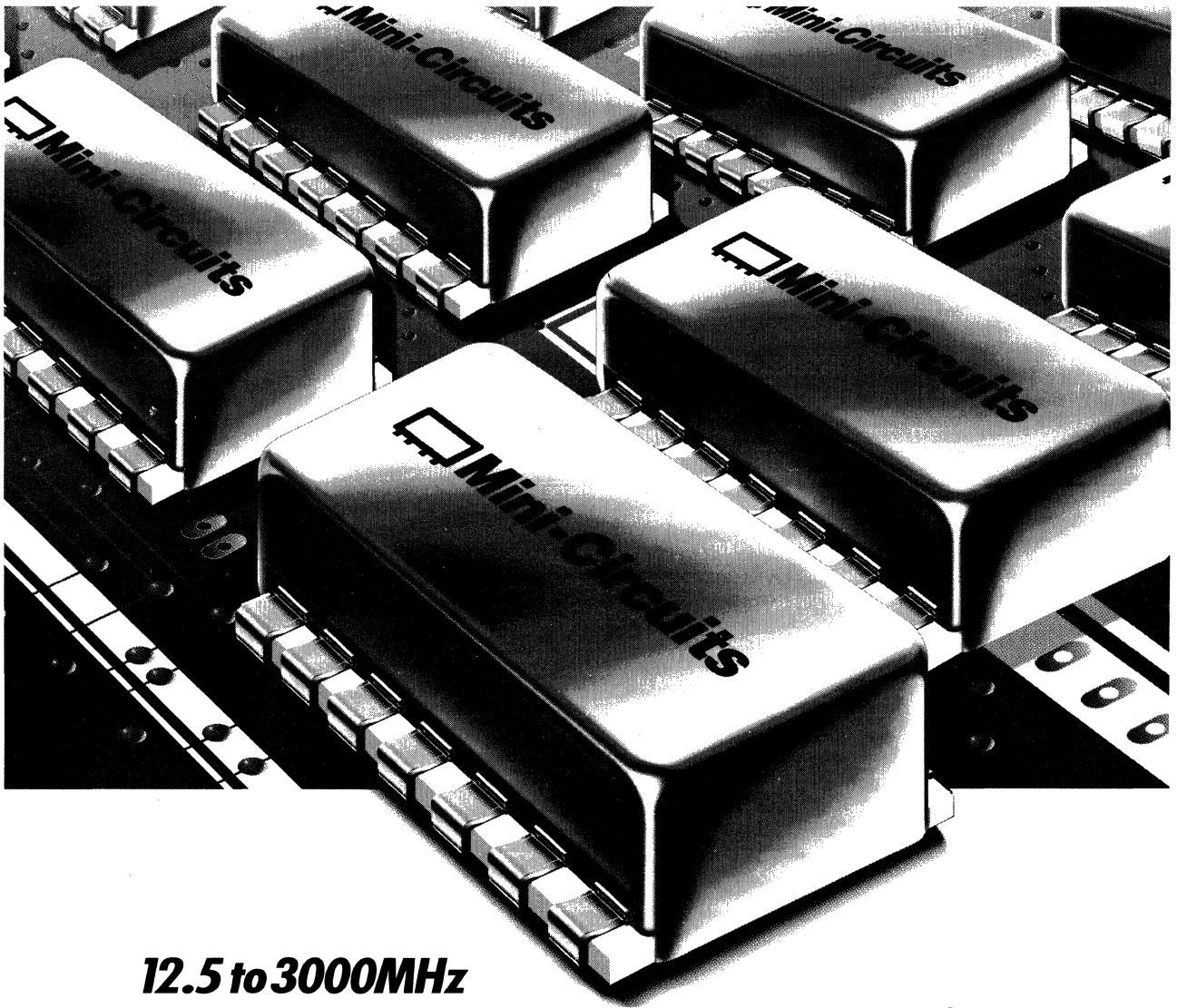
PINOUT	
1	Voltage control
7	GND
8	OUTPUT
14	Vcc

Dim.	Inches	mm
A	0.80	20.3
B	0.52	13.2
C	0.30	7.6
K	0.60	15.2
L	0.30	7.6

FOR DESIGN AND ORDERING ASSISTANCE CONTACT:

Phone: 847-818-9825
Fax: 847-818-9915
e-mail: sales@mcrystal.com

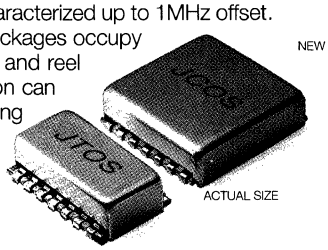
Micro Crystal a Division of SMH (U.S.), Inc.
601 Campus Drive, Suite B4
Arlington Heights, IL 60004



12.5 to 3000MHz

SURFACE MOUNT VCO's from $13.95

Time after time, you'll find Mini-Circuits surface mount voltage controlled oscillators the tough, reliable, high performance solution for your wireless designs. JTOS wide band models span 12.5 to 3000MHz with linear tuning characteristics, low -120dBc/Hz phase noise (typ. at 100kHz offset), and excellent -25dBc (typ) harmonic suppression. JCOS low noise models typically exhibit -132dBc/Hz phase noise at 100kHz offset, and phase noise for all models is characterized up to 1MHz offset. Miniature J leaded surface mount packages occupy minimum board space, while tape and reel availability for high speed production can rocket your design from manufacturing to market with lightning speed. Soar to new heights...specify Mini-Circuits surface mount VCO's.



ACTUAL SIZE

JTOS/JCOS SPECIFICATIONS

	Model	Freq. Range (MHz)	Phase Noise (dBc/Hz) SSB@ 10kHzTyp.	Harmonics (dBc) Typ.	V_{tune}** 1V to:	Current (mA) @+12V DC Max.	Price $ea. (5-49)*
NEW	JTOS-25	12.5-25	-115	-26	11V	20	18.95
	JTOS-50	25-47	-108	-19	15V	20	13.95
	JTOS-75	37.5-75	-110	-27	16V	20	13.95
	JTOS-100	50-100	-108	-35	16V	18	13.95
	JTOS-150	75-150	-106	-23	16V	20	13.95
	JTOS-200	100-200	-105	-25	16V	20	13.95
	JTOS-300	150-280	-102	-28	16V	20	15.95
	JTOS-400	200-380	-102	-25	16V	20	15.95
	JTOS-535	300-525	-97	-28	16V	20	15.95
	JTOS-765	485-765	-98	-30	16V	20	16.95
NEW	JTOS-1000W	500-1000	-94	-26	18V	25	21.95
	JTOS-1025	685-1025	-94	-28	16V	22	18.95
	JTOS-1300	900-1300	-95	-28	20V	30	18.95
	JTOS-1650	1200-1650	-95	-20	13V	30	19.95
	JTOS-1910	1625-1910	-92	-13	12V	20	19.95
	JTOS-2000	1370-2000	-95	-11	22V	30 (@8V)	19.95
	JTOS-3000	2300-3000	-90	-22	***	25 (@5V)	20.95
	JCOS-820WLN	780-860	-112	-13	***	25 (@9V)	49.95
	JCOS-820BLN	807-832	-112	-24	14V	25 (@10V)	49.95
	JCOS-1100LN	1079-1114	-110	-15	***	25 (@8V)	49.95

Notes: *Prices for JCOS models are for 1 to 9 quantity. **Required to cover frequency range. ***Tuning Voltage for JTOS-3000 is 0.5 to 12V, JTOS-820WLN and JCOS-1100LN is 0 to 20V. For additional spec information, and details about 5V tuning models available, consult RF/IF Designer's Guide or call Mini-Circuits.

DESIGNER'S KITS AVAILABLE

K-JTOS1 $149.95 (Contains 1ea. all JTOS models except JTOS-25, -1000W, -1300 to -3000).
K-JTOS2 $99.95 (Contains 1ea. JTOS-50, -100, -200, -400, -535, -765, -1025).
K-JTOS3 $114.95 (Contains 2ea. JTOS-1300. -1650. -1910).

Mini-Circuits...we're redefining what VALUE is all about!

Please refer to our complete catalog in Volume A, Section 3450

Mini-Circuits®

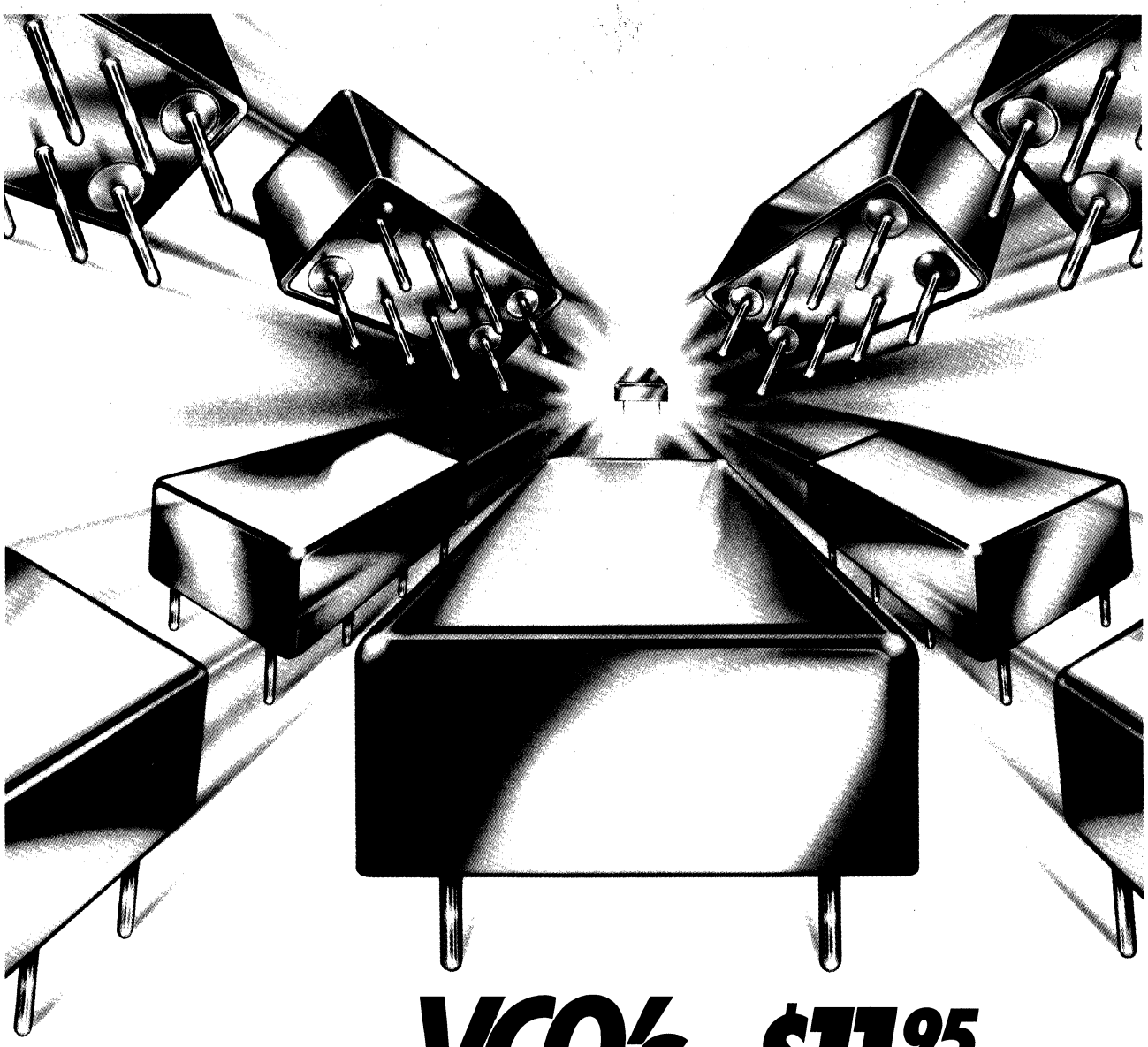
US INT'L CIRCLE READER SERVICE CARD

P.O Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718)332-4661 ***INTERNET*** http://www. minicircuits. com

For detailed specs on all Mini-Circuits products refer to • 760 -pg. HANDBOOK • INTERNET • THOMAS REGISTER • MICROWAVE PRODUCT DATA DIRECTORY • EEM

ISO 9001 CERTIFIED

F 234 Rev D



15 to 2000MHz VCO's from $11.95 (5-49)

It's a fact! With Mini-Circuits POS family of shielded, laser sealed voltage controlled oscillators, you pay less and get more...Superior Performance, Top Notch Quality, and Value Pricing. Features include wide band models with typically octave bandwidths and linear tuning. Low SSB phase noise characterized at 100Hz to 1MHz offsets. Excellent harmonic suppression typically more than 30dB below. RF power output of +7dBm, excellent for driving level 7 mixers. Miniature size occupying only 0.4"x0.8" board space. Hermetically sealed and ruggedly constructed for tough environments. And best of all, these extremely reliable, high performance VCO's are affordably priced from only $11.95 each (qty.5-49). Call Mini-Circuits today for guaranteed shipment within one week.

Mini-Circuits...we're redefining what VALUE is all about!

Model	Freq. Range (MHz)	Phase Noise (dBc/Hz) SSB @10kHz Typ.	Harmonics (dBc) Typ.	Current (mA) @ +12V DC Max.	Price (Qty.5-49) $ ea.
NEW POS-25	15-25	-105	-26	20	16.95
POS-50	25-50	-110	-19	20	11.95
POS-75	37.5-75	-110	-27	20	11.95
POS-100	50-100	-107	-23	20	11.95
POS-150	75-150	-103	-23	20	11.95
POS-200	100-200	-102	-24	20	11.95
POS-300	150-280	-100	-30	20	13.95
POS-400	200-380	-98	-28	20	13.95
POS-535	300-525	-93	-26	20	13.95
POS-765	485-765	-85	-21	22	14.95
NEW POS-900W	500-900	-95	-26	25	16.95
NEW POS-1000W	500-1000	-93	-26	20	19.95
POS-1025	685-1025	-84	-23	22	16.95
POS-1060	750-1060	-90	-11	30*	14.95
POS-1400	975-1400	-95	-11	30*	14.95
POS-2000	1370-2000	-95	-11	30*	14.95

*Max. Current (mA) @ 8V DC.

Notes: Tuning voltage 1 to 16V required to cover freq. range. 1 to 11V for POS-25, 1 to 20V for POS-1060 to -2000. 3dB modulation bandwidth for POS-25 is 60kHz, POS-50 to -1025 is 100kHz, and POS-1060 to -2000 is 1MHz (all typ). Operating temperature range: -55°C to +85°C. 5V tuning models available. Consult RF/IF Designer's Guide or call Mini-Circuits.

DESIGNER'S KITS:

K-POS1 $124.95 (Contains 1ea. all models except POS-25, -900W, -1060 to -2000).
K-POS2 $79.95 (Contains 1ea. POS-50, -100, -200, -400, -535, -765, -1025).
K-POS3 $79.95 (Contains 2ea. POS-1060, -1400, -2000).

Please refer to our complete catalog in Volume A, Section 3450

Mini-Circuits®

US INT'L

CIRCLE READER SERVICE CARD

P.O Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718)332-4661 ***INTERNET*** http://www.minicircuits.com

For detailed specs on all Mini-Circuits products refer to • 760- pg. HANDBOOK • MICROWAVE PRODUCT DATA DIRECTORY • EEM

ISO 9001 *CERTIFIED*

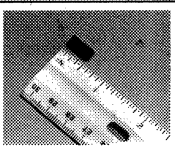
F 229 Rev B

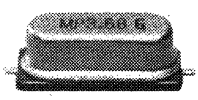
CRYSTALS

TCXO'S, VCXO'S, OCXO'S, HI-REL OSC., DIP OSC.

MONITOR PRODUCTS SURFACE MOUNT SURFACE MOUNT CRYSTALS

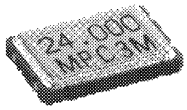
ULTRA-MINIATURE SURFACE MOUNT CRYSTALS


SM-38


SMS-49

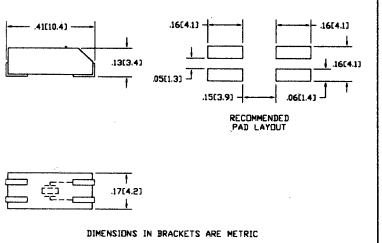
SM-55

SM-61

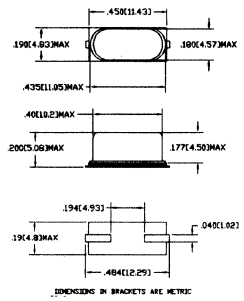

SM-60

SML-49

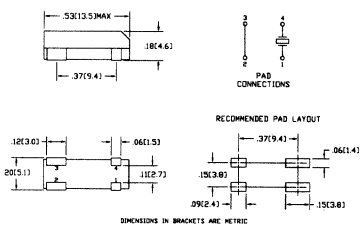
SM-38



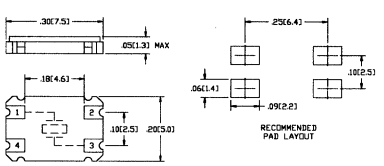
SMS-49



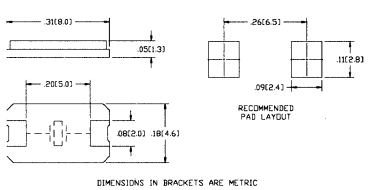
SM-55



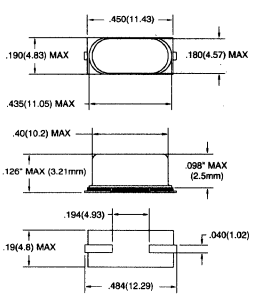
SM-60



SM-61



SML-49



SURFACE MOUNT CRYSTAL CHARACTERISTICS

MPC PART #	FREQUENCY RANGE	STABILITY	FREQ/ ESR OHMS		FREQ/ ESR OHMS		DRIVE LEVEL (Max.)	SHUNT CAP. (Max.)
SM-38	32.768 KHz	±20 ppm @ 25°	32.768 KHz	60K Ohms			1.0 µW	0.85 pf 1.35 pf typical
SMS-49	3.5-66.6 MHz	±50 ppm -10°C to 70°C	3.5-6.0 MHz 6.01-8.0 MHz 8.01-10.0 MHz 10.01-27.9 MHz	300 Ohms 100 Ohms 80 Ohms 60 Ohms	28.0-45.0 MHz 45.1-66.0 MHz* *3rd overtone	40 Ohms 100 Ohms	1.0 mW	7.0 pf
SM-55	3.5-50.0 MHz	±100 ppm -10°C to 70°C	3.5-3.9 MHz 4.0-4.9 MHz 5.0-6.9 MHz 7.0-8.9 MHz	250 Ohms 150 Ohms 100 Ohms 80 Ohms	9.0-12.9 MHz 13.0-25.0 MHz 25.1-50.0 MHz	60 Ohms 50 Ohms 100 Ohms	1.0 mW	7.0 pf
SM-60	10.0-90.0 MHz	±50 ppm -10°C to 60°C	10.0-13.9 MHz 14.0-40.0 MHz	50 Ohms 40 Ohms	40.0-50.0 MHz* 50.0-90.0 MHz*	60 Ohms 50 Ohms	1.0 mW	7.0 pf
SM-61	10.0-90.0 MHz	±50 ppm -10°C to 60°C	10.0-13.9 MHz 14.0-40.0 MHz	50 Ohms 40 Ohms	40.0-50.0 MHz* 50.0-90.0 MHz*	60 Ohms 50 Ohms	1.0 mW	7.0 pf
SML-49	3.57 MHz to 50.0 MHz	±50 ppm -20°C to 70°C	3.57-6.0 MHz 6.01-8.0 MHz 8.01-10.0 MHz	300 Ohms 100 Ohms 80 Ohms	10.01-27.9 MHz 28.0-45.0 MHz 28.0-50.0 MHz* *3rd Overtone	60 Ohms 40 Ohms 100 Ohms	1.0 mW	7.0 pf

Standard Packaging for SM-38, SM-49, SM-55, SM-61, and SM-60: Tape & Reel

MONITOR Products
A Bowthorpe Company
Designers and Manufacturers of Frequency Control Devices Since 1927

MONITOR PRODUCTS COMPANY, INC.

MAIN OFFICE / FACTORY
502 Via del Monte, Oceanside, CA 92054
Tel: 760-433-4510 FAX: 760-434-0255

EASTERN REGIONAL OFFICE
3415 Custer Road, Suite 117, Plano, TX 75023
Tel: 972-758-8687 FAX: 972-758-7574

http://eemonline.com/monpro

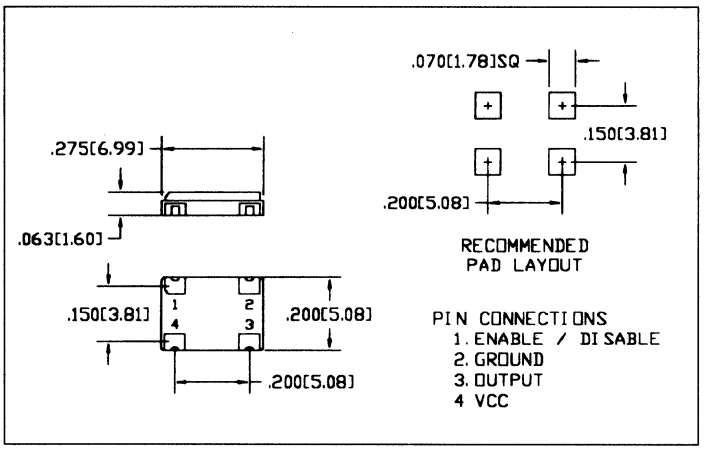
MONITOR PRODUCTS COMPANY, INC.
SURFACE MOUNT CLOCK OSCILLATORS

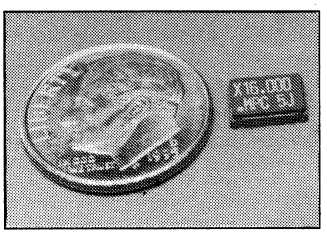
MICRO-MINIATURE SURFACE MOUNT CLOCK OSCILLATOR

SM-990 FAMILY & 4100 FAMILY

Dimensions in inches and (mm) max.

SM-990, SM-991, SM-992, SM-995, SM-996 and 4100 Family





***Seating Height**

- 1.6 mm for SM990, SM991, SM 992, and 4100 Family
- 1.0 mm fpr SM995, and SM996

SURFACE MOUNT OSCILLATOR ELECTRICAL SPECIFICATIONS

Product Family	Frequency Range	Standard Frequency	Output Symmetry	TR and TF (Max)	"0" Level (Max)	"1" Level (Min)	Input Voltage Current (Max)	Output Load
SM-990 (1.6mm Surface Mount HCMOS Tristate)	1.8-66.666 MHz	±100 ppm (.01%) ±50 ppm Option (0.005%)	45/55	10nS 5nS Typ.	+0.5V	Vcc-0.5V	5V ±10% 20mA 1.8-30 MHz 35mA 30-66 MHz	50 pf
SM-991 (1.6mm Low Power Surface Mount HCMOS Tristate)	1.8-80.0 MHz	±100 ppm (.01%) ±50 ppm Option (0.005%)	45/55	10nS 5nS Typ.	+0.5V	Vcc-0.5V	5V ±10% 10mA 1.8-30 MHz 15mA 30-66 MHz 30mA 66-80 MHz	15 pf
SM-992 (1.6mm 3VDC Surface Mount HCMOS Tristate)	1.8-66.666 MHz	±100 ppm (.01%) ± 50 ppm Option (0.005%)	45/55	10nS 5nS Typ.	Vcc x 0.1	Vcc x 0.90	+3VDC ±0.3V 8mA 1.8-34 MHz 12mA 34-66 MHz	15 pf
SM-995 5VDC **SM-996** 3VDC (1.0mm Surface Mount HCMOS Tristate)	1.5-67.0 MHz	±100 ppm (.01%) ± 30 ppm Option (0.003%)	40/60	10nS 5nS Typ.	Vcc x 0.1	Vcc x 0.90	+3VDC ±0.3V +5VDC ±0.5V 8mA 1.8-34 MHz 12mA 34-66 MHz	15 pf

EXTREME ENVIRONMENTAL APPLICATION OSCILLATORS

MPC Part #	Frequency Range	Frequency Tolerance	Oper. Temp. Range	Package Size	Aging	Supply Voltage	Power Consumption	Output Waveform
4183	1.8-66.666 MHz	±50 ppm, 0°C to 70°C ±100 ppm, -55°C to +125°C	-55°C to +125°C	.275" x .200" x .090"	5 ppm/ 30 days @ 70°C	5 VDC	35mA max.	HCMOS, 50 pf max.
4184	1.8-66.666 MHz	±50 ppm	-40°C to +85°C	.275" x .200" x .090"	5 ppm/ 30 days @ 70°C	5 VDC	35mA max.	HCMOS, 50 pf max.
4185	1.8-66.666 MHz	±50 ppm	-40°C to +85°C	.275" x .200" x .090"	5 ppm/ 30 days @ 70°C	5 VDC	30mA max.	HCMOS, 15 pf max.

MONITOR PRODUCTS COMPANY, INC.
MAIN OFFICE / FACTORY
502 Via del Monte, Oceanside, CA 92054
Tel: 760-433-4510 FAX: 760-434-0255
EASTERN REGIONAL OFFICE
3415 Custer Road, Suite 117, Plano, TX 75023
Tel: 972-758-8687 FAX: 972-758-7574
http://eemonline.com/monpro

MONITOR Products
A Bowthorpe Company
Designers and Manufacturers of Frequency Control Devices Since 1927

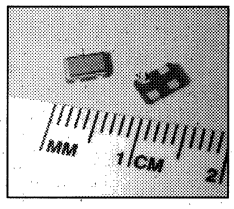
CRYSTALS

TCXO'S, VCXO'S, OCXO'S, HI-REL OSC., DIP OSC.

MONITOR PRODUCTS COMPANY, INC.
SURFACE MOUNT OSCILLATORS & TCVCXO'S

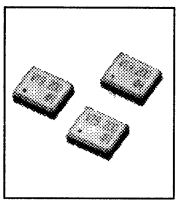
BREAKTHROUGH MONITOR'S SMALLEST SMD OSC AND TCVCXO

SM-2100

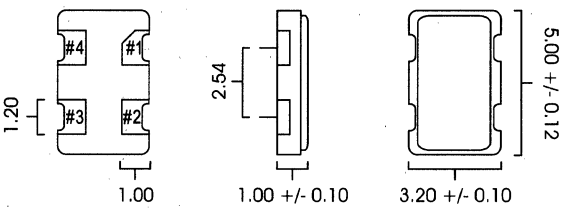


SM-2300V (TCVCXO)

DIGITAL TCVCXO



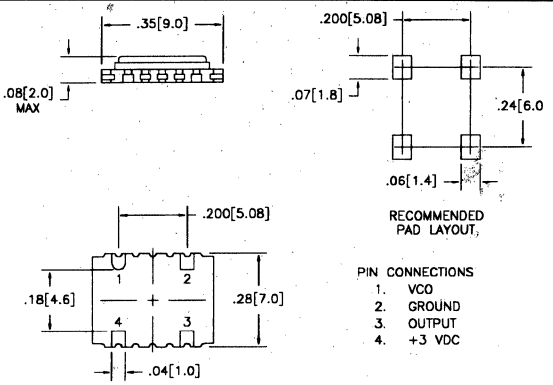
SM-2100 PACKAGE DIMENSIONS



#1	CONT
#2	GND
#3	OUT
#4	Vcc

SM-1000
(Measurements in mm)

SM-2300 PACKAGE DIMENSIONS



SM-2100 FEATURES

- Industry's **SMALLEST** Oscillator
- Seated Height of Only 1.1mm Maximum
- Surface Mount
- Wide Temperature Range (up to -40°C to 85°C)
- Tolerances to +/-2.5 ppm @ 25°C available
- Tri-State Function
- 1000pcs/reel

SM-2300 FEATURES

- Ultra Miniature Surface Mount TCVCXO
- Wide Temperature Operating Range of -30°C to 80°C
- Can Be Re-Flow Soldered
- Low Power Consumption, 3 Volt Design
- Digital Compensation
- Call Factory For Newest Frequencies

SM-2100 ELECTRICAL SPECIFICATIONS

Standard Frequencies:	14.318, 27.0, 28.636 MHz (avail. Jun 98) 2.50-35.0 MHz (Jul 98) 35.0-66.666 MHz (Oct 98)
Frequency Stability:	+/-50 ppm max. -10°C to +70°C
Input Voltage Range:	3.0V DC or 5.0V DC
Input Current: (enabled)	4ma to 15 ma typical, depending on Frequency and Voltage
Input Current: (enabled)	10 μA
Output Voltage:	Up to 15 pF
Rise/Fall Time:	Less than 10 ns

SM-2300 ELECTRICAL SPECIFICATIONS

Standard Frequencies:	12.6, 12.8, 13.0, 14.4, 16.8, 19.2 MHz
Frequency Stability:	±2.5 ppm max.
Operating Temp Range:	-30°C to 80°C
Voltage Stability:	±0.2 ppm, Delta V: ±5%
Long Term Aging:	1 ppm/Year max.
Input Voltage:	3 Volts ±5%
Power Consumption:	1.5 mA
Output Voltage:	+1.0 Volt peak to peak
Output Load:	10 pf/10 K Ohm
AFC Control Voltage:	+1.5 Volts ±1.0 Volts
Voltage Control Range:	±9 ppm min. to ±16 ppm max.

MONITOR Products
A Bowthorpe Company
Designers and Manufacturers of Frequency Control Devices Since 1927

MONITOR PRODUCTS COMPANY, INC.
MAIN OFFICE / FACTORY
502 Via del Monte, Oceanside, CA 92054
Tel: 760-433-4510 FAX: 760-434-0255
EASTERN REGIONAL OFFICE
3415 Custer Road, Suite 117, Plano, TX 75023
Tel: 972-758-8687 FAX: 972-758-7574
http://eemonline.com/monpro

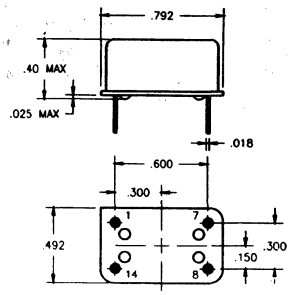
MONITOR PC
A Bowthorpe Company

MONITOR PRODUCTS COMPANY, INC.
TXCO'S

LOW COST PRECISION TCXO'S

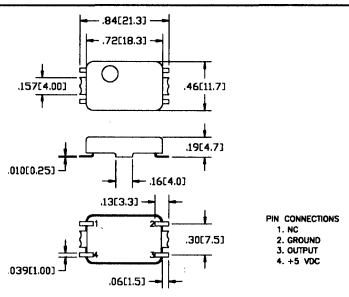
7369-01

Frequency Range:	9.0 to 25.0 MHz
Frequency Tolerance:	To ±1.0 ppm
Operating Temp Range:	To -40°C to +85°C
Package Size:	
Supply Voltage:	5 VDC
Power Consumption:	12 mA typical
Output Waveform:	HCMOS Standard
	TTL and Sine Wave Available
Trim:	External Voltage Trim
	4 ppm per Volt



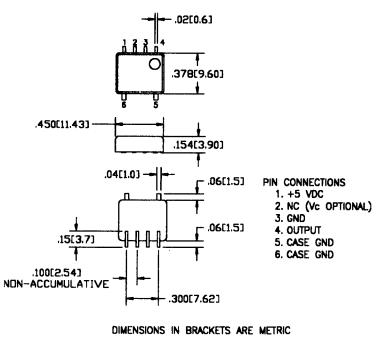
7387

Frequency Range:	5.0 to 25.0 MHz
Frequency Tolerance:	+/- 2.5ppm
Operating Temp Range:	-30°C to +75°C
Package Size:	.85" x .46" x .2"
Aging:	1ppm/Year
Supply Voltage:	5 VDC
Power Consumption:	2 mA
Output Waveform:	Clipped Sine Wave
Trim:	Mechanical
Application	Telecom, Wireless Communication



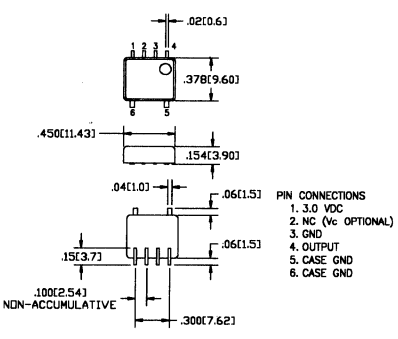
7390

Frequency Range:	5.0 to 25.0 MHz
Frequency Tolerance:	±2.5 ppm
Operating Temp Range:	-30°C to +75°C
Package Size:	.38" x .45" x .15"
Aging:	1 ppm/Year
Supply Voltage:	5 VDC
Power Consumption:	3 mA
Output Waveform:	Clipped Sine Wave
Trim:	Mechanical
	Option: Electrical Vc Pin 2
Application:	Telecom, Wireless Communication



7394

Frequency Range:	5.0 to 25.0 MHz
Frequency Tolerance:	±2.5 ppm
Operating Temp Range:	-30°C to +75°C
Package Size:	.38" x .45" x .15"
Aging:	1 ppm/Year
Supply Voltage:	3 VDC
Power Consumption:	3 mA
Output Waveform:	Clipped Sine Wave
Trim:	Mechanical
	Option: Electrical Vc Pin 2
Application:	Telecom, Wireless Communication



TCXO'S, VCXO'S, OCXO'S, HI-REL OSC., DIP OSC.

CRYSTALS

MONITOR PRODUCTS COMPANY, INC.
MAIN OFFICE / FACTORY
502 Via del Monte, Oceanside, CA 92054
Tel: 760-433-4510 FAX: 760-434-0255
EASTERN REGIONAL OFFICE
3415 Custer Road, Suite 117, Plano, TX 75023
Tel: 972-758-8687 FAX: 972-758-7574
http://eemonline.com/monpro

MONITOR PC A Bowthorpe Company
MONITOR Products
Designers and Manufacturers of Frequency Control Devices Since 1927

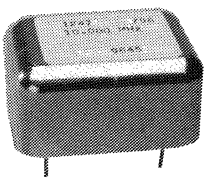
CRYSTALS

TCXO'S, VCXO'S, OCXO'S, HI-REL OSC., DIP OSC.

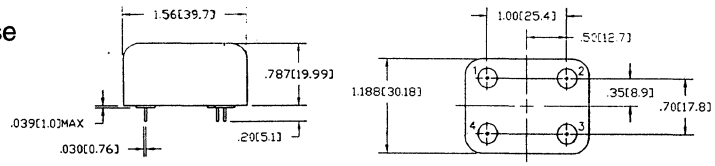
MONITOR PRODUCTS COMPANY, INC.

PRECISION OVEN CONTROLLED CRYSTAL OSCILLATORS

- High Stability, Wide Temperature Ranges
- ASIC Technology, Reduced Parts Count
- ASIC Technology, Increased Reliability
- Seating Height Down to 1/2 Inch
- Excellent Long Term Aging
- Custom Base Connections Available
- Small Size/High Stability
- "SC" Cut Crystals for Low Phase Noise
- Various Input Voltage Options
- Wide Temperature Ranges
- Frequency Trim Adjust by External Control Voltage
- Wide Selection of Standard Output Frequencies



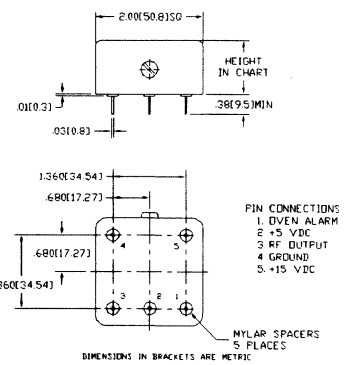
1247



PERFORMANCE CHART

Type		1280		1281		1282		1283	
Height		.5"		1.0"		2.0"		4.0"	
Temperature Range Options		Available Stability Options							
1	0°C ± 50°C	D E F	5 x 10 -8 1 x 10 -7 5 x 10-7	B C D E	2 x 10 -9 5 x 10 -9 5 x 10 -8 1 x 10 -7	B C D	2 x 10 -9 5 x 10 -9 1 x 10 -8	A B C	1 x 10 -9 2 x 10 -9 5 x 10 -9
2	0°C ± 70°C	D E F	5 x 10 -8 1 x 10 -7 5 x 10-7	B C D E	2 x 10 -9 5 x 10 -9 5 x 10 -8 1 x 10 -7	B C D E	2 x 10 -9 5 x 10 -9 5 x 10 -8 1 x 10 -7	A B C D	1 x 10 -9 2 x 10 -9 5 x 10 -9 5 x 10 -8
3	-20°C ± 70°C	E F	1 x 10 -7 8 x 10 -7	C D E	5 x 10 -9 2 x 10 -8 5 x 10 -8	C D E F	5 x 10 -9 5 x 10 -8 1 x 10 -7 5 x 10 -7	A B C D E	1 x 10 -9 2 x 10 -9 5 x 10 -9 5 x 10 -8 1 x 10 -7
4	-55°C ±75°C	E F	1 x 10 -7 5 x 10-7	D E F	5 x 10 -8 1 x 10 -7 5 x 10 -7	C D E F	5 x 10 -9 5 x 10 -8 1 x 10 -7 5 x 10 -7	A B C D E	1 x 10 -9 2 x 10 -9 5 x 10 -9 5 x 10 -8 1 x 10 -7
5	-55°C ± 85°C	E F	1 x 10 -7 5 x 10 -7	D E F	5 x 10 -8 1 x 10 -7 5 x 10 -7	C D E F	5 x 10 -9 5 x 10 -8 1 x 10 -7 5 x 10 -7	A B C D E	1 x 10 -9 2 x 10 -9 5 x 10 -9 5 x 10 -8 1 x 10 -7

PACKAGE DIMENSIONS



Output – A. Sine Wave B. HCMOS C. TTL

Phase Noise – In addition to Monitor Standard Unit, A Low Phase Noise Option Is Available. The Specifications

Offset From Channel	Standard	Low Noise Option
10 Hz	-130 dbc	-135
1 KHz	-140 dbc	-145
5 KHz	-143 dbc	-148
10 KHz	-145 dbc	-150

Alternate Base Designs — Monitor can supply these units with other plug-in 2 wire to Base connection

PART NUMBERING KEY

EXAMPLE: **1281 B 2 A L**

FAMILY	STABILITY	TEMPERATURE RANGE	OUTPUT	PHASE NOISE
1280	A = 1 x 10^{-9}	1 = 0°C±50°C	A = SINE	L = Low Noise Option
1281	B = 2 x 10^{-9}	2 = 0°C±70°C	B = HCMOS	S = Standard
1282	C = 5 x 10^{-9}	3 = -20°C±70°C	C = TTL	
1283	D = 5 x 10^{-8}	4 = -55°C±75°C		
	E = 1 x 10^{-7}	5 = -55°C±85°C		
	F = 5 x 10^{-7}			

MONITOR Products
A Bowthorpe Company
Designers and Manufacturers of Frequency Control Devices Since 1927

MONITOR PRODUCTS COMPANY, INC.
MAIN OFFICE / FACTORY
502 Via del Monte, Oceanside, CA 92054
Tel: 760-433-4510 FAX: 760-434-0255
EASTERN REGIONAL OFFICE
3415 Custer Road, Suite 117, Plano, TX 75023
Tel: 972-758-8687 FAX: 972-758-7574
http://eemonline.com/monpro

MONITOR PC
A Bowthorpe Company

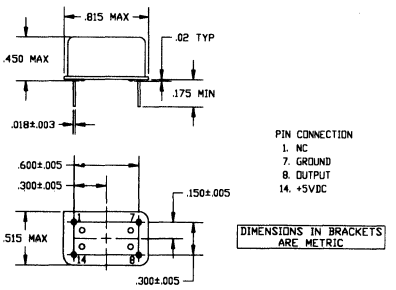
MONITOR PRODUCTS COMPANY, INC.
VCXO'S

14 PIN VCXO'S

6701 14 Pin Dip Configuration
Fundamental Design, Lowest Cost
Frequency up to 20 MHz Available
Wide Temperature Range -40°C to 85°C
Pull Range up to ±100 ppm
HCMOS Compatible Output
ECL 100 MHz to 166 MHz
0.5 to 4.5 Control Voltage Positive Sense

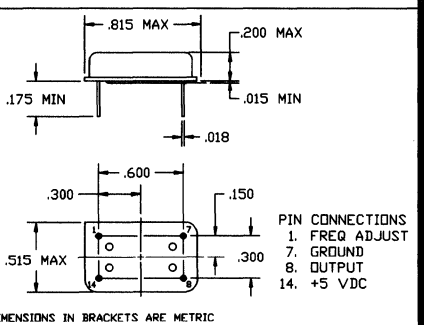
6702 Specs as above except
Frequency Range 20 - 50 MHz
Pull Range ±50 ppm typical

CONVERSION TABLE	
INCH	MM
.003	0.08
.005	0.13
.018	0.46
.020	0.51
.100	2.54
.150	3.81
.175	4.45
.300	7.62
.450	11.43
.515	13.08
.600	15.24
.815	20.74



6723 Wide Pull Range VCXO
Output Frequency Range From 8.0 to 60.0 MHz
+/- 200 ppm Trackability Over All Conditions
14 Pin Dip Design, Leads can be "J" Formed for Surface Mounting
HCMOS Output
0°C to 70°C Operation
Control Voltage 0.5 to 4.5 Positive Slope
Full Hermetic Seal

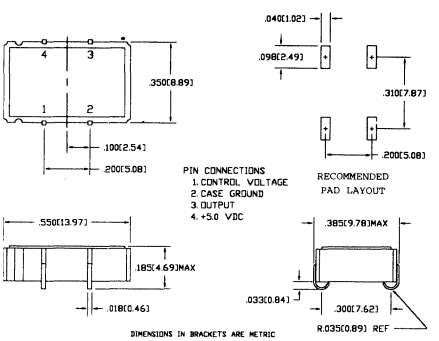
CONVERSION TABLE	
INCH	MM
.015	.38
.018	.46
.150	3.81
.175	4.45
.200	5.08
.300	7.62
.515	13.08
.600	15.24
.815	20.70



HIGH RELIABILITY CERAMIC VCXO'S

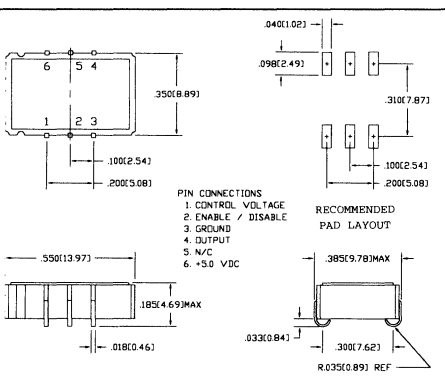
6717 (5 Volt)/6718 (3 Volt)

Frequency Range:	8.192 to 80.0 MHz
Frequency Tolerance:	±30 ppm nom. @ 2.5 Vc
Operating Temp Range:	-40°C to +85°C
Package Size:	.55" x .35" x .185"
Package Configuration:	Ceramic, With Seam Seal and Ground Plane
Seal:	Hermetic Per MIL-STD-883
Supply Voltage:	6717 5 Volts/6718 3.3 Volts
Output Waveform:	HCMOS, 15 pf
Pull Range:	±32ppm to ±128 ppm
Enable/Disable Tristate:	N/A
Application:	Telecom or Satcom



6719

Frequency Range:	8.192 to 80.0 MHz
Frequency Tolerance:	±30 ppm nom. @ 2.5 Vc
Operating Temp Range:	-40°C to +85°C
Package Size:	.55" x .35" x .185"
Package Configuration:	Ceramic, With Seam Seal and Ground Plane
Seal:	Hermetic Per MIL-STD-883
Supply Voltage:	5 Volt
Output Waveform:	HCMOS, 15 pf
Pull Range:	±32ppm to ±128 ppm
Enable/Disable Tristate:	Pin 1 High Enable, Low = Disable & High Impedance Output
Application:	Telecom or Satcom



TCXO'S, VCXO'S, OCXO'S, HI-REL OSC., DIP OSC.

CRYSTALS

MONITOR PRODUCTS COMPANY, INC.
MAIN OFFICE / FACTORY
502 Via del Monte, Oceanside, CA 92054
Tel: 760-433-4510 FAX: 760-434-0255
http://eemonline.com/monpro

EASTERN REGIONAL OFFICE
3415 Custer Road, Suite 117, Plano, TX 75023
Tel: 972-758-8687 FAX: 972-758-7574

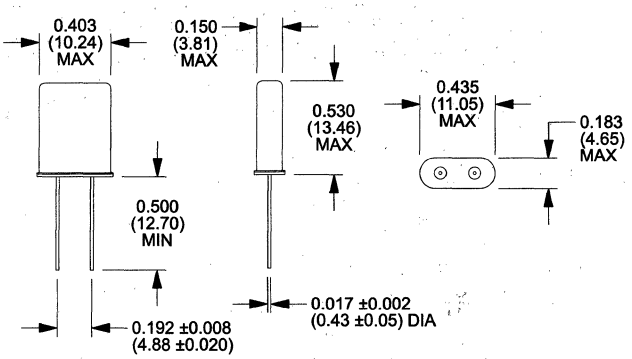
MONITOR PC
A Bowthorpe Company

MONITOR Products
Designers and Manufacturers of Frequency Control Devices Since 1927

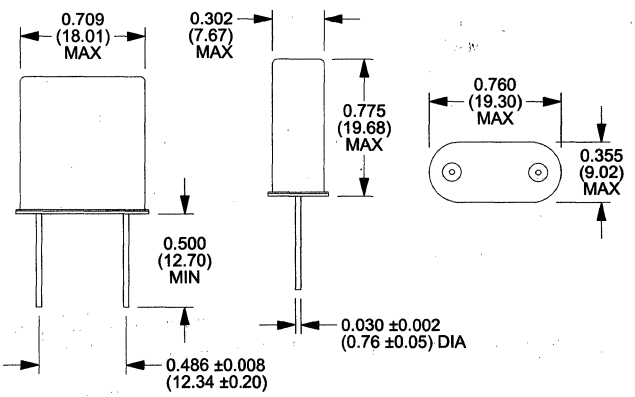
Through Hole Crystals

M-tron

MP-1 (HC-49/U)

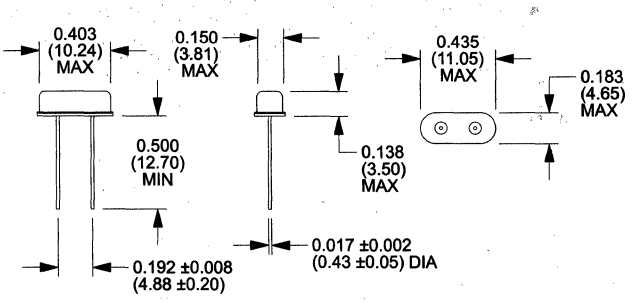


MP-2 (HC-51/U)



MP-1 and MP-2

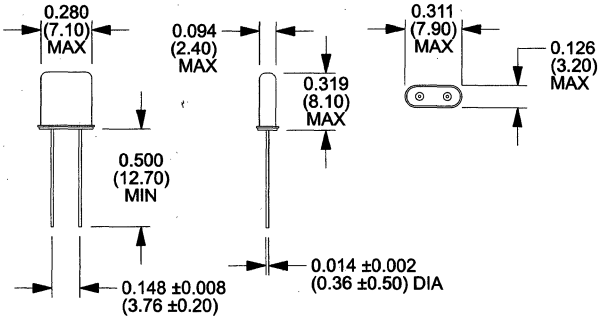
Frequency Range	1.8432 - 200.000 MHz
Operating Temp.	-10°C to +70°C
Tolerance @ +25°C	±30 ppm
Stability	±50 ppm
Load Capacitance	18 pF Standard



ATS-49 (Low Profile HC-49/U)

Frequency Range	3.579545 - 72.000 MHz
Operating Temp.	-10°C to +70°C
Tolerance @ +25°C	±50 ppm
Stability	±50 ppm
Load Capacitance	18 pF Standard

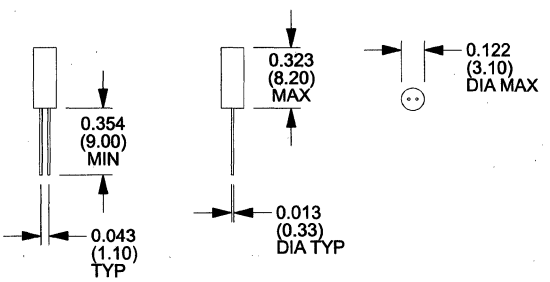
MIL-C-3098 QPL Crystals available. Contact factory.



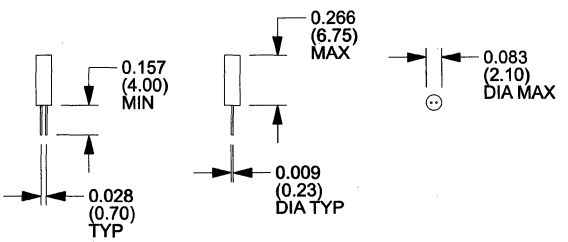
UM-1 (Ultra-Miniature Through Hole Crystals)

Frequency Range	7.000 - 200.000 MHz
Operating Temp.	-20°C to +70°C
Tolerance @ +25°C	±25 ppm
Stability	±35 ppm
Load Capacitance	18 pF Standard

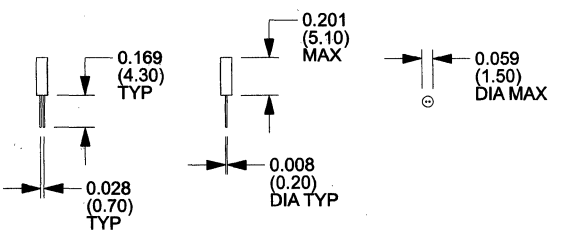
MMCC-1 (Tuning Fork Crystals)



MMCC-2 (Tuning Fork Crystals)



MMCC-3 (Tuning Fork Crystals)



MMCC-1, MMCC-2, and MMCC-3

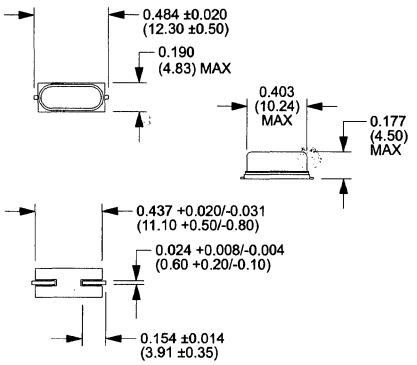
Frequency	32.768 kHz
Operating Temp.	Contact Factory
Tolerance @ +25°C	±30 ppm
Load Capacitance	
MMCC-1/MMCC-2	12.5 pF, Typical
MMCC-3	8.0 pF, Typical

M-tron Industries, Inc., PO Box 630, Yankton, SD 57078-0630, USA Phone: 605-665-9321 or 1-800-762-8800 Fax: 1-605-665-1709

ISO 9001 **www.mtron.com**

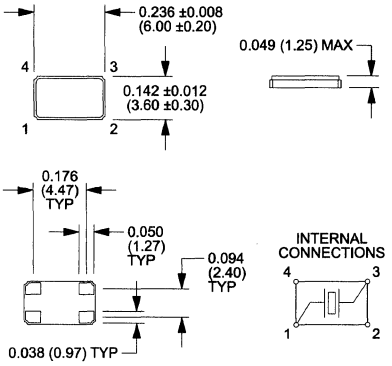
Surface Mount Crystals

M-tron



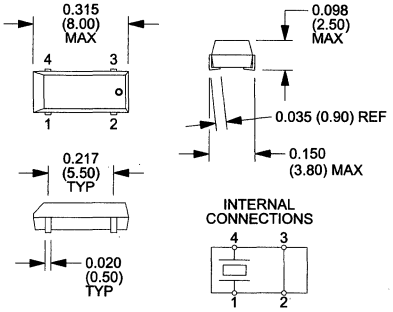
***ATSM-49 (Low Profile SMT Crystal)**

Frequency Range	3.579545 - 72.000 MHz
Operating Temp.	-10°C to +70°C
Tolerance @+25°C	±50 ppm
Stability	±50 ppm



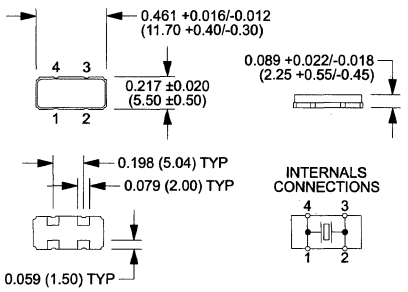
***PP (Ceramic, 3.5 x 6.0 x 1.25 mm)**

Frequency Range	10.000 - 200.000 MHz
Operating Temp.	0°C to +70°C
Tolerance @+25°C	±50 ppm
Stability	±50 ppm



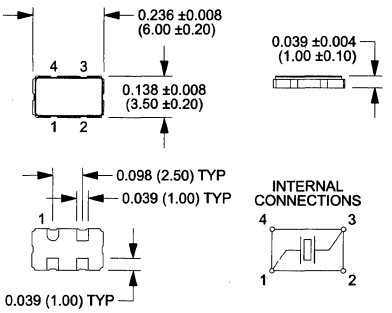
SX1555 - Tuning Fork Crystal

Frequency Range	32.768 kHz
Operating Temp.	-20°C to +70°C
Tolerance @+25°C	±30 ppm
Load Capacitance	12.5 pF Typical



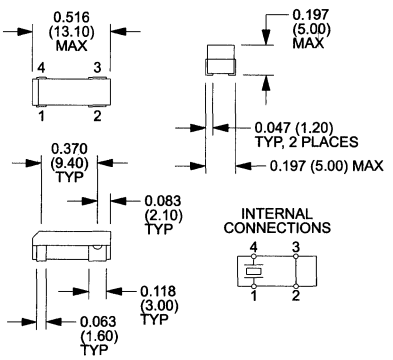
***PJ (Ceramic, 5.5 x 11.7 x 2.25 mm)**

Frequency Range	3.579545 - 27.000 MHz
Operating Temp.	-10°C to +70°C
Tolerance @+25°C	±100 ppm
Stability	±100 ppm



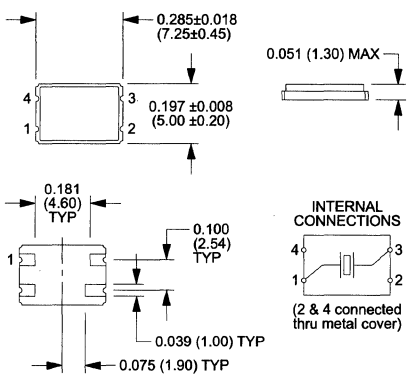
***PQ (Ceramic, 3.5 x 6.0 x 1.0 mm)**

Frequency Range	10.000 - 200.000 MHz
Operating Temp.	0°C to +70°C
Tolerance @+25°C	±50 ppm
Stability	±50 ppm



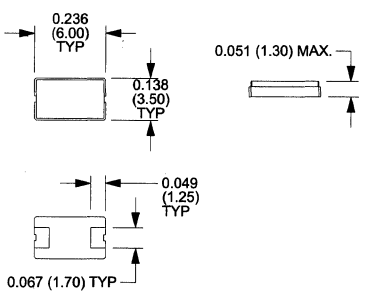
***SX2050 (Plastic Package Crystal)**

Frequency Range	3.579545 - 90.000 MHz
Operating Temp.	-20°C to +70°C
Tolerance @+25°C	±50 ppm
Stability	±100 ppm



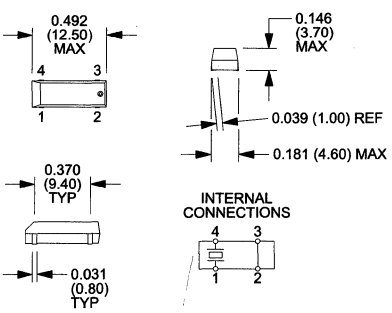
***PM (Ceramic, 5.0 x 7.25 x 1.3 mm)**

Frequency Range	8.000 - 90.000 MHz
Operating Temp.	0°C to +70°C
Tolerance @+25°C	±50 ppm
Stability	±50 ppm



***PR (Ceramic, 3.5 x 6.0 x 1.3 mm)**

Frequency Range	12.000 - 100.000 MHz
Operating Temp.	-20°C to +70°C
Tolerance @+25°C	±50 ppm
Stability	±50 ppm



***SX2060 (Plastic Package Crystal)**

Frequency Range	3.500 - 70.000 MHz
Operating Temp.	-10°C to +60°C
Tolerance @+25°C	±50 ppm
Stability	±50 ppm

* Load Capacitance - 18 pF Standard
Specifications listed are standard. Contact factory for other options.

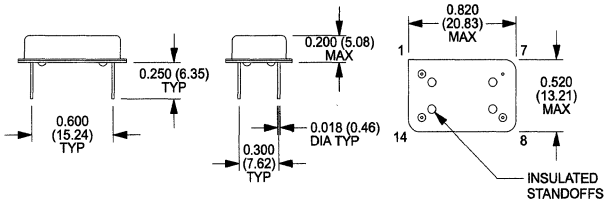
M-tron Industries, Inc., PO Box 630, Yankton, SD 57078-0630, USA Phone: 605-665-9321 or 1-800-762-8800 Fax: 1-605-665-1709

ISO 9001 **www.mtron.com**

Through Hole Oscillators

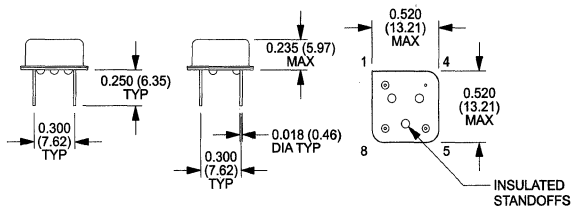
M-tron

Full Size HCMOS/TTL/ECL Oscillators



Product Series*	Frequency Range	Output Type
MHO+	0.732 kHz - 80.000 MHz	HCMOS/TTL
MA	30.000 - 133.000 MHz	ACMOS/TTL
MTO	0.220 - 65.000 MHz	TTL
ME	19.440 - 155.520 MHz	ECL/PECL

Half Size HCMOS/TTL/ECL Oscillators



Product Series*	Frequency Range	Output Type
MH	0.625 - 67.000 MHz	HCMOS/TTL
M3H	1.000 - 40.000 MHz	HCMOS/TTL
MAH	30.000 - 133.000 MHz	ACMOS/TTL
M3A	30.000 - 133.000 MHz	ACMOS/TTL
MEH	40.000 - 133.000 MHz	ECL/PECL

Standard Operating Specifications

00.0000 MHz

*** 1 3 F A D**

Product Series —
Temperature Range —
- **1:** 0°C to +70°C
- **2:** -40°C to +85°C

Stability —
- **3:** ±100 ppm **4:** ±50 ppm
- **6:** ±25 ppm **8:** ±20 ppm

Output[1] —
- **F:** Fixed (See below for ME and MEH)

Symmetry/Logic Compatibility —
- **A:** 40/60

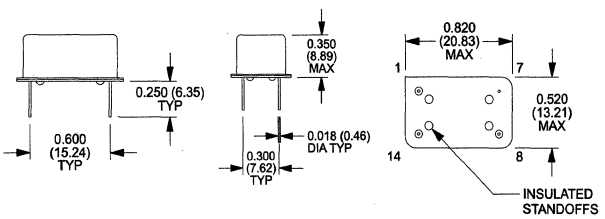
Package/Lead Configurations —
- **D:** DIP; Nickel Header

Frequency (customer specified) —

[1]**ME and MEH Series -** Single or Dual Complementary Output

Other options available. Contact factory.

Full Size VCXO



Product Series	Frequency Range	Output Type
MV High Frequency	25.000 - 155.520 MHz	HCMOS/TTL
MV	1.500 - 25.000 MHz	HCMOS/TTL

Standard Operating Specifications

00.0000 MHz

MV 1 3 V 2 C D

Product Series —
Temperature Range —
- **1:** 0°C to +70°C
- **2:** -40°C to +85°C

Stability —
- **3:** ±100 ppm **4:**±50 ppm
- **6:** ±25 ppm

Output —
- **V:** Voltage Controlled

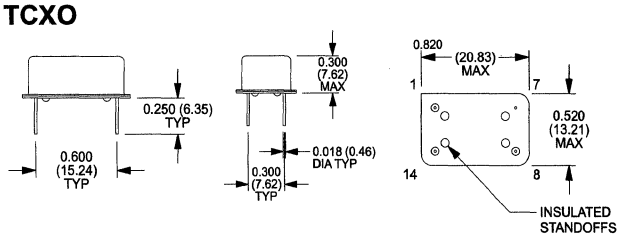
Pull Range (Vc = .5 to 4.5V) —
- **2:** ±100 ppm min.

Symmetry/Logic Compatibility —
- **C:** 45/55

Package/Lead Configurations —
- **D:** DIP; Nickel Header

Frequency (customer specified) —

TCXO



Product Series	Frequency Range	Output Type
MTXO	0.500 - 120.000 MHz	HCMOS/TTL or Sinewave

Standard Operating Specifications

00.0000 MHz

MTXO 1 H V A D

Product Series —
Temperature Range —
- **1:** 0°C to +70°C

Stability —
- **H:** ±2.5 ppm

Frequency Control (Pin #1) —
- **V:** ±5 ppm Min. For 0 VDC to 5.0 VDC

Symmetry/Logic Compatibility —
- **A:** 40/60

Package/Lead Configurations —
- **D:** DIP; Nickel Header

Frequency (customer specified) —

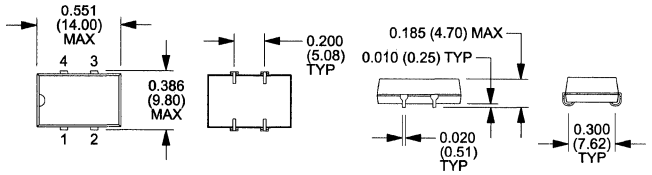
M-tron Industries, Inc., PO Box 630, Yankton, SD 57078-0630, USA Phone: 605-665-9321 or 1-800-762-8800 Fax: 1-605-665-1709

ISO 9001 **www.mtron.com**

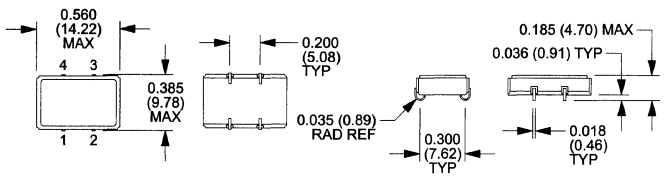
Surface Mount Oscillators

M-tron

MHR13TAJ M3R13FAJ (Plastic J-Lead SMT Oscillators)



M4S13XAJ M5S13XAJ M7S13FAJ M8S13FAJ (Ceramic J-Lead SMT Oscillators)



Standard Operating Specifications

	*	1	3	Δ	Δ	Δ	00.0000 MHz

Product Series

Temperature Range
1: 0°C to +70°C

Stability
3: ±100 ppm **4:** ±50 ppm

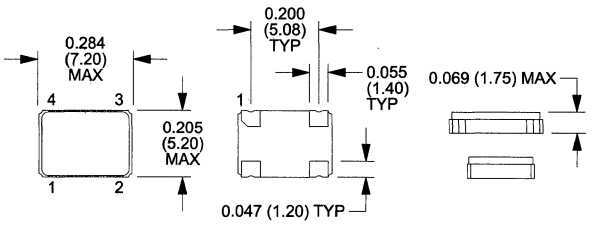
Output
F: Fixed **T:** Tristate **X:** Single Output
Z: Dual Complementary Output

Symmetry/Logic Compatibility
A: 40/60 HCMOS/TTL **G:** 40/60 HCMOS

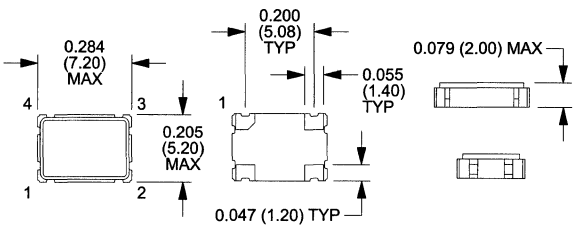
Package/Lead Configurations
J: J Lead **N:** Leadless

Frequency (customer specified)

M113FAN M213FGN M713FGN (Ceramic 5.0 x 7.0 x 1.75 mm SMT Oscillators)



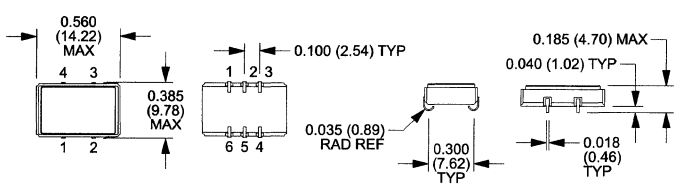
MM13TAN M313TAN (Ceramic 5.0 x 7.0 x 2.0 mm SMT Oscillators)



Product Series*	Frequency Range	Output Type
MHR	1.000 - 50.000 MHz	HCMOS/TTL
M3R	1.000 - 66.667 MHz	HCMOS/TTL
M4S	19.440 - 160.000 MHz	PECL
M5S	19.440 - 100.000 MHz	PECL
M7S, M8S	1.000 - 125.000 MHz	HCMOS/TTL
MM, M3	1.800 - 50.000 MHz	HCMOS/TTL
M1	1.500 - 50.000 MHz	HCMOS/TTL
M2	1.500 - 50.000 MHz	HCMOS
M7	1.500 - 80.000 MHz	HCMOS

Δ Standard part numbers listed above mechanical drawings.
Other options available. Contact factory.

Ceramic Surface Mount VCXO



Standard Operating Specifications

MVS	1	3	V	2	C	J	00.0000 MHz

Product Series

Temperature Range
1: 0°C to +70°C

Stability
3: ±100 ppm **4:** ±50 ppm

Output Type
V: Voltage Controlled **T:** Tristate

Pull Range (Vc = .5 to 4.5 V)
2: ±100 ppm min.

Symmetry/Logic Compatibility
C: 45/55 HCMOS

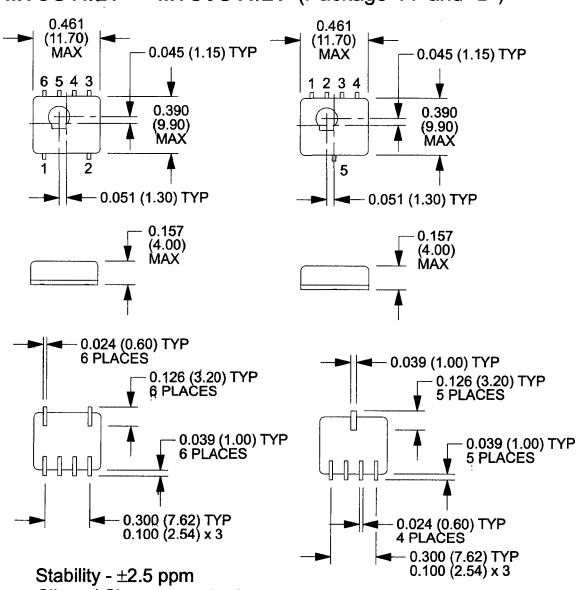
Package/Lead Configurations
J: J Lead

Frequency (customer specified)

Other options available. Contact factory.

Surface Mount TCXO/TCVCXO

MTCO11/21 **MTCVO11/21** (Package "A" and "B")



Stability - ±2.5 ppm
Clipped Sinewave output.
5 V or 3 V options available.

M-tron Industries, Inc., PO Box 630, Yankton, SD 57078-0630, USA Phone: 605-665-9321 or 1-800-762-8800 Fax: 1-605-665-1709

ISO 9001 **www.mtron.com**

OFC CRYSTALS
OAK Frequency Control Group®

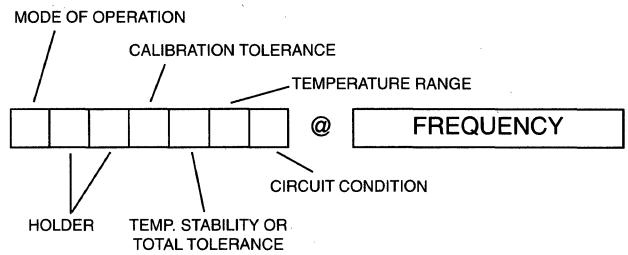
Croven Crystals
500 Beach Street, Whitby, Ontario, Canada L1N 5S5
(905) 668-3324 FAX (905) 668-5003

McCoy Crystals
80 Landis Drive, Mercersburg, PA 17236
(717) 328-5291 FAX (717) 328-9041

Oak Frequency Control Crystals

Oak Frequency Control (OFC) Crystals manufactures quartz resonators from 1 to 360 MHz, fundamental to 11th overtone modes, in a complete range of holder styles. OFC Crystals leads the industry in the design and manufacture of low phase noise and microphonics, low aging rate, low vibration sensitivity, doubly rotated and high frequency fundamental crystals. Our facilities are capable of quick delivery on prototype and initial production quantities and economical high volume production.

The seven parameters of the OFC Crystal code and the required frequency, quickly enable you to completely specify a crystal.



P/N Example: C357FWM-00 @ 90.000000 MHz

The OFC Crystal Code

MODE		HOLDER				CALIBRATION TOLERANCE AT REFERENCE TEMPERATURE		TEMPERATURE STABILITY OR TOTAL TOLERANCE		OPERATING TEMPERATURE RANGE (°C)		CIRCUIT	
CODE	DESC.	CODE	DESCRIPTION[3]	CODE	DESCRIPTION[3]	CODE	DESCRIPTION	CODE	DESCRIPTION	CODE	DESCRIPTION	CODE	DESCRIPTION
A	Fund	35	HC-35/U (TO-5) - cold weld	0	Standard			X	± 2ppm stability	X	+15 to +35		
B	3rd. OT	36	HC-36/U - cold weld	1	Surface mount			Y	± 3ppm stability	Y	+10 to +40		
C	5th OT	37	HC-37/U (TO-8) - cold weld	2	Surface mount			Z	± 4ppm stability	Z	+ 5 to +45		
D[1]	7th OT	40	HC-40/U (EO-7) - cold weld	3	Slimline	B	±5ppm	B	± 5ppm stability	A	+ 0 to +50	00	Series resonance
E[1]	9th OT	42	HC-42/U - cold weld	4	3rd wire	C	±7ppm	C	±7ppm stability	B	- 5 to +55		
F[1]	11th OT	43	HC-43/U - cold weld	5	Modified can height	D	±10ppm	D	±10ppm stability	D	-10 to +60		
		45	HC-45/U - cold weld	6	Modified can height	E	±15ppm	E	±15ppm stability	E	-15 to +65		
		47	HC-47/U - cold weld	7	Four point mount	F	±20ppm	F	±20ppm stability	F	-20 to +70	01	Parallel resonance
		48	HC-48/U - resistance weld			G	±25ppm	G	±25ppm stability	G	-25 to +75		load capacity of
		49	HC-49/U - resistance weld			H	±30ppm	H	±30ppm stability	H	-30 to +80		100pF or more.
		50	HC-50/U - resistance weld			J	±40ppm	J	± 40ppm stability	J	-40 to +90		Advise actual value.
		51	HC-51/U - resistance weld			M	±50ppm	M	±50ppm stability	M	-55 to +105		
		52	HC-52/U - resistance weld					L	±75ppm stability	U	+50 to +60 Oven	10	Parallel resonance
		90	SM1 SMD - resistance weld			K	±100ppm	K	±100ppm stability	L	+55 to +65 Oven	to 90	load capacity in pF.
								N	±150ppm stability	T	+60 to +70 Oven		
								S	Specific curve	N	+65 to +75 Oven		
								T	±20ppm[4] (B)†	P	+70 to +80 Oven		
								U	±25ppm[4] (C)†	R	+75 to +85 Oven	99	Calibration at
								V	±30ppm[4] (D)†	S	+80 to +90 Oven		reference temp.
								W	±50ppm[4] (F)†	V	+85 to +95 Oven		in customer's
								P	±100ppm[4] (H)†	W	+90 to +100 Oven		oscillator.
								R	±200ppm[4] (M)†	0	Not Specified		
								0	Not Specified				
									†Corresponding calibration codes		Reference or calibration temperature is the mid-point of the above ranges.		

Notes: [1] 7th, 9th and 11th overtone modes are available at series resonance only.
[2] Standard holder types for all codes are as per MIL-H-10056.
[3] Not all holders are available with all modifications.
[4] These codes indicate the total tolerance (i.e. calibration and temperature stability) measured from the nominal frequency. They are to be used with the calibration code indicated.

Doubly Rotated AT Crystals OFC Crystals has extensive design and manufacturing experience in doubly rotated resonators such as FC, IT- and SC-cuts. These DRAT resonators provide significant improvement in temperature stability in ovenized applications, reduced vibration sensitivity, improved aging characteristics, higher Q-factors, higher C_0/C_1 ratios, operation at higher drive levels and other benefits. DRAT resonators are the right choice for OCXO applications and their use can significantly improve achievable OCXO characteristics.

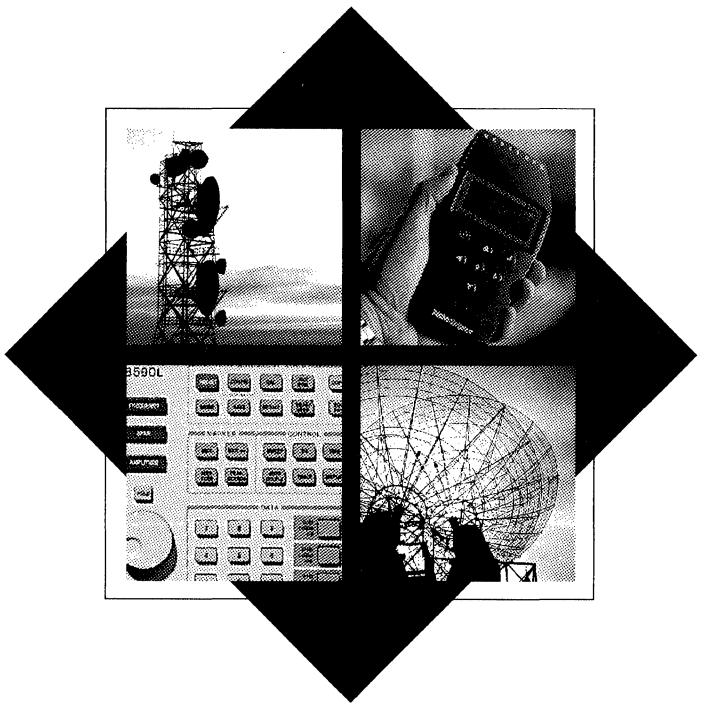
High Frequency Fundamentals OFC Crystals has several proprietary techniques for manufacture of superior quality high frequency fundamental crystals (HFFs) to 170 MHz and beyond. These type of crystals offer improvements in pullability and spurious mode response when compared to overtone mode crystals at the same frequencies.

Surface Mount Crystals OFC Crystals manufactures a wide range of surface mount crystals available in tape and reel and bulk packaging.

OAK Frequency Control Group®

100 Watts Street, P.O. Box B, Mt. Holly Springs, PA 17065
(717) 486-3411 FAX (717) 486-5920
e-mail: sales@ofc.com • website: http://www.ofc.com

OFC quartz crystal frequency control devices are recognized worldwide for Performance, High Reliability and Cost Effectiveness.



We're a leading manufacturer of high quality oscillators for wireless communications, wired communications, test instrumentation and satellite communications. Our investment in research and development ensures a steady flow of new and innovative, market-driven OCXOs, TCXOs, and VCXOs and clock oscillators.

For more information and to receive a free copy of our '97-'98 Data Book, call us at 717-486-3411 or fax your request to 717-486-5920. You can also e-mail OFC at *sales@ofc.com*, or visit our website on the Internet at http://www.ofc.com.

From wireless communications to test equipment, let us show you what OFC can do for you.

High Stability Surface Mount OCXOs

Model SMOCXO® 4.8-40 MHZ

High stability, reflow process compatible, surface mount OCXO is available with AT- or SC-cut crystal. Ideal for PCS Base Stations, Cellular Base Stations, Digital Switching, Synthesizers and Test Equipment.

CO-08 Package OCXOs

Model 4598 Family 10-40 MHZ

CO-08 OCXOs available with AT- or SC-cut crystals offer a compact, standard package and high stability. SC-cut models offer excellent frequency vs. temperature stability, low aging and fast warm-up. Applications include PCS Base Stations, Cellular Base Stations, Digital Switching, Synthesizers and Test Equipment.

DIP OCXOs

Model 4887 10-20 MHZ

4-pin, standard package DIP OCXO features an AT-cut crystal and TCXO-sized footprint. Model 4887 offers fast warm-up and low power consumption. Ideal for PCS Base Stations, Cellular Base Stations, Synthesizers, Test Equipment and Digital Switching.

Surface Mount VCXOs

Model 044 Family 1-85 MHZ

Surface Mount VCXOs offer miniature package, wide frequency range, 3.3 volt supply; 6-pin tri-state options available. Designed for Cellular Base Stations, PCS Base Stations, Radio in the Local Loop, Phase Locking, Test Equipment and Digital Switching.

High Frequency VCXOs

Models 917 and 918 113-821 MHZ

High frequency VCXOs available in 2 package options. Ofers low jitter, ECL and PECL options, complementary output and is ideal for Phase Locking. Applications include SONET, SDH and ATM, Multiplexing and Digital Switching.

OAK Frequency Control Group®

100 Watts Street, P.O. Box B, Mt. Holly Springs, PA 17065
(717) 486-3411 FAX (717) 486-5920
e-mail: sales@ofc.com • website: http://www.ofc.com

PRECISION OCXOs UTILIZING AT-CUT CRYSTALS

Model	4887 NEW	4853	4597	4598	4879	4858	4849	NEW 6100
Key Features	4 pin DIP, TCXO replacement	Small, resistance weld package	Super low-profile, resistance weld package	Standard CO-08 package	Standard package	High stability, economical	High frequency	High frequency Low phase noise
Frequency Range	10 - 20 MHz	10 - 30 MHz	10 - 30 MHz	10 - 30 MHz	5 - 20 MHz	2 - 18 MHz	50 - 100 MHz	75 - 125 MHz
Output	HCMOS	HCMOS or Sine	HCMOS or Sine	HCMOS or Sine	HCMOS or Sine	HCMOS or Sine	Sine	Sine
Supply	+5 Vdc	+5 Vdc	+5 Vdc	+5 Vdc	+12 Vdc	+5 Vdc, +12 Vdc or +15 Vdc	+15 Vdc	+12 Vdc, +15 Vdc
Input Power:								
turn on	2.0 W	3.0 W	3.0 W	3.0 W	5.0 W	8.0 W	7.0 W	5.0W
steady state @ 25° C	0.5 W	1.0 W	1.0 W	1.0 W	1.4 W	2.0 W	1.5 W	1.0W
Temp Stab*:								
0 to 50°C	$\pm1.5 \times 10^{-7}$	$\pm3 \times 10^{-8}$	$\pm3 \times 10^{-8}$	$\pm2 \times 10^{-8}$	$\pm2 \times 10^{-8}$	$\pm2 \times 10^{-8}$	$\pm3 \times 10^{-8}$	$\pm2 \times 10^{-8}$
-20 to 70°C	$\pm2.5 \times 10^{-7}$	$\pm1 \times 10^{-7}$	$\pm1 \times 10^{-7}$	$\pm8 \times 10^{-8}$	$\pm5 \times 10^{-8}$	$\pm5 \times 10^{-8}$	$\pm5 \times 10^{-8}$	$\pm4 \times 10^{-8}$
Aging per year	±0.5 ppm	±0.5 ppm	±0.5 ppm	±0.5 ppm	±0.5 ppm	±0.1ppm	±1 ppm	±1 ppm
EFC	±5 ppm	±8 ppm	±8 ppm	±8 ppm	±4 ppm	±4 ppm	N/A	±2 ppm
Warm-up Time	To within ±0.1ppm of final frequency in 2 min. @ 25°C	To within ±0.1 ppm of final frequency in 3 min. @ 25°C	To within ±0.1ppm of final frequency in 3 min. @ 25°C	To within ±0.1 ppm of final frequency in 3 min. @ 25°C	To within ±0.15 ppm of final frequency in 3 min. @ 25°C	To within ±0.1ppm of final frequency in 5 min. @ 25°C	To within ±0.10 ppm of final frequency in 10 min. @ 25°C	To within ±0.10 ppm of final frequency in 10 min. @ 25°C
Phase Noise:								
1 Hz offset	-65 dBc/Hz	-75 dBc/Hz	-75 dBc/Hz	-75 dBc/Hz	-75 dBc/Hz	-80 dBc/Hz	not specified	
10 Hz offset	-95 dBc/Hz	-100 dBc/Hz	-100 dBc/Hz	-100 dBc/Hz	-110 dBc/Hz	-110 dBc/Hz	-70 dBc/Hz	
100 Hz offset	-120 dBc/Hz	-130 dBc/Hz	-130 dBc/Hz	-130 dBc/Hz	-140 dBc/Hz	-135 dBc/Hz	-105 dBc/Hz	-125 dBc/Hz
1 kHz offset	-140 dBc/Hz	-140 dBc/Hz	-140 dBc/Hz	-140 dBc/Hz	-150 dBc/Hz	-150 dBc/Hz	-140 dBc/Hz	-150 dBc/Hz
10 kHz offset	-145 dBc/Hz	-150 dBc/Hz	-150 dBc/Hz	-150 dBc/Hz	-155 dBc/Hz	-150 dBc/Hz	-150 dBc/Hz	-165 dBc/Hz
Package (LxWxH):								
(in)	.82 x .52 x .40	1.0 x 1.0 x .50	1.0 x 1.0 x .41	1.5 x 1.0 x .54	1.5 x 1.5 x .53	2.0 x 2.0 x .75	2.0 x 2.0 x .85	1.5 x 1.5 x .5
(mm)	20.83 x 13.21 x 10.16	25.4 x 25.4 x 12.7	25.4 x 25.4 x 10.41	38.0 x 26.5 x .54	38.6 x 38.6 x 13.5	50.8 x 50.8 x 19.1	50.8 x 50.8 x 21.6	38.6 x 38.6 x 12.7
Spec. Nos. Typical at	10 MHz	10 MHz	10 MHz	10 MHz	10 MHz	10 MHz	100 MHz	100 MHz
*Other options available								

PRECISION OCXOs UTILIZING SC-CUT CRYSTALS

Model	4853S	4597S	4598S	4598T	4899	4858S	4886	4884	4895 NEW	4834 NEW	6012
Key Features	Resistance Weld Package	World's lowest Profile SC-cut OCXO	High Stability	Excellent Stability Standard Package	Compact Size, Low Power	High Stability Economical	Low Phase Noise	Ultra high Stability	Double Oven OCXO	Ultra high Stability	Low Phase Noise
Frequency Range	10 - 26 MHz	10 - 26 MHz	10 - 26 MHz	10 - 30 MHz	5 - 20 MHz	2 - 18 MHz	5 - 12 MHz	4 - 15 MHz	4 - 15 MHz	4 - 20 MHz	4 - 12 MHz
Output	HCMOS or Sine	HCMOS or Sine	HCMOS or Sine	HCMOS or Sine	HCMOS or Sine	HCMOS or Sine	Sine	HCMOS or Sine	CMOS or Sine	HCMOS or Sine	Sine
Supply	+5 Vdc	+5 Vdc	+5 Vdc	+12 Vdc	+12 Vdc	+5 Vdc, +12 Vdc,	+12 Vdc, +15 Vdc	+10 Vdc, +12 Vdc, +15 Vdc	+12 Vdc	+12 Vdc	+12 Vdc, +15 Vdc +20 Vdc
Input Power: turn on	3.0W	3.0W	3.0W	6.0W	5.0W	8.0W	9.0W	6.0W	15.0W	10W	10W
steady state @ 25°C	1.0W	1.0W	1.0W	1.2W	1.4W	2.0W	2.0W	1.5W	3.0W	1.5W	1.5W
Temp Stab*:											
0 to 50°C	$\pm5 \times 10^{-9}$	$\pm5 \times 10^{-9}$	$\pm4 \times 10^{-9}$	$\pm4 \times 10^{-9}$	$\pm5 \times 10^{-9}$	$\pm4 \times 10^{-9}$	$\pm4 \times 10^{-9}$	$\pm2 \times 10^{-8}$	2×10^{-10} (0°C to +75°C)	$\pm3 \times 10^{-9}$	$\pm2 \times 10^{-9}$
-20 to 70°C	$\pm1 \times 10^{-8}$	$\pm1 \times 10^{-8}$	$\pm7 \times 10^{-9}$	$\pm1 \times 10^{-8}$	$\pm1.5 \times 10^{-8}$	$\pm7 \times 10^{-9}$	$\pm6 \times 10^{-9}$	$\pm4 \times 10^{-9}$	4×10^{-10}	$\pm5 \times 10^{-9}$	$\pm4 \times 10^{-9}$
Aging per year	±0.1ppm	±0.1ppm	±0.1ppm	±0.05ppm	±0.075ppm	±0.075ppm	±0.1 ppm	±0.05 ppm	±0.03 ppm	±0.03 ppm	±0.075 ppm
Frequency Adjustment	±1 ppm	±1 ppm	±1ppm	±0.75ppm	±0.5 ppm	±0.5 ppm	±1 ppm	±0.5 ppm	±0.5 ppm	±0.4 ppm	±0.75 ppm
Warm-up Time	To within ±0.01ppm of final frequency in 3 min. @ 25°C	To within ±0.01ppm of final frequency in 3 min. @ 25°C	To within ±0.01ppm of final frequency in 3 min. @ 25°C	To within ±0.01 ppm of 24-hour frequency in 5 min. @ 25°C	To within ±0.10ppm of final frequency in 3 min. @ 25°C	To within ±0.01ppm of final frequency in 5 min. @ 25°C	To within±0.15ppm of final frequency in 3 min. @ 25°C	To within±0.01ppm of final frequency in 10 min. @ 25°C	To within±0.01ppm of 24 hour frequency in 5 min. @ 25°C	To within±0.01 ppm of final frequency in 5 min. @ 25°C	To within±0.01 ppm of final frequency in 3 min. @ 25°C
Phase Noise:											
1 Hz offset	-80 dBc/Hz	-80 dBc/Hz	-80 dBc/Hz	-85 dBc/Hz	-80 dBc/Hz	-80 dBc/Hz	-95 dBc/Hz	-90 dBc/Hz	-100 dBc/Hz	-80 dBc/Hz	-100 dBc/Hz
10 Hz offset	-120 dBc/Hz	-120 dBc/Hz	-120 dBc/Hz	-110 dBc/Hz	-115 dBc/Hz	-110 dBc/Hz	-125 dBc/Hz	-120 dBc/Hz	-130 dBc/Hz	-120 dBc/Hz	-130 dBc/Hz
100 Hz offset	-140 dBc/Hz	-140 dBc/Hz	-140 dBc/Hz	-130 dBc/Hz	-140 dBc/Hz	-140 dBc/Hz	-150 dBc/Hz	-145 dBc/Hz	-145 dBc/Hz	-140 dBc/Hz	-155 dBc/Hz
1 kHz offset	-145 dBc/Hz	-145 dBc/Hz	-145 dBc/Hz	-140 dBc/Hz	-150 dBc/Hz	-150 dBc/Hz	-160 dBc/Hz	-150 dBc/Hz	-150 dBc/Hz	-150 dBc/Hz	-160 dBc/Hz
10 kHz offset	-150 dBc/Hz	-150 dBc/Hz	-150 dBc/Hz	-145 dBc/Hz	-155 dBc/Hz	-150 dBc/Hz	-165 dBc/Hz	-155 dBc/Hz	-150 dBc/Hz	-155 dBc/Hz	-165 dBc/Hz
Package (LxWxH): (in)	1.0 x 1.0 x .50	1.0 x 1.0 x .41	1.4 x 1.1 x .55	1.5 x 1.0 x .8	1.5 x 1.5 x .53	2.0 x 2.0 x .75	2.0 x 2.0 x .75	2.0 x 1.61 x .980	2.0 x 2.0 x 1.5	3.02 x 2.02 x 1.00	2.0 x 2.0 x 1.5
(mm)	25.4 x 25.4 x 12.7	25.4 x 25.4 x 10.41	35.56x 27.94 x13.97	38.0 x 27.2 x 20.0	38.6 x 38.6 x 13.5	50.8 x 50.8 x 19.1	50.8 x 50.8 x 19.1	51.0 x 41.0 x 24.9	50.8 x 50.8 x 38.1	76.7 x 51.3 x 25.4	50.8 x 50.8 x 38.1
Spec. Nos. Typical at	10 MHz	10 MHz	10 MHz	10 MHz	10 MHz	10 MHz	10 MHz	10 MHz	5 MHz	5 MHz	10 MHz
*Other options available											

OAK Frequency Control Group•
100 Watts Street, P.O. Box B, Mt. Holly Springs, PA 17065
(717) 486-3411 FAX (717) 486-5920
e-mail: sales@ofc.com • website: http://www.ofc.com

Introducing The World's First Surface Mount OCXOs!

NEW

SMOCXO® & SMOCXO-SC™ SURFACE MOUNT OCXO ELECTRICAL SPECIFICATINS

Model	Output	Supply Voltage	Temperature Range with Stability (°C)	Good	Best	Reference Voltage	Frequency
SMOCXO	H (HCMOS)[1]	5 (5 Volts)	B (0 to +50)	48 ($\pm4 \times 10^{-8}$)	38 ($\pm3 \times 10^{-8}$)	R (4 Volts)	4.8 - 40 MHz
	3 (dBm sine)		C (0 to +70)	78 ($\pm7 \times 10^{-8}$)	58 ($\pm5 \times 10^{-8}$)	N (N/C)	
			D (-20 to +70)	37 ($\pm3 \times 10^{-7}$)	17 ($\pm1 \times 10^{-7}$)		
			F (-40 to +85)	37 ($\pm3 \times 10^{-7}$)	27 ($\pm2 \times 10^{-7}$)		
SMOCXO-SC	H (HCMOS)[1]	5 (5 Volts)	B (0 to +50)	79 ($\pm7 \times 10^{-9}$)	59 ($\pm5 \times 10^{-9}$)	R (4 Volts)	4.8 - 40 MHz
	3 (dBm sine)		C (0 to +70)	28 ($\pm2 \times 10^{-8}$)	18 ($\pm1 \times 10^{-8}$)	N (N/C)	
			D (-20 to +70)	38 ($\pm3 \times 10^{-8}$)	28 ($\pm2 \times 10^{-8}$)		
			F (-40 to +85)	48 ($\pm4 \times 10^{-8}$)	38 ($\pm3 \times 10^{-8}$)		

Other options available: 12 Volt supply, improved frequency vs. temperature stability and extended frequency range.

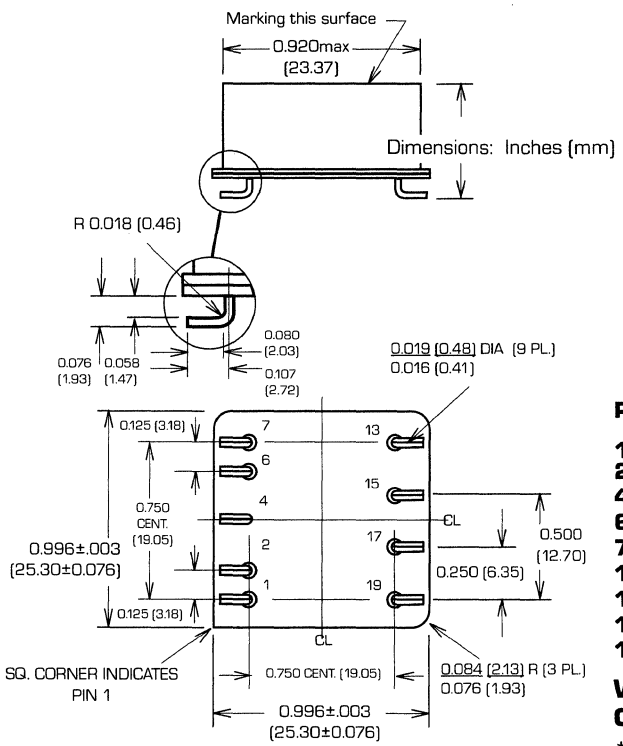
MODEL	SMOCXO	SMOCXO-SC
Frequency Range	4.8 - 40MHz	4.8 - 40MHz
Yearly Aging	±0.5 ppm	±0.1 ppm
Daily Aging[2]	$<\pm2 \times 10^{-9}$ after 72 hours	$<\pm1 \times 10^{-9}$ after 72 hours
Supply Voltage	+5VDC ±5%	+5VDC ±5%
Power Consumption	1.0W @ 25°C steady state	1.0W @ 25°C steady state
Warm-up Power	2.5W (3.0W with temp range F)	2.5W (3.0W with temp range F)
Warm-up Time	To within ±.01 ppm of final frequency in 3 min. @ 25°C	To within ±0.01 ppm of final frequency in 3 min. @ 25°C
Duty Cycle	45/55%	45/55%
Electrical Freq. Control		
Deviation	±8 ppm Typ. (Sufficient for 15 Yrs.)	±1 ppm Typ. (Sufficient for 15 Yrs.)
Voltage Range	0 to 4V	0 to 4V
Slope	Positive	Positive
Sinewave Options		
Harmonics	-30 dBc	-30 dBc
Load	50 ohms	50 ohms
Output Level	+3 dBm nominal (Available up to +8 dBm)	+3 dBm nominal (Available up to +8 dBm)
Phase Noise[2]		
1 Hz offset	-75 dBc/Hz	-80 dBc/Hz
10	-100	-120
100	-130	-140
1K	-140	-145
10K	-150	-150
Reflow	Compatible with convection, IR and combination	Compatible with convection, IR and combination

[1]HCMOS can drive TTL, ACMOS, HCMOS and CMOS. [2]Typical Values at 10.000 MHz.

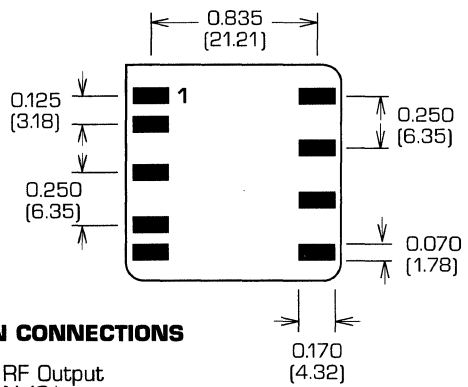
OAK Frequency Control Group•

100 Watts Street, P.O. Box B, Mt. Holly Springs, PA 17065
(717) 486-3411 FAX (717) 486-5920
e-mail: sales@ofc.com • website: http://www.ofc.com

SMOCXO™ & SMOCXO-SC™ SURFACE MOUNT OCXO MECHANICAL CONFIGURATION & REFLOW DATA



RECOMMENDED SOLDER PAD LAYOUT

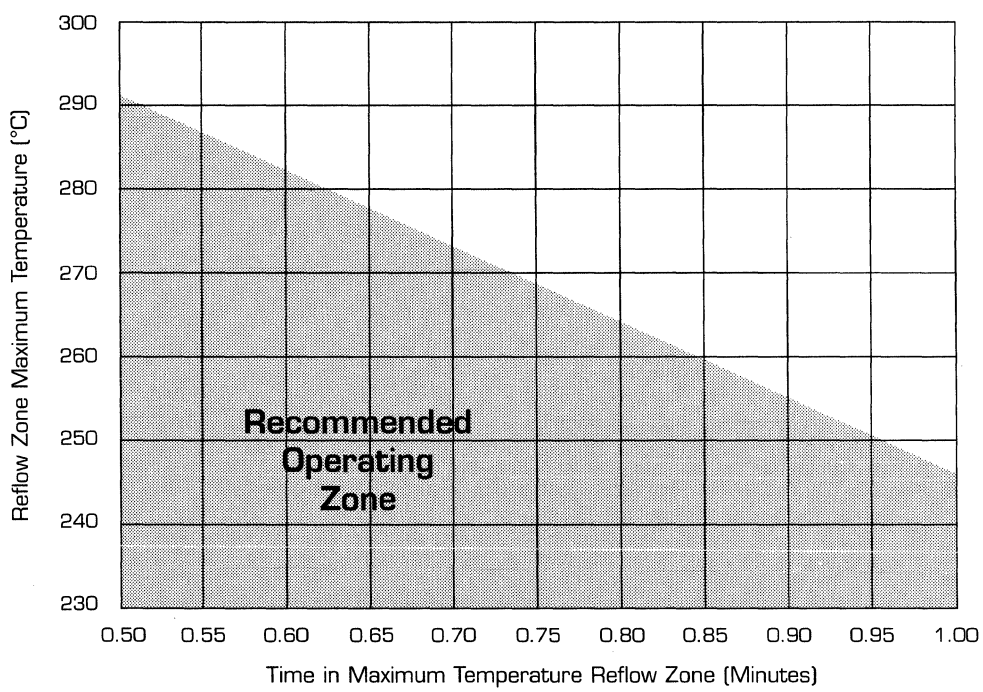


PIN CONNECTIONS

1 - RF Output
2 - N/C*
4 - GND/Case
6 - N/C*
7 - EFC
13 - Ref. Volt. Output
15 - N/C*
17 - N/C*
19 - +5V Supply

WEIGHT: 12g max.
COPLANARITY: 0.003" max. (0.0762mm)
* Do not electrically connect to these pins

MAXIMUM REFLOW TEMPERATURE VS. TIME



OAK Frequency Control Group®

100 Watts Street, P.O. Box B, Mt. Holly Springs, PA 17065
(717) 486-3411 FAX (717) 486-5920
e-mail: sales@ofc.com • website: http://www.ofc.com

TEMPERATURE COMPENSTATED CRYSTAL OSCILLATORS (TCXOs)

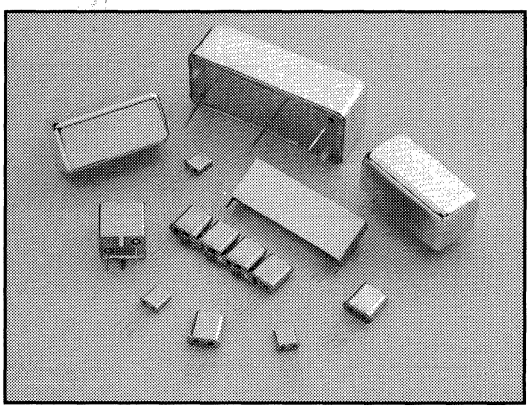
Model	956	958	959	966	544	567	185	623
Key Features	EFC Optional Standard Package	Low profile Standard Package	Hermetically sealed DIP Package	Standard package	High stability, small package	CO-08 package	Wide frequency range	High reliability, surface mount
Frequency Range	5 - 50 MHz	5 - 50 MHz	5 - 50 MHz	5 - 75 MHz	2 - 25 MHz	10 - 30 MHz	3 - 225 MHz	10 - 50 MHz
Output	Sine or HCMOS	Sine or HCMOS	Clipped Sine or HCMOS	Clipped Sine or HCMOS	TTL or HCMOS	HCMOS	Sine	TTL
Supply	+5 Vdc	+5 Vdc	+5 Vdc	+5 Vdc	+5 Vdc	+5 Vdc	+15 Vdc	+5 Vdc
Input Current	6 mA max. sinewave	6 mA max. sinewave	6 mA max. sinewave	6 mA max. for sinewave	15 mA max.	25 mA max.	20 mA max.	25 mA
	12 mA max. HCMOS	12 mA max. HCMOS	12 mA max. for HCMOS	12 mA max. for HCMOS				
Temp Stab*:								
0 to 50°C	±0.5ppm (±1.0 ppm for Model >30 MHz)	±0.5ppm (±1.0 ppm for Model >30 MHz)	±0.5ppm (±1.0 ppm for Model >30 MHz)	±0.5ppm (±1.0 ppm for Model >30 MHz)	±0.5ppm	±0.5ppm	±0.5ppm (±1 ppm for Model >50 MHz)	±2-4ppm typical (-40 to 85°C)
-20 to 70°C	±1.0ppm (±2.0 ppm for Model >30 MHz)	±1.0ppm (±2.0 ppm for Model >30 MHz)	±1.0ppm (±2.0 ppm for Model >30 MHz)	±1.0ppm (±1.5 ppm for Model >30 MHz)	±1.0ppm	±1.0ppm	±0.5ppm (±1 ppm for Model >50 MHz)	±5-10 ppm typical (-55 to 105°C)
Aging per year	±1ppm (±3 ppm first year for Model >30 MHz)	±1ppm (±3 ppm first year for Model >30 MHz)	±1ppm	±1ppm (±1.5ppm for Model >30 MHz)	±1ppm	±1ppm	±1ppm (±2 ppm for Model >50 MHz)	±1ppm
Frequency Adjustment	±3.5ppm mechanical, EFC Optional	±3.5ppm mechanical, EFC Optional	±8ppm electrical	N/A	±5ppm mechanical	±10ppm, electrical	±5ppm mechanical	±5ppm electrical (±3 ppm for Model >24 MHz)
Phase Noise:								
1 Hz offset	-55 dBc/Hz	-55 dBc/Hz	-55 dBc/Hz	-55 dBc/Hz	-65 dBc/Hz	-65 dBc/Hz	-40 dBc/Hz	-40 dBc/Hz
10 Hz offset	-90 dBc/Hz	-90 dBc/Hz	-90 dBc/Hz	-90 dBc/Hz	-95 dBc/Hz	-95 dBc/Hz	-70 dBc/Hz	-70 dBc/Hz
100 Hz offset	-120 dBc/Hz	-120 dBc/Hz	-120 dBc/Hz	-120 dBc/Hz	-125 dBc/Hz	-120 dBc/Hz	-100 dBc/Hz	-100 dBc/Hz
1 kHz offset	-140 dBc/Hz	-140 dBc/Hz	-140 dBc/Hz	-140 dBc/Hz	-140 dBc/Hz	-145 dBc/Hz	-125 dBc/Hz	-125 dBc/Hz
10 kHz offset	-150 dBc/Hz	-150 dBc/Hz	-150 dBc/Hz	-150 dBc/Hz	-145 dBc/Hz	-150 dBc/Hz	-135 dBc/Hz	-135 dBc/Hz
Package (LxWxH):								
(in)	.75 x .48 x .36	.75 x .48 x .26	.82 x .52 x .39	.79 x .79 x .41	1.0 x 1.0 x .5	1.5 x 1.04 x .53	2.0 x 2.0 x .50	1.02 x 1.02 x .20 (32 pin flat pack)
(mm)	19.0 x 12.2 x 9.5	19.0 x 12.2 x 6.6	20.7 x 13.1 x 9.9	20.1 x 20.1 x 11.41	25.4 x 25.4 x 12.7	38.0 x 26.5 x 13.5	50.8 x 50.8 x 12.7	25.8 x 25.8 x 5.08
Spec. Nos. Typical at	10 MHz	10 MHz	10 MHz	10 MHz	10 MHz	13 MHz	100 MHz	10 MHz
*Other options available								

VOLTAGE CONTROLLED CRYSTAL OSCILLATOR (VCXOs)

Model	044*	046*	048	344*	346*	794A5	955	918	917	937	231	580
Key Features	Surface Mount Ceramic package	Surface Mount Ceramic package	High Frequency SMD	Surface mount, 3.3 volt supply	Surface mount, 3.3 volt supply	4 pin DIP	4 pin DIP	High frequency, 4 pin DIP	High frequency	Wide pull range	CO-08 package	Wide pull range
Frequency Range	1 - 45 MHz	46 - 85 MHz	70 - 155.52MHz	1 - 45 MHz	46 - 85 MHz	1 - 85 MHz	30 - 112 MHz	113 - 821 MHz	113 - 821 MHz	100 - 155.52 MHz	10 - 250 MHz	10 - 52 MHz
Output	TTL or ACMOS	TTL or ACMOS	ECL/PECL	TTL or ACMOS	TTL or ACMOS	TTL or ACMOS	HCMOS/ACMOS, Sine, or ECL	ECL/PECL	ECL/PECL	ECL	Sine	Sine or HCMOS
Supply	+5 Vdc	+5 Vdc	-5.2 Vdc(ECL) +5.0 Vdc (PECL)	+3.3 Vdc	+3.3 Vdc	+5 Vdc	+5 Vdc	-5.2 Vdc (ECL), +5 Vdc (PECL)	-5.2 Vdc (ECL), +5 Vdc (PECL)	-5 Vdc	+5 Vdc ±0.25 V	+12 Vdc ±5%
Input Current	<20 MHz:12mA max. >20 MHz:20mA max.	30 mA max.	≤40mA max.	<15 MHz:6mA max. 15-40 MHz:8mA max. 41-45 MHz:12mA max.	20 mA max.	<20 MHz 12mA max. >20 MHZ 30mA max.	70mA max.	<110mA	<110 mA	40 mA max.	<40 mA	20 mA max.
Temp Stab:			0 - 70 ±25 ppm -40 to +85 35 ppm									
0 to +70°C	±24ppm	±24ppm	0 to 70	±24 ppm	±24ppm	±24ppm	±20ppm	±30ppm	±20 ppm	±20 ppm	±10 ppm	±5 ppm
-40 to +85°C	±35ppm	±35ppm	-40 to +85	±35 ppm	±35ppm	±35ppm	±30ppm	±50ppm	±30 ppm	±30 ppm	±20 ppm	±10 ppm
Tuning Range	±100ppm	±100ppm	±50 ppm min APR	±70ppm min	±70ppm min	±100ppm	±150ppm min. (HCMOS/ACMOS&Sine) ±50 to ±100 ppm (ECL)	±100ppm min.	±120 ppm min.	±50 ppm to ±50 ppm to ±100 ppm	±30 ppm	up to ±1000 ppm
Voltage Range	0.5 to 4.5 Vdc	0.5 to 4.5 Vdc	0 to -5V(ECL) 0 to +5V(PECL)	0 to +3.3 Vdc	0 to +3.3 Vdc	±0.5 to +4.5 Vdc	±0.5 to +4.5 Vdc (HCMOS/ACMOS&Sine) 0 to -5 Vdc (ECL)	0 to -5V (ECL), 0 to +5 V (PECL)	0 to -5V (ECL), 0 to +5V (PECL)	0 to -5 Vdc	1 to 4 Vdc	0 to ± 5 Vdc
Linearity	10%	10%	10%	10%	10%	10%	20%	10%	10%	10%	20%	to 5%
Slope	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Positive	Negative
Package (LxWxH):												
(in)	.560 x .368 x .145	.560x .368x.145	.560x.368x.145	.560 x .368 x .145	.560x.368x.145	.82 x .52 x .30	.82 x .52 x .39	.82 x .52 x .30	.797 x .797 x .410	.99 x .81 x .40	1.5 x 1.04 x 0.53	1.5 x 1.5 x .53
(mm)	14.2 x 9.35 x 3.68	14.2x9.35x3.68	14.2x9.35x3.68	14.2 x 9.35 x 3.68	14.2x9.35x3.68	20.7 13.1 x 7.62	20.7 x 13.1 x 9.9	20.7 x 13.1 x 7.62	20.2 x 20.2 x 10.4	25.0 x 20.3 x 10.2	38.0 x 26.5 x 13.5	38.0 x 38.0 x 13.3
*Available with tri-state option												

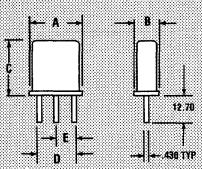
OFC Also Offers A Wide Range Of Hybrid Clock Oscillators!

PDI CRYSTAL FILTERS



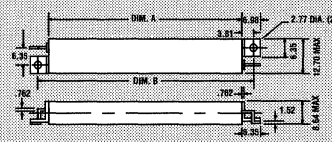
PRECISION DEVICES INCORPORATED manufactures crystal filters from 1.0 MHz to 150 MHz. These products are available in many standard and non-standard packages. Filters providing Chebychev, Butterworth, and Gaussian responses are available. PDI is also offering its SMD type crystal filter with commercial and military grade requirements.

Package # 1 & 2 (Crystal Filter)



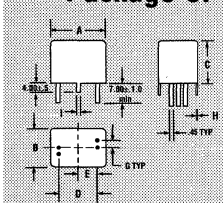
PACKAGE	A	B	C	D	E
PACKAGE 1 HC-49	11.05	4.65	11.43	4.88	2.44
PACKAGE 2 UM-1	7.9	3.2	8.0	3.75	1.88

Package # SMDF (Crystal Filter)



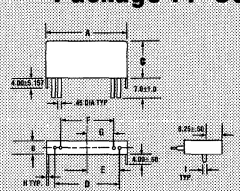
NUMBER OF POLES	DIMENSION A	DIMENSION B	CRYSTAL TYPE	CASE TYPE
2	23.50	31.11	MONOLITHIC	SMDF-1
4	23.50	31.11	MONOLITHIC	SMDF-2
6	31.37	36.99	MONOLITHIC	SMDF-3
8	39.43	43.05	MONOLITHIC	SMDF-4
10	39.43	43.05	MONOLITHIC	SMDF-5
8	71.73	79.38	DISCRETE	SMDF-6
4	31.37	36.99	HC-49 MONO.	SMDF-7

Package SP Series (Crystal Filter)



PACKAGE	A	B	C	D	E	G	H	I
SP-1	10.99	8.51	11.50	7.39	3.71	1.98	.254	1.50
SP-2	13.56	8.74	11.50	7.39	3.71	1.98	.254	1.50
SP-3	14.98	11.94	15.11	8.99	4.50	2.44	.304	1.55
SP-4	18.92	12.60	15.11	13.41	6.71	2.44	.356	1.55
SP-5	23.24	12.95	15.24	17.78	8.89	2.44	.635	1.80

Package FP Series (Crystal Filter)

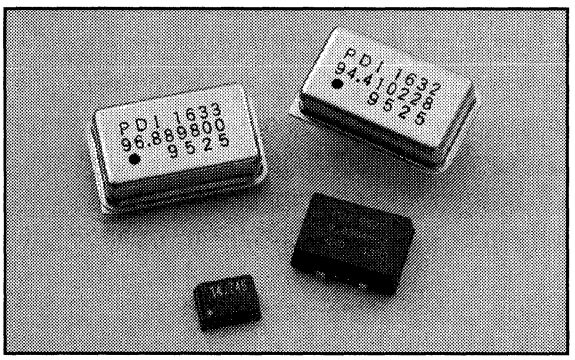


PACKAGE	A	B	C	D	E	F	G	H	I
FP-1	17.02	4.19	11.94	11.94	5.92	7.87	3.94	.254	1.27
FP-2	25.15	4.19	11.94	19.71	9.85	15.75	7.87	.254	1.27
FP-3	33.27	5.84	16.00	27.58	13.79	23.62	11.81	.254	1.27
FP-4	22.61	5.84	16.00	15.58	7.92	10.97	5.49	.381	1.57
FP-5	33.53	5.84	16.00	26.97	13.49	22.10	11.05	.381	1.57
FP-6	44.45	5.84	16.00	38.10	19.05	33.22	16.61	.381	1.57
FP-7	55.55	5.84	16.00	49.23	24.61	44.35	22.17	.381	1.57

Frequencies	P/N	(dB)	Passband	Ripple	Insertion Loss	No. of Poles	Impedance Level	(dB)	Stopband	Guaranteed Attenuation	Operating Temp Range	Package
10.7 MHz	3057	3	±3.75 KHz min	2.0 dB max	2.5 dB max	4	1800 Ohms	40	±14 KHz max	65 dB	-20°C to +70°C	2x #1
	3065	3	±15.0 KHz min	1.0 dB max	2.5 dB max	2	5000 Ohms	18	±50 KHz max	18 dB	-20°C to +70°C	#1
	3085	3	±7.5 KHz min	1.0 dB max	1.5 dB max	2	3000 Ohms	18	±25 KHz max	35 dB	-30°C to +70°C	#1
	3090	3	±15.0 KHz min	1.0 dB max	2.5 dB max	6	5000 Ohms	60	±45 KHz max	90 dB	-40°C to +80°C	FP-5
	3092	3	±7.5 KHz min	1.0 dB max	2.5 dB max	3	3500 Ohms	60	±22.5 KHz max	90 dB	-40°C to +80°C	FP-5
21.4 MHz	3044	3	±7.5 KHz min	0.5 dB max	2.0 dB max	2	1500 Ohms	20	±35.0 KHz max	45 dB	-30°C to +80°C	#1
	3007	3	±7.5 KHz min	1.0 dB max	2.0 dB max	4	1400 Ohms	60	±40.0 KHz max	90 dB	-30°C to +80°C	2x #1
	3055	3	±15.0 KHz min	2.0 dB max	3.0 dB max	8	2300 Ohms	60	±35.0 KHz max	90 dB	-20°C to +70°C	SP-4
	3088	3	±3.75 KHz min	2.0 dB max	3.0 dB max	4	50 Ohms	65	±14.0 KHz max	60 dB	-20°C to +70°C	FP-5
	5012	3	±25.0 KHz min	2.0 dB max	2.5 dB max	2	5000 Ohms	20	±110.0 KHz max	45 dB	-30°C to +70°C	#2
45.0 MHz	3039	3	±7.5 KHz min	1.0 dB max	3.0 dB max	4	3600 Ohms	35	±200 KHz max	80 dB	-30°C to +85°C	#2
	3091	3	±15.0 KHz min	0.3 dB max	1.0 dB max	2	1200 Ohms	20	±65 KHz max	70 dB	-20°C to +70°C	#2
	3094	3	±10.0 KHz min	1.0 dB max	3.0 dB max	4	800 Ohms	25	±25.0 KHz max	80 dB	-30°C to +70°C`	2x #2
	4018	3	±3.75 KHz min	1.0 dB max	4.0 dB max	4	3000 Ohms	40	±15.0 KHz max	80 dB	-20°C to +70°C	2x #2
	4022	3	±7.50 KHz min	2.0 dB max	6.0 dB max	4	50 Ohms	25	± 25.0 KHz max	70dB	-20°C to +70°C	#3
SMD FILTERS	62920	3	± 3.75 KHz min	2.0 dB max	3.5 dB max	4	50 Ohms	40	±12.5 KHz max	70 dB	-40°C to +85°C	SMDF-7
	62940	3	± 7.5 KHz min	2.0 dB max	3.5 dB max	4	50 Ohms	40	±25 KHz max	70 dB	-40°C to +85°C	SMDF-7
	63020	3	± 7.5 KHz min	2.0 dB max	3.5 dB max	4	50 Ohms	40	±25 KHz max	70 dB	-40°C to +85°C	SMDF-2
	63040	3	±15.0 KHz min	2.0 dB max	3.5 dB max	4	50 Ohms	40	±50 KHz max	70 dB	-40°C to +85°C	SMDF-2

1-800-274-XTAL ■ FAX 608-831-3343 ■ Sales @ PDIXTAL.Com

PDI CLOCK OSCILLATORS



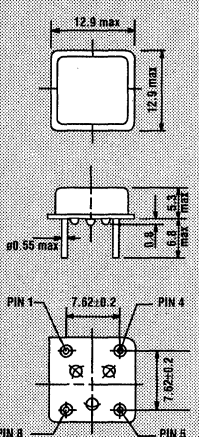
PRECISION DEVICES INCORPORATED offers clock oscillators for general and specific applications. Standard TTL/ CMOS Oscillators with a frequency range from 32.768 KHz to 100 MHz. Standard 8 pin and 14 pin packages are available as well optional Tri-State Enable/ Disable functions. PDI manufactures a variety of SMD oscillators reduced in size with the \same or increased electrical capability. Our newest SMD package, the Micro Mini, reduces space as compared to current industry standard SMD packages. We continue to offer design solutions by producing low cost products in alternative packages. Standard items are listed for reference.

Typical Electrical Characteristics

Frequency Range : 500.0 KHz to 100.0 MHz
Operating Temp Range : -20°C to +70°C
Rise and Fall Time : 10 nS
Output Symmetry : A. 40% Min. B. 45% Min.
60% Max. 55% Max.
Max Current: 500 KHz to 30 MHz: 30 mA Max.
30 MHz to 100 MHz: 40 mA Max.

Frequency Tolerance	Operating Temperature Range	Frequency Tolerance over Temp Range
A = ±5 ppm	1. 0°C to 50°C	a. ± 5 ppm
B = ±10 ppm	2. 0°C to 70°C	b. ± 10 ppm
C = ±25 ppm	3. -20°C to 70°C	c. ± 25 ppm
D= ±50 ppm	4. -40°C to 85°C	d. ± 50 ppm
E= ±100 ppm	5. -55°C to 105°C	e. ±100 ppm

Package # OSC-5 (8 Pin OSC)



PIN	CONNECTION
1	N.C.
4	GND
5	OUTPUT
8	Vcc

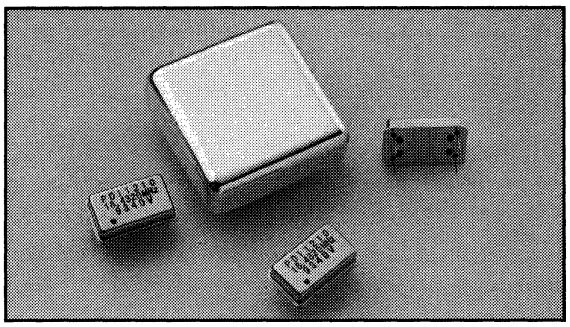
8 PIN STANDARD OSCILLATORS

Nominal Frequency (MHz)	Frequency Tolerance	Operating Temp Range	Part Number
1.84320	±100ppm	0°c to +70°c	1577
2.00000	±100ppm	0°c to +70°c	1651
3.68640	±100ppm	0°c to +70°c	1177
5.00000	±100ppm	0°c to +70°c	1593
7.37280	±100ppm	0°c to +70°c	1656
10.00000	±100ppm	0°c to +70°c	1386
14.31818	±100ppm	0°c to +70°c	1208
16.38400	±100ppm	0°c to +70°c	1380
19.66080	±100ppm	0°c to +70°c	1175
24.00000	±100ppm	0°c to +70°c	1199
25.00000	±100ppm	0°c to +70°c	1184
32.00000	±100ppm	0°c to +70°c	1344
40.00000	±100ppm	0°c to +70°c	1305
64.00000	±100ppm	0°c to +70°c	1290
80.00000	±100ppm	0°c to +70°c	1461

Other Frequencies available upon request

1-800-274-XTAL ■ FAX 608-831-3343 ■ Sales @ PDIXTAL.Com

PDI VOLTAGE CONTROLLED CRYSTAL OSCILLATORS



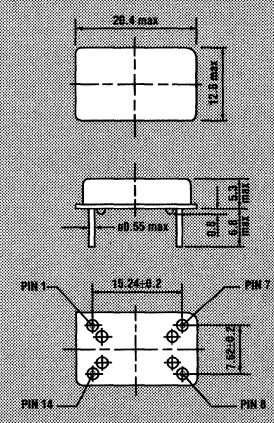
PRECISION DEVICES INCORPORATED offers voltage controlled crystal oscillators for many applications, such as telecom switching systems, local area networks (LAN) and video applications. The VCXO provides an output frequency which can be pulled by a change in voltage. Fundamental crystals are required to provide pullability to the internal oscillator design. PDI designs and manufactures fundamental crystals up to 200 MHz. These high frequency crystals allow engineers flexibility in oscillator design. Tight tolerances and wide temperature ranges are also available with VCXO's.

Typical Electrical Characteristics

Frequency Range: 100.0 KHz to 200.0 MHz
Operating Temp Range: -20°C to +70°C
Control Voltage: A) 0V to 5V B). 0V to 10V
C) .5V to 4.5V D). 1V to 4V
Supply Current: 60 mA for 70 MHz
30 mA for 25 MHz
Supply Voltage: 5.0 Vdc (± 10%)

Frequency Tolerance	Operating Temperature Range	Frequency Tolerance over Temp Range
A = ±5 ppm	1. 0°C to 50°C	a. ± 5 ppm
B = ±10 ppm	2. 0°C to 70°C	b. ± 10 ppm
C = ±25 ppm	3. -20°C to 70°C	c. ± 25 ppm
D= ±50 ppm	4. -40°C to 85°C	d. ± 50 ppm
E= ±100 ppm	5. -55°C to 105°C	e. ±100 ppm

Package # OSC-20 (VCXO)



PIN	CONNECTION
1	Voltage Control
7	GND
8	OUTPUT
14	Vcc

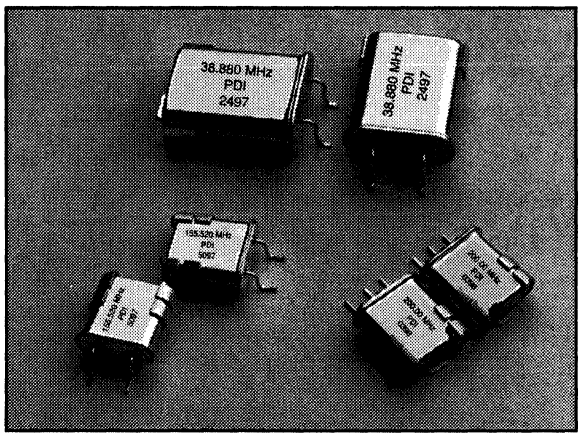
STANDARD VOLTAGE CONTROLLED CRYSTAL OSCILLATORS

Nominal Frequency	Control Voltage (MHz)	Frequency Deviation (ppm)	Temperature Range (Degree °C)	Available Packages	PDI Part No
704 KHz	.5V to 4.5 V	±75 to ±200	-35 to 75	14 Pin	1262
1.54400	.5V to 4.5V	±75 to ±200	0 to 70	14 Pin	1103
2.04800	.5V to 4.5V	±100	-20 to 70	14 Pin	1497
4.00000	.5V to 4.5V	±80	0 to 50	14 Pin	1206
6.17600	.5V to 4.5V	±100 to ±150	0 to 70	14 Pin	1264
9.34400	.5V to 4.5V	±100	0 to 70	14 Pin	1299
10.0000	.5V to 4.5V	±100	-10 to 85	14 Pin	1531
12.2880	.5V to 4.5V	±100	0 to 70	14 Pin	1118
16.3840	.5V to 4.5V	±100 to ±150	0 to 70	14 Pin	1265
18.4320	.5V to 4.5V	±75 to ±200	0 to 70	14 Pin	1210
25.0000	.5V to 4.5V	±100	0 to 70	14 Pin	1720
28.63636	.5V to 4.5V	±125	0 to 50	14 Pin	1389
30.57600	.5V to 4.5V	±150	0 to 50	14 Pin	1360
34.36800	.5V to 4.5V	±80	0 to 70	14 Pin	1504
45.55200	.5V to 4.5V	±100	0 to 50	14 Pin	1488
55.20000	.5V to 4.5V	±80	0 to 70	14 Pin	1705

Other frequencies available upon request

1-800-274-XTAL ■ FAX 608-831-3343 ■ Sales @ PDIXTAL.Com

PDI High Frequency Fundamentals



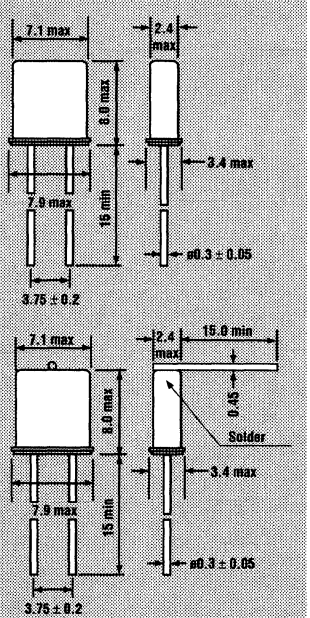
PRECISION DEVICES INCORPORATED now offers high frequency fundamentals and tight tolerance crystals. These crystals are used for oscillators and crystal filters and provide wide pullability and excellent spurious suppression. Using the latest state of the art etching techniques PDI can provide you with fundamental frequencies up to 350.00 MHz. This allows fewer components in oscillator designs and much more flexibility. Excellent for Sonet applications and High Speed Microprocessor design.

Typical Electrical Characteristics

Frequency Range: 30.0 MHz to 350.0 MHz
Operating Temp Range: -40°C to +85°C
Calibration Tolerance: ± 15 ppm
Calibration Tolerance
over Operating Temp Range : ± 25 ppm
Aging : ± 2 ppm/year
Drive Level : 100 µW
Package: UM-1

Frequency Tolerance	Operating Temperature Range	Frequency Tolerance over Temp Range
A = ±5 ppm	1. 0°C to 50°C	a. ± 10 ppm
B = ±10 ppm	2. 0°C to 70°C	b. ± 15 ppm
C = ±15 ppm	3. -20°C to 70°C	c. ± 25 ppm
D= ±25 ppm	4. -40°C to 85°C	d. ± 50 ppm
	5. -55°C to 105°C	

Package # CRY-2 (UM-1)



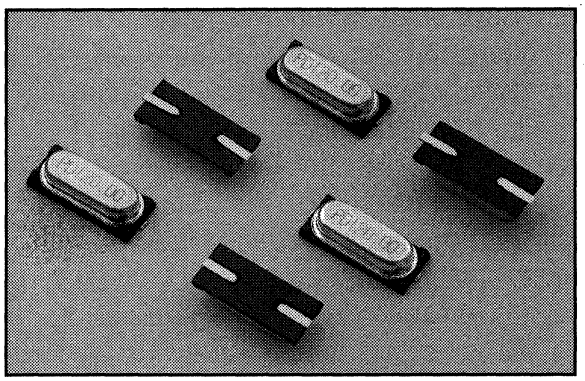
HIGH FREQUENCY FUNDAMENTAL STANDARD CRYSTALS

Nominal Frequency (MHz)	Frequency Tolerance	Operating Temp Range	Part Number
38.880	±10 ppm	-40°c to +85°c	9462
44.736	±15 ppm	-20°c to +70°c	9463
51.840	±10 ppm	-40°c to +85°c	9464
52.192	±15 ppm	-20°c to +70°c	9465
77.760	±10 ppm	-40°c to +85°c	9466
80.000	±25 ppm	-20°c to +70°c	9467
100.000	±25 ppm	-20°c to +70°c	9468
139.264	±15 ppm	-40°c to +85°c	9469
140.000	±15 ppm	-40°c to +85°c	9470
155.520	±15 ppm	-20°c to +70°c	9471
200.000	±25 ppm	-20°c to +70°c	9472
225.000	±25 ppm	-20°c to +70°c	9473
233.000	±25 ppm	-20°c to +70°c	9474
250.000	±25 ppm	-20°c to +70°c	9475
300.000	±25 ppm	-20°c to +70°c	9476

Other Frequencies available upon request

1-800-274-XTAL ■ FAX 608-831-3343 ■ Sales @ PDIXTAL.Com

PDI LP-9000 SMD CRYSTAL



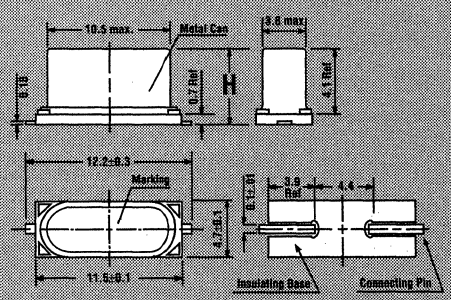
PRECISION DEVICES INCORPORATED has developed new technology to produce low profile surface mount crystals that are "ASSEMBLED IN THE USA". We have put considerable time and effort into producing these crystals with the utmost accuracy. This crystal has been developed to provide coplanarity within ± 0.6 mm. This allows the PDI part to be easily auto-inserted to prevent variance or movement which could create a poor electrical connection. We have also extended the lead lengths of these parts to allow a direct view of the solder connection between the lead and the PCB. The low profile SMD part has been used in many designs and produced by many manufacturers. We feel the PDI LP-9000 CRYSTAL offers a superior design due to software control during the assembly process. This SMD device provides long term reliability and has passed significant environmental testing.

Typical Electrical Characteristics

Frequency Range : 3.2 MHz to 100.0 MHz
Calibration Tolerance @ 25°c : ± 50 ppm
Operating Temp Range : -20°c to +70°c
Calibration Tolerance
over Temp Range : ± 50 ppm
Aging : ± 2 ppm/year
Drive Level : 100 µW

Frequency Tolerance	Operating Temperature Range	Frequency Tolerance over Temp Range
A = ±20 ppm	1. 0°C to 70°C	a. ± 10 ppm
B = ±30 ppm	2. -20°C to 70°C	b. ± 20 ppm
C = ±50 ppm	3. -30°C to 80°C	c. ± 50 ppm
D= ±100 ppm	4. -40°C to 85°C	d. ±100 ppm

Package # CRY-16 (LP-9000 SMD)



HEIGHT	1	2	3	4	5
H	2.5	3.0	3.5	4.0	5.0

Available Frequency Range	Resistance	Oscillation Mode
3.200 - 3.499 MHz	300 Ω	Fundamental
3.500 - 4.999 MHz	150 Ω	Fundamental
5.000 - 5.999 MHz	120 Ω	Fundamental
6.000 - 6.999 MHz	100 Ω	Fundamental
7.000 - 8.999 MHz	80 Ω	Fundamental
9.000 - 12.999 MHz	60 Ω	Fundamental
13.000 - 19.999 MHz	40 Ω	Fundamental
20.000 - 29.999 MHz	30 Ω	Fundamental
30.000 - 35.000 MHz	30 Ω	Fundamental
24.000 - 80.000 MHz	100 Ω	3rd Overtone

1-800-274-XTAL ■ FAX 608-831-3343 ■ Sales @ PDIXTAL.Com

LP-9000 STANDARD CRYSTAL FREQUENCIES

Nominal Frequency (MHz)	Temp Range	Frequency Over Operating	Load Capacity	PDI Part Number
3.276800	0°C to 70°C	±100 ppm	18 pF	8279B
3.579545	-20°C to 70°C	±50 ppm	18 pF	7201B
3.686400	-20°C to 70°C	±100 ppm	20 pF	8247B
3.975000	-20°C to 85°C	±15 ppm	32 pF	7991B
4.000000	-20°C to 70°C	±100 ppm	series	8000B
4.000000	-20°C to 70°C	±50 ppm	20 pF	7843B
4.032000	-40°C to 85°C	±100 ppm	18 pF	8404B
4.096000	0°C to 70°C	±50 ppm	18 pF	7550B
4.194304	-20°C to 70°C	±50 ppm	20 pF	7888B
4.433619	-20°C to 70°C	±100 ppm	20 pF	7240B
4.915200	-20°C to 70°C	±100 ppm	series	7999B
5.000000	-20°C to 70°C	±100 ppm	20 pF	8364B
5.068800	-20°C to 70°C	±50 ppm	20 pF	8974B
6.000000	-20°C to 70°C	±50 ppm	20 pF	7832B
6.144000	-20°C to 70°C	±50 ppm	20 pF	7672B
6.176000	0°C to 70°C	±50 ppm	series	7850B
7.200000	-20°C to 70°C	±100 ppm	30 pF	8384B
7.372800	0°C to 70°C	±50 ppm	20 pF	7377B
7.680000	-20°C to 70°C	±50 ppm	18 pF	8526B
8.000000	-20°C to 70°C	±50 ppm	20 pF	7435B
8.000000	-30°C to 80°C	±100 ppm	series	7823B
8.000000	-40°C to 85°C	±100 ppm	18 pF	7766B
8.192000	0°C to 70°C	±50 ppm	30 pF	7303B
9.048300	-20°C to 70°C	±35 ppm	32 pF	8139B
9.216000	0°C to 70°C	±100 ppm	series	8266B
9.830400	-20°C to 70°C	±100 ppm	series	7998B
10.000000	0°C to 70°C	±100 ppm	18 pF	7863B
10.240000	-20°C to 70°C	±50 ppm	20 pF	7435B
10.245000	0°C to 70°C	±50 ppm	18 pF	7795B
11.000000	0°C to 70°C	±50 ppm	18 pF	7879B
11.059200	-20°C to 70°C	±50 ppm	20 pF	7833B
11.155000	-20°C to 70°C	±50 ppm	18 pF	8467B
12.000000	0°C to 70°C	±50 ppm	18 pF	8017B
12.288000	-40°C to 85°C	±100 ppm	18 pF	7705B
12.352000	-40°C to 85°C	±30 ppm	15 pF	8674B
12.800000	0°C to 70°C	±50 ppm	20 pF	8293B
13.824000	-20°C to 70°C	±100 ppm	20 pF	8085B
14.318180	-20°C to 70°C	±100 ppm	series	7456B
14.318180	-20°C to 70°C	±100 ppm	18 pF	8332B
14.745600	-20°C to 70°C	±100 ppm	18 pF	7252B
15.000000	0°C to 70°C	±100 ppm	18 pF	8014B
15.360000	-20°C to 70°C	±100 ppm	20 pF	8024B
16.000000	0°C to 70°C	±50 ppm	20 pF	8301B
16.000312	0°C to 70°C	±25 ppm	32 pF	8015B
16.384000	0°C to 70°C	±30 ppm	20 pF	8278B
16.667000	-20°C to 70°C	±50 ppm	18 pF	8233B
16.934400	-20°C to 70°C	±100 ppm	20 pF	7982B
17.000000	0°C to 70°C	±50 ppm	20 pF	8489B
17.445000	-30°C to 60°C	±20 ppm	32 pF	8524B
17.760000	-20°C to 70°C	±100 ppm	32 pF	8538B
18.000000	-20°C to 70°C	±50 ppm	series	7641B
18.432000	-20°C to 70°C	±50 ppm	20 pF	8241B

Nominal Frequency (MHz)	Temp Range	Frequency Over Operating	Load Capacity	PDI Part Number
19.440000	-20°C to 70°C	±100 ppm	20 pF	8285B
19.660800	-20°C to 70°C	±100 ppm	16 pF	7232B
20.000000	0°C to 70°C	±10 ppm	18 pF	8012B
20.000000	0°C to 70°C	±10 ppm	18 pF	8012B
20.480000	-20°C to 70°C	±50 ppm	18 pF	7699B
20.945000	0°C to 50°C	±50 ppm	32 pF	7799B
22.118400	-20°C to 70°C	±100 ppm	20 pF	8287B
20.480000	-20°C to 70°C	±50 ppm	18 pF	7699B
23.040000	-20°C to 70°C	±50 ppm	18 pF	8885B
24.000000	-20°C to 70°C	±100 ppm	series	8657B
24.000140	0°C to 70°C	±100 ppm	18 pF	7200B
24.576000	-20°C to 70°C	±100 ppm	20 pF	7984B
24.576000	-20°C to 70°C	±100 ppm	30 pF	8432B
25.000000	0°C to 70°C	±50 ppm	20 pF	7927B
27.000000	-30°C to 60°C	±15 ppm	18 pF	8324B
28.322000	0°C to 70°C	±50 ppm	20 pF	8421B
28.375000	-20°C to 70°C	±100 ppm	20 pF	8317B
28.571000	0°C to 70°C	±50 ppm	18 pF	8173B
20.480000	-20°C to 70°C	±50 ppm	18 pF	7699B
28.636363	0°C to 70°C	±50 ppm	30 pF	8962B
29.491200	-20°C to 70°C	±50 ppm	22 pF	7608B
29.500000	0°C to 70°C	±100 ppm	30 pF	8387B
32.000000	0°C to 70°C	±50 ppm	20 pF	7606B
32.256000	0°C to 70°C	±100 ppm	20 pF	7389B
33.000000	0°C to 70°C	±50 ppm	20 pF	8040B
35.251200	0°C to 70°C	±50 ppm	18 pF	7729B
39.321600	0°C to 70°C	±50 ppm	20 pF	8363B
40.000000	0°C to 70°C	±100 ppm	20 pF	8308B
40.320000	0°C to 70°C	±50 ppm	20 pF	7694B
44.236800	0°C to 70°C	±50 ppm	18 pF	7988B
44.545000	-20°C to 70°C	±50 ppm	18 pF	7940B
48.000000	0°C to 70°C	±50 ppm	18 pF	8251B
54.857000	-20°C to 70°C	±100 ppm	20 pF	8435B
55.000000	-20°C to 70°C	±100 ppm	20 pF	8181B
60.000000	-20°C to 70°C	±100 ppm	18 pF	8184B
65.536000	-20°C to 70°C	±100 ppm	series	8456B
77.760000	-20°C to 70°C	±100 ppm	20 pF	8286B

PDI™

PRECISION DEVICES INC.

8840 N. Greenview Drive
P.O. BOX 620155
Middleton, WI 53562-0155

1-800-274-XTAL FAX 608-831-3343 Sales @ PDIXTAL.Com

Q-TECH Corporation

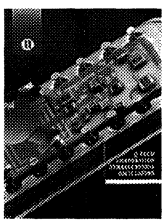
High-Reliability Crystal Oscillators

10150 West Jefferson Blvd., Culver City, Ca 90232-3502

Hybrid-

Crystal

Oscillators



Product catalog available upon request.

OUR PRODUCT LINE

Q-TECH Corporation is the leading source for high-reliability crystal oscillators. We offer complete crystal oscillator capabilities ranging from standard clock oscillators to MCXOs. All of which meet our very high standards in design, performance, and quality.

Standard Products/Hybrid Crystal Oscillators

- DUAL IN-LINE PACKAGES
- TRANSISTOR OUTLINE PACKAGES
- LEADLESS CHIP CARRIERS
- FLAT PACKS

Special Products/Hybrid Crystal Oscillators

- MCXO
- VCXO
- SINE
- MICROPROCESSOR DRIVER
- SPACE PRODUCTS

QPL Products/Hybrid Crystal Oscillators

- DIP TTL (MIL-O-55310/08,/14,/16 &/17)
- DIP CMOS (MIL-O-55310/11,/15,/18 &/26)
- DIP ECL (MIL-O-55310/25)
- TO5, TTL, & CMOS (MIL-O-55310/09 &/12)
- TO8, TTL, & CMOS (MIL-O-55310/10 &/13)
- LCC, TTL (MIL-O-55310/19 &/20)

OUR PHILOSOPHY

Q-TECH Corporation was founded in 1972 with the objective of providing state-of-the-art hybrid crystal oscillators. Q-TECH has been built on the philosophy that our customers are best served by our being on the leading edge of crystal oscillator technology. Therefore, we've committed ourselves to accepting nothing less than superior quality- in our products and in our customer service. Even as we have become the industry leader in our field, at Q-TECH we have never forgotten that our most valuable resource is our customer.

Q-TECH Product Bulletins

Available at your request are:

- Baud Rate Generators
- ECL Clock Oscillators
- Extended Temperature Clock Oscillators for "Down-Hole" Applications
- Microprocessor Driver Clock Oscillators
- Technical Memo on Radiation-Hardened Devices
- Q-TECH Quality Assurance Manual
- Surface Mount Crystals
- Individual Product Specifications and Package Outlines
- MCXO: Microcomputer Compensated Crystal Oscillators
- VCXO: Voltage Controlled Crystal Oscillators
- UHF/VHF Sources
- Short Form Catalog

SPECIAL PRODUCTS

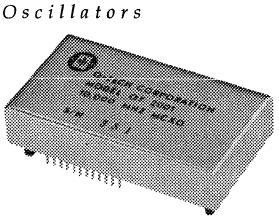
MCXO

Microcomputer

Compensated

Crystal

Oscillators



Ovenized oscillator stability at TCXO size, power, and start-up.

Q-TECH Corporation's microcomputer compensated crystal oscillator, MCXO, uses a high stability 3rd overtone SC-cut crystal and microprocessor-controlled compensation.

The self-temperature-sensing resonator*, using a dual-mode oscillator, virtually eliminates thermometry-related errors. As a result, all basic TCXO and OCXO limitations are overcome or significantly reduced in the MCXO.

*Licensed under U.S. Patent No. 4,872,765 entitled "Dual Mode Quartz Thermometric Sensing Device," issued to Stanley S. Schodowski, U.S. Army Research Lab, EPSD.

Applications

- Battery-operated equipment
- Mobile equipment
- Low-power counters for field use
- Uplink/Downlink stable sources
- Aviation equipment
- Satelite sources
- GPS
- IFF

Any precision frequency application where immediate initialization, field calibration and small size, weight, and power are important.

Features

Frequency Stability-Temperature:
±3 x 10^{-8} from -55°C to +85°C
Outputs:
10 MHz (others available)
Phase Noise:
£ (f) <-140 dBC/Hz @ 1 KHz, 10 MHz
DC Power Input:
+5 volt Vcc, 75 milliwatts max
Timing mode: 25 milliwatts
Inputs:
Calibration Reference Signal
Sync (optional)
Start-Up Time:
<8 seconds from power-on to full performance
Aging Correction:
Auto-calibration against customer standard
Environmental:
Inherently rugged design capable of full military screening)
Options:
• Low Noise • Low power
• 1 PPS output • 3 volt model.

Telephone: (310) 836-7900 • *Fax*: (310) 836-2157 • *E-mail*: sales@q-tech.com

Please contact us for variations on these specifications.

Q-TECH Corporation

10150 West Jefferson Blvd., Culver City, Ca 90232-3502

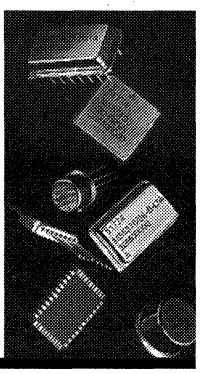
MIL-O-55310 Cross Reference to Q-Tech Models

M55310	Q-TECH#	PKG. TYPE	LOGIC TYPE	MIL-O FREQ. RANGE
/08	QT10T	DIP	TTL	50 Hz to 50 MHz
/09	QT1T	TO-5	TTL	400 KHz to 60 MHz
/10	QT3T	TO-8	TTL	1 KHz to 60 MHz
/11	QT10C	DIP	CMOS	0.05 MHz to 10 MHz
/12	QT1C	TO-5	CMOS	0.05 MHz to 10 MHz
/13	QT3C	TO-8	CMOS	300 Hz to 10 MHz
/14	QT4T	DIP	TTL	0.1 Hz to 25 MHz
/15	QT10C	DIP	CMOS	0.01 Hz to 10 MHz
/16	QT6T	DIP	TTL	0.1 Hz to 80 MHz
/17	QT6T w/gate	DIP	TTL	250 KHz to 50 MHz
/18	QT6C	DIP	CMOS	0.01 Hz to 15 MHz
/19	QT66T	LCC	TTL	1 MHz to 60 MHz
/20	QT62T	LCC	TTL	40 KHz to 60 MHz
/25A	QT48E	DIP 14 pin	ECL	25 MHz to 175 MHz
/25B	QT39E	DIP 4 pin	ECL	25 MHz to 175 MHz
/26A	QT6HC	DIP 14 pin	HCMOS	0.01 MHz to 65 MHz
/26B	QT41HC	DIP 4 pin	HCMOS	0.01 MHz to 65 MHz

Q-TECH Corporation is qualified to manufacture all **MIL-O-55310** hybrid clock oscillators. Our designs, manufacturing methods, materials, and facilities are periodically reviewed and approved by the appropriate government agency. Because of the strict standards our products must meet to be included on the **QPL**, you can be sure that the oscillator you receive will be of the highest quality and reliability available. **Q-TECH** oscillators are used in the most demanding applications, from jet fighters to spacecraft.

QPL

Military Oscillators



Whether you order a QPL oscillator, an equivalent military standard, or a custom unit, all are built in accordance with military quality procedures and workmanship standards.

Q-TECH oscillator products address various technical requirements and applications. Some of the more common parameters beyond the ones already covered in the standard product categories are:

Tech

Technical Data

Supply Voltage Options:
Range: from 2 Volts to 24 Volts
Standard Voltages (V): 3.3, 5, 10, 12, 15

Output Characteristics/Options:
Additional Outputs: synchronous and asynchronous
Duty Cycle: 45/55%, 47.5/52.5%, 33/66%, 20/80%
Rise/Fall Time: 10ns, 5ns, 3ns, 2ns (please specify load)
Output Load: customer specified (capacitive or other)
Sine Wave: options available for harmonics, output power (up to +30 dBm)
Start-Up Time: 5 to 15 msec

Frequency Stability:
Phase Noise: -100 dBc/Hz (typical) at 100 Hz offset
Phase Jitter: available to less than 5 ps (rms)
Aging: 5 ppm per year; 20 ppm per ten years
Short Term Stability: better than .01 ppm per second

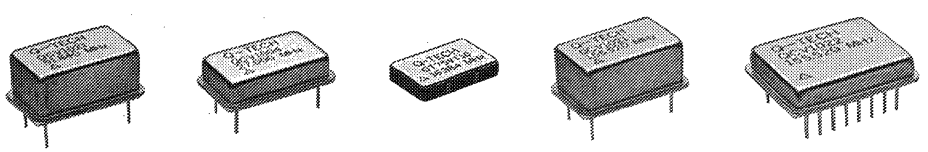
Voltage Control Options:
Crystal or non-crystal controlled (through-hole and SMD)
Pull Range: up to +/-1000 ppm (VCXO); Octave range (VCO)
Various options on modulation BW, input impedance and linearity
Transfer Function: positive, negative, single-ended or bipolar

SPECIAL PRODUCTS

Telcom

Crystal Oscillators for Telecommunications/ Industrial Applications

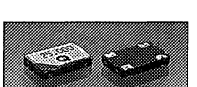
Q-TECH products in this category are offered to satisfy the special requirements of the Industrial/Telecom market while meeting and exceeding the price/performance needs. The common feature among the different product types is the availability of common frequencies, including those used in telecom applications, such as: 8.192 MHz, 16.384 MHz, 32.768 MHz, 38.888 MHz, 40.960 MHz, 44.736 MHz (DS3), 51.840 MHz (OC1), 65.536 MHz, 70.000 MHz, 133.9364 MHz, 155.52 MHz (OC3), & 622.08 MHz (OC12).



Among the various products in this group are:

VCXO (QCV series): Providing efficient solutions for phase locking and data/clock recovery applications. Electrical specifications typically follow the parameters specified under the VCXO section. Parts could be provided as through-hole or surface-mount. The low-profile ceramic commercial VCXO (QCV XXXX) provides electrical performance of QT75V Series for commercial applications.

XO Crystal Oscillator (QCC series): Providing cost-effective but reliable clock sources for a wide range of applications, including portable, surface mount, and low-voltage electronic systems. Please call for the appropriate data sheet on these products.



QCC570 Series
Clock Oscillators

Telephone: (310) 836-7900 • *Fax*: (310) 836-2157 • *E-mail*: sales@q-tech.com

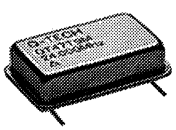
Q-TECH Corporation

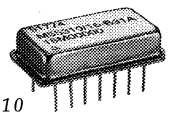
High-Reliability Crystal Oscillators

10150 West Jefferson Blvd., Culver City, Ca 90232-3502

DIP

Dual In-Line Package Crystal Clock Oscillators





QPL per MIL-0-55310

{ ORDERING INFORMATION }

sample part number: **QT6HC10M-20.000MHz**

QT6 | HC | 10 | M | - | 20.000 MHz

MODEL #
QT4, QT6, QT10, QT12, QT18, QT41, QT48, QT50

STABILITY
Please refer to stability table on opposite page.

SCREENING
Designate **M** for Class B M55310 screening.

FREQUENCY OPTIONS

TTL	LOW VOLTAGE, 3.3V
0.01 Hz to 160 MHz **1	0.1 MHz to 100 MHz
10 Hz to 80.000 MHz **2	**ECL**
CMOS3	1 MHz to 200 MHz **1
0.01 Hz to 15 MHz (5 to 15V)	1 MHz to 110 MHz **2
HCMOS/ACMOS	*New in ECL:* Up to 350 MHz in Double DIP Package
0.01 Hz to 150 MHz **1	
0.01 Hz to 100 MHz **2	

OUTPUT LOGIC OPTIONS
T = TTL
C = CMOS
HC = High Speed CMOS
AC = Advanced CMOS
L = Low Voltage, 3.3V
Z* = Special CMOS
E = 10 K ECL
EH = 10 KH ECL
EF = 100 K/300 K ECL
PE = +5V ECL

D* = Tri-State Output (add "D" as a suffix to these listed logic options)

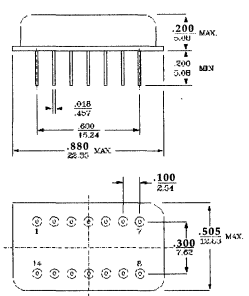
Pin Configuration

QT#	GND	OUT	VCC	CASE	ITP*	Tri-State**	M55310
QT4	7	5	4	7	3&12	1	/ 14 = QT4T
QT6	7	8	14	7	4&11	1	/ 16 = QT6T / 17 = QT6T with gate / 18 = QT6C / 26 = QT6HC
QT10	8	1	14	2	3&12	N/A	/ 08 = QT10T / 11 = QT10C / 15 = QT10C
QT12	7	4	14	7	3&12	1	N/A
QT18	7	8	14	7	4&11	1	N/A
QT41	7	8	14	7	N/A	1	/ 26 = QT41HC
QT48	14	8	7	14	N/A	1	/ 25 = QT48E
QT50	4	5	8	4	N/A	1	N/A

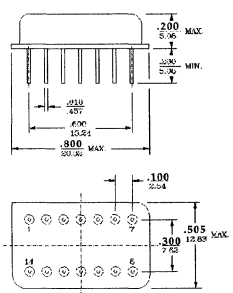
* ITPs: Internal Tie Points: Do not connect to these pins.
** Tri-State control pin, available only when requested.
**1 Frequency range for all DIP model numbers other than QT50
**2 Frequency range for QT50
**3 Indicate Supply Voltage: QT6C9M - 10.000 MHz, 15V
Z* Output logic can drive up to 200 pF load with typical 5 ns rise & fall times (tr, tf).
D* Tri-State frequency range for all dips & all logic options is up to 100 MHz.

All DIP packages are available in surface mount form. Please consult the factory.

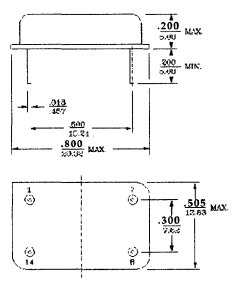
QT6 (QT4, QT10, QT12, QT48 - same package)



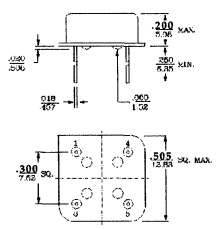
QT18



QT41



QT50



SPECIAL PRODUCTS

VCXO

Voltage Controlled Crystal Clock Oscillators

{ ORDERING INFORMATION }

sample part number: **QT6VHC9M-20.000MHz**

QT6V | HC | 9 | M | - | 20.000 MHz

MODEL #
QT6V, QT41V, QT50V, QT57V*, QT75V

STABILITY
Please refer to stability table on opposite page.

SCREENING
Designate **M** for Class B M55310 screening.

FREQUENCY
From: 1 KHz to 200 MHz** See Standard Electrical Specifications on next page.

OUTPUT LOGIC OPTIONS
T = TTL
HC = High Speed CMOS
AC = Advanced CMOS
E = 10 K ECL
EH = 10 KH ECL
PE = +5V ECL

* QT57V package offers a broader range of capabilities. Consult the factory for details.
** Frequency range for QT50V and QT75V is 5.000 MHz to 70.000 MHz for TTL, HC/ACMOS.

Pin Configuration

QT#	GND	OUT	VCC	ITP***	CONTROL V
QT6V	7	8	14	4&11	1
QT41V	7	8	14	N/A	1
QT50V	4	5	8	N/A	1
QT57V	8	9	16	N/A	1
QT75V	2	3	4	N/A	1

*** Internal tie points. Do not connect to these pins.

Features
- Wide frequency range
- Hermetically sealed packages
- Wide pull range (optional) (example: ± 1000 ppm)
- Control voltage and polarity of choices
- Special linearity (optional)
- Class B M55310 Screening available upon request

Outline drawings for standard VCXO packages shown above.

Telephone: (310) 836-7900 • *Fax*: (310) 836-2157 • *E-mail*: sales@q-tech.com

For complete electrical specifications, please request our product catalog.

Q-TECH Corporation

10150 West Jefferson Blvd., Culver City, Ca 90232-3502

TO-5/TO-8

Transistor Outline Package

Crystal Clock Oscillators

{ ORDERING INFORMATION }

sample part number: QT1HC10 - 20.000 MHz

QT1 | HC | 10 | M | A | 20.000 MHz

MODEL #
QT1, QT14, QT2, QT3, QT15

OUTPUT LOGIC OPTIONS
T = TTL
C = CMOS
HC = High Speed CMOS
AC = Advanced CMOS
L = Low Voltage, 3.3V
Z*= Special CMOS
E = 10 K ECL
EH = 10 KH ECL
D*= Tri-State Output (add "D" as a suffix to these listed logic options)

STABILITY
Please refer to stability table on this page.

SCREENING
Designate M for Class B M55310 screening.

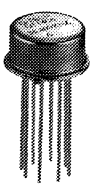
FREQUENCY OPTIONS
TTL
400 Hz to 100 MHz
CMOS**[1]
0.01 Hz to 15 MHz (5 to 15V)
HCMOS/ACMOS
0.03 Hz to 100 MHz
LOW VOLTAGE, 3.3V
0.1 MHz to 100 MHz
ECL
6 MHz to 100 MHz

**1 Indicate Supply Voltage: QT1C9M - 16.000 MHz, 15V
Z* Output logic can drive up to 200 pF load with typical 5 ns rise & fall times (tr, tf)
D* Tri-State frequency range for all TOs (TTL & CMOS) is up to 100 MHz.

Pin Configuration

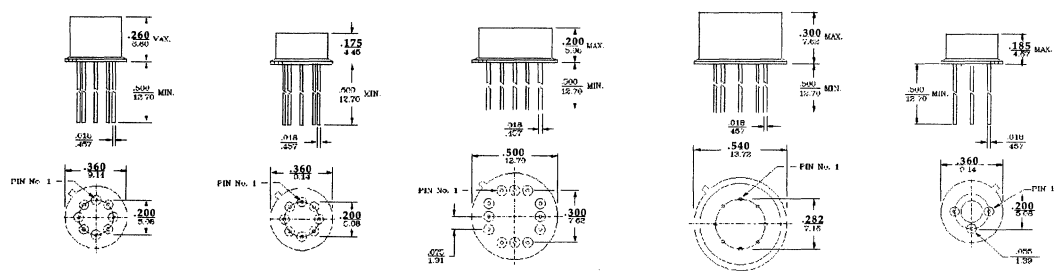
QT#	GND	OUT	VCC	CASE	ITP*	Tri-State**	M55310
QT1	4	5	8	4	1, 2, 6	3	/ 09 = QT1T*** / 12 = QT1C***
QT14	4	5	8	4	1, 2, 6	3	N/A
QT2	6	5	12	6	3, 9, 10	4	N/A
QT3	4	5	8	4	2, 6, 7	3	/ 10 = QT3T / 13 = QT3C
QT15	5	3	1	5	N/A	N/A	N/A

* Internal tie points. Do not connect to these pins.
** Tri-State control pin is available only when requested.
*** May be ordered with the low profile cover.



Upper dimensions in inches - lower dimensions in millimeters.
Unless otherwise specified, tolerances are .005" (.127mm).
Detailed mechanical drawings available upon request.

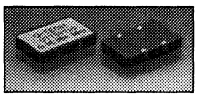
QT1 | QT14 | QT2 | QT3 | QT15



Standard Electrical Specifications

Frequency Range:
QT41V, QT6V, QT57V: up to 200 MHz
QT75V, QT50V: 5 MHz to 70.000 MHz
Output: TTL, HC/ACMOS, ECL
Supply Voltage: 5V ±10% (-5.2V for 10 K ECL)
(-4.5V for 100 K ECL)
Deviation: ±100 PPM (min)
Control Voltage (Vc): 0 to 5 Volts
Transfer Function: Positive
Modulation BW: Up to 10 KHz
Linearity: 10%
Input Impedance: >50 K ohm
Temperature Range: See frequency stability table
Stability vs. Temp.: See frequency stability table
Stability vs. Supply and Load changes: ±4 PPM
Package: 14 pin & 4 pin DIP/Half DIP/Double DIP

New! 4 pad LCC



See next page for package outline drawing.

Q-TECH Corporation has developed various types of VCXOs, VCOs, and complete phase-locked loops in hermetically sealed as well as solder-sealed packages.

The Q-TECH double DIP VCXO, QT57V, offers a broader range of capabilities. Consult the factory for details.

Frequency Stability vs Temperature*

CODE	±%	±PPM	TEMP
1	.01	100	0°C to +70°C
4	.005	50	0°C to +70°C
3**	.0005	5	0°C to +50°C
5	.0025	25	-20°C to +70°C
6	.005	50	-55°C to +105°C
9	.005	50	-55°C to +125°C
10	.01	100	-55°C to +125°C
11	.005	50	-40°C to +85°C
12	.01	100	-40°C to +85°C

* All units operate from -55°C to +125°C. Tolerance is not specified outside the temperature ranges shown above.
** Requires external tuning capacitors. Consult the factory for pin connections. For frequencies above 30 MHz, consult the factory.
• For frequency stability vs. temperature options not listed herein, request a custom part number.

Telephone: (310) 836-7900 • *Fax*: (310) 836-2157 • *E-mail*: sales@q-tech.com

Q-TECH Corporation

High-Reliability Crystal Oscillators

10150 West Jefferson Blvd., Culver City, Ca 90232-3502

QPL per MIL-0-55310

LCC

Leadless Chip Carrier Crystal Clock Oscillators

{ ORDERING INFORMATION }

sample part number: **QT66HC10M-20.000MHz**

QT66 | HC | 10 | M | - | 20.000 MHz

MODEL #
QT62, QT66, QT71, QT75

STABILITY
Please refer to stability table on opposite page.

SCREENING
Designate **M** for Class B M55310 screening.

FREQUENCY OPTIONS

TTL
1 Hz to 100 MHz **1
500 KHz to 80.000 MHz **2
CMOS
Not Available
HCMOS/ACMOS
0.03 Hz to 100 MHz**1
500 KHz to 100 MHz **2
ECL
1 MHz to 120 MHz **1
4 MHz to 100 MHz **2

OUTPUT LOGIC OPTIONS

T = TTL
C = CMOS
HC = High Speed CMOS
AC = Advanced CMOS
L = Low Voltage, 3.3V
Z* = Special CMOS
E = 10 K ECL
EH = 10 KH ECL
EF = 100 K/300 K ECL
PE = +5V ECL

D* = Tri-State Output (add 'D' as a suffix to these listed logic options)

Pin Configuration

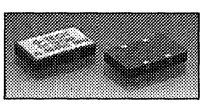
QT#	GND	OUT	VCC	CASE	Tri-State*	M55310
QT62	34&40	42	6&12	34&40	41	/ 20 = QT62T
QT66	31&37	39	4&10	31&37	38	/ 19 = QT66T
QT71	22&26	28	8	22&26	27	N/A
QT75	2	3	4	2	1	N/A

* Tri-State control pin, available only when requested.

**1 Frequency range for QT62 and QT66
**2 Frequency range for QT71 and QT75 (ECL not available in QT75 package)
Z* Output logic can drive up to 200 pF load with typical 6 ns rise & fall times (tr, tf). (not available in QT75 package)
D* Tri-State frequency range for all LCCs & all logic options is up to 100 MHz.

Lead options for the below packages include Gullwing, J-Lead, and Spider Lead. Please consult the factory for details.

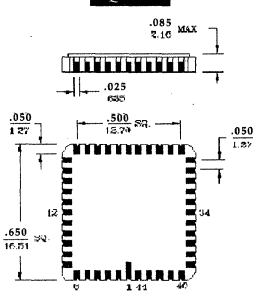
***4 pad LCC** Available with "J" Leads*



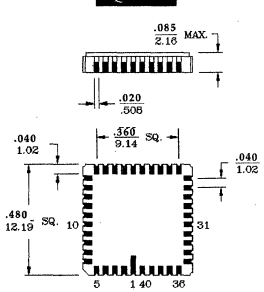
Also available as VCXO

***Ruggedized** Class "B" Screening Available*

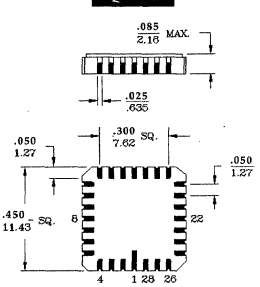
QT62



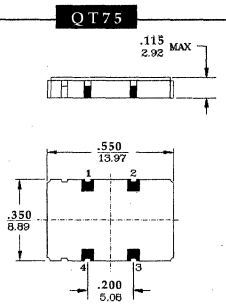
QT66



QT71



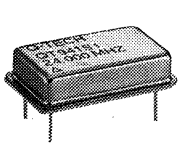
QT75



SPECIAL PRODUCTS

SINE

Dual In-Line Sine Wave Source Crystal Clock Oscillators



{ ORDERING INFORMATION }

sample part number: **QT901S11M-30.000KHz**

QT901S | 11 | M | - | 30.000 KHz

MODEL #
QT901S, QT906S
QT941S, QT957S

STABILITY
Please refer to stability table on opposite page.

SCREENING
Designate **M** for Class B M55310 screening.

FREQUENCY
QT901S: 10 Hz to 1 MHz
QT906S: 1 MHz to120 MHz
QT941S: 1 MHz to 120 MHz
QT957S: 10 Hz to 250 MHz

Features

- Wide frequency range
- Hermetically sealed packages
- Wide pull range (optional)
- Control voltage and polarity of choices
- Special linearity (optional)
- Class B M55310 Screening available upon request

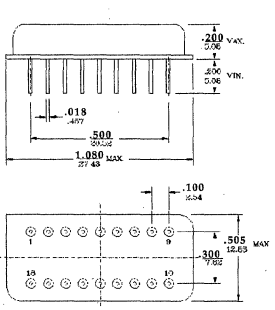
Pin Configuration

QT#	GND	OUT	VCC	CASE	ITP*
QT901S	9	10	16	9	4&11
QT906S	7	8	14	7	4&11
QT941S	7	8	14	7	N/A
QT957S	8	9	16	8	N/A

* Internal tie points. Do not connect to these pins.

Please consult the factory for other Sine Wave package outlines.

QT901S



Telephone: (310) 836-7900 • *Fax*: (310) 836-2157 • *E-mail*: sales@q-tech.com

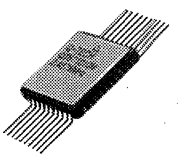
For complete electrical specifications, please request our product catalog.

Q-TECH Corporation

10150 West Jefferson Blvd., Culver City, Ca 90232-3502

FP

Flat Pack Crystal Clock Oscillators



ORDERING INFORMATION

sample part number: QT24HC10 - 20.000 MHz

QT24 | HC | 10 | | - | 20.000 MHz

MODEL #
QT22, QT24, QT25, QT26

STABILITY
Please refer to stability table on this page.

SCREENING
Designate M for Class B M55310 screening.

FREQUENCY OPTIONS

TTL	HCMOS/ACMOS
0.1 Hz to 110 MHz **1	0.03 Hz to 110 MHz **1
500 Hz to 85.000 MHz **2	500 Hz to 85.000 MHz**2
CMOS3	**ECL**
0.01 Hz to 15 MHz (5 to 15V)	1 MHz to 160 MHz **1
70 KHz to 10 MHz (5 to 10V)	8 MHz to 85.000 MHz **2

OUTPUT LOGIC OPTIONS

T = TTL
C = CMOS
HC = High Speed CMOS
AC = Advanced CMOS
L = Low Voltage, 3.3V
Z* = Special CMOS
E = 10 K ECL
EH = 10 KH ECL
EF = 100 K/300 K ECL
PE = +5V ECL

D* = Tri-State Output (add "D" as a suffix to these listed logic options)

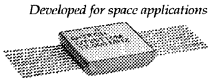
Pin Configuration

QT#	GND	OUT	VCC	CASE	Tri-State*	M55310
QT22	9	10	8	9	11	N/A
QT24	10	11	13	10	12	/ 21 = QT24T
QT25	10	11	13	10	12	N/A
QT26	7	8	14	7	1	N/A

* Tri-State control pin, available only when requested.

**1 Frequency range for QT24, QT25 and QT26
**2 Frequency range for QT22
**3 Indicate Supply Voltage: QT24C9M - 10.000 MHz, 15V
Z* Output logic can drive up to 200 pF load with typical 6 ns rise & fall times (tr, tf).
D* Tri-State frequency range for all FPs & all logic options is up to 100 MHz.

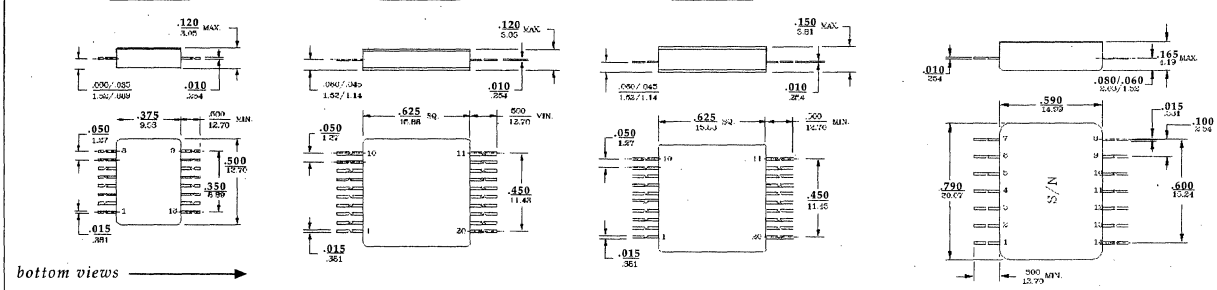
Developed for space applications



Lead forming options are available for these packages. Please consult the factory for details.

Upper dimensions in inches - lower dimensions in millimeters.
Unless otherwise specified, tolerances are .005" (.127mm).
Detailed mechanical drawings available upon request.

QT22 | QT24 | QT25 | QT26

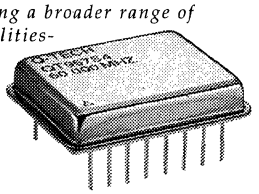


bottom views

Phase Noise: (typical)

Offset from Carrier	Standard
100 Hz	-100 dbc/Hz
1 KHz	-120 dbc/Hz
10 KHz	-140 dbc/Hz
50 KHz	-150 dbc/Hz

Offering a broader range of capabilities-



Standard Electical Specifications

Model #	Frequency	Input Voltage	Output Power	Supply Current	Spectral Purity
QT901S	10 Hz to 1 MHz*1	+15V +5%*2	Standard: 1V RMS (1 KΩ load)*4	<20 mA	<1% THD
QT906S	1 MHz to 120 MHz	+5V +10%*3	Standard: 0 dBm (50Ω load)*4	<40 mA	Harmonics: -20 dBc*5 Sub-harmonics: -30 dBc
QT941S	1 MHz to 120 MHz	+5V +10%*3	Standard: 0 dBm (50Ω load)*4	<40 mA	Harmonics: -20 dBc*5 Sub-harmonics: -30 dBc
QT957S	10 Hz to 250 MHz*1	+5V +5%*3	Standard: 0 dBm (50Ω load)*4	<60 mA	Harmonics: -20 dBc*5 Sub-harmonics: -30 dBc

*1 Frequencies less than 500 Hz require an external 1 uf AC coupling capacitor at the output pin.
*2 Supply voltage avove 15V is available.
*3 Supply voltage above 5V is available.
*4 Options are available for other power and load specifications, please consult the factory.
*5 Options are available for -30 dBc adn -40 dBc harmonics, please consult the factory.

Frequency Stability vs Temperature*

CODE	±%	±PPM	TEMP
1	.01	100	0°C to +70°C
4	.005	50	0°C to +70°C
3**	.0005	5	0°C to +50°C
5	.0025	25	-20°C to +70°C
6	.005	50	-55°C to +105°C
9	.005	50	-55°C to +125°C
10	.01	100	-55°C to +125°C
11	.005	50	-40°C to +85°C
12	.01	100	-40°C to +85°C

* All units operate from -55°C to +125°C. Tolerance is not specified outside the temperature ranges shown above.
** Requires external tuning capacitors. Consult the factory for pin connections. For frequencies above 30 MHz, consult the factory.
• For frequency stability vs. temperature options not listed herein, request a custom part number.

Telephone: (310) 836-7900 • *Fax*: (310) 836-2157 • *E-mail*: sales@q-tech.com

Q-TECH Corporation

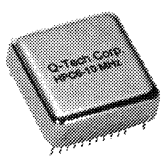
10150 West Jefferson Blvd., Culver City, Ca 90232-3502

High-Reliability Crystal Oscillators

QPL per MIL-0-55310

MCXO *New!* QT2002: Reduced Size MCXO

Microcomputer Compensated Crystal Oscillators



Q-TECH Corporation has announced a new model of the MCXO, called the **QT2002**. This new unit combines the extraordinary stability, low power, and fast warm-up time of its predecessor, with small size, and additional frequency flexibility.

With a stability of better than +/-30 parts per billion, over -55 to +85 degrees centagrade, the MCXO delivers two orders of magnitude better stability than conventional TCXOs! And its two second warm-up time and 90 milliwatt power requirement make it an ideal choice in applications where an ovenized oscillator would be too large, power hungry, and slow.

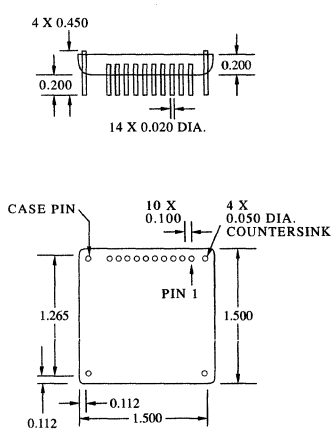
The **QT2002**, at 1.5 X 1.5 X 0.5 inches, is one quarter the size of its predecessor, the QT2001. A new digital ASIC allows primary frequency flexibility from 10 MHz to 20 MHz, with various selectable timing outputs. (10 MHz is the standard, "off the shelf" frequency).

Standard Electrical Specifications	
OUTPUTS:	1. 10 MHz, frequency mode only
All I/O is HCMOS	2.1 Hz
DC Power Consumption	
Timekeeping Mode:	25 mW
Frequency Mode:	90 mW
DC Supply Voltage	5 V +/-10%
10 MHz Output Characteristics	
Frequency Stability vs. Temperature	<3 x 10-8
Startup time	<2 Seconds
Frequency Stability vs. Time (Aging)	<1x 10-9 / Day
Phase Noise @ 10 MHz	
10 Hz Offset	90 dBc
100 Hz Offset	120 dBc
1 kHz Offset	134 dBc
>3 kHz Offset	134 dBc
Spurious Signals	<70 dBc @ >50 +/-10 kHz Offset
1 Hz Timing Signal Characteristics	
Frequency vs. Temperature	<3 x 10-8
Duty Factor	50%
Jitter:	
Frequency Mode	5 nS
Timekeeping Mode	600 nS
Shift During Mode Change:	
Frequency to Timekeeping Mode	<250 nS + Timekeeping Mode Jitter
Timekeeping to Frequency Mode	<450 nS
Syncronization Delay:	
Frequency Mode	<150 nS
Timekeeping Mode	<450 nS
Temperature Range:	-55°C to +85°C
Package Size	1.5 x 1.5" x.5"
Weight	<2 oz.

Four times smaller than it's predecessor!

Dimensions are in inches.
Unless otherwise specified, tolerances are .005" (.127mm).
Detailed mechanical drawings available upon request.

QT26



Device Pin Out	
PIN#	FUNCTION
1	+5 Volts Dc
2	Ground
3	10 MHz Output
4	1 Hz Output
5	Reserved
6	Reserved
7	Reserved
8	Mode Select
9	Status
10	Calibration/ Synch Input

Telephone: (310) 836-7900 • *Fax*: (310) 836-2157 • *E-mail*: sales@q-tech.com

It's FREE... and it's fast!

http://icmaster.com

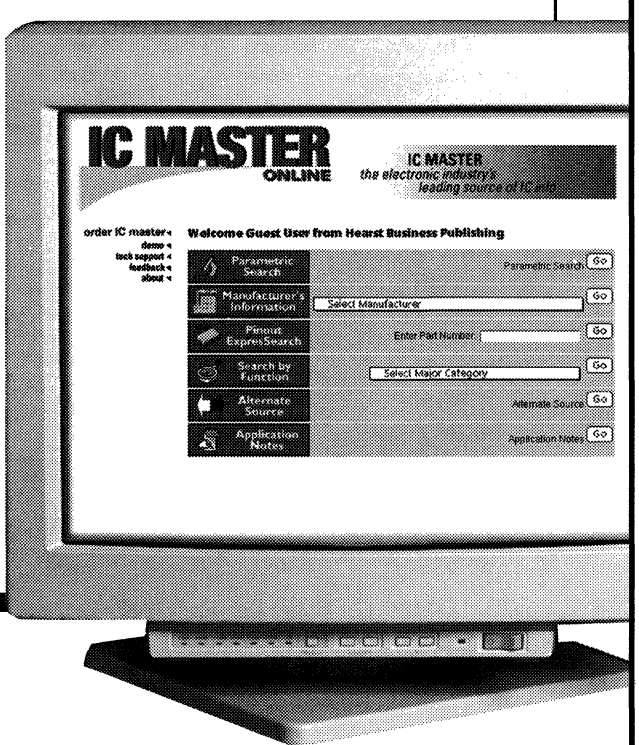
IC MASTER Online is the industry's leading database, updated monthly, of both current and discontinued commercially available integrated circuits from over 345 manufacturers. It gives you basic specifications, pinout diagrams and package outlines, second source data, application notes, and complete vendor contact information for over 135,000 base part numbers.

Go online now for:

- ***FREE*** and unlimited access to the entire IC MASTER database.
- ***Direct links*** to actual datasheets on the manufacturer's own website, for devices selected by the manufacturer.
- Full part number and specification search capability.
- Plus, much more!

Try **http://icmaster.com** today, it's ***FREE!***

IC MASTER Online will dramatically cut the number of online hours you spend searching, comparing, and finally selecting integrated circuits.

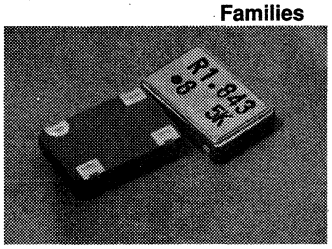


Hearst Business Communications, Inc./UTP Division
645 Stewart Avenue, Garden City, NY 11530 ▪ Tel: 516.227.1300 ▪ FAX: 516.227.1901

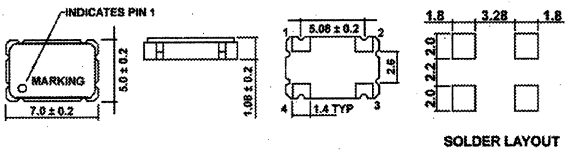
SMD OSCILLATORS

RALTRON

CO4810
CO4910
Families

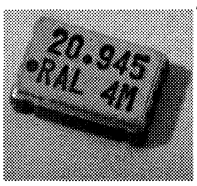


Ultra Thin Surface Mount Clock Oscillator
Frequency Range: 1.8432 MHz - 67.000 MHz
Enable/ Disable Function Available
Dimension: 7.5 x 5 x 2mm (high)
(1.5mm height also available)
Driving ability:
10 LS - TTL (15pf mos) CO4810
10 N - TTL (15pf mos) CO4910



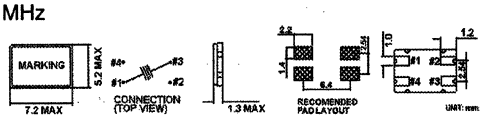
SMD CRYSTALS

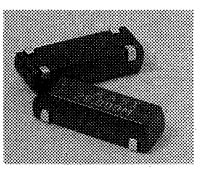
RALTRON



H-13K
Families

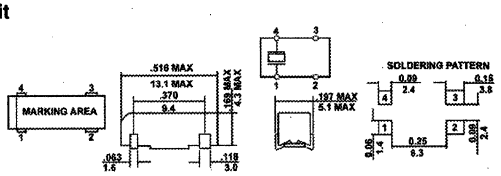
Ultra Thin Surface Mount Crystal Unit
Frequency Ranges: 16.000 MHz - 200.000 MHz
Dimensions: 7.5 x 5.1 x 1.3mm (High)
(1.0 mm height also available)
Fundamental, 3rd, 5th and 7th Overtones
± 50 ppm at Room Temp
± 50 ppm from -10°C to + 60°C

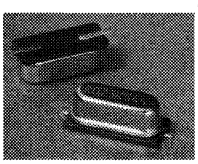




TT-SMD
Families

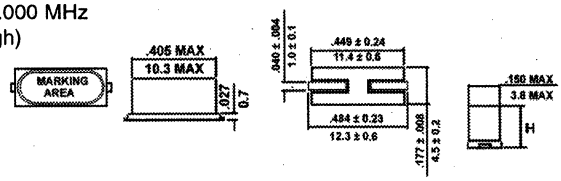
Plastic Package Surface Mount Crystal Unit
Frequency Range: 3.500 MHz - 50.000 MHz
Dimensions: 13.1 x 5 x 5mm (High)
Fundamental and Third Overtone
± 50 ppm at Room Temp
± 100 ppm from -10° to + 60°C

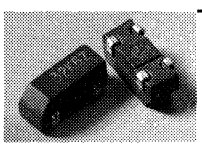




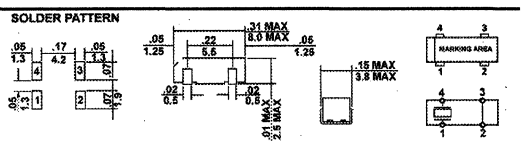
HC-49
Short
Family

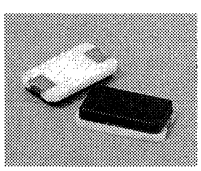
HC - 49 Short Surface Mount Crystal Unit
Frequency Ranges: 3.000 MHz - 70.000 MHz
Dimensions: 12.7 x 8.3 x 4.2mm (High)
(2.6 mm max height also available)
Fundamental and Third Overtones
± 50 ppm at Room Temp
± 50 ppm typ. (±100 ppmmax)
from -10°C to + 60°C
40°C to + 85°C available



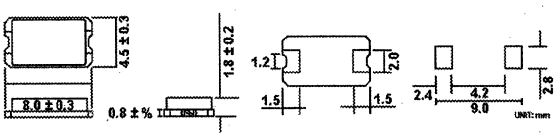


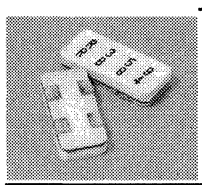
RSM-200S Frequency: 32.768 KHz
Dimensions: 9.1 x 4.0 x 2.5mm
± 30 ppm @ + 25°C
(2.0mm max height available)



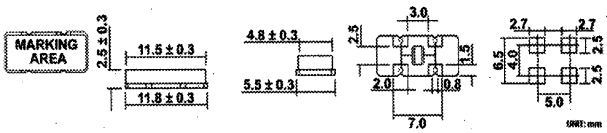


H-180A
Frequency Range: 10 MHz to 90 MHz
Dimensions: 8.0 x 4.5 x 1.8mm
(1.5mm max height also available)
Fundamental to Third Overtone
± 50 ppm @ 50°C
± 100 ppm (-10° to +60°C)





H-250A
Frequency Range: 3.2 MHz to 60 MHz
Dimensions: 11.9 x 5.3 x 2.5mm
Fundamental to Third Overtone
± 50 ppm @ 50°C
± 100 ppm (-10° to +60°C)



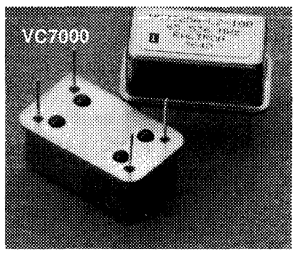
RALTRON

RALTRON ELECTRONICS CORP.
2315 NW 107th Ave., MIAMI FLORIDA 33172 U.S.A. FAX (305) 594-3973 PHONE (305) 593-6033
Raltron is one of the fastest growing manufacturers of a complete line of management components, including crystal units, oscillators, filters and ceramic resonators.
http://www.raltron.com
E-mail: sales@raltron.com
NOTE: OTHER OPTIONS AVAILABLE UPON REQUEST, PLEASE CONSULT WITH RALTRON

CRYSTAL OSCILLATORS

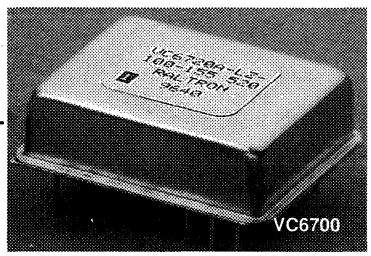
RALTRON

VCXO'S

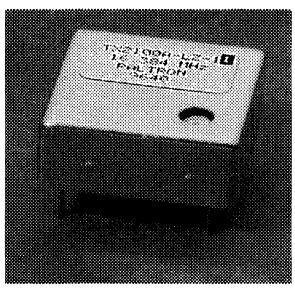


VC 7000 Series
Frequency Range : 1 MHz to 200 MHz
Frequency Stability* : ± 25 ppm / ± 50 ppm
Frequency Pullabiliy : up to ± 100 ppm/V
Output : TTL, HCMOS, ACMOS
Package : 4 pins DIL - 14

VC 6700 Series
Frequency Range : 100 MHz to 700 MHz
Typical Frequency : 155.52 MHz (SONET)
Frequency Pullabiliy* : up to ± 150 ppm/v
Output : ECL
Package : Double DIL - 16

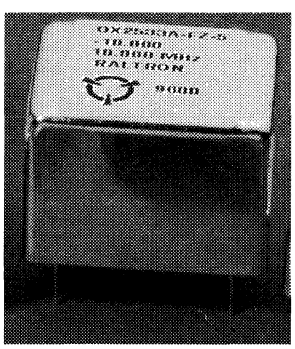


TCXO'S



MODEL	SIZE	FREQUENCY RANGE	FREQUENCY* STABILITY	OUTPUT
TX _100	20 X 20 X 10 mm	1 MHz TO 70 MHz	± 0.8 ppm	HCMOS CLIPPED-SINEWAVE TTL SINEWAVE
TX _146	38.5 X 38.5 X 13.5 mm	1 MHz TO 150 MHz	± 0.6 ppm	ECL, PECL HCMOS CMOS TTL SINEWAVE
TX _045	DIL - 14, 4 PINS STANDARD PACKAGE	1 MHz TO 45 MHz	± 1.0 ppm	CLIPPED-SINEWAVE HCMOS TTL SINEWAVE

OCXO'S



MODEL	SIZE	FREQUENCY RANGE	FREQUENCY* STABILITY	OTHER FEATURES
OX0017	35.8 X 27.5 X 16 mm	1 TO 50 MHz	± 3 X 10^{-8}	MINIATURE, FAST-WARM-UP-TIME-
OX0037	35.8 X 27.5 X 16 mm	1 TO 50 MHz	± 1 X 10^{-7}	MINIATURE, LOW COST
OX0014	51.8 X 51.8 X 24 mm	1 TO 150 MHz	± 5 X 10^{-9}	RUGGED
OX0006	51.8 X 51.8 X 102.4 mm	1 TO 150 MHz	± 5 X 10^{-9}	EXCELLENT AGING

* FREQUENCY STABILITY IS FOR TEMPERATURE RANGE OF -10°C TO +60°C; OTHER RANGES AND OTHER STABILITIES ARE AVAILABLE.

RALTRON

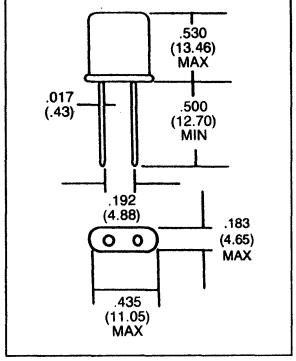
RALTRON ELECTRONICS CORP.
2315 NW 107th Ave., MIAMI FLORIDA 33172 U.S.A. FAX (305) 594-3973 PHONE (305) 593-6033
Raltron is one of the fastest growing manufacturers of a complete line of management components, including crystal units, oscillators, filters and ceramic resonators.
http://www.raltron.com
E-mail: sales@raltron.com
NOTE: OTHER OPTIONS AVAILABLE UPON REQUEST, PLEASE CONSULT WITH RALTRON

RXD, Inc.
P.O Box 1494 • 806 Custer Avenue • Norfolk • NE 68702-1494
Phone: 800-228-8108 • 402-379-0112 • Fax 402-379-3074

CRYSTALS

FULL SIZE

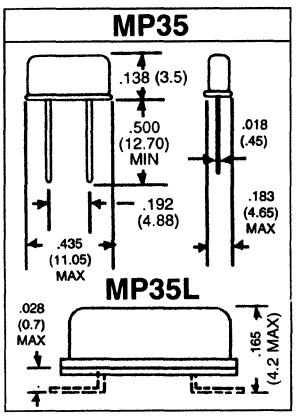
HC-49/U



Standard HC49	250 KHz - 200.0 MHz
Low Profile	3.5 MHz - 80.0 MHz
Miniature HC45	3.5 MHz - 180.0 MHz
2mm x 6mm	32.768 KHz
3mm x 8mm	32.768 KHz
Cylindrical	4.0 - 24.0 MHz
Surface Mount	30 KHz - 90.0 MHz

LOW PROFILE

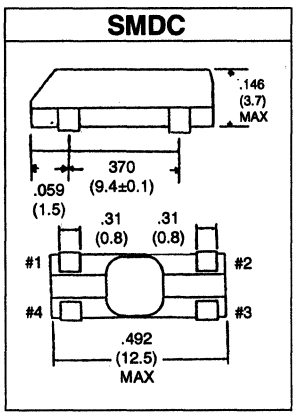
MP35



MP49
MP35-MP25
UM1
WC26
WC38
AT39, AT310

SURFACE MOUNT

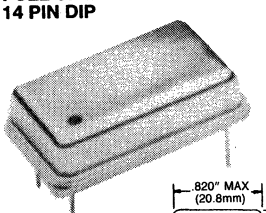
SMDC

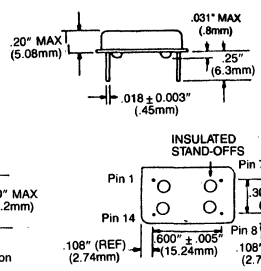


SMD, SMDC, SMDBWCR, 5ASM/5CSM, 13SM, 30SM, C3SM, F3SM, X2SM, X3SM, XHSM, XSHSM, X6MSM, X9SM

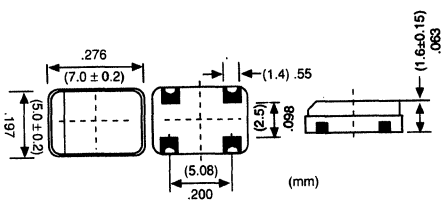
OSCILLATORS

FULL SIZE
14 PIN DIP





803 SERIES

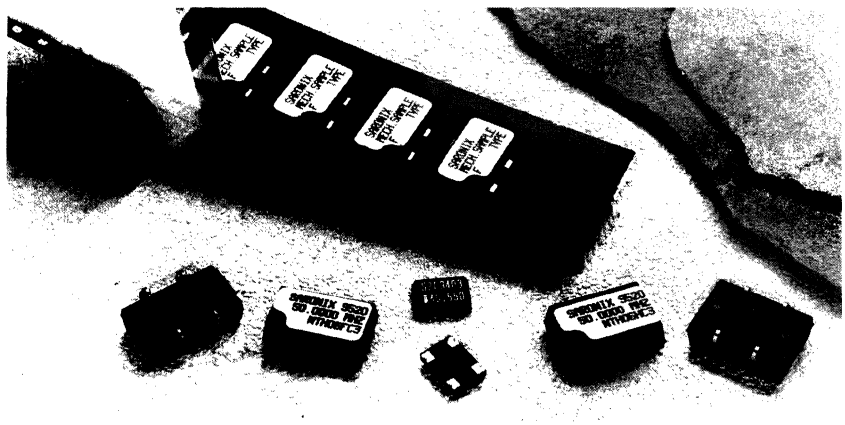


TTL Full & Half Size	1.0 - 100.0 MHz	T2 & HT2
TTL High Frequency Full & Half Size	101-120 MHz	HFT2 & HHFT2
High Speed CMOS Full and Half Size	1.0 - 68.0 MHz	HSC2 & HHSC2
TTL/CMOS Compatible Full & Half Sizes	1.0 - 70.0 MHz	THSC2 & HTHSC2
HCMOS Independent Dual Output	1.0 - 50.0 MHz	HSCD2
Tristate Enable/Disable/HCMOS/TTL Compatible Full & Half Size	1 - 68.9 MHz	THSCR2 & HTHSCR2
3 Lead Low Profile TTL & HCMOS	1.0 - 70.0 MHz	3 LT2 & 3LHSC2
ECL	40 - 200 MHz	ECL 2100 Series
Surface Mount w/J Lead TTL & HCMOS	1.0 - 70 MHz	SMJT2, SMJHSC2 & SMJTHSC2
Surface Mount, Low Power, Heavy Load, 3 Volt, 3.3 Volt	1.5 - 80 MHz	803 Series
High Speed CMOS Low Input Current	1.0 - 20.0 MHZ	7HSC2/7HHSC2
TTL/HCMOS Compatible Low Voltage	1.0 - 45.0 MHz	6THSC2/6HTHSC2
Ceramic Surface Mount	1.0 - 70.0 MHz	850 Series, 860 Series
Oven Controlled	1.0 - 60.0 MHz	OCXO Series
Temperature Compensated	10.0 - 24.0 MHz	TCXO Series
Surface Mount Temperature Compensated	10.0 - 20.0 MHz	9STCXO
Voltage Controlled	10.0 - 24.0 MHz	VCXO Series
Surface Mount TTL/CMOS Compatible	1.8 - 125.0 MHz	830 Series

SaRonix

Frequency Control Products

- **Established in 1975**
- **Factories ISO 9001 / 9002 Certified**
- **Manufacturing and Sales in the U.S., Europe and Asia**
- **Crystals, Oscillators, VCXOs TCXOs & TCVCXOs**
- **Online at www.saronix.com**



Products in bold can be found on the following pages, *other listed products in italics can be found at www.saronix.com, or contact SaRonix*

Crystals

	Through-Hole Metal Industry Standard	SMD Plastic	SMD Ceramic 5 x 7mm
Tuning Forks 32.768kHz	*NTF*	*32S12*	
Fundamental & Overtone	*HC-49/U, 49S/L, UM1*	**49SMLB/SNC/SAB/SUB**	**NKS7, NES7, NLS7**
High Frequency Fundamental (TmT)	*HFX4*		**HFX7**

Oscillators & VCXOs

	Metal DIL14 & DIL8	SMD Plastic	SMD Ceramic 5 x 7mm
Oscillator, CMOS	*NCC, NTC*		
Oscillator, TTL	**STT**, *NCT S1100/1109*	**NTT, STT**	
Oscillator, HCMOS/ACMOS/TTL, 3.3/5V	*NTH/NCH*, **STA, ST4100, DTH/DCH**	**NTH, STA, ST410H, S1228**	**S1700/03/50, S1800/03/50, S1903/50**
Oscillator, ECL/PECL, -5.2/3.3/5V	*S1149/1150, SEL3400/2400*	**SEL3600/3700**	
VCXO, HCMOS/ACMOS/TTL, 5V	**S1500/1509, S1510/1519**	**S1518, S1528**	
VCXO, HCMOS/ACMOS, 3.3V	**S1300/1309, S1310/1319**	**S1318**	
VCXO, ECL/PECL, -5.2/3.3/5V	**S1550**		

TCXOs & TCVCXOs

	Through-Hole Metal DIL Type	SMD Metal	SMD Ceramic 7 x 9 x 2mm
Clipped Sinewave, 5V	*S5200, S5600/5900, 5200/5300/5400*	*S5500*	
Clipped Sinewave, 3V	*S6200/6300/6400*	*S6500*	**S6700**

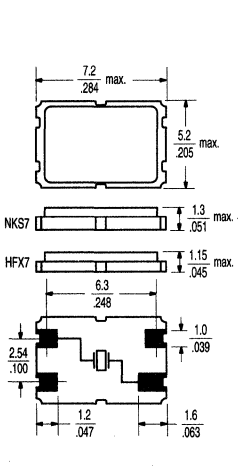
SaRonix 141 Jefferson • Menlo Park CA 94025 • USA • 650-470-7700 • 800-227-8974 • Fax 650-462-9894

SaRonix

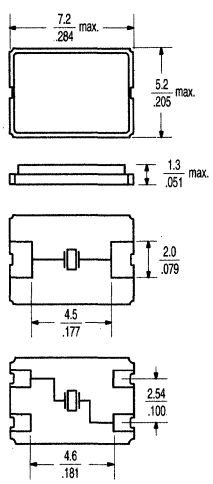
SMD Ceramic & Metal Crystals

Series		NKS7	NES7/NLS7	HFX7	49SMLB/49SUB 49SAB/49SNC
KEY FEATURES		*small ceramic package very low profile*	*economical rugged ceramic package 2 or 4 pad*	*high frequency fundamental AT-cut very low profile*	*precision molded universal contact pattern low profile*
Frequency Range	MHz	8 to 83	9.8304 to 100	30 to 250	3.2 to 80
Frequency Tolerance @ 25°C	± ppm	15, 50*	30, 50	25, 50, 100*	50*
Frequency Stability Over Operating Temp Range	± ppm	15, 50*	30, 50	10, 25, 50, 100*	50*
Load Capacitance - C_L	pF	16 to 32, Series	16, 20, Series	4 to Series	16 to 32, Series
Series Resistance - R_S	Ω	80 to 30 max**	60 max**	20 to 15**	200 to 35**
Motional Capacitance - C_1	fF	**	**	**	**
Shunt Capacitance - C_O	pF	7 max	7 max	3 max	7 max
Drive Level	µW	500 max	100 max	500 max	500 max
Temperature Range					
Operating	°C	–20 to +70	–20 to +70	–20 to +70***	–20 to +70***
Storage	°C	–40 to +85	–40 to +85	–55 to +125	–55 to +125
Aging First Year	± ppm	5	5	5	5

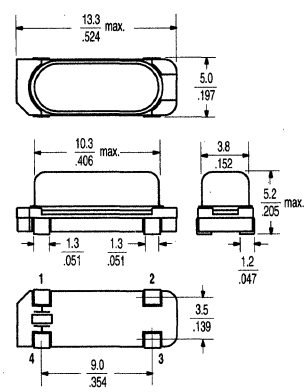
**Tighter / other specifications available. **Value is frequency dependent, see detailed data sheet or consult factory. ***Extended temperature range available.*



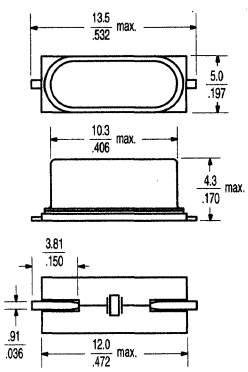
NKS7 & HFX7



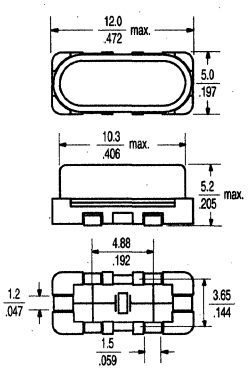
NES7 (2pad)
NLS7 (4pad)



49SNC
49LNC (4.2 max ht.)



49SMLB
49SX3H (3.3 max ht.)



49SUB (6 pad)
49SAB (4 pad)
49LUB/LAB (4.2 max ht.)

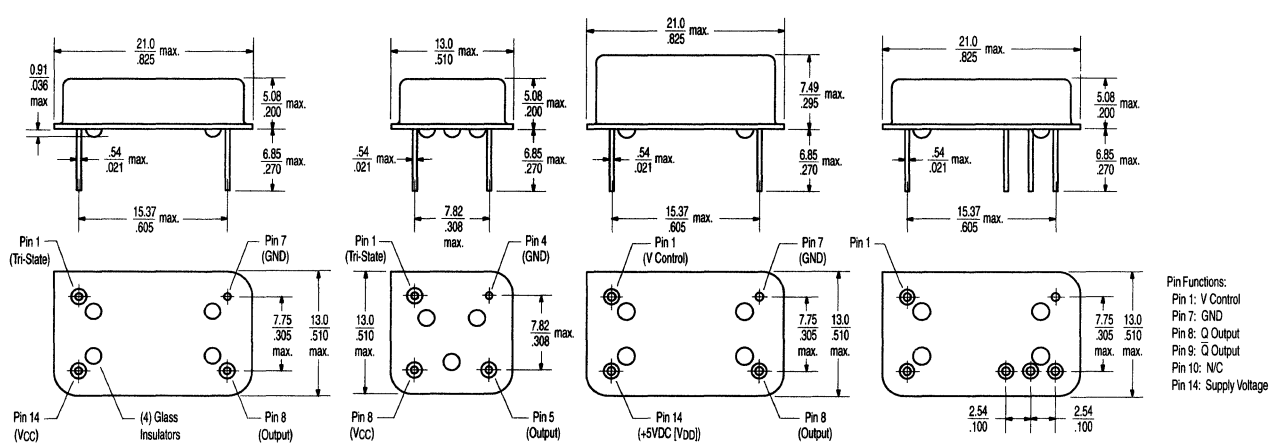
SaRonix 141 Jefferson • Menlo Park CA 94025 • USA • 650-470-7700 • 800-227-8974 • Fax 650-462-9894

SaRonix

Metal Oscillators & VCXOs

Series Logic		STA/STT/ST4100 HCMOS/ACMOS/TTL	DTH/DCH HCMOS	S1510/1310 HCMOS VCXO	S1500/1300 HCMOS VCXO	S1550 PECL VCXO
KEY FEATURES		*RISC & CISC Clock high drive ACMOS*	*double sealed high reliability crystal superior stability*	*full & half DIL tri-state 3.3 or 5V*	*wide performance range tri-state 3.3 or 5V*	*wide pull range*
Frequency Range	MHz	0.25 to 135	0.5 to 66.6667	32 to 120	1.5 to 100	38.88 to 155.52
Frequency Stability	± ppm	20, 25, 50, 100	20*, 25, 50, 100	25, 50	20, 25, 50	20, 25, 50, 100
Pullability APR**	± ppm			25, 50, 75, 100	50, 70, 100, 200	50, 100
Temperature Range						
Operating	°C	0 to +70, -40 to+85	0 to +70, –30 to +85	0 to +70, –40 to +85	0 to +70, –40 to +85	0 to +70, –40 to +85
Storage	°C	–55 to +125	–55 to +125	–55 to +125	–55 to +125	–55 to +125
Supply Voltage	VDC	3.3 ±10%, 5 ±10%	3.3 ±10%*, 5 ±10%	3.3 ±10%, 5 ± 5%,	3.3 ±10%, 5 ±10%	5 ±5%
Supply Current						
typ	mA	50 (3.3V: 30)	20 to 39*	25*	15*(3.3V: 10)	70
max	mA	70 (3.3V: 35)	35 to 60*	50, 65 (3.3V: 35)*	65*(3.3V: 15)	100
Output		HCMOS/ACMOS/TTL	HCMOS/TTL	HCMOS/TTL	HCMOS	PECL
Disable or Tri-State		standard Tri-State	standard on DTH	optional on full size	optional	optional
Symmetry	%	40/60, 45/55	45/55 or 40/60	40/60, 45/55	40/60, 45/55*	45/55 @ crossing
Rise/Fall Time 20 - 80%	ns max	1, 1.5, 2, 3.5, 4, 5.5	5 (TTL: 6)	4 (TTL: 1.5)	3 to 8*(3.3V: 9)	rise: 1.2, fall: 1.7
Logic 0: max	V	10%VDD or 0.5V	0.5V or 10%VDD	0.5	10% VDD	VCC –1.60
Logic 1: min	V	90%VDD or 2.5V	2.5V or 90%VDD	2.5	90% VDD	VCC –1.02
Load: max	pF	50Ω ACMOS	50 or 10TTL<50MHz	50 or 5TTL <50MHz	30 <70MHz	50Ω to VCC –2V
Load: max	pF		30 or 10TTL >50Mhz 10LSTTL on ±20ppm	30 or 5TTL >50MHz	15 >70MHz	
Load: max @ 3.3V	pF			30 <80MHz	30	
Load: max @ 3.3V	ΩAC	95 ACMOS		95 <120MHz		
Jitter (peak-to-peak)	ps max	50 (ST4100: 80/120/150*)	50	150	20	20
Package Type		A, B, K	A*, D	A(tri-state: 6pin), B	A, B <28.636MHz, D, K	T

**Frequency dependent or available in a specific frequency range, consult SaRonix. **APR: (VCXO Pull relative to specified output freq)-(VCXO Freq Stability)*



PACKAGE A **PACKAGE B** **PACKAGE D** **PACKAGE T**

PACKAGE K: Gull Wing (not shown) (gull wing available)

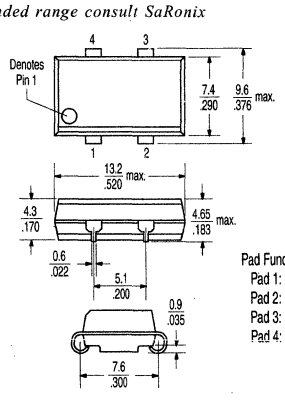
SaRonix 141 Jefferson • Menlo Park CA 94025 • USA • 650-470-7700 • 800-227-8974 • Fax 650-462-9894

SaRonix

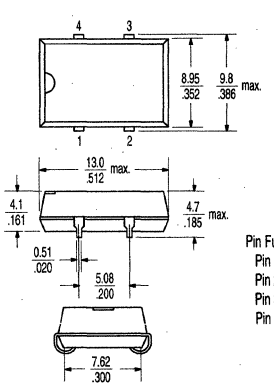
SMD Plastic VCXOs & Oscillators

Series Logic		S1528 HCMOS/TTL VCXO	S1518/1318 HCMOS/TTL VCXO	NTH/NTT ST410H/S1228 HCMOS/TTL	STA/STT ACMOS/TTL	SEL3600/3700 ECL/PECL
KEY FEATURES		*compact plastic molded SMD*	*compact plastic molded 3.3 or 5V*	*molded packages 3.3 or 5V*	*high frequency molded package*	*exceptional start time stability & reliability 3.3 or 5V, 4ps typ jitter*
Frequency Range	MHz	1.5 to 65.536	32 to 120	1 to 125	32 to 110	33 to 155.52
Frequency Stability	± ppm	50	50	50, 100, 130	50, 100	50, 100
Pullability APR**	± ppm	20, 50, 70, 100	25, 50, 75			
Temperature Range						
Operating	°C	0 to +70, –40 to +85	0 to +70, –40 to +85	0 to +70***	0 to +70, –40 to +85	0 to +70
Storage	°C	–55 to +125	–55 to +125	–55 to +125	–55 to +125	–55 to +125
Supply Voltage	V_{DC}	5 ±5%	5 ±5%	5 ±10%	5 ±10%	5.0 or –5.2V ±5%
	V_{DC}		3.3 ±10%	3.3 ±10% (HCMOS)		3.3 or –3.3V ±5%
Supply Current						
typ	mA	20*	25*	*	50	5V: 70, 3.3V: 63
max	mA	50*	50, 65 (3.3V: 35)*	15 to 65*	70	100
Standby	µA					
Output		CMOS / TTL	HCMOS/TTL	HCMOS	ACMOS	ECL
Tri-State (Enable/Disable)		standard	standard	standard	standard	optional
Complementary						standard
Symmetry @50%V_{DD}	%	40/60, 45/55*	40/60, 45/55	45/55, 40/60	45/55, 40/60	45/55 @ crossing / V_{BB}
Rise/Fall Time	ns max	5	4	8 or 2 (3.3V: 5 or 2)	2	550ps max (350ps typ)
Logic 0: max	V_{DD}	10%	20%	10% (3.3V: 0.4V)	10%	V_{CC}:-1.6V, 3.3V: -1.62V
Logic 1: min	V_{DD}	V_{CC} –0.6	80%	90% (3.3V: –0.4V)	90%	V_{CC}:-1.02V, 3.3V: -1.025V
Load: max	pF	50 < 32.768MHz	50 < 50MHz	30 or 50*	50Ω ACMOS	50Ω to V_{CC} –2V
	pF	30 > 32.768MHz	30 > 50MHz	50ΩAC >70MHz		
	pF		3.3V: 30 <80MHz 3.3V: 95 <120MHz	3.3V: 15 or 95ΩAC		
Output		TTL	TTL	TTL	TTL	
Symmetry @ 1.5V	%	40/60, 45/55*	40/60, 45/55	40/60, 45/55*	40/60, 45/55 <60MHz	
Rise/Fall Time	ns max	4	1.5	8 or 1.5	1	
Logic 0 : max	V	0.4	0.5	0.5	0.5	
Logic 1: min	V	2.4	2.5	2.5	2.5	
Load: max	TTL	10	5	5, 10, 5MTTL*	10	
Jitter (peak-to-peak)	ps max	50	150	50, 80, 120, 150*	50	20
Package Type		S	S	H, S	F	S

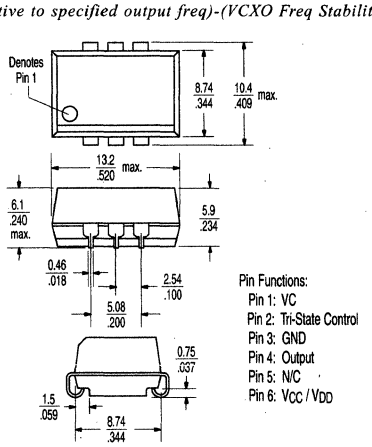
**Frequency dependent or available in a specific frequency range, consult SaRonix. **APR: (VCXO Pull relative to specified output freq)-(VCXO Freq Stability)*
****For extended range consult SaRonix*



PACKAGE F



PACKAGE H



PACKAGE S

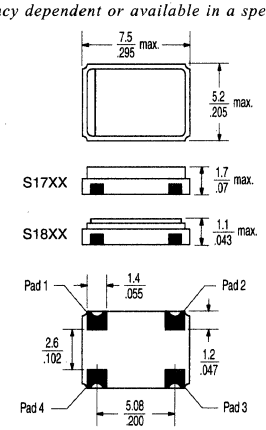
SaRonix 141 Jefferson • Menlo Park CA 94025 • USA • 650-470-7700 • 800-227-8974 • Fax 650-462-9894

SaRonix

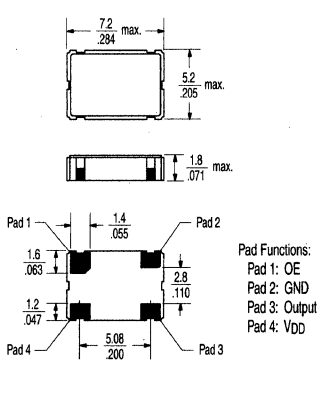
SMD Ceramic Oscillators & TCVCXO

Series Logic		S1700/1750/1703 HCMOS/TTL	S1800/1850/1803 HCMOS	S1950/1903 HCMOS	S6700 Clipped Sinewave TCVCXO
KEY FEATURES		*miniature ceramic* *1.7mm high* *3.3 or 5V*	*miniature ceramic* *1.1mm high* *3.3 or 5V*	*miniature ceramic* *1.8mm high* *3.3 or 5V*	*TCVCXO* *ceramic SMD* *low power 3V*
Frequency Range	MHz	1.5 to 80	4 to 80	50 to 125	12.6 to 19.68
Frequency Stability	± ppm	50, 100	25, 50, 100*	25, 50, 100	2.5, 5
Freq Control Range	± ppm				5 to 18 (0.5 to 2.5V)
Temperature Range					
Operating	°C	0 to +70	-10 to +70, -40 to +85	0 to +70, -40 to +85	–30 to +80, –20 to +75
Storage	°C	–55 to +125	–55 to +125	–55 to +125	–40 to +85
Supply Voltage	VDC	5 ±10%	5 ±10%	5 ±10% (80+ to 125MHz)	3 ±5% (±0.3ppm max
	VDC	3.3 ±10% (S1703 only)	3.3 ±10% (S1803 only)	3.3 ±10% (S1903 only)	Voltage Stability)
Supply Current					
typ	mA	*	*	50	
max	mA	10 to 60*	15 to 75*	65 (3.3V: 35)	2
Standby	µA		10 (1800/1803 only)		
Output		HCMOS	HCMOS	HCMOS	Clipped Sinewave
Tri-State(Enable/Disable)		standard	standard	standard	
Complementary					
Symmetry @50%VDD	%	45/55 (3.3V: 40/60)	45/55	45/55, 40/60	
Rise/Fall Time	ns max	10	7 (10: S1800)	2	
Logic 0: max	VDD	10%	10%	10%	
Logic 1: min	VDD	90%	90%	80%	1.0V peak-to-peak
Load: max	pF	S1700: 15	S1800: 15	S1950: 50Ω ACMOS	10KΩ //10pF
	pF	S1703: 30 < 67MHz	S1803: 15	S1903: 95Ω ACMOS	
	pF	S1750: 50 < 67MHz	S1850: 20, 30, 50*		
Output		TTL	TTL	TTL	
Symmetry @ 1.5V	%	40/60	40/60	45/55, 40/60	
Rise/Fall Time	ns max	5	5	1.5 (S1950 only)	
Logic 0 : max	V	0.5	0.5	0.5	
Logic 1: min	V	2.5	2.5	2.5	
Load: max	TTL	5	10 or 10LSTTL		
Jitter (peak-to-peak)	ps max	50	50	80 to 150**	
Package Type		S17XX	S18XX	S19XX	S6700

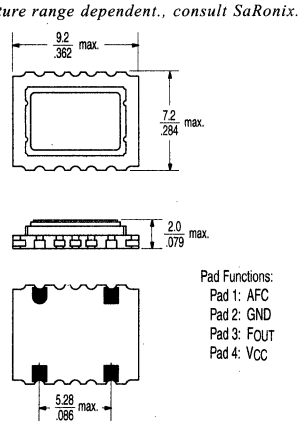
**Frequency dependent or available in a specific frequency range, consult SaRonix. ** Frequency and temperature range dependent., consult SaRonix.*



S17XX & S18XX



S1903 & S1950



S6700

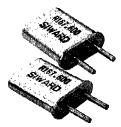
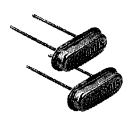
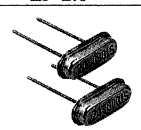
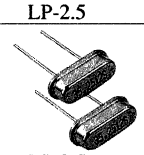
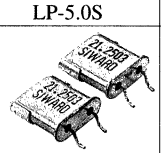
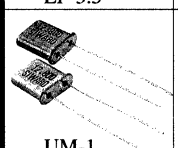
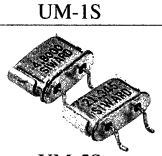
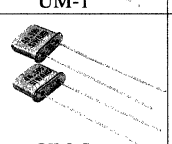
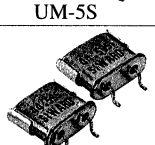
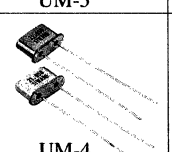
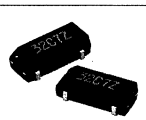
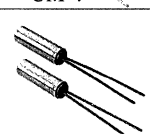
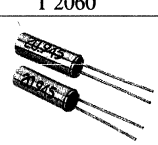
SaRonix 141 Jefferson • Menlo Park CA 94025 • USA • 650-470-7700 • 800-227-8974 • Fax 650-462-9894

Patience Confidence Concentric

SIWARD

An ISO-9002 Company

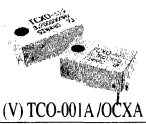
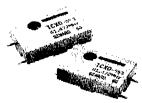
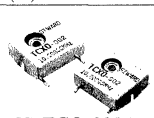
Enterprising Complete Crystal Solutions For Customers Worldwide

Crystal Units	Dimensions(m/m)	Stability Ref,to25℃	Frequency Range(MHz)	Crystal Units	Dimensions(m/m)	Stability Ref,to25℃	Frequency Range(MHz)
SX-7050	L 7.0±0.2 W 5.0±0.2 H 1.50 S.M.D	±10 ppm ≀ ±50	8 MHz ≀ 150	 HC-50 /u	L 10.3 W 3.8 H 13.1	±5 ppm ≀ ±100	1.50 MHz ≀ 160
SX-6035	L 6.0±0.2 W 3.5±0.2 H 1.2 S.M.D	±10 ppm ≀ ±50	12 MHz ≀ 150	HC-49 /u	L 10.3 W 3.8 H 13.1	±5 ppm ≀ ±100	1.50 MHz ≀ 160
LP-2.5S	L 10.3 W 4.5±0.2 H 2.5	±10 ppm ≀ ±100	6.0 MHz ≀ 90	 LP-2.0	L 12.3±0.6 W 4.5±0.2 H 2.0	±10 ppm ≀ ±100	6.0 MHz ≀ 90
LP-3.5S	L 10.3 W 4.5±0.2 H 3.5		5.0 MHz ≀ 90	 LP-2.5	L 12.3±0.6 W 4.5±0.2 H 2.5		4.0 MHz ≀ 90
LP-5.0S	L 10.3 W 4.5±0.2 H 5.0 S.M.D		3.5 MHz 90	 LP-3.5	L 12.3±0.6 W 4.5±0.2 H 3.5		3.5 MHz ≀ 90
 UM-1S	L 11.7 W 3.2 H 7.7	±5 ppm ≀ ±5 0	4.0 MHz ≀ 160	 UM-1	L 6.9±0.2 W 2.2±0.2 H 8.2	±5 ppm ≀ ±5 0	4.0 MHz ≀ 160
 UM-5S	L 9.9 W 3.2 H 5.9		8.0 MHz ≀ 160	 UM-5	L 6.9±0.2 W 2.2±0.2 H 6.0		8.0 MHz ≀ 160
 UM-4S	L 8.6 W 3.2 H 4.6 S.M.D		10.0 MHz ≀ 160	 UM-4	L 6.9±0.2 W 2.2±0.2 H 4.7		10.0 MHz ≀ 160
 SM-200S	L 8.0 W 3.8 H 2.5 S.M.D	±50 ppm ≀ ±500	32.768 KHz on /y	 T 2060	L 6 W 2	±50 ppm ≀ ±500	32.768 KHz on /y
SM-309S	L 12.5 W 4.6 H 3.7 S.M.D	±30 ppm ≀ ±500	25 KHz ≀ 130 10.0 MHz ≀ 80.0	 T 3090	L 9 W 3	±10 ppm ≀ ±500	25 KHz ≀ 130 10.0 MHz ≀ 80.0

Our Product Lines:

- Crystal units
- Saw filters
- Oscillator units
- Monolithic crystal filters (MCFs)
- Temperature-compensated crystal oscillators (TCXOs)
- Voltage-controlled crystal oscillators (VCXOs)
- Voltage-controlled temperature-compensated crystal oscillators (VC-TCXOs)
- Oven-controlled crystal oscillators
- Voltage-controlled oscillators (VCO)

Crystal filter	Dimensions(m/m)	Description	Frequency Range(MHz)
HC-49 /u-3S	L 10.3 W 3.8 H 13.1	2 ~ 10 Pole	10.7 MHz ~ 45.0
UM-1 /-5 /-4	L 7.0 W 2.4 H 8.2/6.0/4.7	2 ~ 10 Pole	10.7 MHz ~ 90.0
UM-1S /-5S /4S	L 7.9 W 3.2 H 7.7/5.9/4.6 S.M.D	2 ~ 4 Pole	10.7 MHz ~ 90.0
SF-7050	L 7.0±0.2 W 5.0±0.2 H 1.50 S.M.D	2 ~ 4 Pole	16.9MHz ~ 90.0

TCXOs VC-TCXOs	Dimensions(m/m)	Description	Frequency Range(MHz)
 (V) TCO-001A /OCXA	L 18.5±0.3 W 12±0.3 H 8.0	±1.0 ppm ~ ±5.0	2.0 MHz ~ 100
 (V) TCO-005A	L 18.5±0.3 W 12±0.3 H 5.0	±1.0 ppm ~ ±5.0 S.M.D	2.0 MHz ~ 100
(V) TCO-007A	L 11.4±0.3 W 11.4±0.2 H 4.5	±1.0 ppm ~ ±5.0 S.M.D	2.0 MHz ~ 100
 (V) TCO-009A	L 11.4±0.2 W 9.6±0.2 H 3.7	±1.0 ppm ~ ±5.0 S.M.D	2.0 MHz ~ 100

Crystal Oscillator	Dimensions(m/m)	Description	Frequency Range(MHz)
CXO-001	L 20.8 W 13.2 H 5.08	±10 ppm ~ ±100	1.8 MHz ~ 120
CXO-002	L 13.2 W 13.2 H 5.08	HCMOS /TTL	
CXO-003	L 20.8 W 13.2 H 6.0 S.M.D	5.0 V	
CXO-004	L 13.2 W 13.2 H 6.0 S.M.D	3.3 V	
CXO-005	L 7.0±0.2 W 5.0±0.2 H 1.8±0.2 S.M.D	±10 ppm ~ ±100 3.3V /5.0V HCMOS /TTL	1.8 MHz ~ 80
CXO-007	L 6.0±0.2 W 3.5±0.2 H 1.8±0.2 S.M.D	±10 ppm ~ ±100 3.3V /5.0V HCMOS /TTL	1.8 MHz ~ 80
CXO-S.M.J	L 14.0 W 9.80 H 4.70 S.M.D	±30 ppm ~ ±100 HCMOS /TTL	1.8 MHz ~ 80

VCXOs	Dimensions(m/m)	Description	Frequency Range(MHz)
VXO-001	L 20.8 W 13.2 H 5.08	±10 ppm~±50 HCMOS /TTL Dip	4.0 MHz ~ 100
VXO-001A	L 20.8 W 13.2 H 8.0	±10 ppm~±50 HCMOS /TTL Dip	4.0 MHz ~ 100
VXO-005	L 18.5±0.3 W 12±0.3 H 5.0	±10 ppm~±50 HCMOS /TTL S.M.D	4.0 MHz ~ 100
VXO-006	L 20.8 W 13.2 H 6.0 S.M.D	±10 ppm~±50 HCMOS /TTL	4.0 MHz ~ 100

Patience Confidence Concentric

SIWARD

An ISO-9002 Company

SIWARD INTERNATIONAL, INC.

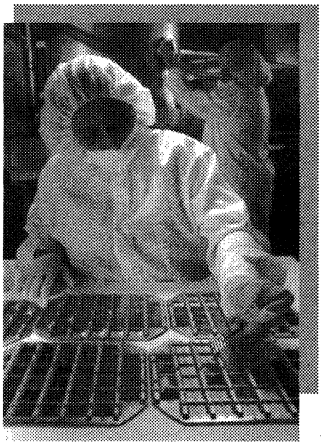
USA Sales Office: One Gatehall Drive Plaza Level
Parsippany, NJ 07054
Tel : (973)**898-1234**
Fax : (973)**898-1235**
E-mail : sales@siward.com
Web Sitei http : //www.siward.com

ISO-9002
No.:5EY004-00

STATEK

The world's smallest surface mount crystals and oscillators

Visit our website — www.statek.com



STATEK CORPORATION has been a technological leader in the design and manufacture of **ultra-miniature quartz crystals and crystal oscillators** for over 25 years. STATEK offers a complete line of reliable products in the smallest packages available, and all manufactured in the USA. Contact STATEK for the following **NEWEST** and **SMALLEST** product:

- CX-4-SM Crystal - Statek's newest ultra-miniature, lowest profile (less than 1.22mm) and smallest package (5mm x 1.8mm) surface mountable CX-4 crystal is now available in frequencies from 32.768kHz to 50MHz. Ideal for "wireless communication" and "hand-held instrumentation applications".

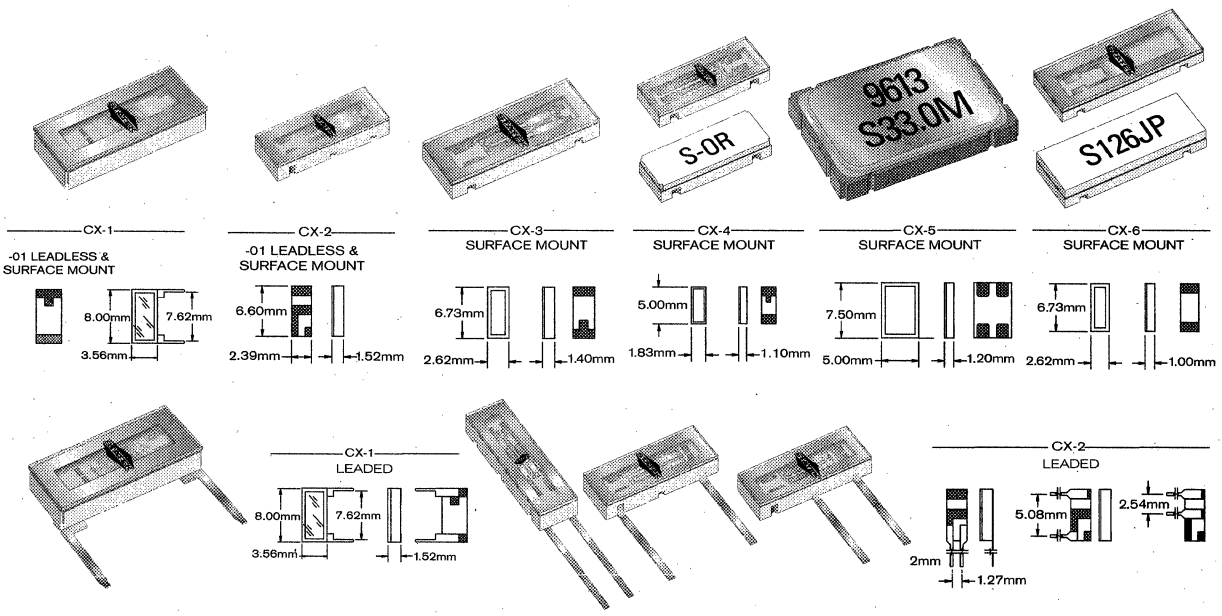
APPLICATIONS

- computer/computer peripherals
- industrial instrumentation
- military devices
- PCMCIA/fax/modem/LAN
- cardiac pacemakers/defibrillators
- medical equipment
- pagers/cellular telephones
- wireless/portable telecommunications

KEY FEATURES

- high stability and precision
- low long-term aging
- low power consumption
- manufactured and designed in the USA
- smallest footprint
- ultra low-profile
- excellent shock resistance

QUARTZ CRYSTALS - 10kHz to 160 MHz*

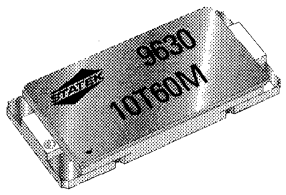


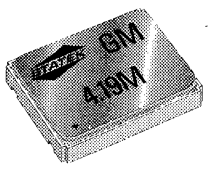
***Visit our website or call us for individual product data sheets**

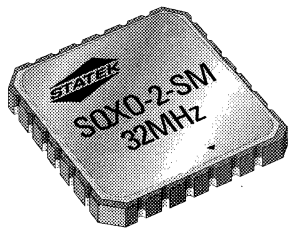
STATEK CORPORATION 512 N. MAIN ST., ORANGE, CA 92868 714-639-7810 FAX 714-997-1256 www.statek.com

STATEK CORPORATION
512 N. MAIN ST., ORANGE, CA 92868
714-639-7810 FAX 714-997-1256 www.statek.com

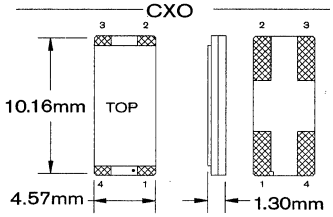
QUARTZ CRYSTAL OSCILLATORS - .001 Hz to 100 MHz*



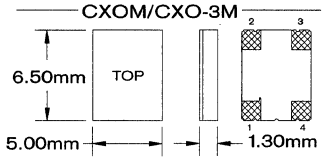




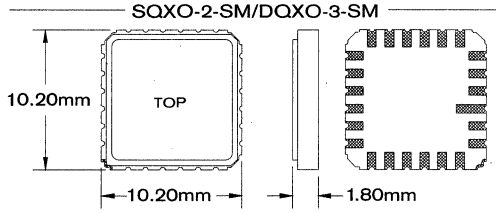
CXO

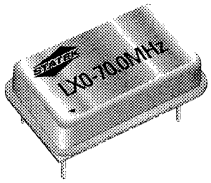


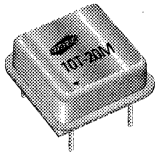
CXOM/CXO-3M

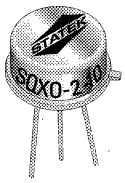


SQXO-2-SM/DQXO-3-SM

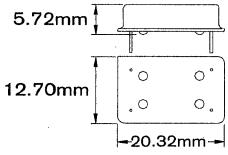




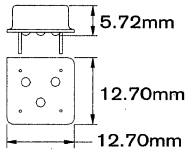




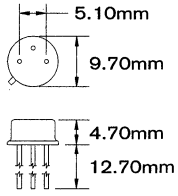
LXO/LXO-AT/VCXO-1



LXOM/LXOM-AT



SQXO/LQXO/DQXO



SURFACE MOUNT (SM) PACKAGE TERMINATION GUIDE

Designation	Termination	Suggested Application	Maximum Process Temperature
-01	Leadless	Conductive Epoxy only	210°C
SM1	Gold Plated	Vapor Phase, IR Reflow,Conductive Epoxy	260°C
SM2	Nickel & Solder Plated	Vapor Phase, IR Reflow	260°C
SM3	SM2 & Solder Dipped	Vapor Phase, IR Reflow	260°C

HOW TO ORDER STATEK QUARTZ CRYSTALS

CX-1 * S C SM1 32 MHz (25ppm / 25ppm / 50ppm / I)

Model	S=Special	C=Ceramic Lid Blank=Glass Lid	01 02 03 04 SM1 SM2 SM3	Frequency	Calibration Tolerance @ 25°C**	Frequency Stability over Temp. Range	Total Frequency Tolerance	Temp. Range: C = Commercial I = Industrial M = Military

* Designate "H" for series, "V" for pierce: 10 kHz to 600 kHz only.
**Other calibrations available: indicate your requirement in ppm.

HOW TO ORDER STATEK QUARTZ CRYSTAL OSCILLATORS

CXO S 10 T * 32 MHz (25ppm / 25ppm / 50ppm / I)

Model	S=Special	2 = 2LS TTL Load 8 = 8 TTL Load 10=10 TTL Load	E=Enable T=Tri-State N=Neither	Frequency	Calibration Tolerance @25°C**	Frequency Stability over Temp. Range	Total Frequency Tolerance	Temp. Range C = Commercial I = Industrial M = Military

*SM1 standard/SM3 available
**Other calibrations available: indicate your requirement in ppm.

***Visit our website or call us for individual product data sheets**

TELLURIAN®
TECHNOLOGIES, INC.

At TELLURIAN -"Quality Comes First"

Make TELLURIAN your crystal source. Whatever your requirements, TELLURIAN is capable of supplying them from world-wide resources. Listed below is a summary of our standard quartz products. We are also able to design and manufacture custom products for your particular application. Our engineering staff will assist you in specifying the precise device for your application.

Quality in design and manufacture are our number one concerns. We have built our reputation on supplying crystal based products dock-to-stock, on time or just-in-time from our ISO9002 certified factories.

We look forward to your sample and quote requests.

Visit our Web Site: http://www.telluriantech.com

TYPE	Package Description	Dimensions Inches, max	Frequency Range (MHz)
Crystal Units			
TU2	Precision Low Profile Ceramic SMD, LCC	.296x.197x.051	10—90
TU2G	Low Profile, Ceramic, SMD, LCC	.315x.181x.079	10—90
TU3	Low Profile (2.5mm Ht.)Welded, Thru-Hole	.437x.181x.099	3.5—90
TU3B	Low Profile (3.2mm Ht.)Welded, SMD	.437x.193x.126	3.5—90
TU4	Low Profile (3.5mm Ht.)Welded, Thru-Hole	.437x.193x.138	3.5—90
TU4B	Low Profile (4.3mm Ht.)Welded, SMD	.437x.189x.169	3.5—90
TUM-1	Miniature, Welded,Thru-Hole, (SMD optional)	.315x.138x.315	10—200
TUM-4	Miniature, Welded,Thru-Hole, (SMD optional)	.315x.138x.177	10—200
TUM-5	Miniature, Welded,Thru-Hole, (SMD optional)	.315x.138x.236	10—200
THC49/U	Low Cost Welded Thru-Hole, (SMD optional)	.398x.197x.516	1—125
T26	Tubular 2x6 mm Thru-Hole/SMD	.083x.236	32.768kHz
T38	Tubular 3x8 mm Thru-Hole	.122x.323	25—130
Clock Oscillators			
T500	Half DIP Welded HCMOS/TTL	.520x.520x.228	1—160
T1000/T1100	Full DIP Welded, HCMOS/TTL/ECL	.820x.532x.228	1—200
T2000	Plastic SMD J-Lead HCMOS/TTL	.552x.386x.185	1—75
T3000	Ceramic Low Profile SMD, LCCHCMOS/TTL	.295x.200x.071	1.5—100
VCXOs			
V1000	Full DIP Welded Thru-Hole HCMOS/TTL	.820x.532x.228	1—160
V1100	Full DIP Thru-Hole Hi-Speed ECL, SONET	.820x.532x.228	100—600
V2000	Ceramic Tri-State SMD HCMOS/TTL	.552x.386x.185	1—160
V3000	Ceramic LCC SMD HCMOS/TTL	.295x.200x.071	1—40
V4000	Thru-Hole ECL SONET Compatible	.200x2.00x.930	2488.32

TYPE	Package Description	Dimensions Inches, max	Frequency Range (MHz)
TCXOs			
TT1000	Full DIP Thru-Hole SMD Sine/HCMOS	.721x.461x.185	9—40
TT1700	Miniature SMD Sine/HCMOS	.449x.449x.177	9—40
TT1900	Miniature Low Profile SMD Sine/HCMOS	.449x.378x.134	9—40
TT1900M	Ultra-Miniature Low Profile SMD Sine/HCMOS	.449x.378x.126	9—40
VCTCXOs			
VT1000	Full DIP Thru-Hole SMD Sine/HCMOS	.721x.461x.185	9—40
VT1700	Miniature SMD Sine/HCMOS	.447x.449x.177	9—40
VT1900	Miniature Low Profile SMDSine/HCMOS	.449x.378x.134	9—40
VT1900M	Ultra-Miniature Low Profile SMD Sine/HCMOS	.315x.197x.087	9—40
Crystal Filters			
TMCF	10.7 Filter, 2/4/6/8/10 Pole, Leaded	.437x.185x.532	10.7 Only①
TMCF	21.4 Filter, 2/4/6/8/10 Pole, Thru-Hole, SMD Fundamental	②.307 x .126 x .315 ③.307 x .126 x .492	21.4 Only①
TMCF	45-F Filter, 2/4/6/8/10 Pole Thru-Hole, SMD Fundamental	②.307 x .126 x .315 ③.307 x .126 x .492	45 Only①
TMCF	45-O Filter, 2/4/6 Pole Thru-Hole, SMD Overtone	②.307 x .126 x .315 ③.307 x .126 x .492	45 Only①
TMCF	70 Filter, 2/4 Pole, Thru-Hole, SMD	②.307 x .126 x .315 ③.307 x .126 x .492	70 Only①
TMCF	90 Filter, 2/4 Pole, Thru-Hole, SMD	②.307 x .126 x .315 ③.307 x .126 x .492	90 Only①

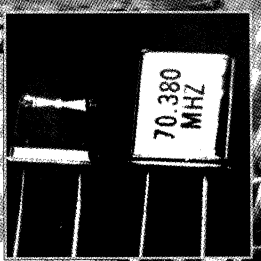
① Custom frequencies available. Contact Factory.
② Thru-Hole dimensions ③ SMD dimensions

Tellurian® Technologies, Inc. 1801 Hicks Road, Ste. B • Rolling Meadows, IL 60008 • Tel: 847-934-4141 • Fax: 847-934-4175 • info@telluriantech.com

ADVANCED CRYSTALS AND OSCILLATORS

VALPEY-FISHER
A SUBSIDIARY OF MATEC

VALPEY-FISHER, FOUNDED IN 1931, IS ONE OF THE FEW REMAINING "FULL-LINE" CRYSTAL AND OSCILLATOR MANUFACTURERS WITH THE CAPABILITY TO MEET THE COMPLETE RANGE OF CUSTOMERS' FREQUENCY CONTROL REQUIREMENTS... INCLUDING STANDARD AND CUSTOM DESIGNS.



FUNDAMENTALLY BETTER CRYSTALS

- Frequencies to 350 MHz (Fundamental Mode)
- Superior spurious response
- Pullability to 1000 ppm
- Ideal for SONET and fiber optic networks

ADVANCED DESIGNS IN SURFACE MOUNT OSCILLATORS

- VCXOs to 200 MHz
- ECL to 300 MHz
- ACMOS to 200 MHz
- HCMOS to 80 MHz
- Tight stability to 20 ppm
- Temperature range: -55°C to +125°C available

NEW OSCILLATORS FOR SONET • SDH • ATM APPLICATIONS

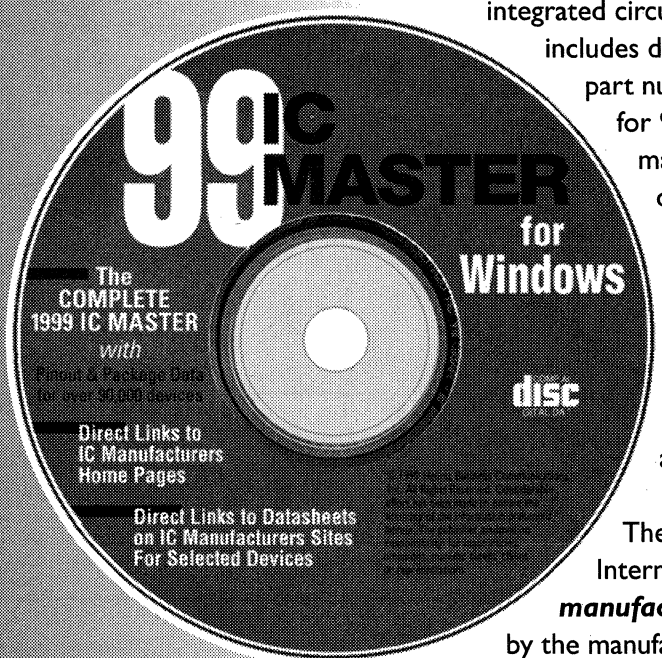
- VCXO and Tight Stability Clocks
- Standard frequencies include:
  - ❑ 16.384 MHz
  - ❑ 19.440 MHz
  - ❑ 38.880 MHz
  - ❑ 44.736 MHz
  - ❑ 51.840 MHz
  - ❑ 155.520 MHz
- Wide Pullability
- Low phase jitter
- Excellent frequency stability
- Full-size, Half-size DIP and SMD

FOR YOUR COPY OF THE VALPEY-FISHER *"USER'S GUIDE TO QUARTZ CRYSTALS AND OSCILLATORS"*, CALL 1-800-982-5737 OR SEND US YOUR REQUEST BY FAX FOR FAST ACTION.

VALPEY-FISHER CORPORATION • 75 SOUTH STREET, HOPKINTON, MA 01748
TEL. 1-800-982-5737 • FAX 508-497-6377
Visit our website at: valpeyfisher.com

1999 IC MASTER CD-ROM
for Windows

Now you can search the industry's leading IC database right on your own PC!



The **1999 IC MASTER CD-ROM for Windows** gives you direct access to product information on current and discontinued integrated circuits from over 300 manufacturers. The database includes device specifications for more than 135,000 base part numbers with pinout diagrams and package styles for 90,000 of these devices. Plus, complete manufacturer contact information with sales office and distributor listings.

A powerful part number and specification search engine lets you narrow your search to a few possible devices in just minutes. Then make your final device choices based on the most current and reliable information available, the manufacturer's own data!

The CD-ROM search program can launch your Internet browser and ***link*** you directly ***to the manufacturer's own website.*** And, for devices selected by the manufacturer, ***link*** you directly ***to the actual datasheets*** for the device on the manufacturer's website.

There is simply no better time-saving tool for IC buyers and specifiers.

To order your 1999 IC MASTER CD-ROM for Windows
contact your local IC MASTER distributor or Marie Botta at:

Hearst Business Communications, Inc.
645 Stewart Avenue, Garden City, NY 11530
(516) 227-1314 FAX (516) 227-1453
Credit Card Hotline: 1-800-833-7138

Tell Marie you saw IC MASTER in the 1999 EEM, and she'll take $10.00 off the subscription price!
The IC MASTER CD-ROM is released annually in March.
See us on the World Wide Web at http://icmaster.com

Vectron International.

One Company. One Commitment. Excellence!

KVG

Quarzkeramik

Vectron Technologies

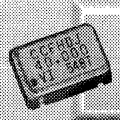
Vectron Laboratories

Oscillatek

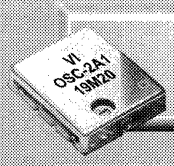
Telefilter

The best in the business have combined to offer a single source for virtually every frequency generation and control product... for virtually every application. Now, as a single source, we offer a broader range of products and frequencies than any other company in the market. Add our unparalleled engineering assistance and customer support, and there is no reason to call anyone else, ever again!

Crystals Including HFF to 160 MHz

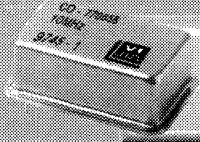


Crystal Oscillators from 0.1 Hz to 2.488 GHz

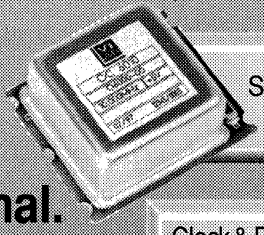


TCXOs from 2.5 ppm to 0.1 ppm

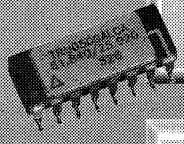
Complete Range of SMD & Specialty VCXOs



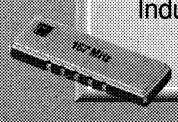
Wide Range of High Stability OCXOs



Surface Mount OCXOs



Clock & Data Recovery and Frequency Translation Products



Industry Standard & Custom SAW Filters

Vectron International. We *are* the One!

Toll Free **1-88-VECTRON1**
FAX **1-888-FAX-VECTRON**
Web: **www.vectron.com**

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY

166 Glover Avenue, Norwalk, CT 06856 USA
www.vectron.com

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY
166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

Voltage Controlled Crystal Oscillators (VCXOs)

Voltage controlled crystal oscillators (VCXOs) are widely used in telecommunications, instrumentation and other electronic equipment where a stable but electrically tunable oscillator is required. Typical applications include frequency translation and data recovery or retiming. VCXOs are commonly imbedded into PLLs. In this case, specifications such as pull range, stability and linearity are key parameters. Vectron International manufactures several different lines of VCXOs that are uniquely tailored to individual applications, including for use in phase locking applications.

HIGH VOLUME SERIES
- Lowest cost for larger production volume OEM requirements.
- Tape and reel packaging for C type, tube packaging on F and H metal can products.
- Custom designed crystal oscillator ASIC for high performance.

CUSTOM HYBRID SERIES
- True hybrid construction with chip and wire bonding to ceramic substrate for high reliablity and small size.
- Many options for output, frequency, supply and other specifications.
- High reliability processing options available.

PACKAGED CRYSTAL SERIES
- Crystal is sealed in its own hermetic package for superior aging and temperature performance.
- Many custom options are available, including very low phase noise and jitter.
- Potentially the lowest cost solution for exacting or custom requirements.

SONET/SDH VCXOs
- High performance VCXOs are available at standard SONET/SDH frequencies ranging from 155.52 MHz to 2.488 GHz.
- Performance optimized for SONET data transmission.

VCXO's – Product Offering

(VCXOs)	Frequency Range	Output	Tune Voltage	Slope	Package	Features
HIGH VOLUME						
V-Type	1 MHz to 52 MHz	TTL/CMOS	0.5 to +4.5V	Positive	6 pin leadless ceramic chip carrier	ASIC technology, smallest VCXO available, tri-state option
J-Type	1 MHz to 155 MHz	TTL/CMOS	0 to +5V	Positive	J Lead Ceramic SMD	ASIC technology, industry standard J lead, tri-state option
S-Type	1 MHz to 52 MHz	TTL/CMOS	0 to +5V	Positive	6 pin ceramic DIP/SMD	ASIC technology, tri-state option
R-Type	1 MHz to 52 MHz	TTL/CMOS	0 to +5V	Positive	14 pin DIP footprint, 4 pin ceramic pkg.	ASIC technology
FTV-Type	1 MHz to 30 MHz	TTL/CMOS	0 to +5V	Positive	4 pin DIP	ASIC technology
CUSTOM HYBRID						
CO-401V/441V	32 kHz to 75 MHz	TTL/HC/ACMOS	0 to +5V	Positive	4 pin DIP	3 point mount crystal, bipolar option
CO-402V/442V	32 kHz to 75 MHz	TTL/HC/ACMOS	0 to +5V	Positive	14 pin DIP	3 point mount crystal, bipolar option
CO-464V/467V	64 kHz to 200 MHz	ECL	0 to -33V	Negative	16 pin flatpack and 16 pin DDIP	-3.3V Supply
CO-434V/454V	201 MHz to 640 MHz	ECL	0 to -5V	Negative	16 pin DDIP	10K, 10KH, 100K, ECLinPS, 10E/EL 100E/EL, bipolar option
CO-434VH/454VH	8 MHz to 640 MHz	ECL	0 to -5V	Negative	24 pin DDIP	10K, 10KH, 100K, ECLinPS, 10E/EL 100E/EL, bipolar option
CO-445V	100 kHz to 50 MHz	HCMOS	0 to +5V	Positive	16 pin DDIP	Wide deviation to ±500ppm, bipolar option
PACKAGED CRYSTAL						
VCXO-1070	2 MHz to 30 MHz	HCMOS	0.5 to +4.5V	Positive	4 pin 1/2 DIP (8.5 mm ht.)	
VCXO-2070/4085	2 MHz to 51.84 MHz	HCMOS	0.5 to +4.5V	Positive	4 pin DIP (8.5 mm ht.)	
V-600	2 MHz to 38.88 MHz	HCMOS	0.5 to +4.5V	Positive	Plastic SMD (19.2 x 13.1 mm)	Surface mount device
VCXO-SM100/SM100A	2 MHz to 26 MHz	HCMOS	0.5 to +4.5V	Positive	Plastic SMD (14 x 9.3 mm)	Surface mount device
VCXO-S122	622.08 MHz	PECL	0.5 to +4.5V	Positive	Solder sealed CO-8	±10ppm aging over 10 years
CO-223V/233VH	8 MHz to 200 MHz	SINE	0 to +6V	Optional	Solder seal metal can	1.5" x 1.5" x 0.625", bipolar option
CO-223VF/233VFW	8 MHz to 400 MHz	SINE	0 to +6V	Optional	Solder seal metal can	2" x 2" x 0.75", bipolar option
CO-286VW/286VP	400.1 MHz to 1200 MHz	SINE	0 to +6V	Optional	Solder seal metal can	1" x 2" x 0.6", SMA connector option
CO-484V/487V	8 MHz to 200 MHz	SINE	0 to +6V	Positive	16 pin DDIP and 16 pin flatpack	Flatpack available, bipolar option
SONET/SDH						
434Y2600	622.08 MHz	ECL/PECL	0.5 to ±5V	Optional	24 pin DDIP	Conventional harmonics generation technique
430Y3100	155.52 MHz, 622.08 MHz	ECL/PECL	0.5 to ±5V	Optional	4 pin DIP, SMT, flatpack	Singlended output, PLL based
430Y3200	155.52 MHz, 622.08 MHz	ECL/PECL	0.5 to ±5V	Optional	5 pin DIP, SMT, flatpack	Complementary output, PLL based
430Y5200	1.244 GHz	ECL/PECL	0.5 to ±5V	Optional	5 pin DIP, 14 pin flatpack	Complementary output, PLL based
487Y4300	2.488 GHz	ECL/PECL	0.5 to ±5V	Optional	16 pin flatpack	5V supply, PLL based

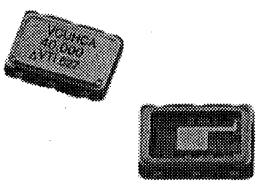
166 Glover Avenue • Norwalk, CT 06856
Toll Free **1-88-VECTRON1**
Web: www.vectron.com

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY

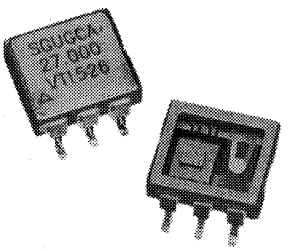
Voltage Controlled Crystal Oscillators (VCXOs)

Applications: VTI's VCXOs are utilized for Phase LockLoop applications and other applications that require a precision tunable frequency source in the telecom, wireless, datacom and computer markets.

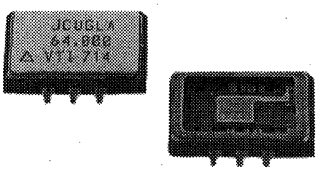
V-Type



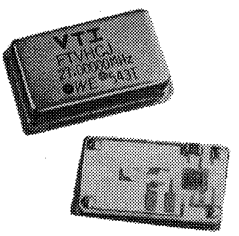
S- Type



J-Type



FTV-Type



FEATURES

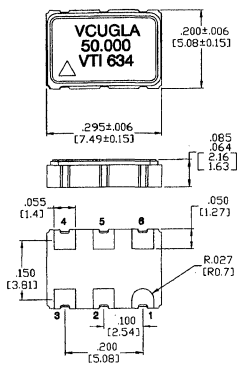
- **ASIC Technology**
- Leadless, ceramic chip carrier
- Smallest package

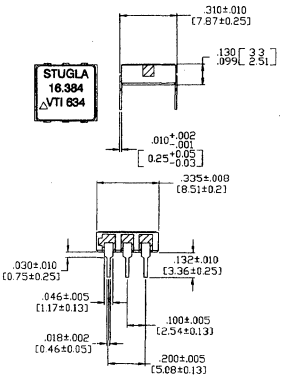
- **ASIC Technology**
- 6 pin DIP ceramic package
- J-Lead compatible

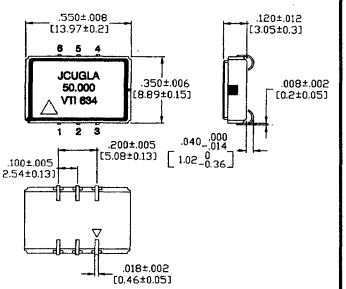
- **ASIC Technology**
- 4 or 6 J-Lead package
- 3 & 5V supply
- Frequencies to 155 MHz

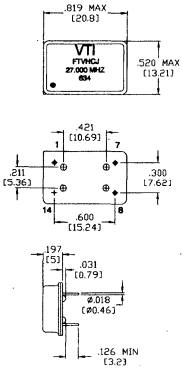
- **ASIC Technology**
- Standard 14 pin DIP metal package

OUTLINES









SPECIFICATIONS

Technology	Quartz stabilized
Frequency Range	1 to 52 MHz
Pullability	±50 to ±200
Stability	±20, ±30 ppm 0/70, -40/85
Duty Cycle	±5%
Output	TTL or CMOS
Temperature Range	0°C to 70°C, -40°C to 85°C
Tri-state	J, V & S Types

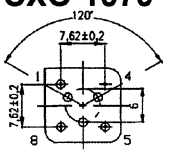
VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY
166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

Packaged Crystal VCXOs

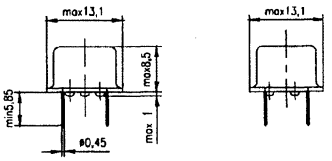
Features

- Frequencies to 622 MHz
- ECL and HCMOS outputs
- SMD package designs

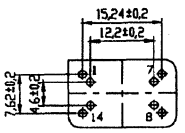
VCXO-1070



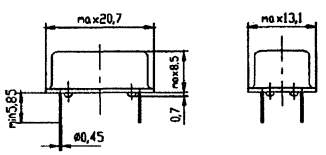
Pin configuration
1. Control voltage Uc
4. Ground, case
5. RF-output
8. Supply voltage UB



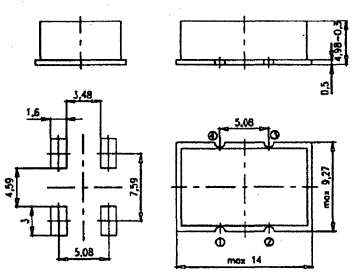
VCXO-2070, -4085 & V-600



Pin configuration
1. Control voltage Uc
7. Ground, case
8. RF-output
14. Supply voltage

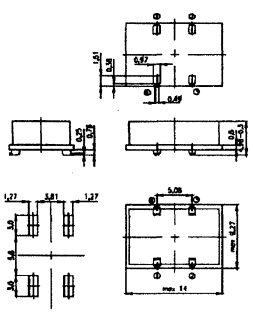


SM100



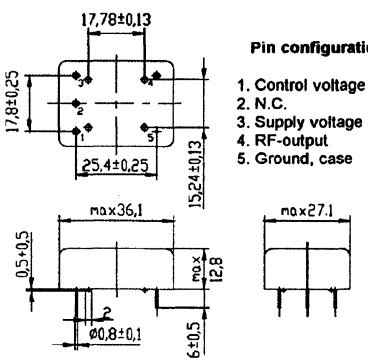
Pin configuration
1. Control voltage Uc
2. Ground, case
3. RF-output
4. Supply voltage U_B

SM100A



Pin configuration
1. Control voltage
2. Ground, case
3. RF-output
4. Supply volatge U_B

VCXO-S122



Pin configuration
1. Control voltage U_C
2. N.C.
3. Supply voltage U_B
4. RF-output
5. Ground, case

NOTE: Dimensions in mm

SPECIFICATIONS

	VCXO-1070	VCXO-2070/4085	V-600H/V-600P	VCXO-SM100/SM100A	VCXO-S122
Nominal Frequency:	2 MHz to 30 MHz	100 KHz to 51.84 MHz	44.736 MHz to 155.52 MHz	2 to 35 MHz	622.08 MHz
Nominal Frequency Tolerance, T = 25±3°C and Uc = 2.5V:	<±10 ppm	<±10 ppm	<±10 ppm	<±10 ppm	<±15 ppm
Frequency Stability in the temperature range -20°C to +70°C:	<±10 ppm	<±10 ppm	<±15 ppm	<±20 ppm	<±12 ppm
in the temperature range -40°C to +85°C:		<±20 ppm			<±20 ppm
vs. supply voltage changes UB±5%:	<±5 ppm	<±5 ppm <±3 ppm	<±5 ppm	<±10 ppm	<±2 ppm
vs. load changes:	<±5 ppm (1 to 10 HCMOS)	<±2 ppm (1 to 10 HCMOS)	<±2 ppm <±0.5 ppm (5% load factor)	<±5 ppm (20% load change)	<±2 ppm (5% load change) (1 to 10 HCMOS)
Aging:	±5 ppm/first year ±2 ppm following years	±5 ppm/first year ±2 ppm following years	±5 ppm/first year ±2 ppm following years	±5 ppm/first year ±2 ppm following years	±2 ppm/first year ±10 ppm in 10 years
Frequency Control Range:	≥±100 ppm	≥±100 ppm	≥±100 ppm	≥±100 ppm	≥±80 ppm; ≤±120 ppm
Control Voltage Uc:	0.5 V to 4.5 V	0.5 V to 4.5 V	0.5 V to 4.5 V	0.5 V to 4.5 V	0.5 V to 4.5 V
Control Input Impedance:					>50 kOhm
Transfer Function/Linearity:	Positive/10%	Positive/10%	Positive/15%	Positive/15%	Positive/±40 to 60 ppm/V
Supply Voltage UB:	5 V ± 5%	5 V ± 5%	5 V ± 5%	5 V ± 5%	5 V ± 5%
Current Consumption With Load 1 kOhm//15pF:	≤25 mA	≤25 mA (f<40 MHz) ≤30 mA (f>40 MHz)	≤40 mA ≤70 mA	≤20 mA	≤120 mA
Output Voltage:	HCMOS Low <1.0V; High >4.0V	HCMOS Low <1.0V; High >4.0V	HCMOS PECL 100Kcomps	HCMOS Low <0.4V; High >4.0V	ECLinPS 100k
Load:	1 kOhm//15pF	1 kOhm//15pF	1 kOhm//15pF 50 Ohm	1 kOhm//15pF	50 Ohm
Duty Cycle:	40/60%	40/60%	40/60% 40/60%	40/60%	45/55%
Rise Time, Fall Time:	8 ns	8 ns (f<40 MHz) 5 ns (f>40 MHz)		<5 ns	≤1 ns
Frequency Modulation:					0 Hz to 10 kHz; 3 dB cut-off frequency
Temperature Ranges:					
Operating:	-20°C to +70°C	-20°C to +70°C -40°C to +85°C	-20°C to+70°C	-20°C to +70°C	0°C to +70°C
Operable:	-25°C to +75°C	-25°C to +75°C -45°C to +85°C	-25°C to+75°C	-25°C to +75°C	-20°C to +80°C
Storage:	-40°C to +85°C	-40°C to +85°C -55°C to +105°C	-40°C to +85°C	-40°C to +85°C	-55°C to +105°C

166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY

TTL, CMOS, HCMOS, ACMOS VOLTAGE CONTROLLED OSCILLATORS

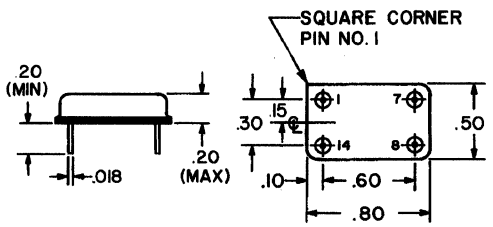
Features

- Frequency to 640 MHz
- 3 Point Mount Crystal
- Low Profile
- Wide Deviation Models Available

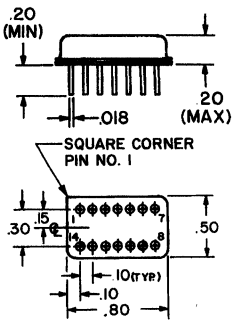
NOTE: Dimensions in inches

CO-401V/CO-441V

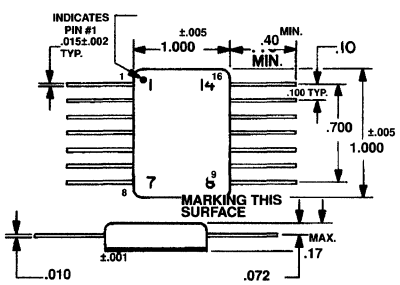
Available with insulated standoffs: increases height to 0.23 maximum



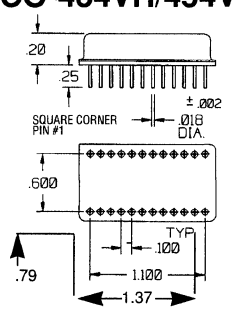
CO-402V/CO-442V



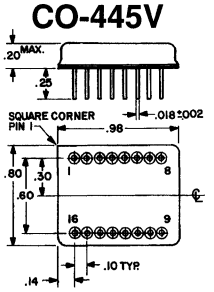
CO-467V



CO-434VH/454VH



CO-434V/CO-454V CO-445V



SPECIFICATIONS

	HCMOS	TTL/HCMOS/ACMOS	ECL	
Series	**CO-445V** 16 pin Double DIP *Very wide deviation*	**CO-401V** 4 Pin Dip **CO-402V** 14 Pin Dip **CO-441V:** 4 Pin Dip **CO-442V:** 14 Pin Dip	**CO-434V:** 16 pin DDIP ***CO-434VH:** 24 pin DDIP **CO-437V:** Flatpack	**CO-454V:** 16 pin DDIP ***CO-454VH:** 24 pin DDIP **CO-464V:** 16 pin DDIP **CO-467V:** flatpack
Center Frequency	100 kHz to 50 MHz	32 kHz-75 MHz 64 kHz-75 MHz	8-200 MHz *200.1-640 MHz	8-200 MHz *200.1-640 MHz
Output Level	HCMOS, drives 3 TTL loads	HCMOS/ACMOS compatible	10K, 10KH, MECLIII, ECLinPS 10E or 10EL Complementary output is standard in CO-434VH and CO-454VH; optional in other models	100K ECLinPS, 100E or 100 EL
Supply (±5%)	+5 Vdc, <25 mA	+5 Vdc at 20-60 mA, depending on frequency	−5.2 Vdc	−4.5 Vdc
Deviation/ Stability Alternatives	**Code** / **Range** / **Temperature Stab. at fo** / **Deviation Range** EB35 0 to +50°C ±30 ppm ±250 ppm FB55 0 to +50°C ±50 ppm ±500 ppm EC45 0 to +70°C ±40 ppm ±250 ppm FC65 0 to +70°C ±60 ppm ±500 ppm ED45 −20 to +70°C ±40 ppm ±250 ppm FD65 −20 to +70°C ±60 ppm ±500 ppm EE55 −40 to +85°C ±50 ppm ±250 ppm FE75 −40 to +85°C ±70 ppm ±500 ppm EF55 −55 to +85°C ±50 ppm ±250 ppm FF85 −55 to +85°C ±80 ppm ±500 ppm **NOTE:** When internal multiplication is used (generally above 25 MHz) sub-harmonic suppression is >-30 dBc.	**Code** / **Temperature Range** / **Temperature Stability** / ***Minimum Deviation** **0** 0 to +50°C ±10 ppm ±30 ppm **A** 0 to +50°C ±20 ppm ±50 ppm **B** 0 to +50°C ±35 ppm ±100 ppm **C**** 0 to +50°C ±35 ppm ±200 ppm **D** 0 to +70°C ±20 ppm ±40 ppm **E** 0 to +70°C ±40 ppm ±100 ppm **F**** 0 to +70°C ±40 ppm ±200 ppm **G** −20 to +70°C ±30 ppm ±60 ppm **H** −20 to +70°C ±40 ppm ±100 ppm **I**** −20 to +70°C ±40 ppm ±200 ppm **J** −40 to +85°C ±40 ppm ±60 ppm **K** −40 to +85°C ±50 ppm ±100 ppm **L**** −40 to +85°C ±50 ppm ±200 ppm **M** −55 to +85°C ±50 ppm ±100 ppm **N**** −55 to +85°C ±50 ppm ±200 ppm * Deviation is referenced to the specified output frequency. For example, in Model CO-441V-BX at 10 MHz, at 25°C and OV control the frequency is at least 100 ppm below 10 MHz and at +5V the frequency is at least 100 ppm above 10 MHz. **The following notes apply to options C, F, I, L, and N (±200 ppm deviation) They are only available at frequencies up to 25 MHz for HCMOS/ACMOS and 75 MHz for ECL. Linearity of ±10% is standard. (±5% and ±2% optional for HCMOS and ACMOS models)		
Control Voltage and Linearity	0 to +5 Vdc Positive transfer (lowest frequency at 0V) ±20% linearity smooth monotonic characteristic (±10% linearity available)	0 to +5V; positive transfer function (lowest frequency at 0V) ±20% linearity is standard, ±10% optionally available (standard forC, F, I, L, and N deviation codes).	±5V bipolar control voltage is optional (±3V to ±10V available) With Bipolar, transfer function is negative, standard linearity is ±10% (±5% optional).	
Modulation Rate	0 to 10 kHz (Higher modulation rates available)	dc to 1 kHz; higher modulation rates optional		
Modulation Input Z	Greater than 50 kΩ	Greater than 50 kΩ		
Aging Rate	3-5 ppm first year, then 2 ppm/year thereafter—less than 20 ppm total over 10 years.			

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY
166 Glover Avenue • Norwalk, CT 06856
Toll Free **1-88-VECTRON1**
Web: www.vectron.com

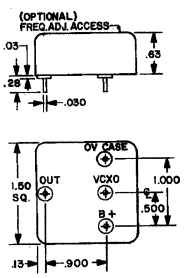
Sinewave Voltage Controlled Crystal Oscillators

Features

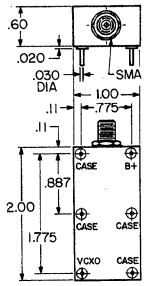
- Frequencies to 2.488 GHZ
- Deviation to ±200 ppm
- Low Profile PC, Board Mounts, and DIP packages available

NOTE: Dimensions in inches

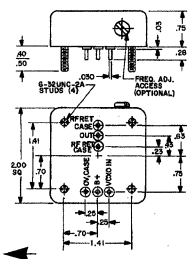
CO-233V



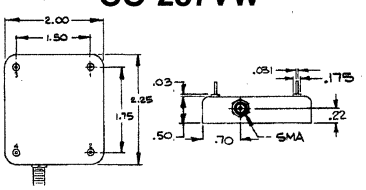
CO-286VW



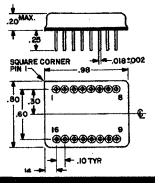
CO-233VF



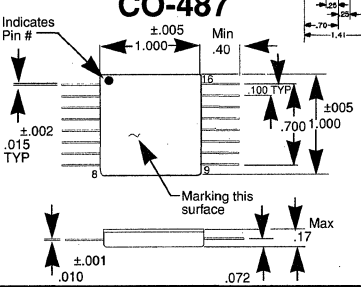
CO-287VW



CO-484V



CO-487



SPECIFICATIONS

	SINEWAVE					
Configuration	PC board mount		Chassis mount with rf output connector			Low profile hybrid DIP and flatpack
Series	(a) **CO-233V** (b) **CO-233VH**	(a) **CO-233VF** (b) **CO-286C**	**CO-233VFW**	**CO-286VW** **CO-283VW**	**CO-287VW**	**CO-484V** **CO-487V**
Center Frequency	(a) 8-149.9 MHz (b) 150-400 MHz	(a) 8-400 MHz (b) 400.1-1200 MHz	8-400 MHz	400.1-1200 MHz	1.3GHZ to 2.488GHZ	8-200 MHz
Output Level	0.5 Vrms/50Ω (+7 dBm); Option **"R"**: +13 dBm (not available in CO-484V/487V above 140 MHz or CO-233VF/VFW above 280 MHz). Harmonics are –20 dBc. Harmonic and subharmonic levels can be reduced to –30 dBc or –40 dBc in all models except CO-233V and CO-233VH. +20 dBm optional in CO-283VW.					
Supply (±5%)	+15 Vdc (+12 Vdc to +24 Vdc optional); current ranges from 15 mA at 8 MHz to 100 mA at 1200 MHz					

Deviation/ Stability Alternatives

Code	Temperature Range	Temperature Stability	*Minimum Deviation
0	0 to +50°C	±10 ppm	±30 ppm
A	0 to +50°C	±20 ppm	±50 ppm
B	0 to +50°C	±35 ppm	±100 ppm
C**	0 to +50°C	±35 ppm	±200 ppm
D	0 to +70°C	±20 ppm	±40 ppm
E	0 to +70°C	±40 ppm	±100 ppm
F**	0 to +70°C	±40 ppm	±200 ppm
G	–20 to +70°C	±30 ppm	±60 ppm
H	–20 to +70°C	±40 ppm	±100 ppm
I**	–20 to +70°C	±40 ppm	±200 ppm
J	–40 to +85°C	±40 ppm	±60 ppm
K	–40 to +85°C	±50 ppm	±100 ppm
L**	–40 to +85°C	±50 ppm	±200 ppm
M	–55 to +85°C	±50 ppm	±100 ppm
N**	–55 to +85°C	±50 ppm	±200 ppm

Not available for CO-287VW

*Deviation is referenced to the specified output frequency. For example, in Model CO-484V-AX at 100 MHz, at 25°C and OV control the frequency is at least 50 ppm below 100 MHz and at +6V the frequency is at least 50 ppm above 100 MHz.

**The following notes apply to options C, F, I, L, and N (±200 ppm deviation)
•They are only available at frequencies up to 75 MHz
•Linearity of ±10% is standard

Control Voltage	0 to +6V positive transfer function (lowest frequency at OV) * ±3V to ±10V optional except for CO-286V *(With bipolar control voltage, transfer function is negative, linearity is ±10%.)
Linearity	±20%, smooth monotonic characteristic (±10% linearity available) ±10% is standard with bipolar control voltage and with deviation/stability options C, F, I, L, and N.
Modulation Rate	dc to 1 kHz; higher modulation rates available
Modulation Input Z	Greater than 50 kΩ
Aging Rate	Hybrid models: 3-5 ppm for first year, then 2 ppm/year thereafter—less than 20 ppm total over 10 years. Other Models: 5 ppm for first year, then 3 ppm/year thereafter. Option **"Y"**: 2 ppm for first year, 1 ppm/year thereafter.

166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

VECTRON INTERNATIONAL

Temperature Compensated Crystal Oscillators (TCXOs)

Temperature compensated crystal oscillators (TCXO's) are essentially crystal oscillators which are tuned over temperature by a network in such a manner as to compensate for the natural temperature drift of the uncompensated crystal oscillator.

VI produces the broadest line of TCXOs in the industry. Temperature compensation techniques employed include both direct and indirect. All devices undergo extensive testing to ensure specification compliance and high levels of quality and reliability.

Most VI TCXOs employ the indirect method of compensation where a resistor-thermistor network is used to tune a VCXO over temperature. This method of compensation provides very precise control and is generally used for higher stability TCXOs.

Over narrower temperature ranges and on TCXOs with moderate stability, it is possible to compensate the oscillator with variable reactance elements inserted in the oscillator loop. This method of compensation is referred to as direct compensation and is used on certain VI models.

Many other options and special features are available, including improved temperature and aging stability, low noise and improved vibration sensitivity. Please contact factory for additional information.

TCXOs – Product Offering

TCXOs	Frequency Range	Output Logic	Package	Features
LOW COST INDUSTRIAL				
B8 Series	1.0 MHz to 160 MHz	Squarewave	4 pin DIP	Voltage tune, hermetic seal
F4 Series	1.0 MHz to 160 MHz	CMOS, sinewave	16 pin DIP	Low aging, military versions
G2 Series	1.0 MHz to 160 MHz	CMOS, sinewave	24 pin DIP	Tight stability, low aging
P1/P2 Series	1.0 MHz to 160 MHz	CMOS, sinewave	1.0" square	Economical, low aging
R1 Series	0.01 MHz to 220 MHz	CMOS, sinewave	1.5" square	Low phase noise
S6 Series	0.01 MHz to 220 MHz	CMOS, sinewave	2.0" square	Stability to +0.5ppm
Z1/Z2 Series	0.01 MHz to 125 MHz	CMOS, sinewave	1.0" square	Tight stability, surface mount
6024 Series	9.0 MHz to 36 MHz	Sinewave	2.0" x 2.0" x 0.53"	Excellent short term stability
6099 Series	9.0 MHz to 36 MHz	Sinewave	1.5" square	Extremely low aging
6079 Series	9.0 MHz to 36 MHz	CMOS	1.5" square	Extremely low aging
LOW COST CONSUMER				
T-1050 Series	8.0 MHz to 24 MHz	Clip sinewave	0.5" square	Low cost, many units in stock
T-1100 Series	8.0 MHz to 24 MHz	Squarewave	4 pin DIP	Low cost, many units in stock
T-1150 Series	8.0 MHz to 24 MHz	Clip sinewave	4 pin DIP	Low cost, many units in stock
OSC Series	10.0 MHz to 25 MHz	Clip sinewave	0.4" x 0.5" x 0.1"	Available on tape and reel
HIGH STABILITY				
F100/200/300 Series	3 kHz to 35 MHz	HCMOS/Sinewave	CO-8	High stability
G100/200/300 Series	5 MHz to 35 MHz	Sinewave	CO-8	High stability
TO-200 Series	10 MHz to 35 MHz	Sinewave	20mm x 20mm	20mm x 20mm
TO-210 Series	3 kHz to 35 MHz	HCMOS	20mm x 20mm	20mm x 20mm
TO-300 Series	10 MHz to 40 MHz	Sinewave	Dil-14	High stability
TO-400 Series	10 MHz to 40 MHz	HCMOS	Dil-14	High stability
TO-330 Series	1 MHz to 26 MHz	LV-HCMOS	Dil-14	3.3V
TO-500 Series	40 MHz to 250 MHz	Sinewave	CO-8	High frequency
TO-600 Series	12.8 MHz to 38.88 MHz	HCMOS	SMD	Surface mount
CO-255 Series	140.1 MHz to 420 MHz	Sinewave	Solder seal metal can	High stability
CO-256 Series	420.1 MHz to 630 MHz	Sinewave	Solder seal metal can	High stability
CO-856 Series	630.1 MHz to 1000 MHz	Sinewave	Solder seal metal can	High frequency
CO-566 Series	5 MHz to 50 MHz	HCMOS/TTL	24 pin hybridized double DIP	Space qualified option
VOLTAGE CONTROLLED				
CO-351 Series	To 20 MHz	TTL/HCMOS/Sinewave	Solder seal metal can	Voltage controlled, wide deviation
CO-352 Series	20.1 MHz to 800 MHz	TTL/HCMOS/Sinewave	Solder seal metal can	Voltage controlled, wide deviation

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY
166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

Dual-In-Line Package (DIP) TCXOS

B-8 Series 14/4 Pin TCXO

Output Options:

TC	= LS TTL	= 1.0 to	160 MHz
AC	= CMOS AC	= 1.0 to	160 MHz
HC	= HCMOS	= 10 to	160 MHz

Stability Options:

A16	=	±1.0 PPM	0° to +50°C
AB6	=	±2.5 PPM	0° to +50°C
A56	=	±5.0 PPM	0° to +50°C
D15	=	±10.0 PPM	-40° to +85°C

Screening Options:

C = Standard Commercial
S = Class "B" per MIL-O-55310

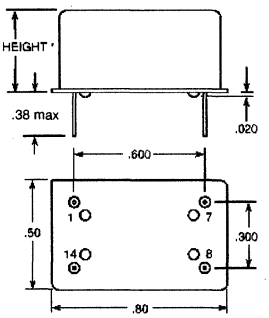
Typical P/N: HC B8 GO **A16 C 24.000 MHz**
GO is predetermined

Pinouts:

Pin 1	=	Tune 0 to +5V
Pin 7	=	Ground
Pin 8	=	Output
Pin 14	=	+5.0 Vdc

General Specifications:

Supply Voltage:	+5.0 Vdc ±5%
Voltage Stability:	<1.0 PPM for ±5%
Trim Range:	>15 PPM
Tuning Voltage:	0 to +5.0 Vdc
Seal:	<1 x 10^{-8} cc/second



B8 Package

NOTE: Dimensions in inches

F4 Series 16 Pin Doublewide DIP TCXO

Output Options:

TC	= LS TTL	= 1.0 to	160 MHz
AC	= CMOS AC	= 1.0 to	160 MHz
HC	= HCMOS	= 1.0 to	160 MHz

Stability Options:

B57	=	±0.5 PPM	0° to +70°C
B16	=	±1.0 PPM	0° to +70°C
D16	=	±1.0 PPM	-40° to +85°C
DB6	=	±2.5 PPM	-40° to +85°C

Screening Options:

C = Standard Commercial
S = Class "B" per MIL-O-55310

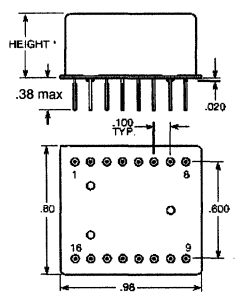
Typical P/N: TC F4 GO **D16 S 6.4000 MHz**
GO is predetermined

Pinouts

Pin 6	=	Tune 0 to +5V
Pin 8	=	Ground
Pin 9	=	Output
Pin 16	=	+5.0 Vdc

General Specifications:

Supply Voltage:	+5.0 Vdc ±5%
Voltage Stability:	<1.0 PPM for ±5%
Trim Range:	>10 PPM
Tuning Voltage:	0 to +5.0 Vdc
Aging:	< 2 PPM per year
	<10 PPM per 10 yrs
Seal:	<1 x 10^{-8} cc/second



F4 Package

NOTE: Dimensions in inches

Solder Seal TCXOS

P1 and P2 Series Solder Seal TCXO Small Package (1.0 " SQ.)

Output Options:

TC	= LS TTL	= .01 to	160 MHz	+5.0Vdc
HC	= HCMOS	= .01 to	160 MHz	+5.0Vdc
RB	= +4 dBm 50Ω	= 4 to	160 MHz	+12.0Vdc

Input:

Stability Options

A17	=	±0.1 PPM	0° to +50°C
A16	=	±1.0 PPM	0° to +50°C
B16	=	±1.0 PPM	0° to +70°C
BB6	=	±2.5 PPM	0° to +70°C
D57	=	±0.5 PPM	-40° to +85°C
D16	=	±1.0 PPM	-40° to +85°C

Typical P/N: HC P2 HO **D16 S 12.800 MHz**
HO is predetermined

Screening Options:

C= Commercial
S= Class "B" per MIL-O-55310

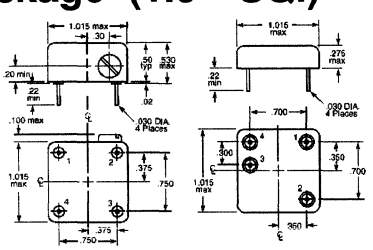
P2 Package

Pin 1	=	Output
Pin 2	=	Tune
Pin 3	=	Gnd, Case
Pin 4	=	Supply

P1 Package

Pin 1	=	Output
Pin 2	=	Gnd, Case
Pin 3	=	Gnd, Case*
Pin 4	=	Supply

*Optional VCO



P1 Package **P2 Package**

NOTE: Dimensions in inches

Note: Not all stabilities are available in all output options. Oscillatek does not recommend wave soldering, IR reflow or other elevated temperature processing without consulting the factory.

166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY

10 MHz Satcom Base Station TCXOS

6024 Series and 6099 Series

Stabilities to ±0.1 PPM! ±1 x 10^{-9}/second Peak to Peak

Oscillatek has introduced an entire family of 10 MHz TCXO's designed to bridge the gap between OCXO's and TCXO's. These parts have been optimized for excellent short-term stability and ***LOW AGING.*** With over 150,000 units produced and units in constant production we can offer ***LOW PRICE*** and ***QUICK DELIVERY.***

6024-XX 6099-XX 10.0 MHz SINEWAVE

STABILITY OPTIONS		6024 - XX	6099-XX
-01	0° to +70°C	±0.1 PPM	±0.2 PPM
-02	0° to +70°C	±0.3 PPM	±0.5 PPM
-03	0° to +70°C	±0.5 PPM	±1.0 PPM
-04	-40° to +85°C	±1.0 PPM	±1.0 PPM
-05	-55° to +85°C	±1.0 PPM	±1.5 PPM
-XX	**CALL FOR OTHER OPTIONS**		

ALAN VARIANCE:

-01	±1 x 10^{-10} at tau = 1 second
-02 thru -05	±2 x 10^{-10} at tau = 1 second

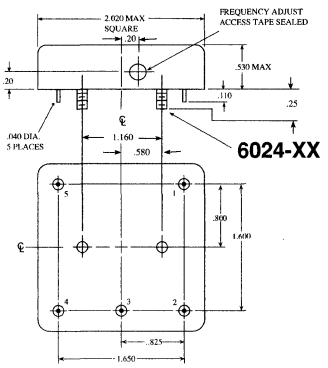
AGING:

-01 thru -02	<0.2 PPM/year	< 0.25 PPM/year
	<1.0 PPM/10 years	< 1.5 PPM/10 years
-03 thru -05	<0.5 PPM/year	< 0.5 PPM/year
	<2.0 PPM/10 years	< 2.0 PPM/10years

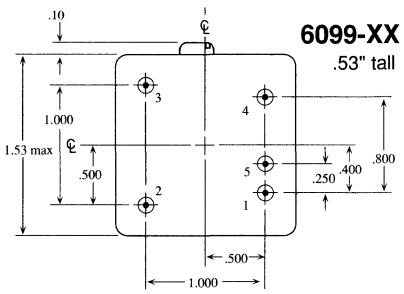
PHASE NOISE:

-100 dBc at	10 Hz
-125 dBc	100 Hz
-145 dBc	1.0 KHz
-150 dBc	>10.0 KHz

+12.0 VDC ±5% Input +6.5 to +10 dBm Output into 50Ω



1 = GND, CASE
2 = OUTPUT
3 = +12 Vdc
4 = NC
5 = GND



1 = OUTPUT
2 = + 12 Vdc
3 = CASE
4 = CASE
5 = GND, CASE
Pin Dia. = .030

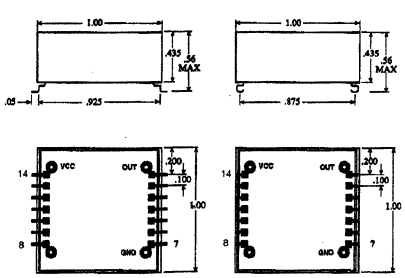
Options are available for ± 1.0 ppm all inclusive for 10 years.

Precision Surface Mount TCXO'S

Z1/Z2 Series

Features

- Gull or J-Lead surface mount
- Reflowable
- Low cost
- Voltage tune option
- Low aging
- Low phase noise
- 10 MHz standard frequency



SPECIFICATIONS

Frequency range: .01 to 125 MHz

Output Options:		Input:
TC = LS TTL	= .01Hz to 30 MHz	+5.0 Vdc
HC = HCMOS	= .01Hz to 125 MHz	+5.0 Vdc
RC = +7dBm 50Ω	= 4Hz to 40 MHz	+12.0 Vdc

Screening Options:
C=Commercial
Aging:
.2 ppm 1st year
1 ppm 10 years

Output Options:		
A27 = ±0.2 ppm	= 0°C to +50°C	.01 to 16 MHz
B57 = ±0.5 ppm	= 0°C to +70°C	.01 to 125 MHz
D16 = ±1.0 ppm	= -40°C to +85°C	.01 to 125 MHz

Z1 and Z2 Packages:
Pin 1 = Out
Pin 7 = Gnd
Pin 8 = Tune
Pin 14 = Vcc

Typical P/N: HC Z1 HO D16 C 12.800 MHz
HO is predetermined

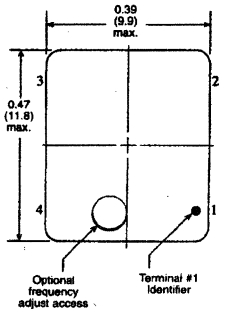
VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY
166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

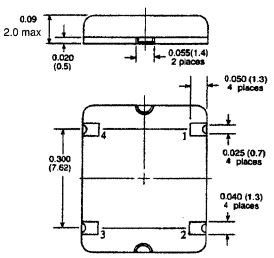
Ultra Miniature TCXO's

OSC series

Features
- 3.0 or 5.0 Vdc option
- Tape and reel
- Reflow solderable
- Low cost
- <2.2 mm tall
- Voltage tune option

Ideal for
- Wireless handsets PCS, GSM, Cellular
- GPS





PIN 1 = VC or N/C
PIN 2 = GROUND
PIN 3 = OUTPUT
PIN 4 = B+

SPECIFICATIONS

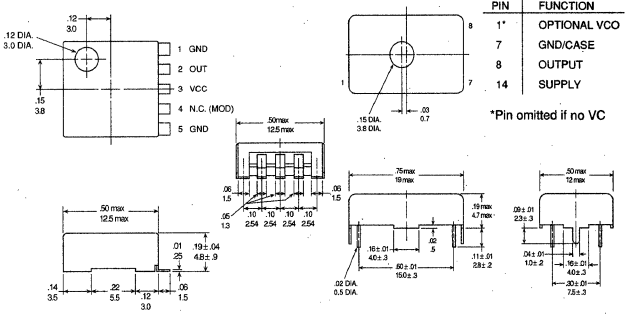
Frequency range:	10 to 25 MHz
Stability Options: (relative to +25°C)	**1** = ±1.5 ppm -20 to +70°C **2** = ±2.0 ppm -30 to +70°C **3** = ±2.5 ppm -30 to +75°C **4** = ±5.0 ppm -40 to +85°C
Stability vs. Supply Aging: (typical)	<±0.3 ppm vs B+ of ±5% < 1.0 ppm/year at +40°C
Input Voltage & current:	**A** = +5.0 Vdc ±5% <2.0 mA MAX. **B** = +3.0 Vdc ±5% <1.5 mA (10.0 to 16.8 MHz). <2.0 mA (16.8 to 20.0 MHz).
Output: (Clipped Sinewave)	+5.0 VDC = 1.0 VP-P minimum +3.0 VDC = 0.7 VP-P minimum
Load:	10 KΩ/10pf
Mechanical trim:	+3.0 ppm minimum
Trim options:	**0** = NO VCO mechanical trim **1** = ±5.0 ppm VC & mechanical **2** = Voltage trim only ±8 ppm min.
Typical part number:	**OSC-3B2 19.2 MHz** **3** = ±2.5 ppm **B** = ±3.0 Vdc **2** = Voltage Tune no mechanical trimmer
Standard Frequencies:	10.0, 12.8, 13.0, 14.4, 15.36, 16.0, 19.2, 19.68 and 20MHz
VCO Impedance:	100KΩ minimum
VCO at +25°C ±2°C: 3.0 VDC 5.0 VDC	 ±2.0 ppm at 1.5 Vdc ±2.0 ppm at 2.5 Vdc
Start-up Time:	<10 msec (typical) to within ±1.0 ppm
Harmonics: 2nd Harmonic 3rd Harmonic Other	 > 3 dBc down >10 dBc down >18 dBc down
Phase Noise (typical **OSC-3B1** 14.4) -80 dBc/Hz at 10 Hz offset -125 dBc/Hz at 100 Hz -150 dBc/Hz at 100 KHz	 -145 dBc/Hz at 1 KHz -148 dBc/Hz at 10 KHz

Miniature TCXO's

T-1050 Series,T-1100 & T-1150 Series

Features
- Low profile design
- Low current
- 5.0 Vdc and 3.3 Vdc options
- Voltage tune option
- Low Cost
- Many Parts in stock

1.2 mA Current



SPECIFICATIONS

T-1050-XXX = CLIPPED SINEWAVE SURFACE MOUNT*
T-1100-XXX = LS-TTL THRU HOLE
T-1150-XXX = CLIPPED SINEWAVE THRU HOLE

FREQUENCY RANGE	8.0 to 24.0 MHz
STANDARD FREQUENCIES	9.6 MHz, 10 MHz, 12.8 MHz, 15.36 MHz
STABILITY OPTIONS	**1** = ±1.5 PPM **2** = ±2.5 PPM **3** = ±3.5 PPM -30°C to +70°C relative to +25°C
STABILITY VS. SUPPLY AGING	<±0.3 PPM for a change in B+ of <±5%
MECHANICAL TRIM	< 1.0 PPM/Year after 30 days at +40°C ±3.0 PPM Minimum, sufficient for 5 years aging
STORAGE TEMPERATURE	-40°C to +80°C
INPUT VOLTAGE	**A** =+5.0 Vdc ±5% **B** =+3.0 Vdc ±5%

T- 1100	+5.0 Vdc	+3.0 Vdc
LOGIC "1"	4.5 V Min.	2.6 V Min
LOGIC "0"	0.4 V MAX.	0.4 V MAX.
CURRENT	10 mA MAX.	5 mA MAX.
LOAD	10kΩ/10pf	10kΩ/10pf

T- 1050 T-1150	+5.0 Vdc	+3.0 Vdc
OUTPUT	1.0 VP-P	0.8 VP-P
CURRENT	<1.2 mA	<1.0 mA
LOAD	10kΩ/10pf	10kΩ/10pf

OPTIONAL VOLTAGE CONTROL
0 = NO VCO Option
1 = ±3.0 PPM Min. 2.5V ± 1.5V*
2 = ±6.0 PPM Min. 2.5V ± 1.5V*

* 3.0 VDC units' VC is +1.5V±1.0V. Option 2 is not available. VCO Option is only available with ±2.5PPM vs TEMP.

166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

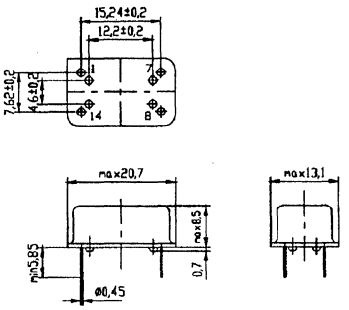
VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY

High Stability TCXOs

TO-500

Features

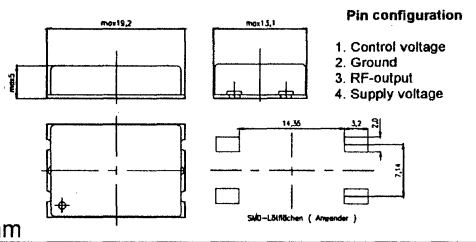
- High freq. Standard-TCXO series
- 40 to 250MHz
- -20 to +70°C
- Sinewave output
- 36 x 27 x 13mm



TO-600

Features

- SMD-TCXO
- 19.44
- 0 to +70°C
- HCMOS-output
- 19 x 13 x 5mm
- Low aging



NOTE: Dimensions in mm

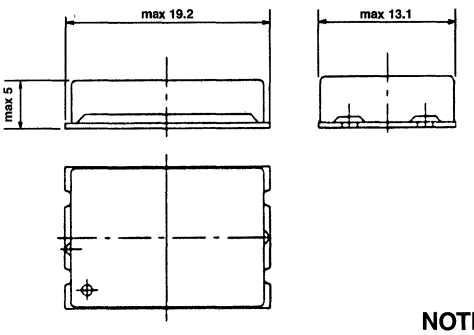
TO-500/600 SERIES SPECIFICATIONS

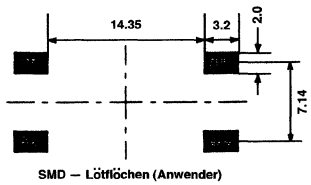
Type :	TO-501	TO-502	TO-601	TO-602
Frequency range:	40 to 250 MHz		12.80 to 38.88 MHz	
Nominal frequency tolerance, @ T=25±3°C:	<±1 ppm		<±1ppm	
after reflow soldering U_C=2.5V:			<±2ppm	
Frequency stability in the temp. range -20°C to +70°C:	<±1.0ppm	<±2.0ppm	<±1ppm	<±2ppm
Frequency stability				
vs. supply voltage changes UB ± 5%:	<±0.1 ppm		<±0.3 ppm	
vs. load changes ± 5%:	<±0.5 ppm		<±0.2 ppm	
Aging @ 25°C ± 3%:	±1 ppm/year		±2 ppm/year ±10 ppm in 15 years	
Frequency correction:	±5 ppm by ext. trimmer 20k Ohm		≥±10 ppm by ext. volt. 0.5 to 4.5 V	
Supply voltage U_B:	5 Vdc±5%		5 Vdc±5%	
Current consumption:	≤ 30 mA		≤ 15 mA ≤ 25 mA	
Output voltage:	Sinewave 0 dBm		HCMOS	
load:	50 Ohm		1k Ohm / 15pF	
duty cycle:			50±10%	
rise time, fall time:			10 ns	
Temperature ranges				
Operating:	-20°C to + 70°C		-20°C to + 70°C	
Operable:	-25°C to + 75°C		-25°C to + 75°C	
Storage:	-40°C to + 85°C		-40°C to 105°C	

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY
166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

TO-700

Case style: BF-169





Pin configuration
1. Control voltage Uc
4. Ground, case
5. RF-output
8. Supply voltage

NOTE: Dimensions in mm

TO-700 SERIES SPECIFICATIONS

Type :	TO-701	TO-702	TO-703	TO-704
Frequency range: U_C=2.5 V, T=25°C	10 ... 52 MHz			
Nominal frequency tolerance:	<±1 ppm			
Frequency stability				
in the op. temp. range:	<±1.0 ppm	<±1.5 ppm	<±0.5 ppm	<±1.0 ppm
vs. supply voltage± 10%:	<±0.2 ppm	<±0.2 ppm	<±0.2 ppm	<±0.2 ppm
vs. load changes ± 10%:	<±0.1 ppm	<±0.1 ppm	<±0.1 ppm	<±0.1 ppm
Aging @ 25°C ± 3%:	<±2.0 ppm / first year <±1.0 ppm / year			
Frequency control range:	± 10 ... 15 ppm			
Supply voltage U_C:	5.0 V±10%			
Control input impedance:	>5.0 kOhm			
Transfer function / Linearity:	negative / 10%			
Supply voltage U_B:	5.0 V±10%			
Current consumption:	≤ 3 mA			
Output voltage:	Sinewave ≥ $1V_{PP}$			
load:	10k Ohm // 10pF (optional 1kOhm)			
Phase noise (for 10MHz):				
100 Hz:	-110 dBc / Hz			
1 kHz:	-130 dBc / Hz			
10 kHz:	-135 dBc / Hz			
Temperature ranges				
Operating:	-40°C to +85°C		-20°C to +70°C	
Operable:	-45°C to +90°C		-25°C to +85°C	
Storage:	-50°C to +105°C		-50°C to 105°C	

166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

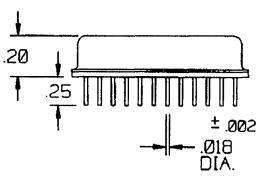
VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY

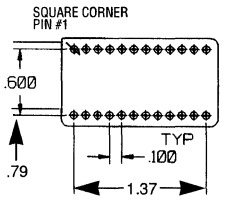
Space Qualified TCXO's

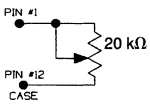
CO-566 SERIES

Features

- Hybridized 24 pin double DIP
- Small size: 0.8" x 1.4" x 0.2"
- Class S screened for space applications







Pin	Function
1	Ext. Tuning Input
2-11	N/C
12	Common, 0 Volt/Case
13	RF Output
14-23	N/C
24	B+

SPECIFICATIONS

CO-566 SERIES

24 pin double-DIP resistance welded package

FREQUENCY	HCMOS/TTL/Sine 5 MHz to 50MHz
STABILITY Temperature (Temp. Range **A**) +15°C to +35°C:	**CO-566A37:** $\pm 3 \times 10^{-7}$
(Temp. Range **B**) 0°C to +50°C:	**CO-566B57:** $\pm 5 \times 10^{-7}$
(Temp. Range **C**) 0°C to +70°C:	**CO-566C57:** $\pm 5 \times 10^{-7}$
(Temp. Range **D**) –20°C to +70°C:	**CO-566D36:** $\pm 3 \times 10^{-6}$ **CO-566D16:** $\pm 1 \times 10^{-6}$
(Temp. Range **E**) –40°C to +75°C:	**CO-566E56:** $\pm 5 \times 10^{-6}$ **CO-566E26:** $\pm 2 \times 10^{-6}$
(Temp. Range **F**) –55°C to +85°C:	**CO-566F56:** $\pm 5 \times 10^{-6}$ **CO-566F26:** $\pm 2 \times 10^{-6}$
(Temp. Range **G**) –55°C to +105°C:	**CO-566G56:** $\pm 5 \times 10^{-6}$
(Temp. Range **H**) –55°C to +125°C:	**CO-566H15:** $\pm 1 \times 10^{-5}$ "B" or "S" Screening available at reduced stability. Better aging and stability available with increased height. Contact factory with your requirements.
Aging Rate	2×10^{-6} per year, 1×10^{-6} per year option
Short Term	1×10^{-9} per second under constant conditions (Allan Variance)
Frequency vs Supply	2×10^{-8} per percent in supply for ≥10 Vdc 1×10^{-7} per percent in supply for <10 Vdc
OUTPUT / SUPPLY **Standard**	Output level / Supply ±5% **HCMOS/TTL 5 Vdc, <25 mA **Drives 3 TTL loads, 10 LSTTL loads or HCMOS (output is from HCMOS gate)
Optional	Sine, +7 dBm/50Ω } 15 Vdc, <25 mA
FREQUENCY ADJUSTMENT	Tuning via external potentiometer with range sufficient to compensate for 10 years aging.

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY
166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

Oven Controlled Crystal Oscillators (OCXOs)

For the most stringent frequency stability requirements, the temperature of the crystal oscillator may be controlled by use of an oven that surrounds the resonator and key oscillator elements such as the tuning diode. This approach also reduces the tuning range requirements on the resonator so that ultra-high Q overtone resonators can be used. In addition to superior temperature stability, the use of these resonators greatly improves close-in phase noise, short-term stability and aging in comparison to other types of crystal oscillators.

VI produces the broadest range of OCXOs in the industry. Models range from low cost moderate stability units to double oven references with performance levels approaching and even exceeding Rubidium atomic oscillator performance in some regards. VHF models generally use low frequency crystals for the best stability with subsequent frequency multiplication, although certain low noise models operate directly at the output frequency.

Many other options and special features are available, including improved temperature and aging stability, lower noise, lower power and faster warm-up time. Please contact factory for additional information.

OCXOs – Product Offering

OCXOs	Frequency Range	Output Logic	Package	Features
CO-711/718S	1 MHz to 25 MHz	TTL/HCMOS/SINE	2" X 2" X 1"	Low Cost
CO-718S	1 MHz to 25 MHz	TTL/HCMOS/SINE	2" X 2" X 1"	Low Cost
CO-705S	1 MHz to 25 MHz	TTL/HCMOS/SINE	1.5" X 1.5" X 2"	Premium Performance
CO-706/707S	5 MHz to 75 MHz	TTL/HCMOS/SINE	2" X 2" X 2.75" or 3.25"	Excellent Temperature Stability
CO-724/724S	25 MHz to 400 MHz	ECL/TTL/HCMOS/SINE	2" X 2" X 1" or 1.25"	Low Cost
CO-725/725S	25 MHz to 200 MHz	ECL/TTL/HCMOS/SINE	2" X 2" X 1.25"	High Stability
CO-734/737/738S	32 KHz to 50 MHz	TTL/HCMOS/SINE	1.5" X 1.25" X 0.86"	High Stability
CO-734C/737C/738CS	5 MHz to 50 MHz	TTL/HCMOS/SINE	1.4" X 1.06" X 0.76"	CO-08 Package
CO-750	5 MHz to 25 MHz	TTL/HCMOS/SINE	1.5" X 1.5" X 0.5"	Low Profile
CO-760	5 MHz to 25 MHz	TTL/HCMOS/SINE	1" x 1" x 0.5"	Low Profile
CO-760P/760PS	5 MHz to 25 MHz	TTL/HCMOS/SINE	0.81" x 0.81" x 0.531"	Surface Mount
CO-805	10 MHz standard	TTL/HCMOS/SINE	1.33" x 1.33" x 1.27"	Vacuum Insulated
CO-770	10 KHz to 24 MHz	HCMOS	4 Pin DIP	Small Size
CO-330	5 MHz to 10 MHz Standard	Sinewave	2" x 2" x 1.5"	Double Oven
Series 2000	2 MHz to 160 MHz	HCMOS/Sinewave	67mm x 60mm x 40mm	High stability
Series 2500	2 MHz to 160 MHz	HCMOS/Sinewave	50mm x 50mm x 40mm	Low profile
Series 2600	2 MHz to 160 MHz	HCMOS/Sinewave	51mm x 41mm x 25mm	Compact design
Series 3000	5 MHz to 16.384 MHz	HCMOS	36mm x 27mm x 19mm	CO-08 Package
Series 4000	4 MHz to 30 MHz	HCMOS	25.4mm x 27mm x 19mm	Small size
Series 5000	4 MHz to 20 MHz	HCMOS	25.7mm x 25.7mm x 13.2mm	Very small size
Series 6000	10 MHz to 25 MHz	HCMOS	25.4mm x 22mm x 10.3mm	Surface mount device (SMD)

166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY

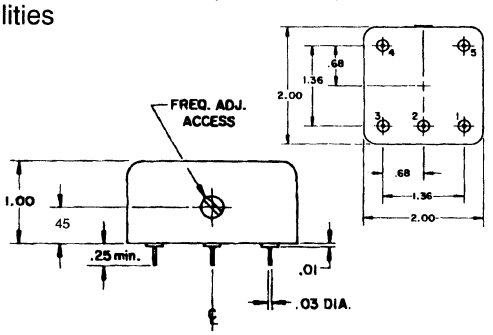
OCXOs Basic Series - 1 MHz to 25 MHz

Features

- Frequencies to 25 MHz
- Superior Aging Characteristics
- Excellent Temperature Stabilities
- AT and SC/IT Cut Crystals
- Low Phase Noise

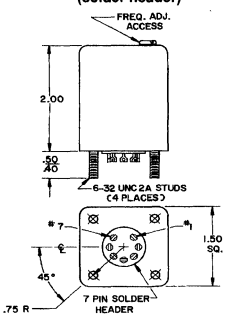
CO-711/CO-718S Series

Standard
(pc board mount)

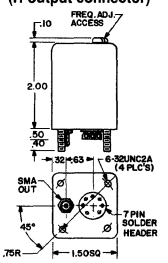


CO-705S Series

Standard
(solder header)



Option W
(rf output connector)



NOTE: Dimensions in inches

SPECIFICATIONS

	CO-711 SERIES *(AT Cut Crystal)*	CO-718S SERIES *(SC/IT Cut Crystal)*	Premium Performance CO-705S SERIES *(SC/IT Cut Crystal)*	Ultra Stable CO-706S/707S SERIES *(SC/IT Cut Crystal)*
Frequency	1-25 MHz with 5 MHz and 10MHz standard (available 32 kHz - 25 MHz with logic output)			5 MHz (available to 75 MHz)
Temperature Stability (Temp. Range **A**) +15°C to +35°C	**CO-71** ☐ **A38:** $\pm 3 \times 10^{-8}$ **CO-71** ☐ **A29:** $\pm 2 \times 10^{-9}$	**CO-718SA28:** $\pm 2 \times 10^{-8}$ **CO-718SA19:** $\pm 1 \times 10^{-9}$	**CO-705SA39:** $\pm 3 \times 10^{-9}$ **CO-705SA510:** $\pm 5 \times 10^{-10}$	**CO-70** ☐ **A19-V:** $\pm 1 \times 10^{-9}$ ***CO-70** ☐ **A310-V:** $\pm 3 \times 10^{-10}$
(Temp. Range **B**) 0°C to +50°C	**CO-71** ☐ **B58:** $\pm 5 \times 10^{-8}$ **CO-71** ☐ **B59:** $\pm 5 \times 10^{-9}$	**CO-718SB38:** $\pm 3 \times 10^{-8}$ **CO-718SB29:** $\pm 2 \times 10^{-9}$	**CO-705SB59:** $\pm 5 \times 10^{-9}$ **CO-705SB19:** $\pm 1 \times 10^{-9}$	**CO-70** ☐ **B29-V:** $\pm 2 \times 10^{-9}$ ***CO-70** ☐ **B510-V:** $\pm 5 \times 10^{-10}$
(Temp. Range **D**) –20°C to +70°C	**CO-71** ☐ **D17:** $\pm 1 \times 10^{-7}$ **CO-71** ☐ **D28:** $\pm 2 \times 10^{-8}$	**CO-718SD58:** $\pm 5 \times 10^{-8}$ **CO-718SD59:** $\pm 5 \times 10^{-9}$	**CO-705SD18:** $\pm 1 \times 10^{-8}$ **CO-705SD39:** $\pm 3 \times 10^{-9}$	**CO-70** ☐ **D59-V:** $\pm 5 \times 10^{-9}$ ***CO-70** ☐ **D29-V:** $\pm 2 \times 10^{-9}$
(Temp. Range **G**) –55°C to +75°C	**CO-71** ☐ **G27:** $\pm 2 \times 10^{-7}$ CO-71 ☐ G38: $\pm 3 \times 10^{-8}$	**CO-718SG17:** $\pm 1 \times 10^{-7}$ CO-718SG28:	**CO-705SG28:** $\pm 2 \times 10^{-8}$ **CO-705SG59:** $\pm 5 \times 10^{-9}$	**CO-70** ☐ **G28-V:** $\pm 2 \times 10^{-8}$ ***CO-70** ☐ **G59-V:** $\pm 5 \times 10^{-9}$
	*N/A with "L2" or"N" options	CO-718SF27:	***CO-705SF38:** $\pm 3 \times 10^{-8}$ ***CO-705SF18:** $\pm 1 \times 10^{-8}$	***CO-70** ☐ **F38-V:** $\pm 3 \times 10^{-7}$ ***CO-70** ☐ **F18-V:** $\pm 1 \times 10^{-8}$
Aging	**4:** 1×10^{-8}/day (2×10^{-6}/year) **7:** 1×10^{-9}/day (3×10^{-7}/year)	5×10^{-10}/day (1×10^{-7}/year) 5×10^{-9}/year optional at some frequencies 2×10^{-8}/year optional at 5 MHz	5×10^{-10}/day (1×10^{-7}/year) 5×10^{-9}/year optional at some frequencies 2×10^{-8}/year optional at 5 MHz	**6:** 3×10^{-10}/day (4×10^{-8}/year) ***7:** 1×10^{-10}/day (2×10^{-8}/year) ** 1×10^{-10}/day models in 4-6.25 MHz range and at multiples and some binary divisions of 4-6.25 MHz
Output Level	Standard: >0.5 Vrms/50Ω (+ 7 dBm): >1 Vrms/ 50Ω (+ 13 dBm) with L2 option HCMOS/TTL optional		>1 Vrms/ 50Ω (+ 13 dBm) HCMOS/TTL optional	0.5 Vrms/50Ω, 1 Vrms opt. HCMOS/TTL optional
Supply Voltage	+15 Vdc standard (12-24 Vdc optional); + 15 Vdc and +5 Vdc for HCMOS/TTL: Option **"N"**: +5 Vdc supply with HCMOS/TTL output available (results in some degradation in stability)			
Input Power	<4 Watts at turn-on –20/+70°C (lower power available); 2 Watts stabilized at 25°C		<5 Watts at turn-on	<6 Watts at turn-on
Frequency Adjustment	Mechanical adjustment settable to 1×10^{-8}. Option **"V"**: Voltage tuning			Both mechanical and electrical
Size	2" x 2" x 1" (0.75" also available), pins for pcb mounting		1.5" x 1.5" x 2", solder header and studs: SMA output optional	≤ 12.5 MHz: 2" x 2" x 2.75" >12.5 MHz: 2" x 2" x 3.25 solder header, studs
Phase Noise (typical) (with sinewave output 4-12 MHz)	Offset Standard Option L2* 10 Hz –105 dBc/Hz –120 dBc/Hz 100 Hz –135 dBc/Hz –145 dBc/Hz 1 kHz –145 dBc/Hz –160 dBc/Hz 10 kHz –148 dBc/Hz –165 dBc/Hz 50 kHz –150 dBc/Hz –165 dBc/Hz *10 MHz lower frequency limit. Contact Factory for lower frequencies.	Offset Standard Option L2* 10 Hz –115 dBc/Hz –130 dBc/Hz 100 Hz –140 dBc/Hz –155 dBc/Hz 1 kHz –145 dBc/Hz –163 dBc/Hz 10 kHz –148 dBc/Hz –166 dBc/Hz 50 kHz –150 dBc/Hz –168 dBc/Hz *4 MHz lower limit	Offset Standard Option L2 10 Hz –115 dBc/Hz –130 dBc/Hz 100 Hz –140 dBc/Hz –155 dBc/Hz 1 kHz –145 dBc/Hz –163 dBc/Hz 10 kHz –148 dBc/Hz –166 dBc/Hz 50 kHz –150 dBc/Hz –168 dBc/Hz	Offset Standard Option L2* 10 Hz –115 dBc/Hz –135 dBc/Hz 100 Hz –140 dBc/Hz –155 dBc/Hz 1 kHz –145 dBc/Hz –165 dBc/Hz 10 kHz –148 dBc/Hz –168 dBc/Hz 50 kHz –150 dBc/Hz –168 dBc/Hz * Output is >10 dBm. Specify RF connector

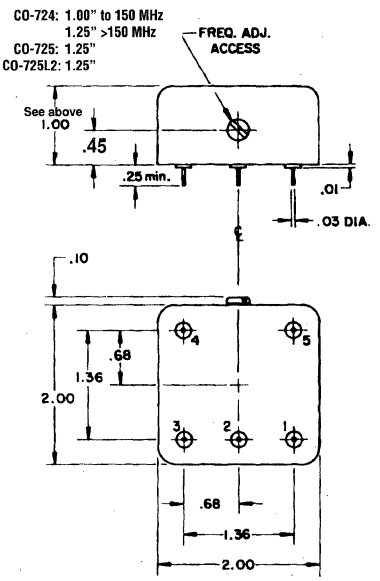
VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY
166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

Size Reduced PC Board Mount VHF OCXOs

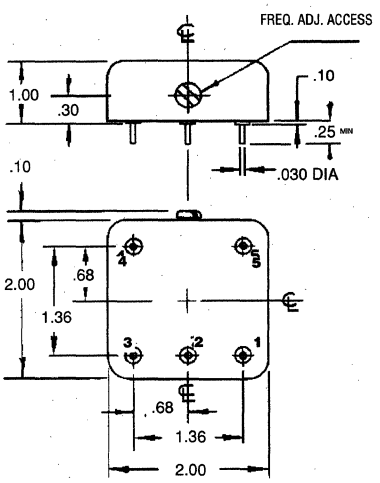
CO-724/724S Series
CO-725/725S Series

Features
- Frequencies from 25 MHz to 400 MHz
- Size Reduced, PC Board Mount Design
- Low Phase Noise
- Superior Aging Characteristics
- AT and SC/IT Cut Crystals

CO-724, CO-725, CO-725L2 Series



CO-724L2 (L2 ONLY) (to 200 MHz)



NOTE: Dimensions in inches

SPECIFICATIONS

	Lowest Noise		*Highest Stability*	
	CO-724 SERIES *(AT Cut Crystal)*	**CO-724S SERIES** *(SC/IT Cut Crystal)*	**CO-725 SERIES** *(AT Cut Crystal)*	**CO-725S SERIES** *(SC/IT Cut Crystal)*
Frequency	25-400 MHz range		25-200 MHz range	
Temperature Stability (Temp. Range **A**) +15°C to +35°	**CO-724A38:** ±3 x 10^{-8} ***CO-724A18:** ±1 x 10^{-8}	**CO-724SA18:** ±1 x 10^{-8} ***CO-724SA39:** ±3 x 10^{-9}	**CO-725A38:** ±3 x 10^{-8} **CO-725A29:** ±2 x 10^{-9}	**CO-725SA18:** ±1 x 10^{-8} **CO-725SA19:** ±1 x 10^{-9}
(Temp. Range **B**) 0°C to +50°C	**CO-724B58:** ±5 x 10^{-8} ***CO-724B28:** ±2 x 10^{-8}	**CO-724SB28:** ±2 x 10^{-8} ***CO-724SB59:** ±5 x 10^{-9}	**CO-725B58:** ±5 x 10^{-8} **CO-725B59:** ±5 x 10^{-9}	**CO-725SB28:** ±2 x 10^{-8} **CO-725SB29:** ±2 x 10^{-9}
(Temp. Range **D**) –20°C to +70°C	**CO-724D17:** ±1 x 10^{-7} ***CO-724D58:** ±5 x 10^{-8}	**CO-724SD58:** ±5 x 10^{-8} ***CO-724SD18:** ±1 x 10^{-8}	**CO-725D17:** ±1 x 10^{-7} **CO-725D28:** ±2 x 10^{-8}	**CO-725SD58:** ±5 x 10^{-8} **CO-725SD59:** ±5 x 10^{-9}
(Temp. Range **G**) –55°C to +75°C	**CO-724G37:** ±3 x 10^{-7} ***CO-724G17:** ±1 x 10^{-7}	**CO-724SG17:** ±1 x 10^{-7} ***CO-724SG38:** ±3 x 10^{-8}	**CO-725G37:** ±3 x 10^{-7} ***CO-725G38:** ±3 x 10^{-8}	**CO-725SG17:** ±1 x 10^{-7} ***CO-725SG28:** ±2 x 10^{-8}
(Temp. Range **F**) –55°C to +85°C	*Not available with L2 option	**CO-724SF27:** ±2 x 10^{-7} ***CO-724SF58:** ±5 x 10^{-8}	*Not available with L2 option	***CO-725SF27:** ±2 x 10^{-7} ***CO-725SF38:** ±3 x 10^{-8}
Aging	Standard: 1 x 10^{-8}/day, (2 x 10^{-6}/year) Optional: 5 x 10^{-9}/day, (1 x 10^{-6}/year)	2 x 10^{-9}/day(5 x 10^{-7}/year)	1 x 10^{-9}/day, (3 x 10^{-7}/year)	**5 x 10^{-10}/day (1 x 10^{-7}/year) **Optional 1 x 10^{-10}/day to 150 MHz
Output Level	**Standard:** >0.5 Vrms/50Ω (+7 dBm); +10 dBm optional Optional: HCMOS, TTL (to 70 MHz), ECL (to 400 MHz)		**Standard:** >0.5 Vrms/50Ω (+7 dBm) Optional: >1 Vrms/50Ω (+13 dBm) to 125 MHz, ECL (to 200MHz)	
Supply Voltage (±5%)	+15 Vdc standard. Operation from any specified voltage in 12-24 Vdc range optional.			
Input Power	<4.5 Watts at turn-on (–20°C to +70°C); <2.5 Watts stabilized at 25°C. Higher power required beyond -20°C to +70°C, lower power for 0°C to +50°C			
Frequency Adjustment	Multi-turn screwdriver adjust. settable to <1 x 10^{-8} Electronic tuning option "**V**".			
Size	≤ 150 MHz: 2" x 2" x 1". > 150 MHz: 2" x 2" x 1.25"		2" x 2" x 1.25" (51 x 51 x 32 mm)	
Base	Pins for pcb mounting. Option "**W**" for SMA connector and terminals on side, studs on base.			
Phase noise (typical) sine output in 75-125 MHz range	Offset / Standard / Option (**L2**) ** 100 Hz / –115 dBc/Hz / –130 dBc/Hz 1 kHz / –130 dBc/Hz / –145 dBc/Hz 50 kHz / –145 dBc/Hz / –157 dBc/Hz **available to 200 MHz		Offset / Standard / Option (**L2**) 100 Hz / –105 dBc/Hz / –120 dBc/Hz 1 kHz / –115 dBc/Hz / –135 dBc/Hz 50 kHz / –125 dBc/Hz / –140 dBc/Hz	

Reduced height available (Contact Factory)

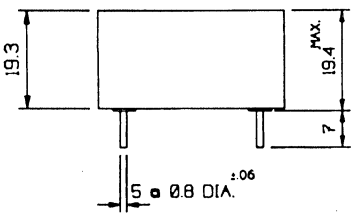
166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

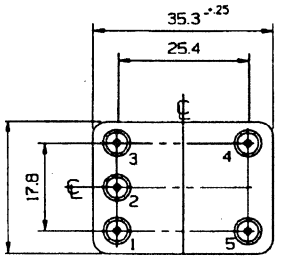
VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY

Miniature PC Board Mount OCXOs (32KHz-50MHz)

European CO-08; CO-734C/737C/738CS Series

Features
- Frequencies from 5 MHz to 50 MHz
- European C0-08 Package
- Ultra-High Temperature Stability
- Superior Aging Characteristics
- Very Fast Warm-up





NOTE: Dimensions in mm

SPECIFICATIONS

	CO-734C, CO-737C SERIES (AT Cut Crystal)	CO-738CS SERIES (SC/IT Cut Crystal)
FREQUENCY	5 MHz and 10 MHz standard. Other frequencies available in 5 MHz to 50 MHz range with sine output and in 5 MHz to 17 MHz range with logic output. See Series CO-724 for 50-400 MHz and CO-725 for 50-200 MHz.	
STABILITY Temperature		
(Temp Range **A**) +15°C to +35°C	**CO-73□CA18:** $\pm 1 \times 10^{-8}$ **CO-73□CA59:** $\pm 5 \times 10^{-9}$	**CO-738CSA510:** $\pm 5 \times 10^{-10}$ **CO-738CSA310:** $\pm 3 \times 10^{-10}$
(Temp Range **B**) 0°C to +50°C	**CO-73□CB38:** $\pm 3 \times 10^{-8}$ **CO-73□CB18:** $\pm 1 \times 10^{-8}$	**CO-738CSB19:** $\pm 1 \times 10^{-9}$ **CO-738CSB510:** $\pm 5 \times 10^{-10}$
(Temp Range **D**) −20°C to +70°C	**CO-73□CD58:** $\pm 5 \times 10^{-8}$ **CO-73□CD28:** $\pm 2 \times 10^{-8}$	**CO-738CSD59:** $\pm 5 \times 10^{-9}$ **CO-738CSD29:** $\pm 2 \times 10^{-9}$
(Temp Range **E**) −40°C to +75°C	**CO-73□CE17:** $\pm 1 \times 10^{-7}$ **CO-73□CE58:** $\pm 5 \times 10^{-8}$	**CO-738CSE18:** $\pm 1 \times 10^{-9}$ **CO-738CSE59:** $\pm 5 \times 10^{-9}$
Aging Rate	**4:** 1×10^{-8}/day (2×10^{-6}/year) **7:** 1×10^{-9}/day (3×10^{-7}/year) (5×10^{-10}/day available at some frequencies)	5×10^{-10}/day (1×10^{-7}/year) 5 to 32 MHz only 5×10^{-8}/year optional at some frequencies 2×10^{-8}/year at 5 MHz optional
Supply	2×10^{-9} per percent	5×10^{-10} per percent
Short Term (Allan Variance)	5×10^{-11} per second	5×10^{-12} per second
Warm-up (Restabilization) (frequency relative to that two hours after turn-on following 24 hours off time at +25°C with max ambient of ≤+70°C)	1×10^{-6}: 6 minutes 1×10^{-7}: 8 minutes 3×10^{-8}: 10 minutes 1×10^{-8}: 30 minutes	1×10^{-6}: 2 minutes 1×10^{-7}: 2.5 minutes 3×10^{-8}: 3 minutes 1×10^{-8}: 4 minutes
OUTPUT / SUPPLY VOLTAGE (±5%)	Output / Supply Standard: >0.5 Vrms into 50Ω(+7dBm) / +15 Vdc* Option "**R**": >1.0 Vrms into 50Ω(+13dBm) / +15 Vdc* Option "**J**": **HCMOS/TTL / * +15 Vdc and +5 Vdc Option "N": **HCMOS/TTL / +5 Vdc *Any voltage in 12-24 Vdc range optional; supply below 15 Vdc results in reduced sinewave output level. ** Drives 3 TTL loads. 10 LSTTL loads or HCMOS; output is from HCMOS gate.	
Harmonics (Sinewave Output)	20 dB below desired output. If internal multiplication is used, generally above 12-16 MHz, subharmonics are also -20 dBc. Harmonic and subharmonic attenuation can be improved on special order.	
Input Power	6 watts at turn-on; less than 2.5 watts stabilized at +25°C. Higher power and longer warm-up required for temperature beyond −20°C to +70°C; lower power needed for 0°C to +50°C.	
PHASE NOISE (typical) (Sinewave Output 5-12 MHz)	Offset / Phase Noise 10 Hz -100 dBc/ Hz 100 Hz -135 dBc/ Hz 1 kHz -145 dBc/ Hz 10 kHz -150 dBc/ Hz 50 kHz -150 dBc/ Hz	Offset / Phase Noise 10 Hz -120 dBc/ Hz 100 Hz -140 dBc/ Hz 1 kHz -145 dBc/ Hz 10 kHz -150 dBc/ Hz 50 kHz -150 dBc/ Hz
FREQUENCY ADJUST Tuning via ext potentiometer	10×10^{-6} typical range for 0 to 6V control	2×10^{-6} typical range for 0 to 6V control

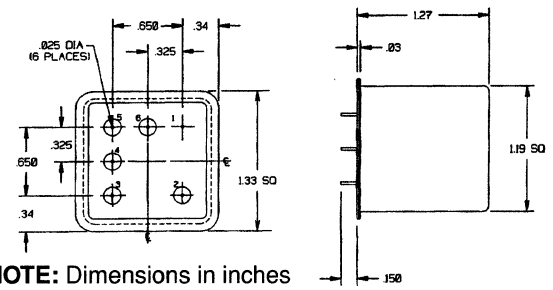
VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY
166 Glover Avenue • Norwalk, CT 06856
Toll Free **1-88-VECTRON1**
Web: www.vectron.com

Evacuated Miniature Crystal Oscillators (EMXO™)

CO-805 Series

Features
- 10 MHz Standard
- Low Power Consumption
- Small Size: 1.33" x 1.33" x 1.27"
- Ruggedized Construction
- High Temperature Stability
- Superior Aging Characteristics
- Fast warm-up

By utilizing a vacuum sealed enclosure with unique oscillator packaging, the Vectron EMXO represents the highest performance available for low power and fast warm-up applications. Please contact factory for other available options.



NOTE: Dimensions in inches

SPECIFICATIONS

Output Frequency	10.00 MHz (other frequencies optional)
Output Level	+7.0 dBm sine minimum into 50Ω **Option J**: HCMOS/TTL output (additional +5 Vdc required)
Voltage Control	0 to +5 Vdc
Voltage Control Range	±5 x 10^{-7} positive transfer function
Allan Variance	5 x 10^{-12} 0.1 sec to 10 sec
Aging	5 x 10^{-10}/day; 5 x 10^{-8}/year
SSB Phase Noise/Hz 100 Hz 1 kHz 10 kHz	 SINE TTL –140 dBc –140 dBc –150 dBc –145 dBc –150 dBc –145 dBc
Acceleration Sensitivity (worst case axis)	1.5 x 10^{-9}/G
Harmonic Distortion	–30 dBc
Input Voltage Range **Oscillator:** **Oven:**	 +12 Vdc ±5% (other supply voltages available) +11 Vdc to ±15 Vdc
Power, Steady State (max.) **–55°C:** **0°C:** **+25°C:**	 1 Watt 0.75 Watt 0.60 Watt
Warm-up Power	6 Watts maximum
Frequency Retrace @ +25°C (24 hours off)	±1 x 10^{-8} after one hour on
Warm-up Time from –55°C	2 minutes to 1 x 10^{-7} reference to 30 minutes 4 minutes to 1 x 10^{-8} reference to 30 minutes
Temperature Stability (Temperature Range "**B**") (Temperature Range "**C**") (Temperature Range "**G**") (Temperature Range "**F**")	 0°C to +50°C: **B58** = ±5 x 10^{-8} **B29** = ±2 x 10^{-9} 0°C to +70°C: **C59** = ±5 x 10^{-9} –55°C to +75°C: **G18** = ±1 x 10^{-8} –55°C to +85°C: **F18** = ±1 x 10^{-8}
Size	1.33" x 1.33" x 1.27" (1" ht available on special order)

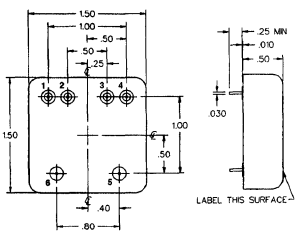
166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY

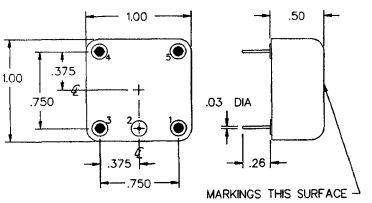
Low Profile PC Board Mount OCXOs

Features
- Frequencies from 5 MHz to 25 MHz
- Low Profile Design
- High Temperature Stability
- Superior Aging Characteristics

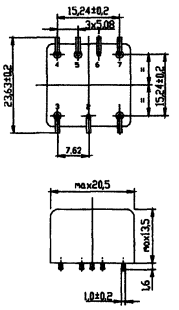
CO-750 SERIES



CO-760 SERIES



CO-760PS SERIES



SPECIFICATIONS

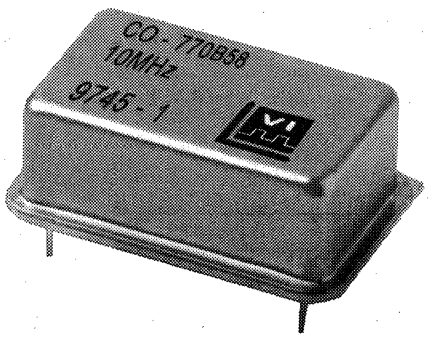
		CO-750 SERIES 1½" x 1½" x ½"		CO-760 SERIES 1" x 1" x ½"		CO-760PS SERIES Surface Mount OCXO	
FREQUENCY		5 MHz - 25 MHz *AT cut Crystal*	5 MHz - 25 MHz *SC/IT cut Crystal*	5 MHz - 25 MHz *AT cut Crystal*	5 MHz - 25 MHz *SC/IT cut Crystal*	10 MHz - 25 MHz *AT cut Crystal*	10 MHz - 25 MHz *SC/IT cut Crystal*
STABILITY (Temp Range **A**)	**Temperature** +15°C to +35°C	**A58**: ±5 x 10^{-8} **A18**: ±1 x 10^{-8}	**A28**: ±2 x 10^{-8} **A59**: ±5 x 10^{-9}	**A17**: ±1 x 10^{-7}	**A28**: ±2 x 10^{-8}	N/A	N/A
(Temp Range **B**)	0°C to +50°C	**B17**: ±1 x 10^{-7} **B28**: ±2 x 10^{-8}	**B58**: ±5 x 10^{-8} **B18**: ±1 x 10^{-8}	**B58**: ±5 x 10^{-8}	**B28**: ±2 x 10^{-8}	**B58**: ±5 x 10^{-8}	**B28**: ±2 x 10^{-8}
(Temp Range **D**)	−20°C to +70°C	**D27**: ±2 x 10^{-7} **D58**: ±5 x 10^{-8}	**D17**: ±1 x 10^{-7} **D28**: ±2 x 10^{-8}	**D17**: ±1 x 10^{-7} (±2.5 x 10^{-7} 0/70°C avail. on special order)	**D48**: ±4 x 10^{-8}	**D17**: ±1 x 10^{-7}	**D48**: ±4 x 10^{-8}
(Temp Range **E**)	−40°C to +75°C	**E57**: ±5 x 10^{-7} **E17**: ±1 x 10^{-7}	**E27**: ±2 x 10^{-7} **E58**: ±5 x 10^{-8}	N/A	**E88**: ±8 x 10^{-8}	N/A	N/A
	Aging Rate	**CO-754**: 1 x 10^{-9}/day 2 x 10^{-6}/year **CO-757**: 1 x 10^{-9}/day 3 x 10^{-7}/year	**CO-758S**: 5 x 10^{-10}/day 1 x 10^{-7}/year (5 x 10^{-9}/year optional)	**CO-764**: 1 x 10^{-9}/day (2 x 10^{-6}/year) **CO-766**: 3 x 10^{-9}/day (1 x 10^{-6}/year)	**CO-767S**: 1 x 10^{-9}/day 3 x 10^{-7}/year **CO-768S**: 5 x 10^{-10}/day 1 x 10^{-7}/year	1 x 10^{-8}/day, 2 x 10^{-6}/day 3 x 10^{-9}/day, 1 x 10^{-6}/day Option 10 to 15 MHz	1 x 10^{-9}/day, 3 x 10^{-7}/day 5 x 10^{-10}/day, 1 x 10^{-7}/day
	vs Supply	5 x 10^{-9} per percent	2 x 10^{-9} per percent	5 x 10^{-9} per percent	2 x 10^{-9} per percent	5 x 10^{-9} per percent	2 x 10^{-9} per percent
Short Term (Allan Variance)		5 x 10^{-11}/second	1 x 10^{-11}/second	5 x 10^{-11}/second	1 x 10^{-11}/second	1 x 10^{-10}/second	5 x 10^{-11}/second
OUTPUT/SUPPLY VOLTAGE (±5%)		**Output** / **Supply** Std: >0.5Vrms/50Ω (+7 dBm) *+15Vdc **R**: >1.0Vrms/50Ω (+13 dBm) *+15Vdc **J**: **HCMOS/TTL *+15Vdc & +5Vdc **N**: HCMOS/TTL +5 Vdc *Any voltage in 12-24 Vdc range optional **Drives 3 TTL loads, 10LS TTL loads or HCMOS (output is from HCMOS gate)		**Output** / **Supply** **Std: HCMOS/TT +5Vdc Option:>0.5 Vms/50Ω (+7 dBm) +15Vdc **Drives 3 TTL loads (10 LSTTL loads) HCMOS (output is from HCMOS gate)		**Output** / **Supply** HCMOS/TTL** +5Vdc ±5% SINE (+7 dBm) into 50Ω (option) +12Vdc ±5% or +5Vdc ±5% **Drives 3 TTL loads 10 LS TTL loads or HCMOS (output is from HCMOS gate)	
	Harmonics (Sinewave Output)	>20 dB below desired output. If internal multiplication is used, sub-harmonics are also -20 dBc.		−30 dB below desired output. If internal multiplication is used, sub-harmonics are also −30 dBc.		−30 dB below desired output. If internal multiplication is used, sub-harmonics are also −30 dBc.	
	Input Power	5 watts at turn-on; <2.5 watts stabilized @ 25°C Higher power required for -20°C to +70°C and lower power needed for 0°C to 50°C.		3 watts at turn-on; <1 watt stabilized at 25°C		3 watts at turn-on; <1 watt stabilized at 25°C	
PHASE NOISE (typical) (Sinewave Output 5-12 MHz)	**Offset**	**Phase Noise**	**Phase Noise**	**Phase Noise**		**Phase Noise**	
	10 Hz	-105 dBc/Hz	-115 dBc/Hz	-115 dBc/Hz		-110 dBc/Hz	
	100 Hz	-135 dBc/Hz	-140 dBc/Hz	-140 dBc/Hz		-130 dBc/Hz	
	1 kHz	-145 dBc/Hz	-145 dBc/Hz	-145 dBc/Hz		-140 dBc/Hz	
	10 kHz	-148 dBc/Hz	-148 dBc/Hz	-150 dBc/Hz		-140 dBc/Hz	
	50 kHz	-150 dBc/Hz	-150 dBc/Hz	-150 dBc/Hz		-140 dBc/Hz	
FREQUENCY ADJUST Via external potentiometer Mechanical Tuning		10 x 10^{-6} typical range Optional	2 x 10^{-6} typical range Optional	10 x 10^{-6} typical range N/A	2 x 10^{-6} typical range N/A	5 x 10^{-6} typical range N/A	2 x 10^{-6} typical range N/A
CONFIGURATION/ MECHANICAL PACKAGE		1½" x 1½" x ½", pins for PCB mounting (38 x 38 x 12.7 mm)		1" x 1" x ½", pins for PCB mounting (25.4 x 25.4 x 12.7 mm)		0.8" x 0.8" x 0.53" for surface mount (20.5 x 20.5 x 13.5 mm)	

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY
166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

Oven Controlled Crystal Oscillator

4 Pin DIP CO-770 Series

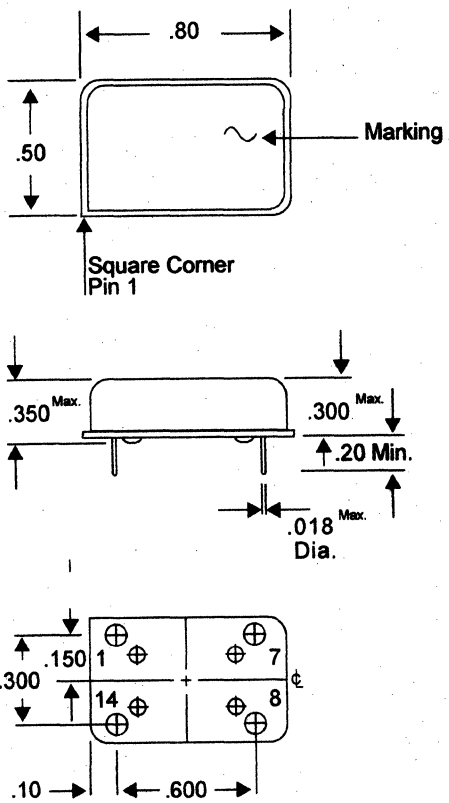
Features
- Extremely small dimensions
- Very fast warm-up
- Low power consumption
- Shock resistance: 2000g/0.3 ms (1/2 Sine)
- Vibration Resistance: 10g/10 to 2000 Hz
- Acceleration Sensitivity: 3.5 x 10^{-9}/G
- Standard 10 MHz version available from stock



CO-770 Series

SPECIFICATIONS

	CO-770 SERIES
Frequency	10 MHz standard. Advertised specifications available from 10 kHz to 24 MHz. Available to 80 MHz on secial order.
Temperature Stability	0°C to +50°C **B58**: ±5 x 10^{-8} -20°C to +70°C **D17**: ±1 x 10^{-7} -40°C to +85°C **H27**: ±2 x 10^{-7}
Aging	< 3 x 10^{-9} / day average, 7 x 10^{-7} first year, < 4 x 10^{-6} for 10 years
Frequency vs. Supply (±0.5V)	±1 x 10^{-7}
Short Term (AllanVariance)	< 5 x 10^{-10}, 0.1 seconds to 10 seconds
Output	HCMOS compatible (10 LSTTL)
Symmetry (@ 50% Vdd)	60/40 to 40/60
Rise/Fall Time (10-90%) (15pf load)	< 7ns
Level "0" and "1"	< 0.4V, > 4.5V
Supply Voltage	+12 Vdc ±0.5V
Input Current	< 25mA @ +30°C < 40mA @ -20°C < 120mA first 10 seconds after turn-on
Warm-up @ 25°C (24 hours off relative to the frequency 2 hours after turn-on)	±1 x 10^{-6} 15 seconds ±1 x 10^{-7} 60 seconds < ±5 x 10^{-8} 10 seconds
Phase Noise (typical @ 10 MHz)	Offset / Phase Noise 1 Hz / −70 dBc/Hz 10 kHz / −100 dBc/Hz 100 kHz / −125 dBc/Hz 1 kHz / −135 dBc/Hz
Acceleration Sensitivity (worst case axis)	3.5 x 10^{-9} / G
Frequency Adjustment	> ±4 ppm range with 0 to +5V input (external resistor adjustment available on special order)
Size	0.50" x 0.8" x 0.35" (12.7 x 20.3 x 8.9mm)
Base	4 pin DIP package with standoffs



Ordering Information

CO-770 – [ ] at [ ]

PACKAGE TYPE
4-pin DIPpackage with standoffs

Temperature Stability option

FREQUENCY

* Specifications subject to change without notice

PIN Function

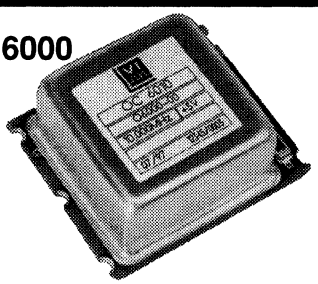
Pin	Function
1	Frequency control
7	0V, Case
8	Output
14	Vcc (+12 Vdc)

166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

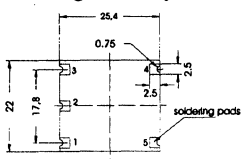
VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY

Surface Mount OCXOs

Series 6000

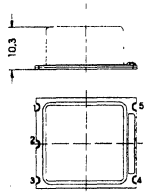


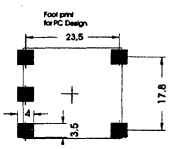
Features
- Frequency range 10 to 25MHz
- Small package outlines
- Low power consumption
- Fast warm-up time
- Low profile
- Turning linearity



Pin	connections
1	Frequ. adj.
2	Ref. volt.
3	Vcc
4	RF out
5	Case / GND

NOTE: Dimensions in mm



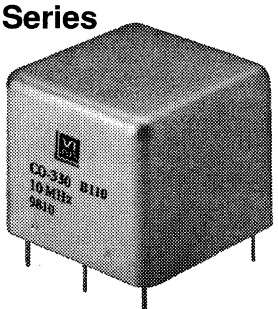


SPECIFICATIONS

Surface Mountable Oven Controlled Crystal Oscillator Series 6000		Options
Long term stability per year	$<3*10^{-7}$	
Short term stability Allan var. for Tau=1 sec.	$<5*10^{-10}$	
Frequency stability versus		
— operating temperature range	$<1*10^{-7}$	
— load variation ±10%	$<5*10^{-9}$	
— supply voltage variation ±10%	$<5*10^{-9}$	
— orientation (tip over) 90° rotation	$<3*10^{-9}$	
Operating temperature °C	0 to +70	
Frequency adjustment		
— electronic	$<50*10^{-7}$	$<100*10^{-7}$
— linearity	<10%	
Supply voltage V	+5	
Current consumpt. operating 25°C mA	<100	
Current consumpt. warm up mA	<250	
Warm up time at 25°C min	<1	
Output signal	HCMOS	
Spurious/Subharmonics attenuation dB	70	
Phase noise L(f) at 10 Hz/ 10 kHz dBc/Hz	-105/-135	
Preferred frequency MHz	10.0 13.0 16.384 24.576	

Double Oven OCXO

CO-330 Series



Features
- 5 to 10MHz standard
- Ultra low aging
- Superior frequency stability

Ideal for GPS Timing and Wireless Communications

Contact factory for availability.

SPECIFICATIONS

Frequency	5 MHz and 10 MHz standard, contact factory for other frequencies.	
Temperature Stability 0°C to +50°C	**B110**: ±1 x 10^{-10} (other temperature stabilities optional)	
Aging	1x10^{-10}/day; 3x10^{-7} over 20 years	
Frequency vs. supply	5x10^{-11} per percent	
Short term (Allan Variance)	5x10^{-12} per percent	
Output/Supply Voltage Sine	**Output** ≥0.5 Vrms into 50Ω(+7dBm)	**Supply** +15 Vdc ±5% (any center voltage in +12 Vdc to +24Vdc range optional)
Harmonics/subs	-25 dBc	
Phase noise (typical)	**Offset** 10 Hz 100 Hz 1 kHz	**Phase Noise** -125 dBc/Hz -140 dBc/Hz -144 dBc/Hz
Input power	10 watts at turn-on (over 0°C to +50°C), 5.0 watts stabilized @ 25°C	
Frequency Adjust **Electrical tuning** **Mechanical tuning**	 1x10^{-7} range over 0 to +6V control Range for 20 year crystal aging, settable to 5x10^{-9} (optional).	
Size	2.00" x 2.00" x 1.50" (check factory for smaller size availability)	
Base	Threaded inserts for mounting	

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY
166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

Flexible Modular Solution A Quartz Stabilized PLL

TRU-050

It's a phase-locked loop ASIC with a quartz stabilized VCXO!

It will:

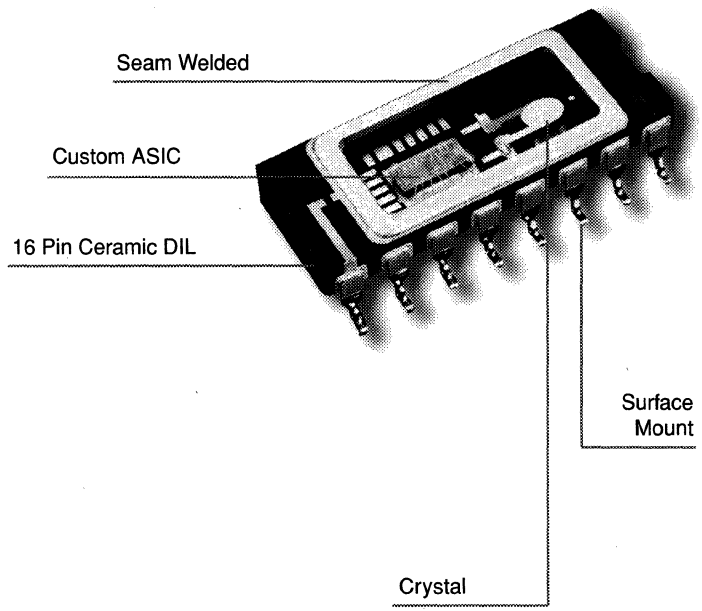
- Reduce: design time
  component count
  board space
- Improve: jitter performance
  reliability

It performs:

- Clock recovery & data retiming
- Frequency translation
- Clock smoothing

In applications up to 65 Mb/s:

- ATM, SONET / SDH
- XDSL, Network communications
- Digital audio / video, PBX systems



What Does It Do?

Vectron International's TRU-050 module is a user-configured, phase-locked loop (PLL) solution designed to simplify a wide variety of clock recovery and data retiming, frequency translation and clock smoothing applications. The device features a phase-lock loop ASIC with a quartz stabilized VCXO for superior stability and jitter performance. This highly integrated module provides unsurpassed performance, reliability and quality. The proprietary ASIC device includes a refined Phase Detector, a Loop Filter Op-Amp, a Loss of Signal Alarm with Clock Return to Nominal feature, a VCXO circuit, and an optional 2^n divided output.

The ASIC and quartz resonator are housed in a hermetic 16-pin DIL ceramic package with optional thru-hole or surface mount leads. The VCXO frequency (OUT1) and division factor (OUT2) are factory set in accordance with customer specifications. PLL response is optimized for each application by the selection of three external passive components. Software is available from Vectron to aid in loop filter component selection and loop response modeling.

Features:

PLL with quartz stabilized VCXO
Output jitter less than 20 ps
Loss of signal (LOS) alarm
Return to nominal clock upon LOS
Input data rates from 8 kb/s to 65 Mb/s
Surface mount option
Tri-state output
User defined PLL loop response
NRZ data compatible
Robust hermetic ceramic package
Single or +5.0 V supply (+3.3V option available)

Benefits:

Flexible modular solution
Reduce design time
Increase circuit reliability
Less board space
Reduces component count

What is the main benefit of the TRU-050?

It's a single drop-in Quartz Stabilized PLL solution.

166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY

TRU-050

1. For input RZ data, Manchester encoded data, and input clock recovery applications, the output clock must run at two times the input rate to ensure that the input is clocked correctly. Since the output clock has a maximum frequency of 65.536 MHz, these inputs are limited to a maximum rate of 32.768 MHz.
2. OUT2 is a binary submultiple of OUT1, or it may be disabled.
3. A 3.3 volt supply option is also available.
4. Figure 1 defines these parameters. Figure 2 illustrates the equivalent five-gate MTTL load and operating conditions under which these parameters are specified and tested.
5. Symmetry is the ON TIME/PERIOD in percent with V_S = 1.4 V for TTL, per figure 1.
6. A loss of signal (LOS) indicator is set to a logic high if no transitions are detected at DATAIN after 256 clock cycles. As soon as a transition occurs at DATAIN, LOS is set to a logic low.
7. Accuracy at room temperature. Stability over temperature is typically ±20 ppm.

Parameter	Symbol	Min	Max	Unit
Input NRZ Data Rates	DATAIN	0.008	65.536	MHz
Input RZ Data and Clock Rates [1]	DATAIN	0.008	32.768	MHz
Nominal Output Frequency				
Output 1	OUT1	12.0	65.536	MHz
Output 2 [2]	OUT2	0.05	32.768	MHz
Supply Voltage [3]	V_{DD}	4.5	5.5	V
Supply Current (V_{DD} = 5.5 V)	I_{DD}	25	63	mA
Output Voltage Levels (V_{DD} = 4.5 V)				
Output Logic High [4]	V_{OH}	2.5	-	V
Output Logic Low [4]	V_{OL}	-	0.5	V
Transition Times: [4]				
Rise Time (0.5 V to 2.5 V)	t_R	0.5	5	ns
Fall Time (2.5 V to 0.5 V)	t_F	0.5	5	ns
Symmetry or Duty cycle [5]				
Output 1	SYM 1	40	60	%
Output 2	SYM 2	45	55	%
Recovered Clock	R_{CLK}	40	60	%
Input Data				
Input Logic High	V_{IH}	2.0	-	V
Input Logic Low	V_{IL}	-	0.8	V
Control Voltage Bandwith (-3 dB,VC = 2.50 V)	BW	50	-	kHz
Sensitivity @ VC = VO	$\Delta F/\Delta V_C$	See Figure 11		ppm/V
Loss of Signal Indication [6]	L_{OS}			
Output Logic High	V_{OH}	2.5	-	V
Output Logic Low	V_{OL}	-	0.5	V
Nominal Output Frequency on Loss of Signal: [7]				
Output 1	OUT	-75 ppm	75 ppm	ppm from fo 1
Output 2	OUT2	-75 ppm	75 ppm	ppm from fo 2
Phase Detector Gain	K_D	-0.53 x Data Density		V/rad

Pin	Symbol	Function
1	V_C	Control voltage input to internal voltage controlled crystal oscillator (VCXO).
2	OPN	Negative input terminal to internal operational amplifier.
3	OPOUT	Output terminal of internal operational amplifier.
4	OPP	Positive input terminal to internal operational amplifier.
5	LOSIN	With LOSIN set to a logic high, the external input to the VCXO (VC) is disabled and the VCXO returns to it's nominal center frequency. With LOSIN set to logic low, the external input to the VCXO is enabled. The LOSIN input has an internal pull-down resistor.
6	PHO	Output signal produced by phase detector.
7	DATAIN	Input data stream to phase detector (TLL switching thresholds).
8	GND	Circuit and cover ground.
9	CLKIN	Input clock signal to phase detector (TTL switching thresholds)
10	LOS	Loss of signal indicator is set to a logic high if no transitions are detected at DATAIN after 256 clock cycles. As soon as a transition occurs at DATAIN, LOS is set to a logic low.
11	RCLK	TTL compatible recovered clock.
12	RDATA	TTL compatible recovered data stream.
13	OUT2	Divided version of internal VCXO output clock (TTL).
14	HIZ	When set to a logic low, output pins OUT1, OUT2, RCLK, and RDATA buffers are set to high-impedance state. When set to a logic high o no connect, the device functions and output pins OUT1, OUT2, RCLK, and RDATA are active. This input has an internal pull-up resistor.
15	OUT1	Output clock of internal VCXO (TTL).
16	V_{CC}	+5.0 V ±10% supply voltage (+3.3 V option available).

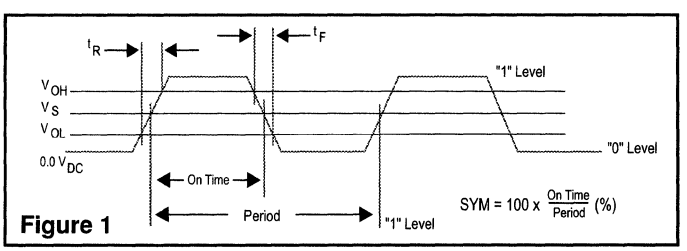


Figure 1

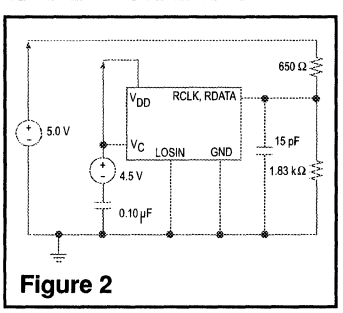


Figure 2

Top View

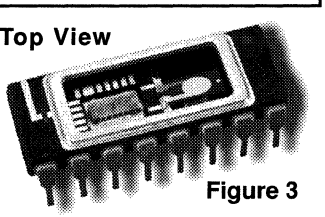


Figure 3

Why would someone buy a TRU-050?

To save design time, reduce component count, conserve board space, & optimize manufacturing efficiency.

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY
166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

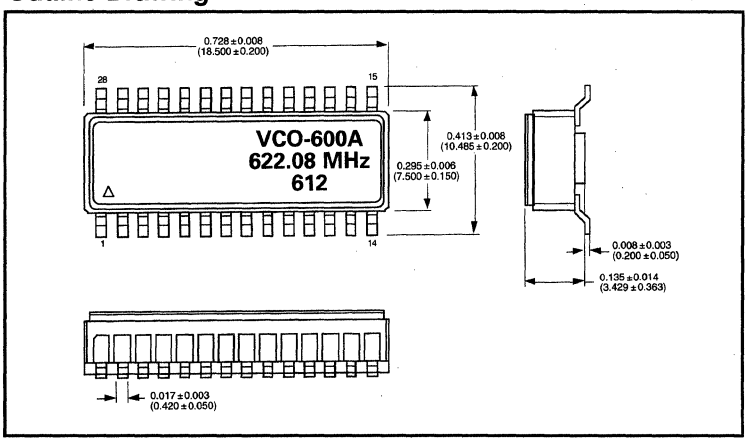
SAW Based Oscillator

VCO-600A

Features

- Voltage Controlled SAW Oscillator
- Phase Jitter Typically <12 ps
- Output Frequency Options from 155 MHz to 622 MHz
- Ideal for Frequency Translation and Timing Recovery Applications
- 100K ECL/PECL Logic Levels with Fast
- Transition Times
- Complementary Outputs
- Low-Frequency Clock Through Feature
- Output Disable Feature
- Miniature Ceramic SMD Package (SO-28)

Outline Drawing



Description

The VCO600A is SAW stabilized, voltage controlled oscillator that operates at the fundamental frequency of the internal SAW filter. The very stable, high-Q, quartz SAW filter enables the device to achieve very low phase jitter performance over a wide operating temperature range. The oscillator is housed in a 28-lead surface-mount package. It has a unique output disable and clock through feature to facilitate on-board testing.

The VCO-600A is available with center frequency options ranging from 155 MHz to 622 MHz, including the common SONET/SDH/ATM frequencies of 155.52 MHz, 311.04 MHz and 622.08 MHz. Typical applications would include phase locked loop circuits for frequency synthesis, frequency translation and timing recovery.

Performance Characteristics (TA = -40 °C to 85 °C)

Specifications	Sym	Min	Typ	Max	Unit
Center Frequency	f_N	155.52	-	622.08	MHz
Supply Current	I_{EE}	45	55	70	mA
Supply Voltage[1]	VCC	-4.5	-5	-5.5	V
Absolute Pull Range	APR	-50	-	+50	ppm
Total Freq. Deviation	Df	-400	-	+400	ppm
Output Level Low[2]	v_{OL}	-1.95	-	-1.63	V
Output Level High[2]	v_{OH}	-0.98	-	-0.75	V
Output Rise/Fall Time[3]	$T_{R/F}$	100	250	400	ps
Frequency Stability		-150	-	+150	ppm
Data Symmetry	Sym	45	49/51	55	%
Linearity		-3	-	+3	%

Specifications	Sym	Min	Typ	Max	Unit
Spurious Suppression		-50	-60	-	dB
V_C Input Impedance	ZC	8	10	12	kΩ
V_C Modulation Bandwidth[4]	BW	-	500	-	kHz
V_C Range	V_C	V_{EE}	-	V_{CC}	V
Output Current	I_{OUT}	-	-	20	mA
Absolute Max. VC Range[5]	V_{CMX}	V_{EE}+.5	-	V_{CC}-.5	V
Absolute Max Output Current[5]	I_{MAX}	-	-	50	
Storage Temperature[5]	T_S	-55	-	125	°C
Soldering Temp. /Time[5]	T_{LS}	-	-	240/10	°C/s
Absolute Max Supply Volt[5]	V_{CC}-V_{EE}	-8	-	0	V
ESD Rating (HBM,CDM)	-	-	-	1k	V

Notes

1 The VCO-600A may be configured for PECL operation. All outputs and inputs including V_C are referenced to V_{CC}

2 Output levels are standard 10K ECL and are fully 100K ECL compatible.

3 Transition Times are measured from 20% to 80% of a full 10K ECL level swing.

4 The modulation bandwidth is a function of nominal center frequency and may be adjusted down through the use of an external capacitor on pin 17.

5 Stresses in excess of the absolute maximum ratings can permanently damage the device. Functional operation is not implied at these or any other conditions in excess of conditions represented in the operational sections of this data sheet. Exposure to absolute maximum ratings for extended periods may adversely affect device reliability.

166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY

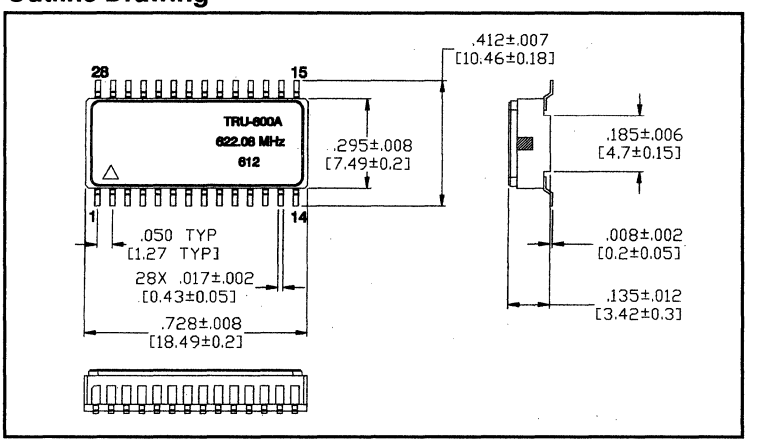
SAW Oscillator

TRU-600A

Features

- SAW Filter Based Timing Recovery Module
- Typical Output Jitter Below 10 ps
- Data Rate Output Options from 124.416 Mb/s to 622.08 Mb/s
- SONET/SDH Compatible
- 100K ECL/PECL Compatible Outputs and Inputs
- Superior Jitter Tolerance and Transfer Performance
- Single Power Supply Operation
- External Clock Enable upon LOS
- Miniature Ceramic SMD Package (SO-28)

Outline Drawing



Description

The TRU600A regenerates clean clock and data signals from incoming NRZ data streams, such as those encountered in fiber-optic transmission and telecom applications. The device utilizes SAW filter CDR technology for superior jitter performance.

The clock is extracted from the input NRZ data by first passing it through a frequency doubler to generate sufficient spectral energy at the data rate. The SAW filter (a precision narrow-band filter) then suppresses jitter by rejecting unwanted frequency spectra. The extracted clock is then precisely aligned with the data and the signals are reshaped.

The output is thus free of undesirable jitter and distortion. Unlike phase-locked loop designs, the jitter transfer function is uniquely stable because it is determined by the SAW filter's response, which can be precisely controlled and reproduced.

Performance Characteristics (TA = -40 °C to 85 °C)

Specifications	Sym	Min	Typ	Max	Unit
Nominal Clock Frequency	f_N	124.416	-	622.08	MHz
Supply Current	I_{EE}	50	65	75	mA
Supply Voltage	V_{CC}	4.5	5	5.5	V
Data Input Low	V_{IL}	-1.81	-	-1.48	V
Data Input High	V_{IH}	-1.17	-	-0.88	V
Data/Clock Output Low[1]	V_{OL}	-1.95	-	-1.63	V
Data/Clock Output High[1]	V_{OH}	-1.03	-	-0.88	V
Input Clock Deviation[2]	D_C	-200	-	200	ppm
Clock/Data Alignment[3]	T_{DCA}	-100	-	100	ps

Specifications	Sym	Min	Typ	Max	Unit
Data/Clock Rise/Fall Time[4]	$T_{R/F}$	275	375	575	ps
Clock Duty Cycle	DC	45	-	55	%
Acquisition Time[5]	T_A	-	-	2	µs
Clock Random Jitter[6]	J_C	-	10	-	ps rms
Storage Temperature[7]	T_S	-55	-	125	°C
Soldering Temp. /Time[7]	T_{LS}	-	-	240/10	°C/s
Absolute Max Supply Volt	V_{CC}-V_{EE}	0	-	8	V
ESD Rating (HBM,CDM)	-	-	-	1	kV

Notes

1 Measured with respect to V_{CC} with a 50Ω load to V_{CC}-2V. See Fig 6 and 7. ECL levels are specified for D.C. performance, 50 mV should be added for dynamic performance.
2 Allowable input clock variation with respect to nominal clock Frequency(f_N), -40°C to 85°C.
3 Alignment of clock and data output.
4 20% to 80%.
5 Time required to achieve valid data and clock outputs with a 50% input transition density.
6 Measured with 2^{23}-1pseudorandom word(PRW) data input.
7 Stresses in excess of the absolute maximum ratings can permanently damage the device. Functional operation is not implied at these or any other conditions in excess of conditions represented in the operational sections of this data sheet. Exposure to absolute maximum ratings for extended periods may adversely affect device reliability.

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY
166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

SAW Sonet/SDH Receiver Module

SRM SERIES

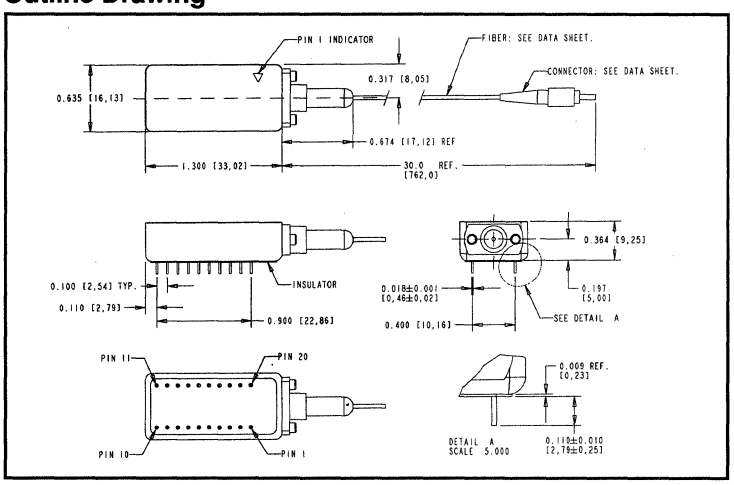
Features

- SONET/SDH Compatible
- SAW Filter Clock Recovery and Data Retiming
- 17 ps Typical Output Jitter
- PECL Clock and Data Outputs
- Single +5 Volt Supply
- CMOS Loss of Signal Flag
- Operation at 1300 nm and 1550 nm
  -40 °C to +85°C Operation
- Wide Dynamic Range
- Multi-Sourced 20 Pin DIL Footprint

Applications

Telecom Receiver Applications
High Performance Datacom Receiver Applications

Outline Drawing



Description

The SRM is a fully integrated fiber-optic receiver module with SAW filter clock recovery and data retiming. It is ideally suited for SONET/SDH and other fiber-optic transmission applications that demand superior performance and stability.

Qualification

The SRM-155 and SRM-622 have been designed to comply with the intent of Bellcore specifications TR-NWT-000468 and TA-TSSY-000983. All of the technologies used in the assembly of the module represent standard microelectronics technologies that are used in similar products, and have extensive field reliability data.

Performance Characteristics (TA = -40 °C to 85 °C)

Specifications	Sym	Min	Typ	Max	Unit
Standard Bit Rates[1]			155.52, 622.08		Mb/s
Operating Temperature	T_o	-40	-	85	°C
Power Supply Voltage	V_{CC}	4.5	5.0	5.5	V
Power Supply Current	I_{CC}	-	-	300	mA
Data & Clock Output Level[2]					
High	V_{OL}	V_{CC}-1.95		V_{CC}-1.03	V
Low	V_{OH}	V_{CC}-1.63		V_{CC}-0.88	
Clock/Data Alignment[3]	T_{CDA}	-100		+100	ps
Data & Clock Rise/Fall Time[4]	$T_{R/F}$	275	375		ps
Output Clock Duty Cycle	Duty	45	50	55	%

Specifications	Sym	Min	Typ	Max	Unit
Received Power Level Flag					
SRM-155					
Decreasing Optical Power			-37		
Increasing Optical Power	LOS	-	-34	-	dBm
SRM-622					
Decreasing Optical Power			-34		
Increasing Optical Power			-31		
Flag Hysteresis	Hyst	-	3	-	dB
Acquisition Time[5]	T_A	-	-	2	µs
Output Clock Random Jitter[6]	J_C	-	17	-	ps_{rms}
Average Sensitivity[7]					
SRM-155	Sens	-34.0	-37	-	dBm
SRM-622		-31.0	-33	-	
Optical Input[7]					
SRM-155	P_{MAX}	-	-	0	dBm
SRM-622		-	-	-3	
Input Wavelength	λ	1100		1580	nm

Notes

1 Other center frequencies are available in the 124 to 622 MHz frequency range.
2 Measured with a load of R_L = 50Ω to V_{CC} - 2 V. See figures 3 and 4. ECL levels are specified for dc measurement, an additional tolerance of 50 mV should be included for dynamic measurements.
3 Alignment of clock and data outputs
4 Measured at 20% to 80% levels.
5 Time required to achieve valid data and clock outputs with a transition density of at least 50%.
6 Measured with an input data pseudorandum word 2^{23} - 1.
7 For a BER less than 1E-10. Measured using a 2^{23} - 1 pseudorandum word and a 50% average optical duty cycle and a 10 dB Extinction Ratio.

166 Glover Avenue • Norwalk, CT 06856
Toll Free 1-88-VECTRON1
Web: www.vectron.com

VECTRON INTERNATIONAL
A DOVER TECHNOLOGIES COMPANY

Custom SAW Products

VI Capabilities
- More than a decade of experience in the design and high volume manufacturing of SAW filters and SAW-based modules.
- Industry leader in Ceramic Surface Mount Packaging.

Product Features
- High volume performance reproducibility
- Frequencies 50 MHz - 2.5 GHz
- 0.1 to >60% fractional bandwidth
- Insertion loss as low as 1dB
- Near-in rejection as high as 90dB
- Ceramic and metal packages (DIP & SMD)

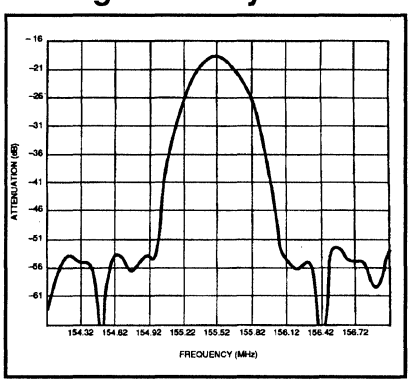
Filters

Timing Recovering SAW Filters:
50 MHz to >2.5 GHz, 8 to 20 dB insertion loss, 0.1% to .5% BW, 20 to 40 dB rejection.

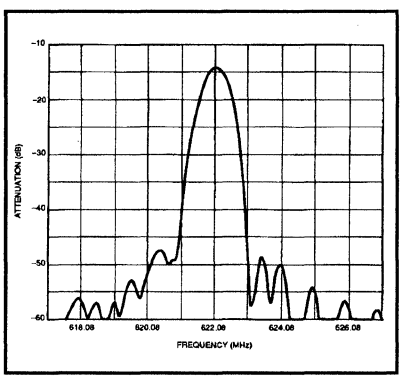
Conventional Precision SAW Filters:
50 MHz to >500 MHz, 15 to 40 dB insertion loss, *high selectivity*, 0.1% to >60% BW, 20 to >90 dB rejection.

Low Loss SAW Filters:
50 MHz to >1 GHz, 1 to 10 dB insertion loss, 0.1% to >5% BW, 25 to >60 dB rejection. Transversely-Coupled Resonator Filter (TCRF), In-line Coupled Resonator Filter (ICRF), Impedance Element Filter (IEF), and Single-Phase Unidirectional Transducer Filter (SPUDT).

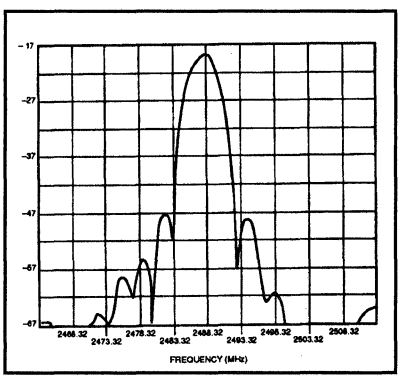
Timing Recovery Filters



155.52 MHz



622.08 MHz



2488.32 MHz

SAW-FILTERS FOR DECT APPLICATIONS
- Center frequency 110.592 MHz and 112.32 MHz
- Small group delay ripple
- Low temperature coefficient of frequency
- SMD ceramic package, hermetically sealed

SAW-FILTERS FOR GSM/PCS/D CS/TDMA-HANDSETS
- Custom IF - filters for wireless applications
- Center frequency to 400 MHz
- Low insertion loss, high stop band suppression
- Simple matching circuit
- Balanced or unbalanced operation possible
- Miniaturized SMD multilayer ceramic package
- Low temperature coefficient of frequency

SAW-FILTERS FOR GSM/PCS/DCS - BASESTATIONS
- Custom IF - filters for wireless applications
- Center frequency to 170 MHz
- Low insertion loss
- SMD multilayer ceramic package
- DIL 14 - and DIL 24 metal package
- Low temperature coefficient of frequency

CUSTOM SAW FILTERS
- IF Filters for wireless applications
- SONET/SDH Clock Recovery applications
- Advanced Surface Mount Packaging
- Low Insertion Loss
- High Rejection

VITE TECHNOLOGY EXPRESS
A VECTRON INTERNATIONAL COMPANY

About VITE | What's New! | VITE Products | Contact VITE

VECTRON INTERNATIONAL

Welcome To Vectron International Technology Express,
...your frequency control product specialists.

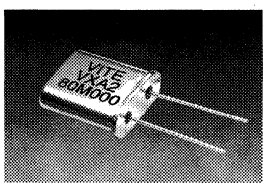
Vectron, since 1966, has been the industry's technical leader in the field of crystal oscillators. With the addition of VITE (pronounced: veet), Vectron International offers products which cover the entire range of crystal and oscillator products, a range which can not be matched by any other supplier in the North American market.

VITE in French means "quick" or "rapid" and that is exactly what we have to offer; the fastest and best customer service and engineering technical support available in the market today.

Mission Statement

Vectron International Technology Express will provide excellent customer service while up-holding the Integrity and Quality Standards of the Vectron International group of companies. Our continued growth will be achieved by offering the most efficient solutions to our customers and by developing long term relationships.

Crystals



VXA Series

VXA1 = HC-49/U 13.5 mm tall
VXA2 = HC-49/U 11.1 mm tall
VXA6 = HC-49/U 13.5 mm tall with top lead
VXA7 = HC-49/U 13.5 mm tall with gull leads

VXA3 = HC-49/U 5.1 mm tall
VXA4 = HC-49/US 3.6 mm tall
VXA5 = HC-49/US 2.5 mm tall (reduced height)

VXB Series

VXB1 = HC-49/U 3.2 mm tall SM
VXB2 = HC-49/U 5.0 mm tall SM

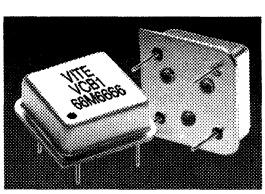
VXC Series

VXC1 = 7 x 5 x 1.7 mm 4 pads
VXC2 = 7 x 5 x 1.7 mm 2 pads
VXC3 = 7 x 5 x 1.0 mm 2/4 pads
VXC4 = 7 x 5 x 1.0 mm 4 pads
VXC5 = 7 x 5 x 1.0 mm 2 pads
VXC6 = 7 x 5 x 1.0 mm 2/4 pads

VXE Series

VXE2 = Epson-compatible 6 x 3.5 mm ceramic
VXE3 = 6 x 3.5 mm ceramic 2 pads
VXE4 = 6 x 3.5 x 1.1 mm 4 pads
VXE5 = 6 x 3.5 x 0.9 mm 4 pads

Clocks



VCA Series

VCA1 = 0.8" x 0.5" x 0.2" 14 pin DIP
VCA2 = 0.8" x 0.5" x 0.2" 14 pin gull lead SM
VCA3 = 0.8" x 0.5" x 0.4" 14 pin thru-hole
VCA4 = 0.8" x 0.5" x 0.4" 14 pin gull lead SM

VCB Series

VCB1 = 0.5" x 0.5" x 0.2" half size DIP
VCB2 = 0.5" x 0.5" x 0.2" half size gull lead SM

VCC Series

VCC1 = 7.5 x 5 mm tall 4 pads

VCE Series

VCE1 = 14 x 9.8 mm tall 4 pads

Visit Our Web-Site at www.viteonline.com

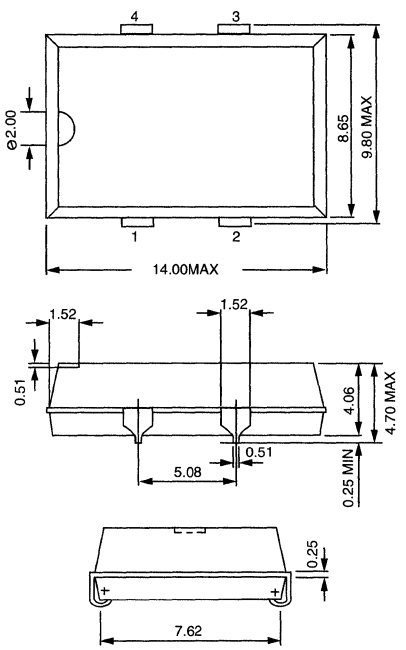
VITE Technology *Express* TEL: 1-888-TELVITE (835-8483) FAX: 1-877- FAXVITE (329-8483)

VITE TECHNOLOGY EXPRESS
A VECTRON INTERNATIONAL COMPANY

About VITE | What's New! | VITE Products | Contact VITE

VCE1 14 x 9.8 mm Crystal Oscillators

Package Options	**E1**= 1.4 x 9.8 x 4.7 mm tall 4 pads
Frequency Range	1 to 70 MHz
Standard Frequencies	See Standard Frequency Table (page 34)
Voltage Options/ Load Drive	**A** = +5.0 VDC ± 10% 15pF **B** = +3.3 VDC ± 10% 15pF **E** = +5.0 VDC ± 10% 50pF
Electrical Options	**C**= No Tristate 60/40 Symmetry **1** = Tristate 60/40 Symmetry **2** = No Tristate 55/45 Symmetry **3** = Tristate 55/45 Symmetry
Tristate	**N/C** = OUTPUT Logic 1 = OUTPUT Logic 0 = High Impedance
Stability Options	**A** = ± 100 PPM 0°C to +70°C **B** = ± 50 PPM 0°C to +70°C
Storage Temperature	-55°C to +125°C
Start-Up	10 ms Maximum
Aging (Typical)	<5.0 PPM/first year at +40°C dynamic
Load	HCMOS/TTL 5 TTL minimum
Tr & Tf	8 ns Maximum
Current	40 mA Maximum
Typical P/N	**VCE1-A1A-40M000** **E1** = 14 x 9.8 x 4.7 mm tall 4 pads **A** = +5.0 VDC **1** = Tristate **A** = ± 100 PPM 0°C to 70°C



Dimensions in Millimeters.

VECTRON INTERNATIONAL

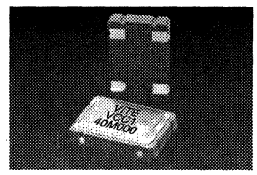
Visit Our Web-Site at www.viteonline.com

VITE Technology *Express* TEL: 1-888-TELVITE (835-8483) FAX: 1-877- FAXVITE (329-8483)

VITE TECHNOLOGY EXPRESS
A VECTRON INTERNATIONAL COMPANY

VECTRON INTERNATIONAL

VCC1 7.5 x 5 mm Crystal Oscillators



Featuring
3.0 or 5.0 VDC Option
Low Cost
1 to 70 MHz
Tristate Option
TTL/CMOS Compatible

Frequency Range 1.8 MHz to 70 MHz

Package Options **C1**= 7.5 x 5 x 1.8 mm tall 4 pads

Voltage Options/ Load Drive
A = +5.0 VDC ± 10% 15pF
B = +3.3 VDC ± 10% 15pF
C = +3.0 VDC ± 5% 15pF
E = +5.0 VDC ± 10% 50pF

Electrical Options
0 = No Tristate 60/40 Symmetry
1 = Tristate 60/40 Symmetry
2 = No Tristate 55/45 Symmetry
3 = Tristate 55/45 Symmetry

Tristate
N/C = OUTPUT
Logic 1 = OUTPUT
Logic 0 = High Impedance

Stability Options
A = ± 100 PPM 0°C to +70°C
B = ± 50 PPM 0°C to +70°C
C = ± 100 PPM -40°C to +85°C
D = ± 50 PPM -40°C to +85°C
E = ± 25 PPM 0°C to +70°C

Start-Up 10 ms Maximum

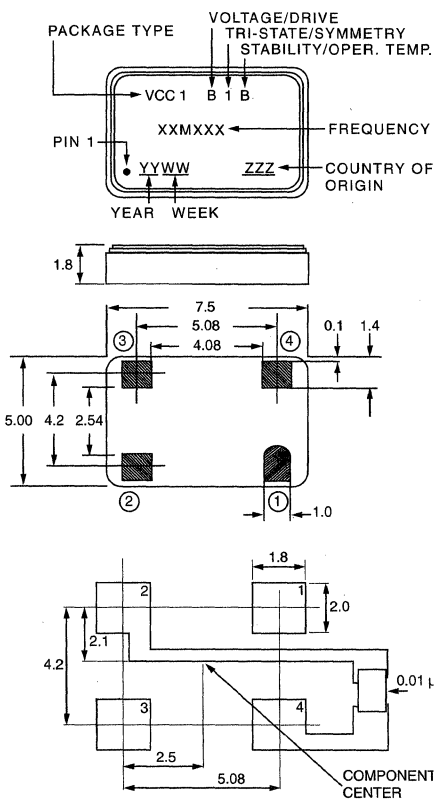
Aging (Typical) <3.0 PPM/first year at +40°C dynamic

Standard Load HCMOS/TTL

Current
30 mA Maximum <40 MHz
60 mA Maximum <80 MHz

Standard Packaging Tape & Reel (500 pc minimum reel)

Typical P/N **VCC1-B1B-40M000**
C1 = 7.5 x 5 x 1.8 mm tall 4 pads
B = +3.3 VDC
1 = Tristate 60/40 Symmetry
B = ± 50 PPM 0°C to +70°C



Dimensions in Millimeters.

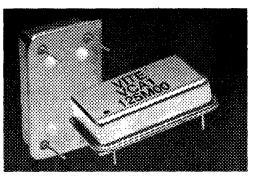
Visit Our Web-Site at www.viteonline.com

VITE Technology *Express* TEL: 1-888-TELVITE (835-8483) FAX: 1-877- FAXVITE (329-8483)

VITE TECHNOLOGY EXPRESS
A VECTRON INTERNATIONAL COMPANY

About VITE | What's New! | VITE Products | Contact VITE

VCA1 VCA2 VCA3 VCA4 VCB1 VCB2 Crystal Oscillators



Featuring

3.0 or 5.0 VDC Option
Low Cost
1 to 160 MHz
Enable Disable Option
TTL/CMOS Compatible

Frequency Range

32.768 KHz to 160 MHz
80 to 160 MHz uses a low jitter internal (<50 ps) multiplier IC which will also affect phase noise performance.

Package Option

A1 = 0.8" x 0.5" x 0.2" 14 pin DIP
A2 = 0.8" x 0.5" x 0.2" 14 pin gull lead SM
A3 = 0.8" x 0.5" x 0.4" Max 4 pin thru-hole
A4 = 0.8" x 0.5" x 0.4" 14 pin gull lead SM
B2 = 0.5" x 0.5" x 0.2" Half size gull leaded SM
B1 = 0.5" x 0.5" x 0.2" Half size DIP

Voltage Options/ Load Drive

A = +5.0 VDC ± 10% 15pF
B = +3.3 VDC ± 10% 15pF
C = +3.0 VDC ± 5% 15pF
E = +5.0 VDC ± 10% 50pF

Electrical Options

0 = No Tristate 60/40 Symmetry
1 = Tristat 60/40 Symmetry
2 = No Tristate 55/45 Symmetry
3 = Tristate 55/45 Symmetry
5 = Enable Option 60/40 Symmetry
6 = Enable Option 55/45 Symmetry

Enable/Disable

Logic 1 = Enable
Logic 0 = Disable

Stability Options

A = ± 100 PPM 0°C to +70°C
B = ± 50 PPM 0°C to +70°C
C = ± 100 PPM -40°C to +85°C
D = ± 50 PPM -40°C to +85°C
E = ± 25 PPM 0°C to +70°C
F = ± 25 PPM -40°C to +85°C
VCA2 VCB1-2 only **G** = ± 20 PPM 0°C to +70°C
VCA3-4 only **H**= ± 20 PPM 0°C to +70°C

Start-Up

10 ms Maximum

Aging

<5.0 PPM/year at +40°C dynamic

Load

HCMOS/TTL

Current

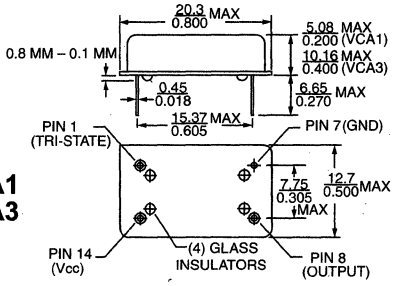
50 mA Maximum

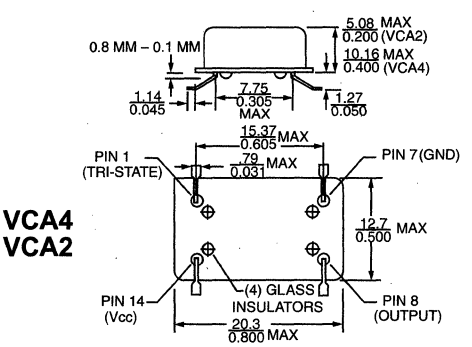
Standard Packaging

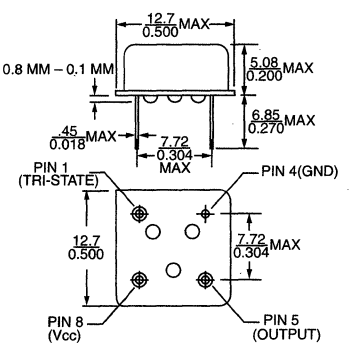
Anti-Static Tubes

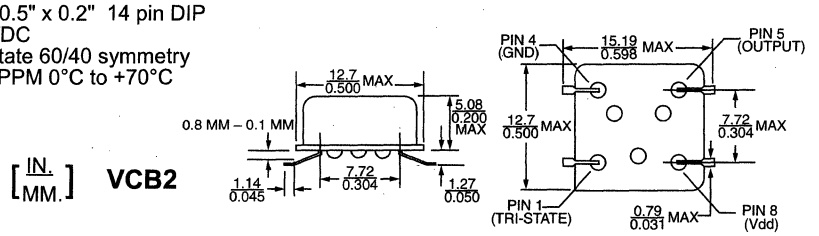
Typical P/N

VCA1-A0A-125M000
A1 = 0.8" x 0.5" x 0.2" 14 pin DIP
A = +5.0 VDC
0 = No tristate 60/40 symmetry
A = ± 100 PPM 0°C to +70°C









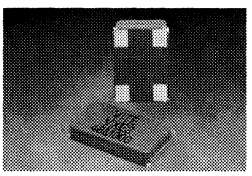
VECTRON INTERNATIONAL

Visit Our Web-Site at www.viteonline.com

VITE Technology *Express* TEL: 1-888-TELVITE (835-8483) FAX: 1-877- FAXVITE (329-8483)

VITE TECHNOLOGY *EXPRESS*
A VECTRON INTERNATIONAL COMPANY

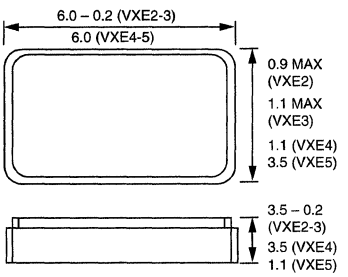
VECTRON INTERNATIONAL



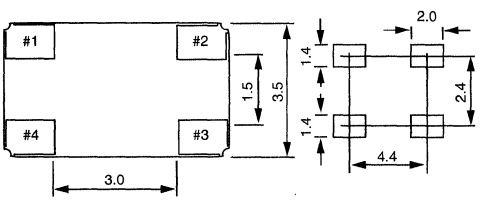
VXE2 VXE3 VXE4 VXE5
Ultra Miniature Surface Mount Crystals

Package Options	**E2** = 6 x 3.5 x 1.1 mm tall 4 pads **E3** = 6 x 3.5 x 1.1 mm tall 2 pads **E4** = 6 x 3.5 x 1.1 mm tall 4 pads **E5** = 6 x 3.5 x 0.9 mm tall 4 pads
Frequency Range	12.0 MHz to 100 MHz
Mode	**1** = Fundamental (12 to 40 MHz) **3** = 3rd Overtone (40 to 100 MHz)
Stability Options	**A** = ± 100 PPM -20°C to +70°C **B** = ± 50 PPM -20°C to +70°C VXE4 VXE5 only **C** = ± 100 PP -40°C to +85°C VXE4 VXE5 only **D** = ± 50 PPM -40°C to +85°C VXE4 VXE5 only **E** = ± 25 PPM -20°C to +70°C VXE2 VXE3 only **F** = ± 30 PPM -20°C to +70°C VXE4 VXE5 only **G** = ± 10 PPM -20°C to +70°C VXE4 VXE5 only **H** = ± 5 PPM -10°C to +60°C
Load Capacitance	**0** = Series Resonant **1** = 16 pF **2** = 20 pF VXE4 VXE5 only **3** = 32 pF **4** = 18 pF
STD Calibration Tolerance	± 25 PPM at +25°C or ± 2 pF whichever is greater Tolerances to ± 10 PPM are available.
Equivalent Series Resistance	80 Maximum VXE2 VXE3 60 Ω VXE4 VXE5
Shunt Capacitance	7 pF Maximum
Drive Level	10 to 100 uW
Crystal Aging	<5 ppm/1st year
Standard Packaging VXE4 VXE 5	Tape and Reel (1000 pc minimum)
Typical P/N	**VXE2-1B2-20M000** **E2** = 6 x 3.5 x 1.1 mm tall 4 pads **1** = Fundamental Mode **B** = ± 50 PPM -20°C to +70°C **2** = 20 pF load capacitance

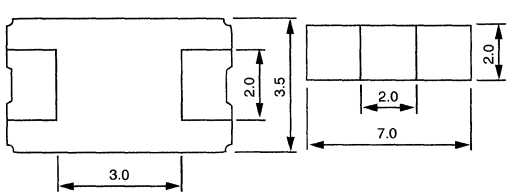
Dimensions in Millimeters.



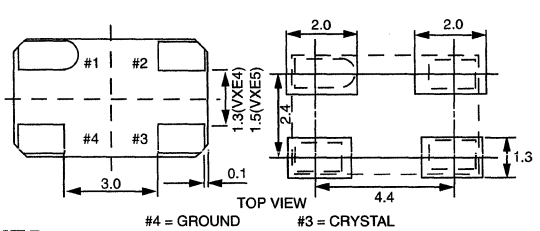
Top/Side View (All)



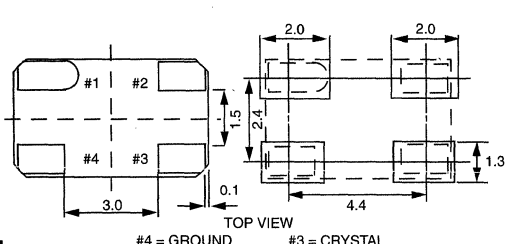
VXE2



VXE3



VXE5



VXE4

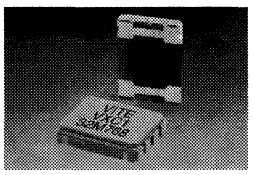
Visit Our Web-Site at www.viteonline.com

VITE Technology *Express* TEL: 1-888-TELVITE (835-8483) FAX: 1-877- FAXVITE (329-8483)

VITE TECHNOLOGY EXPRESS
A VECTRON INTERNATIONAL COMPANY

About VITE | What's New! | VITE Products | Contact VITE

VXC1 VXC2 VXC3 VXC4 VXC5 VXC6



Package Options
C1 = 7 x 5 x 1.7 mm 4 pads
C2 = 7 x 5 x 1.7 mm 2 pads
C3 = 7 x 5 x 1.7 mm 2/4 pads
C4 = 7 x 5 x 1.0 mm 4 pads
C5 = 7 x 5 x 1.0 mm 2 pads
C6 = 7 x 5 x 1.0 mm 2/4 pads

Frequency Range 10 MHz to 100.00 MHz

Mode
1 = Fundamental (10 to 40 MHz)
3 = 3rd Overtone (40 to 100 MHz)

Stability Options
A = ± 100 PPM -20°C to +70°C
B = ± 50 PPM -20°C to +70°C
F = ± 30 PPM -20°C to +70°C

Load Capacitance
0 = Series Resonant
1 = 16 pF
2 = 20 pF
4 = 18 pF

STD Calibration Tolerance ± 30 PPM at +25°C or ± 2 pF whichever is greater
Tolerances to ± 10 PPM are available.

Equivalent Series Resistance 80 Maximum

Shunt Capacitance 7 pF Maximum

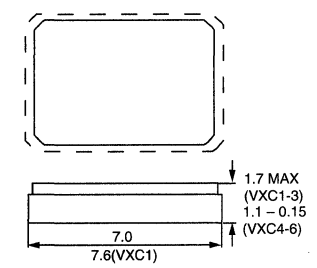
Drive Level 10 to 100 uW

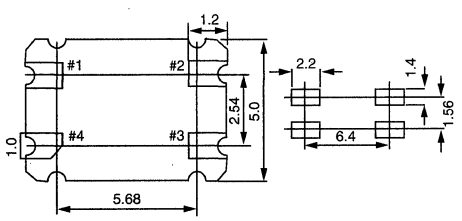
crystal Aging <5 ppm/1st year

Standard Packaging Tape & Reel (500 pc minimum)

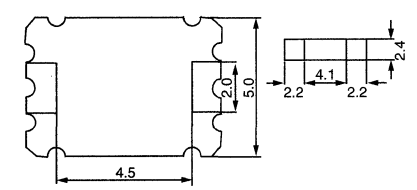
Typical P/N **VXC1-1B2-28M224**
C1 = 7 x 5 x 1.7 mm 4 pads
1 = Fundamental Mode
B = ± 50 PPM -20°C to +70°C
2 = 20 pF load

Dimensions in Millimeters.

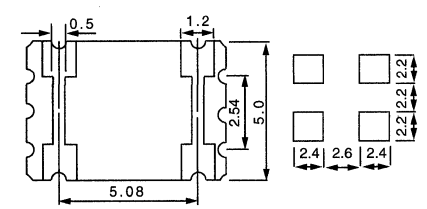




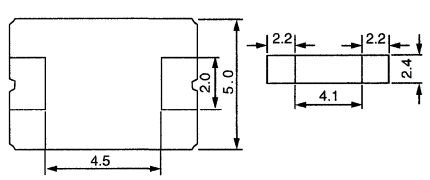
VXC1



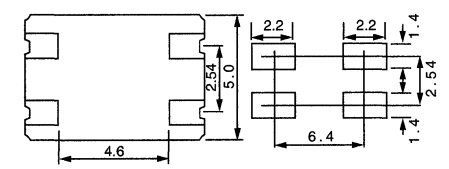
VXC2



VXC3
VXC6



VXC5



VXC4

VECTRON INTERNATIONAL

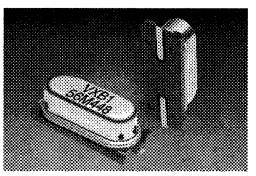
Visit Our Web-Site at www.viteonline.com
VITE Technology *Express* TEL: 1-888-TELVITE (835-8483) FAX: 1-877- FAXVITE (329-8483)

VITE TECHNOLOGY EXPRESS
A VECTRON INTERNATIONAL COMPANY

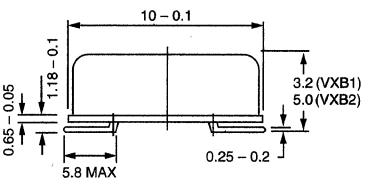
About VITE | What's New! | VITE Products | Contact VITE

VECTRON INTERNATIONAL

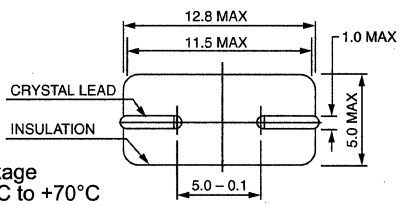
VXB1 VXB2 Microprocessor Crystals



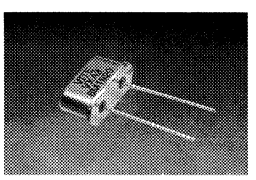
Package Options	**B1** = 3.2 mm tall surface mount	**B2** = 5.0 mm tall surface mount
Frequency Range	3.5 MHz to 75.00 MHz	
Mode	**1** = Fundamental (3.5 to 30 MHz)	**3** = 3rd Overtone (24.1 to 75 MHz)
Stability Options	**A** = ± 100 PPM -20°C to +70°C **B** = ± 50 PPM -20°C to +70°C **C** = ± 100 PPM -40°C to +85°C **D** = ± 50 PPM -40°C to +85°C **F** = ± 30 PPM -20°C to +70°C	
Load Capacitance	**0** = Series Resonant **2** = 20 pF **4** = 18 pF	**1** = 16 pF **3** = 32 pF
STD Calibration Tolerance	± 25 PPM at +25°C or ± 2 pf whichever is greater Tolerances to ± 10 PPM are available.	
Equivalent Series Resistance	See ESR Table II	
Shunt Capacitance	7 pf Maximum	
Drive Level	10 to 2,000 uW	
Crystal Aging	<5 ppm/1st year	
Standard Packaging	Tape & Reel (500 pc minimum)	
Typical P/N	**VXB1-3A2-56M448** **3** = 3rd Overtone **2** = 20 pF load	**B1** = 3.2 mm tall package **A** = ± 100 PPM -20°C to +70°C



Dimensions in Millimeters.



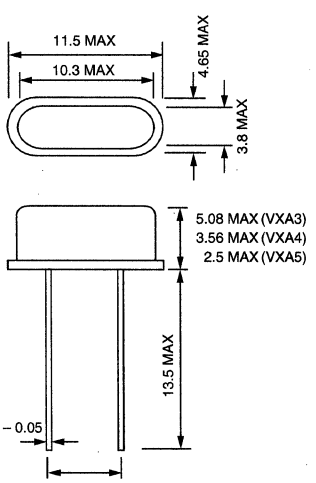
VXA3 VXA4 VXA5 Microprocessor Crystals



The VXA3 series of HC-49/U packaged crystals offers the most popular crystal package for computer and peripherals' applications. Our type "A" package (HC-49/U) offers the highest level of quality at the most economical price.

Vite's standard crystal tolerance (Option "B" under stability vs. temperature) is ± 50 PPM -20°C to +70°C relative to the load capacitance at +25°C. All VXA crystals will operate -40°C to +85°C. The "B" stability of ± 50 PPM is an absolute guarantee but the typical crystal is better than ± 30 PPM 0°C to +70°C and better than ± 75 PPM from -40°C to +85°C.

Package Options	**A3** = HC-49/U 5.1 mm tall **A5** = HC-49/U Reduced Height 2.5 mm tall	**A4** = HC-49/U 3.6 mm tall
Frequency Range	3.5 MHz to 75.00 MHz	
Mode	**1** = Fundamental (3.5 to 30 MHz)	**3** = 3rd Overtone (24.1 to 75 MHz)
Stability Options	**A** = ± 100 PPM -20°C to +70°C **B** = ± 50 PPM -20°C to +70°C **C** = ± 100 PPM -40°C to +85°C **D** = ± 100 PPM -40°C to +85°C	
Load Capacitance	**0** = Series Resonant **2** = 20 pF	**1** = 16 pF **3** = 32 pF **4** = 18 pF
STD Calibration Tolerance	± 25 PPM at +25°C or ± 2 whichever is greater Tolerances to ± 10 PPM are available.	
Equivalent Series Resistance	See ESR Table II	
Shunt Capacitance	7 pf Maximum	
Drive Level	10 to 2,000 uW	
Crystal Aging	<5 ppm/1st year	
Standard Packaging	Bagged	
Typical P/N	**VXA3-1B2-20M000** **1** = Fundamental Mode **2** = 20 pF load	**A3** = HC/49U package 5.1 mm tall **B** = ± 50 PPM -20°C to +70°C
Crystal Aging	<5 ppm/1st year	
Standard Packaging	Tape & Reel (500 pc minimum)	
Typical P/N	**VXB1-3A2-56M448** **3** = 3rd Overtone **2** = 20 pF load	**B1** = 3.2 mm tall package **A** = ± 100 PPM -20°C to +70°C



Dimensions in Millimeters.

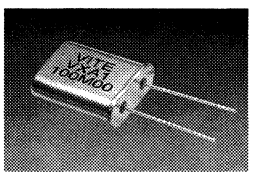
Visit Our Web-Site at www.viteonline.com

VITE Technology *Express* TEL: 1-888-TELVITE (835-8483) FAX: 1-877- FAXVITE (329-8483)

About VITE | What's New! | VITE Products | Contact VITE

VITE TECHNOLOGY EXPRESS
A VECTRON INTERNATIONAL COMPANY

VXA1 VXA2 VXA6 VXA7 Microprocessor Crystals



The VXA1 series of HC-49/U packaged crystals offers the most popular crystal package for computer and peripherals' applications. Our type "A" package (HC-49/U) offers the highest level of quality at the most economical price.

Vite's standard crystal tolerance (Option "B" under stability vs. temperature) is ± 50 PPM -20°C to +70°C relative to the load capacitance at +25°C. All VXA crystals will operate -40°C to +85°C. The "B" stability of ± 50 PPM is an absolute guarantee but the typical crystal is better than ± 30 PPM 0°C to +70°C and better than ± 75 PPM from -40°C to +85°C.

Package Options
A1 = HC-49/U 13.5 mm tall
A2 = HC-49/U 11.1 mm tall
A6 = HC-49/U 13.5 mm tall with top lead
A7 = HC-49/U 13.5 mm tall with gull leads

Frequency Range Standard
1.8432 MHz to 150.00 MHz

Mode
1 = Fundamental (1 to 40 MHz)
3 = 3rd Overtone (20 to 100 MHz)
5 = 5th Overtone (> 100 MHz)

Stability Options
A = ± 100 PPM -20°C to +70°C
B = ± 50 PPM -20°C to +70°C
C = ± 100 PPM -40°C to +85°C
D = ± 50 PPM -40°C to +85°C
E = ± 25 PPM -20°C to +70°C

Load Capacitance
0 = Series Resonant
1 = 16 pF
2 = 20 pF
3 = 32 pF
4 = 18 pF

STD Calibration Tolerance
± 25 PPM at +25°C or ± 2 pf whichever is greater
Tolerances to ± 10 PPM are available.

Equivalent Series Resistance
See ESR Table I

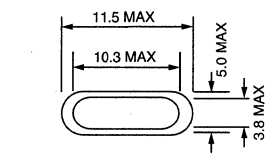
Shunt Capacitance
7 pf Maximum

Drive Level
10 to 1,000 uW

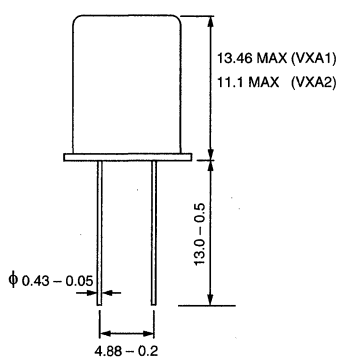
Crystal Aging
<5 ppm/1st year

Standard Packaging
Bagged

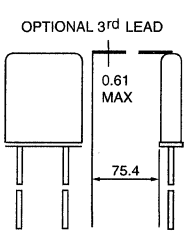
Typical P/N
VXA1-3B2-40M000
A1 = HC/49U package 13.5 mm tall
3 = 3rd overtone
B = ± 50 PPM -20°C to +70°C
2 = 20 pF load



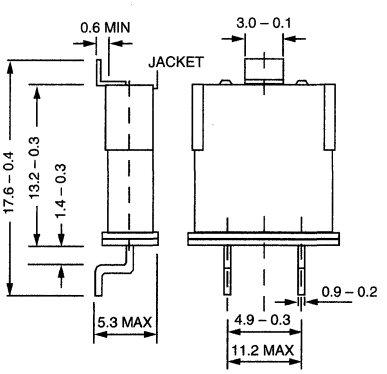
VXA1
VXA2



VXA6



VXA7



Dimensions in Millimeters.

VECTRON INTERNATIONAL

Visit Our Web-Site at www.viteonline.com
VITE Technology *Express* TEL: 1-888-TELVITE (835-8483) FAX: 1-877- FAXVITE (329-8483)

VISHAY

OSCILLATORS and CRYSTALS

- **Surface Mount**
- **Thru-Hole**
- **Crystal Clock**
- **Voltage Controlled**

EEM DESCRIPTIONS

OSCILLATORS:

- Modules
- Crystal, Clock
- Crystal Controlled
- Hybrid
- RF
- Square Wave
- Voltage Controlled Crystal

CRYSTALS:

- Microprocessor
- Piezoelectric
- Quartz, High Frequency
- Quartz, Strip

FLASHFAX℠

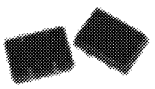
Fax 1-800-835-4272 for literature.

Or call Vishay's FlashFax℠ Service at 1-800-487-9437. Request document 9999. This is a listing of data sheets you can order by fax in a flash!

16 Oscillator/Crystal data sheets are available.

INTERNET

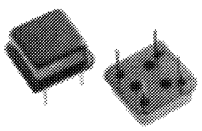
SURFACE MOUNT OSCILLATORS



XOSM-55
1 to 72 MHz

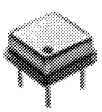
X0SM-57/-573
1.5 to 75 MHz

THRU-HOLE OSCILLATORS

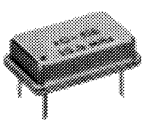


XO-42
1 to 80 MHz

XO-43
250 kHz to 60 MHz



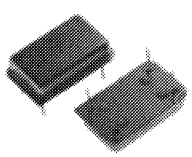
XO-52
240 kHz to 80 MHz



XO-53
1 to 80 MHz

XO-54
240 kHz to 80 MHz

VOLTAGE CONTROLLED OSCILLATORS



XOVC-23
1 to 40 MHz

SURFACE MOUNT CRYSTALS

XT48C
10 to 90 MHz

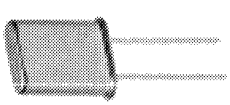
XT49M
3.5 to 60 MHz

XT57C
10 to 72 MHz

THRU-HOLE CRYSTALS

XT38T
32.768 kHz

XT49S
3.5 to 60 MHz



XT49U
3.5 to 48 MHz

Vishay Components Supply Division 1155 W. 23rd Street, Tempe, AZ 85282-1883 • **Phone** (602) 967-7874 • **Fax** 602-829-9314 • **Internet** www.vishay.com
Major Vishay Brands Dale • Draloric • Foil Resistors • Measurements Group • Roederstein • Sfernice • Sprague • Thin Film • Vitramon

DELAY LINES

Manufacturer	Starting EEM Page No.	Passive				Digital		Video	Glass & Quartz	Other Types
		Distributed Constant		Lumped Constant						
		Fixed	Variable	Fixed	Variable	Tapped	Programmable			
Allen Avionics, Inc.	A•1547	√§*	√§*	√§*	√§*	√§*	√§*	√§*		
Bel Fuse	A•1548			√§		√§				
Dallas Semiconductor	A•1550					√§	√§			Active, CMOS, TTL
Data Delay Devices	A•1552	√§*	√§*	√§*	√§*	√§*	√§*	√§*		
Elmec Technology, of America, Inc.	A•1564	√§		√§	√		√			
Kappa Technologies, Inc.	A•1570	√*	√*	√§*	√*	√§*	√§*	√*		
PCA Electronics	A•1571					√§				
Polara Engineering Inc.	A•1572	√*		√§*		√§*	√§*	√§*		
RCD Components, Inc.	A•1573	√§*		√§*		√§*	√§*			
Rhombus Industries	A•1575			√§*		√§*	√§*	√§*		

* MIL Spec. § Surface Mount.

It's FREE... and it's fast!

http://icmaster.com

IC MASTER Online is the industry's leading database, updated monthly, of both current and discontinued commercially available integrated circuits from over 345 manufacturers. It gives you basic specifications, pinout diagrams and package outlines, second source data, application notes, and complete vendor contact information for over 135,000 base part numbers.

Go online now for:

- ***FREE*** and unlimited access to the entire IC MASTER database.
- ***Direct links*** to actual datasheets on the manufacturer's own website, for devices selected by the manufacturer.
- Full part number and specification search capability.
- Plus, much more!

Try **http://icmaster.com** today, it's ***FREE!***

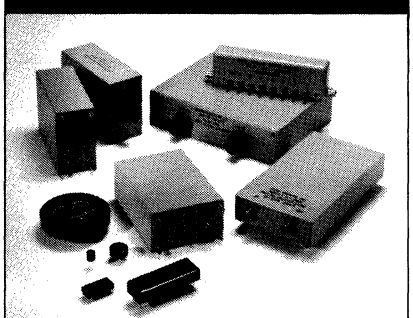
IC MASTER Online will dramatically cut the number of online hours you spend searching, comparing, and finally selecting integrated circuits.

Hearst Business Communications, Inc./UTP Division
645 Stewart Avenue, Garden City, NY 11530 ▪ Tel: 516.227.1300 ▪ FAX: 516.227.1901

ALLEN AVIONICS, INC.

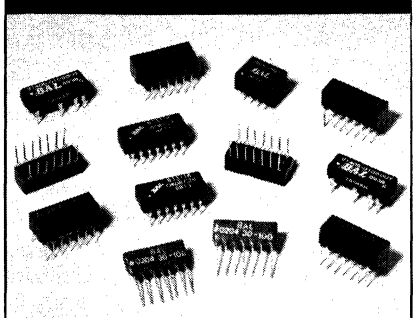
The world's most complete source of:
Video Delay Lines • General Purpose Delay Lines
Video Filters • LC Filters from 20Hz to 3GHz
Video Hum Eliminators & Isolation Transformers
Digital Delay Lines and Video Instrumentation.

GENERAL PURPOSE DELAY LINES



- Audio
- RF
- Lumped & Distributed
- Spiradel
- Fixed
- Variable
- Tapped
- Dual-In-Line
- Programmable
- Miniature & TO5 Package
- Radio Paging
- High Frequency
- Custom Designs
- Military
- Surface Mount

DIGITAL DELAY LINES



- TTL
- DTL
- ECL
- Fixed
- Variable
- Programmable
- Ultra-High-Speed
- Surface Mount
- Delay Trimmers

VIDEO DELAY LINES

- Active & Passive
- Rack Mountable
- Boxed
- Variable & Fixed
- Infinitely Variable
- Programmable
- 30 MHz Delay Lines for HDTV
- Video Equalizers
- Video Attenuators

ALLEN AVIONICS, INC.

224 East Second Street, Mineola, NY 11501 • (516) 248-8080 • FAX (516) 747-6724

bel defining a degree of excellence

ACTIVE DELAY LINES

Bel manufactures a complete line of delay lines for the worldwide electronics industry. Bel provides TTl active, CMOS active, ECL active, and passive delay lines. These densely packaged combinations of wire-wound components used in combination with other passive and active components such as capacitors, resistors and ICs, perform the functions of timing, signal conditioning and power conversion.

The following list of delay lines is representative of the range of products Bel can provide. Please contact Bel directly if you need more technical data or if you need a particular part that you do not see listed here.

SMD Parts	Thru-Hole Parts	Description	Total Delay Range	Data Sheet Number
TTL ACTIVE DELAY LINES				
S422-XXXX-02	A447-XXXX-02	Standard 5 Tap Leading Edge Control 14 Pin Dip	25 to 250 ns	Cat 5-R7
S423-XXXX-02	A463-XXXX-02	Standard 5 Tap Leading Edge Control 8 Pin Dip	25 to 150 ns	Cat 7-R7
	0462-XXXX-02	Standard 5 Tap Leading Edge Control 8 Pin Sip	25 to 200 ns	Cat 25-R1
S497-XXXX-02	A497-XXXX-02	Precise 5 Tap Leading Edge Control 14 Pin Dip	25 to 250 ns	Cat 22-R2
S493-XXXX-02	A493-XXXX-02	Precise 5 Tap Leading Edge Control 8 Pin Dip	25 to 150 ns	Cat 28-R2
S422-XXXX-06	A447-XXXX-06	Stnd 1 Tap Leading & Trailing Edge Control 14 Pin Dip	10 to 200 ns	Cat 23-R3
S423-XXXX-06	A463-XXXX-06	Standard 1 Tap Leading Edge Control 8 Pin Dip	5 to 100 ns	Cat 18-R2
S497-XXXX-06	A497-XXXX-06	Precise 1 Tap Leading Edge Control 14 Pin Dip	10 to 200 ns	Cat 34-R0
S493-XXXX-06	A493-XXXX-06	Precise 1 Tap Leading Edge Control 8 Pin Dip	5 to 100 ns	Cat 29-R1
S422-XXXX-10	A447-XXXX-10	Standard 10 Tap Leading Edge Control 14 Pin Dip	22.5 to 250 ns	Cat 11-R5
S497-XXXX-10	A497-XXXX-10	Precise 10 Tap Leading Edge Control 14 Pin Dip	22.5 to 250 ns	Cat 26-R3
S422-XXXX-A1	A447-XXXX-A1	Stnd 5 Tap Leading & Trailing Edge Control 14 Pin Dip	25 to 250 ns	Cat 3-R6
S422-XXXX-A3	A447-XXXX-A3	Standard Triple Line Leading Edge Control 14 Pin Dip	5 to 80 ns	Cat 12-R3
S423-XXXX-A3	A463-XXXX-A3	Standard Triple Line Leading Edge Control 8 Pin Dip	5 to 50 ns	Cat 9-R4
S497-XXXX-A3	A497-XXXX-A3	Precise Triple Line Leading Edge Control 14 Pin Dip	5 to 80 ns	Cat 32-R0
S493-XXXX-A3	A493-XXXX-A3	Precise Triple Line Leading Edge Control 8 Pin Dip	5 to 50 ns	Cat 39-R0
CMOS ACTIVE DELAY LINES				
S450-XXXX-02	A450-XXXX-02	High Speed 5 Tap Leading Edge Control 14 Pin Dip	25 to 200 ns	Cat 10-R3
S477-XXXX-02	A477-XXXX-02	Low Voltage 5 Tap Leading Edge Control 14 Pin Dip	25 to 250 ns	Cat 30-R2
S473-XXXX-02	A473-XXXX-02	Low Voltage 5 Tap Leading Edge Control 8 Pin Dip	25 to 150 ns	Cat 36-R0
S477-XXXX-06	A477-XXXX-06	Low Voltage 1 Tap Leading Edge Control 14 Pin Dip	10 to 200 ns	Cat 35-R0
S473-XXXX-06	A473-XXXX-06	Low Voltage 1 Tap Leading Edge Control 8 Pin Dip	5 to 100 ns	Cat 38-R0
S477-XXXX-10	A477-XXXX-10	Low Voltage 10 Tap Leading Edge Control 14 Pin Dip	22.5 to 250 ns	Cat 31-R1
S477-XXXX-A3	A477-XXXX-A3	Low Voltage Triple Line Leading Edge Control 14 Pin Dip	5 to 80 ns	Cat 33-R0
S473-XXXX-A3	A473-XXXX-A3	Low Voltage Triple Line Leading Edge control 8 Pin Dip	5 to 50 ns	Cat 37-R0
ECL ACTIVE DELAY LINES				
S459-XXXX-02	A459-XXXX-02	ECL 10KH 5 Tap Leading Edge Control 16 Pin Dip	6 to 125 ns	Cat 41-R0
	0461-XXXX-01	ECL 100K 8 Tap Leading Edge Control 24 Pin Dip	16 to 80 ns	Cat 42-R0

Specifications subject to change without notice.

Bel Fuse Inc. 198 Van Vorst Street, Jersey City, NJ 07302 • Tel 201-432-0463 • Fax 201-432-9542 • www.belfuse.com

defining a degree of excellence

bel

PASSIVE DELAY LINES

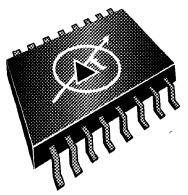
SMD Parts	Thru-Hole Parts	Description	Total Delay Range	Z_0 (Ω)	Data Sheet Number
		PASSIVE DELAY LINES			
	0401 Series	High Speed 1 Tap 8 Pin Sip	0.5 to 40 ns	100	Cat 16-R5
	A401 Series	High Speed 1 Tap 8 Pin Sip	0.5 to 40 ns	50	Cat 16-R5
				60	
				75	
	0402 Series	Standard 1 Tap 3 Pin Sip	0.5 to 15 ns	55	Cat 27-R3
				75	
				82	
				93	
	0403 Series	Standard 1 Tap 7 Pin Sip	1 to 50 ns	50	Cat 40-R0
				75	
				100	
				200	
	0475 Series	Standard 5 Tap 7 Pin Sip	5 to 100 ns	50	Cat 14-R3
			5 to 70 ns	100	
S407 Series		Standard 1 Tap 4 Pin SMD	0.5 to 2.0 ns	55	Cat 24-R4
S469 Series	A446 Series	Standard 10 Tap 14 Pin Dip	5 to 500 ns	100	Cat 20-R3
S470 Series		High Speed 1 Tap 14 Pin SMD	0.5 to 40 ns	50	Cat 43-R0
				65	
				75	
				100	

This list of passive delay lines is representative of the range of products Bel can provide. Please contact Bel directly if you need more technical data or if you need a particular part that you do not see listed here.

Specifications subject to change without notice.

Silicon Timed Circuits

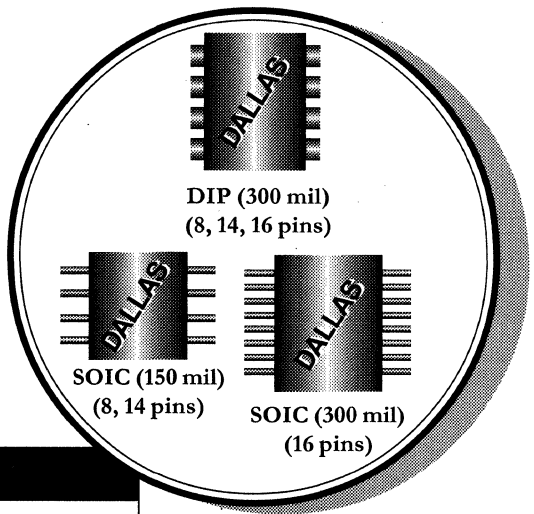
Delay Lines, Timing Functions and More



Dallas Semiconductor Silicon Timed Circuits (STCs) are more than silicon replacements for hybrid delays; they're a designer's all-silicon solution to overcoming system timing problems and maximizing system performance in memory management, clock timing and bus management. STCs let you spend more time designing and less time fine-tuning your system.

The Dallas STC Line Features:

- The high reliability of monolithic ICs
- Leading- and trailing-edge accuracy
- Compatible with TTL and CMOS designs
- Auto-insertable, low-profile packaging
- Tape and reel available
- Suitable for vapor phase, IR and wave soldering manufacturing processes
- Custom delays are available
- Late Package Program shortens lead times for prototypes and custom versions



Multiple-Tap Delays

# Taps	Part #	Packages	Features
5	DS1000	DIP SOIC	4 to 500ns delays Pin-compatible with standard hybrids
5	DS1004	DIP SOIC	2 to 5ns tap-to-tap increments Temperature and voltage compensation
5	DS1005	DIP SOIC	12 to 250ns delays Temperature and voltage compensation
10	DS1010	DIP SOIC	5 to 500ns delays Pin-compatible with standard hybrids

Multiple Independent Delays

Delays	Part #	Packages	Features
3	DS1013	DIP SOIC	10 to 200ns delays Pin-compatible with standard hybrids
3	DS1033	DIP SOIC	8 to 30ns delays 3V operation
3	DS1035	DIP SOIC	6 to 30ns delays High-speed, low-power
4	DS1044	DIP SOIC	5 to 25ns delays Pin-compatible with standard hybrids
7	DS1007	DIP SOIC	3 to 40ns delays

Silicon Timed Circuits Replace Hybrid Delay Lines

These Dallas Semiconductor Silicon Timed Circuits are pin-for-pin compatible with standard hybrid devices so no redesign is required to take advantage of their features:

- **greater reliability**
- **improved accuracy**
- **space and cost savings**
- **ease of manufacturing**

In new designs, custom STCs have become a trusted designer's advantage to speed design to market by fine-tuning system timing. STCs are a single-chip solution; no outside components are required. For custom timing needs, we can deliver factory-trimmed devices.

For the latest product info,
visit our Web site at
http://www.dalsemi.com

DALLAS SEMICONDUCTOR

(972) 371-4348

Programmable Delays

# Delays	Part #	Packages	Key Features
1	DS1020	DIP SOIC	8-bit programmable 0.15 to 2ns steps
1	DS1021	SOIC	8-bit programmable 0.25 and 0.50ns steps
2	DS1045	DIP SOIC	4-bit programmable 9 to 84ns steps

System Timing Functions

Description	Part #	Packages	Key Features
2-in-1 Delay Line with Logic	DS1012	DIP SOIC	3 to 40ns delays 2-input, 4-output with logic
Programmable One-shot Pulse Generator	DS1040	DIP SOIC	5 to 500ns pulse with no external components

New Products

Description	Part #	Packages	Key Features
Single-Chip Oscillator	DS1075	DIP SOIC	• 200kHz to 100MHz frequencies • 1% accuracy over temp and voltage • Choice of internal, external or crystal reference • User/factory-programmable
Oscillator Development	DS1075K	N/A	• User-programmable tool for the EconOscillator Family • Contains S/W, development board and sample device • Supports 5V & 3V device and DIP, SOIC and TO-92 packages
8-bit Programmable Timing Element	DS1023	DIP SOIC	• Configure as delay line, pulse width modulator, or free-running oscillator • 0.25, 0.5, 1.0, 2.0, 5ns steps • Parallel or serial programming • Single 5V supply
In-Circuit Programmable Oscillator	DS1077	DIP SOIC	• 16KHz-133 MHz frequency range • 1% accurate over temp and voltage • In-circuit programmable on the fly
Frequency Synthesizer	DS1085	DIP SOIC	• Up to 120MHz output frequency • Frequency step sizes down to 10KHz • Programmable on the fly

Programmable Silicon Timed Circuits

A generation beyond standard delays, our programmable STCs offer increased capability and flexibility you can use to fine-tune system timing with precision pulse delays or durations. Dallas also offers system timing function devices that feature pulse generation or pulse doubling capability.

Designer Resources

Ask your Dallas rep or contact us for these resources.

- ❑ Dallas Semiconductor CD ROM Data Book
- ❑ Silicon Timed Circuits brochure and selection guide
- ❑ Product data sheets (available immediately on Web)
- ❑ Designer's Guide with application ideas
- ❑ Designs considerations for all-silicon delay lines
- ❑ Product samples

Late Package Program (LLP)

Need a prototype or a custom version in a hurry? Call us at (972) 371-6421. We can turn them quickly for a nominal fee.

How to Contact Us

Literature and Technical Support ..... (972) 371-4448
Sales and Customer Service ..... (972) 371-4969
Automatic Data Sheet Faxback ..... (972) 371-4441
World Wide Web Site ..... http://www.dalsemi.com/
E-mail Format ..... bob.brown@dalsemi.com

STC Product Marketing

Steve Brightman ..... (972) 371-3865
Barry Ross ..... (972) 371-4348
Bob Brown ..... (972) 371-3719
Applications Engineer ..... (972) 371-6421

For more information on this and other Dallas p roduct lines, visit our Web site.

http://www.dalsemi.com

DALLAS SEMICONDUCTOR

4401 S. Beltwood Pkwy
Dallas, Texas 75244
(972) 371-4348 Tel
(972) 371-3717 Fax

PRODUCT SELECTION GUIDE

MONOLITHIC DELAY LINE PRODUCT SELECTION GUIDE

data delay devices, inc.

PRODUCT DESCRIPTIONS

SERIES	DESCRIPTION	PACKAGE	PART NUMBER	DASH NUMBERS	NOTES
3D7010	10-Tap Fixed Delay Line (Large Delays)	14-Pin DIP	3D7010-xxx	80 through 500	Dash Number Equals Total Delay
		14-Pin Gull-Wing	3D7010G-xxx		
		16-Pin SOIC	3D7010S-xxx		
3D7105	5-Tap Fixed Delay Line (Small Delays)	8-Pin DIP	3D7105M-xxx	.75 through 8	Dash Number Equals Increment
		8-Pin Gull-Wing	3D7105H-xxx		
		8-Pin SOIC	3D7105Z-xxx		
		14-Pin DIP	3D7105-xxx		
		14-Pin Gull-Wing	3D7105G-xxx		
		14-Pin Sheared	3D7105K-xxx		
		16-Pin SOIC	3D7105S-xxx		
3D7110	10-Tap Fixed Delay Line (Small Delays)	14-Pin DIP	3D7110-xxx	.75 through 8	Dash Number Equals Increment
		14-Pin Gull-Wing	3D7110G-xxx		
		14-Pin SOIC	3D7110D-xxx		
		16-Pin SOIC	3D7110S-xxx		
3D7205	5-Tap Fixed Delay Line (Large Delays)	8-Pin DIP	3D7205M-xxx	8 through 100	Dash Number Equals Increment
		8-Pin Gull-Wing	3D7205H-xxx		
		8-Pin SOIC	3D7205Z-xxx		
		14-Pin DIP	3D7205-xxx		
		14-Pin Gull-Wing	3D7205G-xxx		
		14-Pin Sheared	3D7205K-xxx		
		16-Pin SOIC	3D7205S-xxx		
3D7303	Triple Fixed Delay Line	8-Pin DIP	3D7303M-xxx	10 through 500	Dash Number Equals Total Delay
		8-Pin Gull-Wing	3D7303H-xxx		
		8-Pin SOIC	3D7303Z-xxx		
		14-Pin DIP	3D7303-xxx		
		14-Pin Gull-Wing	3D7303G-xxx		
		14-Pin Sheared	3D7303K-xxx		
3D7304	Quadruple Fixed Delay Line	14-Pin DIP	3D7304-xxx	10 through 500	Dash Number Equals Total Delay
		14-Pin Gull-Wing	3D7304G-xxx		
		14-Pin SOIC	3D7304S-xxx		
3D7408	8-Bit Programmable Delay Line	16-Pin DIP	3D7408-xxx	.25 through 5	Dash Number Equals Increment
		16-Pin Gull-Wing	3D7408G-xxx		
		16-Pin SOIC	3D7408S-xxx		

PART NUMBER GENERATION PROCEDURE

3D7 X XX X - XXX X

GENERIC NAME

SERIES
0 - 7000 1 - 7100 2 - 7200
3 - 7300 4 - 7400

CONFIGURATION
05 - 5 taps 10 - 10 taps (7000, 7100, 7200)
03 - 3 lines 04 - 4 lines (7300)
08 - 8 bits (7400)

PACKAGE
None - Dip-14, Dip-16
G - Dip-14, Dip-16 Gull-Wing
K - Dip-14 Sheared
S - SOIC-16
M - Dip-8
H - Dip-8 Gull-Wing
Z - SOIC-8
D - SOIC-14

GRADE
None - Commercial
I - Industrial
M - Military (DIP-14 Only)

DELAY
Total Delay (7000, 7300)
Increment (7100, 7200, 7400)

DATA DELAY DEVICES ■ 3 Mt. Prospect Avenue, Clifton, New Jersey 07013 ■ (973) 773-2299 ■ FAX (973) 773-9672

data delay devices

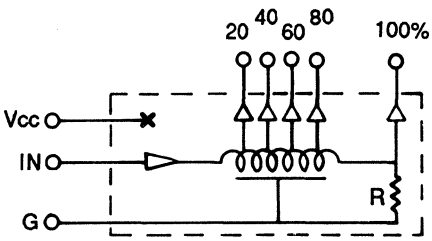
New Dimensions in Delay Line Techniques

5 Taps - Hybrid Delay Lines

(Fast-TTL – ECL – CMOS)

Features:

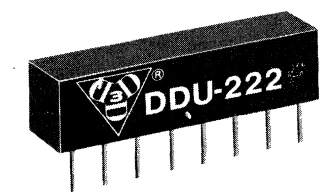
- **Outputs:** 5, equally spaced.
- **Delay Tolerance:** see table.
- **Rise time:** 2 ns typically.
- **Minimum pulse width:** 20% of total delay for DDU-4F. 40% of total delay for rest.
- **Temperature range:** 0°C to + 70°C.
- **Temperature coefficient:** 100 PPM/°C.
- **Input signal requirement:** TTL logic.
- **Output fan-out:** TTL Schottky load.

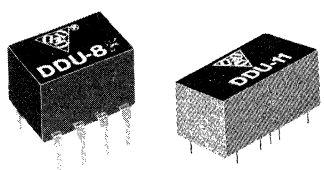


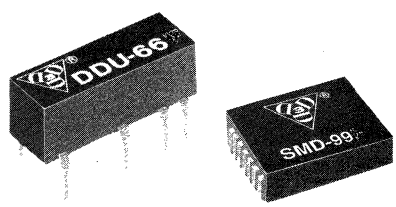
(Fast-TTL) Part Numbers					Total Delay
DDU-4F-5004	DDU-8F-5004	DDU-66F-4	SMD-99F-5004	DDU-222F-4	4
DDU-4F-5006	DDU-8F-5006	DDU-66F-6	SMD-99F-5006	DDU-222F-6	6
DDU-4F-5008	DDU-8F-5008	DDU-66F-8	SMD-99F-5008	DDU-222F-8	8
DDU-4F-5010	DDU-8F-5010	DDU-66F-10	SMD-99F-5010	DDU-222F-10	10
DDU-4F-5012	DDU-8F-5012	DDU-66F-12	SMD-99F-5012	DDU-222F-12	12
DDU-4F-5016	DDU-8F-5016	DDU-66F-16	SMD-99F-5016	DDU-222F-16	16
DDU-4F-5020	DDU-8F-5020	DDU-66F-20	SMD-99F-5020	DDU-222F-20	20
DDU-4F-5025	DDU-8F-5025	DDU-66F-25	SMD-99F-5025	DDU-222F-25	25
DDU-4F-5030	DDU-8F-5030	DDU-66F-30	SMD-99F-5030	DDU-222F-30	30
DDU-4F-5035	DDU-8F-5035	DDU-66F-35	SMD-99F-5035	DDU-222F-35	35
DDU-4F-5040	DDU-8F-5040	DDU-66F-40	SMD-99F-5040	DDU-222F-40	40
DDU-4F-5045	DDU-8F-5045	DDU-66F-45	SMD-99F-5045	DDU-222F-45	45
DDu-4F-5050	DDU-8F-5050	DDU-66F-50	SMD-99F-5050	DDU-222F-50	50
DDU-4F-5060	DDU-8F-5060	DDU-66F-60	SMD-99F-5060	DDU-222F-60	60
DDU-4F-5075	DDU-8F-5075	DDU-66F-75	SMD-99F-5075	DDU-222F-75	75
DDU-4F-5100	DDU-8F-5100	DDU-66F-100	SMD-99F-5100	DDU-222F-100	100
DDU-4F-5125	DDU-8F-5125	DDU-66F-125	SMD-99F-5125	DDU-222F-125	125
DDU-4F-5150	DDU-8F-5150	DDU-66F-150	SMD-99F-5150	DDU-222F-150	150
DDU-4F-5175	DDU-8F-5175	DDU-66F-175	SMD-99F-5175	DDU-222F-175	175
DDU-4F-5200	DDU-8F-5200	DDU-66F-200	SMD-99F-5200	DDU-222F-200	200
DDU-4F-5250	DDU-8F-5250	DDU-66F-250	SMD-99F-5250	DDU-222F-250	250
DDU-4F-5300					300
DDU-4F-5350					350
DDU-4F-5400					400
DDU-4F-5450					450
DDU-4F-5500					500

For complete details consult the specification sheet.

(CMOS) Part Numbers					Total Delay (ns)
DDU-4C-5050	DDU-8C-5050	DDU-66C-50	SMD-99C-5050	DDU-222C-50	50
DDU-4C-5060	DDU-8C-5060	DDU-66C-60	SMD-99C-5060	DDU-222C-60	60
DDU-4C-5075	DDU-8C-5075	DDU-66C-75	SMD-99C-5075	DDU-222C-75	75
DDU-4C-5100	DDU-8C-5100	DDU-66C-100	SMD-99C-5100	DDU-222C-100	100
DDU-4C-5125	DDU-8C-5125	DDU-66C-125	SMD-99C-5125	DDU-222C-125	125
DDU-4C-5150	DDU-8C-5150	DDU-66C-150	SMD-99C-5150	DDU-222C-150	150
DDU-4C-5175	DDU-8C-5175	DDU-66C-175	SMD-99C-5175	DDU-222C-175	175
DDU-4C-5200	DDU-8C-5200	DDU-66C-200	SMD-99C-5200	DDU-222C-200	200
DDU-4C-5250	DDU-8C-5250	DDU-66C-250	SMD-99C-5250	DDU-222C-250	250







(ECL) Part No.	Total Delay (ns)
DDU-11-5	4
DDU-11-10	8
DDU-11-20	16
DDU-11-25	20
DDU-11-50	50
DDU-11-75	75
DDU-11-100	100
DDU-11-150	150
DDU-11-200	200
DDU-11-250	250
DDU-11-300	300
DDU-11-400	400
DDU-11-500	500

DATA DELAY DEVICES ■ 3 Mt. Prospect Avenue, Clifton, New Jersey 07013 ■ (973) 773-2299 ■ FAX (973) 773-9672

data delay devices

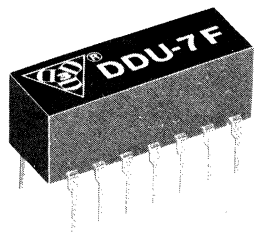
New Dimensions in Delay Line Techniques

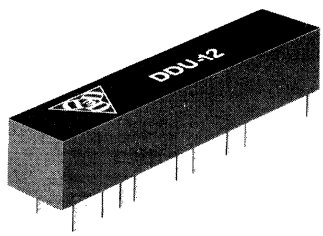
10 Taps - Hybrid Delay Lines

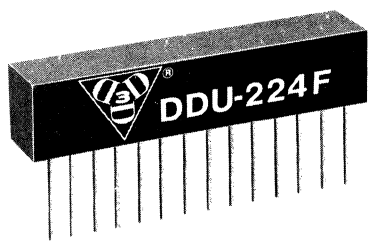
(Fast-TTL, ECL)

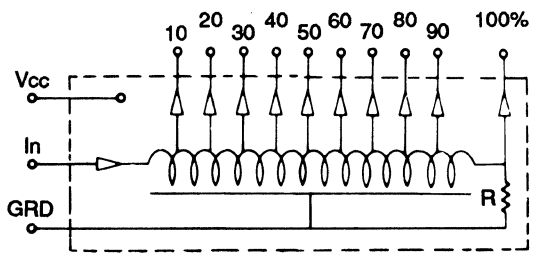
Features:

- **No. Taps:** 10 equally spaced taps.
- **Total Delay Tolerance:** ± 5% or better, or 2 ns whichever is greater.
- **Rise time:** 2 ns typically.
- **Temperature coefficient:** 100 PPM/° C.
- **Temperature range:** 0° to + 70° C.
- **Minimum pulse-width:** 20% of total delay.









(Fast-TTL) Part Numbers		Tap Delay	Total Delay
DDU-7F-10	DDU-224F-10	1	9
DDU-7F-20	DDU-224F-20	2	18
DDU-7F-25	DDU-224F-25	2.5	22.5
DDU-7F-50	DDU-224F-50	5	45
DDU-7F-100	DDU-224F-100	10	100
DDU-7F-150	DDU-224F-150	15	150
DDU-7F-200	DDU-224F-200	20	200
DDU-7F-250	DDU-224F-250	25	250
DDU-7F-300	DDU-224F-300	30	300
DDU-7F-400	DDU-224F-400	40	400
DDU-7F-500	DDU-224F-500	50	500

(ECL) Part No.	Total Delay (ns)	Delay Tap (ns)
DDU-12-10	9	1
DDU-12-20	18	2
DDU-12-25	22.5	2.5
DDU-12-40	36	4
DDU-12-50	45	5
DDU-12-75	75	7.5
DDU-12-100	100	10
DDU-12-150	150	15
DDU-12-200	200	20
DDU-12-250	250	25
DDU-12-300	300	30
DDU-12-400	400	40
DDU-12-500	500	50
DDU-12-750	750	75
DDU-12-1000	1000	100
DDU-12-1500	1500	150

For complete details
consult the specification sheet.

DATA DELAY DEVICES ■ 3 Mt. Prospect Avenue, Clifton, New Jersey 07013 ■ (973) 773-2299 ■ FAX (973) 773-9672

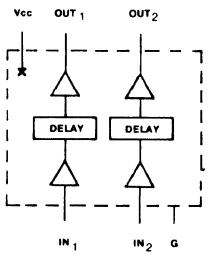
data delay devices

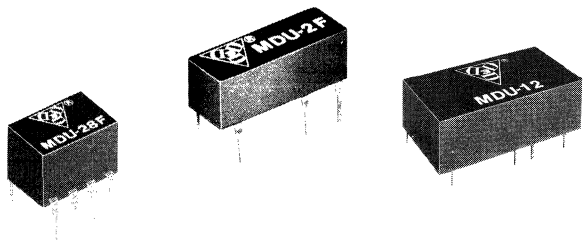
New Dimensions in Delay Line Techniques

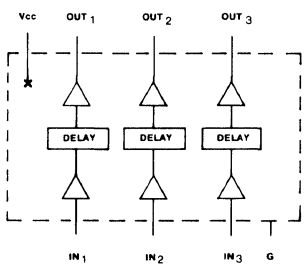
Multiple-Hybrid Delay Lines
(Fast-TTL; ECL)

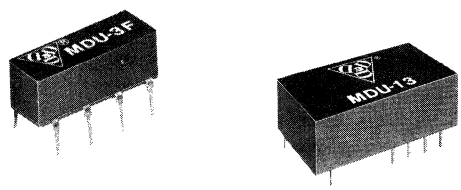
Features:

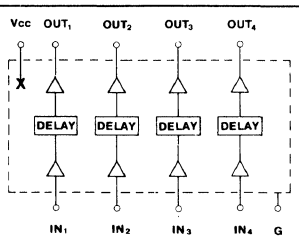
- **Delay Tolerance:** ±5% or 2 ns whichever is greater
- **Rise-time:** 2 ns typically.
- **Temperature coefficient:** 100 PPM/°C.
- **Temperature range:** 0° to + 70°C.
- **Input signal requirement:** TTL logic.
- **Input pulse width:** Min. 100% of total delay.
- **Input rep. rate** = min. 3 X pulse width.

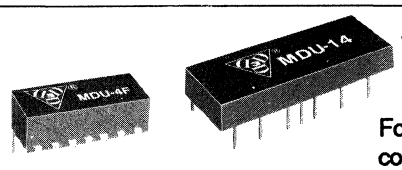












For complete details consult the specification sheet.

(Fast-TTL) Part Numbers				Delay Per Line (ns)
MDU-28F	MDU-2F	MDU-3F	MDU-4F	
MDU-28F-5	MDU-2F-5	MDU-3F-5	MDU-4F-5	5
MDU-28F-6	MDU-2F-6	MDU-3F-6	MDU-4F-6	6
MDU-28F-8	MDU-2F-8	MDU-3F-8	MDU-4F-8	8
MDU-28F-10	MDU-2F-10	MDU-3F-10	MDU-4F-10	10
MDU-28F-12	MDU-2F-12	MDU-3F-12	MDU-4F-12	12
MDU-28F-15	MDU-2F-15	MDU-3F-15	MDU-4F-15	15
MDU-28F-16	MDU-2F-16	MDU-3F-16	MDU-4F-16	16
MDU-28F-20	MDU-2F-20	MDU-3F-20	MDU-4F-20	20
MDU-28F-25	MDU-2F-25	MDU-3F-25	MDU-4F-25	25
MDU-28F-30	MDU-2F-30	MDU-3F-30	MDU-4F-30	30
MDU-28F-35	MDU-2F-35	MDU-3F-35	MDU-4F-35	35
MDU-28F-40	MDU-2F-40	MDU-3F-40	MDU-4F-40	40
MDU-28F-45	MDU-2F-45	MDU-3F-45	MDU-4F-45	45
MDU-28F-50	MDU-2F-50	MDU-3F-50	MDU-4F-50	50
MDU-28F-60	MDU-2F-60	MDU-3F-60	MDU-4F-60	60
MDU-28F-75	MDU-2F-75	MDU-3F-75	MDU-4F-75	75
MDU-28F-100	MDU-2F-100	MDU-3F-100	MDU-4F-100	100
MDU-28F-125	MDU-2F-125			125
MDU-28F-150	MDU-2F-150			150
MDU-28F-175	MDU-2F-175			175
MDU-28F-200	MDU-2F-200			200
MDU-28F-250	MDU-2F-250			250

10K ECL Part No.	Delay Per Line (ns)
MDU-12-5	5
MDU-12-10	10
MDU-12-15	15
MDU-12-20	20
MDU-12-25	25
MDU-12-30	30
MDU-12-35	35
MDU-12-40	40
MDU-12-45	45
MDU-12-50	50
MDU-12-60	60
MDU-12-75	75
MDU-12-100	100
MDU-12-125	125
MDU-12-150	150
MDU-12-200	200
MDU-12-250	250

10K ECL Part No.	Delay Per Line (ns)
MDU-13-5	5
MDU-13-10	10
MDU-13-15	15
MDU-13-20	20
MDU-13-25	25
MDU-13-30	30
MDU-13-35	35
MDU-13-40	40
MDU-13-45	45
MDU-13-50	50

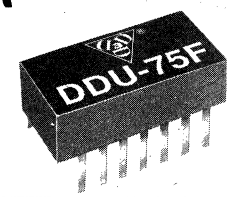
100K ECL Part No.	Delay Per Line (ns)
MDU-14-2	2
MDU-14-2.5	2.5
MDU-14-3	3
MDU-14-4	4
MDU-14-5	5
MDU-14-6	6
MDU-14-7	7
MDU-14-8	8
MDU-14-9	9
MDU-14-10	10
MDU-14-12.5	12.5
MDU-14-15	15
MDU-14-20	20
MDU-14-25	25

DATA DELAY DEVICES ■ 3 Mt. Prospect Avenue, Clifton, New Jersey 07013 ■ (973) 773-2299 ■ FAX (973) 773-9672

data delay devices

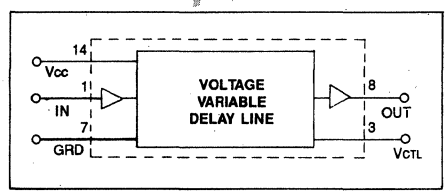
New Dimensions in Delay Line Techniques

VARIABLE HYBRID-DELAY LINES (FAST-TTL LOGIC)

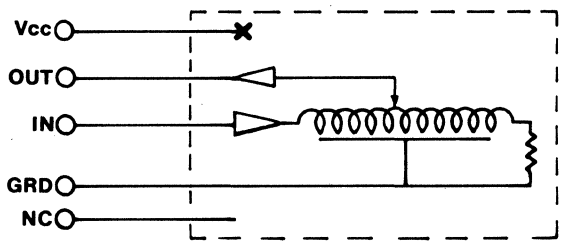


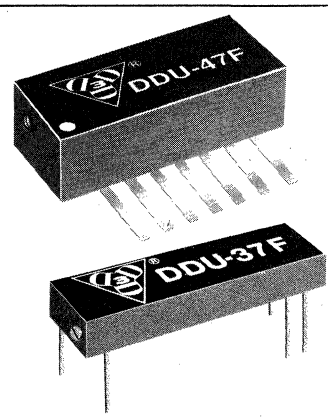
Features:

- **Input signal requirement:** TTL logic.
- **Output fan-out:** TTL Schottky load.
- **Inherent delay:** 10 ns typ.
- **Delay resolution:** .12 ns.
- **Output rise-time:** 4 ns typ.
- **Temperature coefficient:** 100 PPM/°C.
- **Temperature range:** 0°C to 70°C standard. (–55°C to + 125°C on request)
- **Supply voltage:** 5.0 Vdc ± 5%.
- **Power dissipation:** 230 MW max.

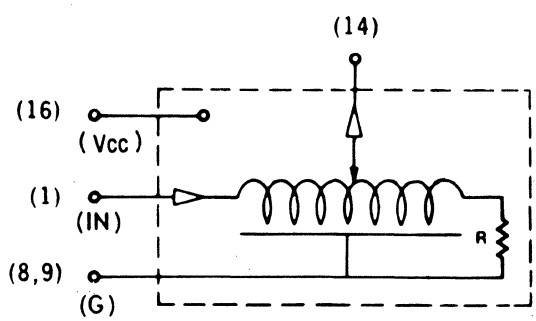


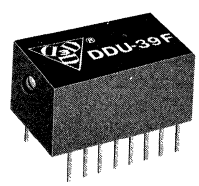
Series DDU-37F, Series DDU-47F





Series DDU-39F





Part No.	Min. Delay Variation (ns)
DDU-37F-25	15
DDU-37F-30	20
DDU-37F-40	30
DDU-37F-50	40
DDU-37F-60	50
DDU-37F-75	60
DDU-37F-80	70
DDU-37F-100	90
DDU-37F-120	100
DDU-37F-150	140
DDU-37F-200	180

Part No.	Inherent Delay Typ.	Adjustment Range Typ.
DDU-39F	7 ns	7 ns to 25 ns
DDU-47F	5 ns	5 ns to 25 ns
DDU-75F	24 ns	24 ns to 52 ns

For complete details consult the specification sheet.

DATA DELAY DEVICES ■ 3 Mt. Prospect Avenue, Clifton, New Jersey 07013 ■ (973) 773-2299 ■ FAX (973) 773-9672

data delay devices

New Dimensions in Delay Line Techniques

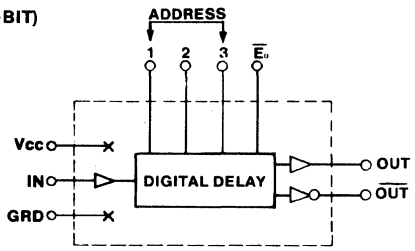
DIGITALLY PROGRAMMABLE HYBRID DELAY LINES

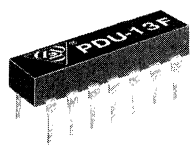
(FAST-TTL; ECL)

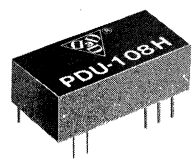
Features:

- **Input signal requirement:** TTL or ECL logic
- **Propagation delay:**
  Address to output = 7 ns typ.
  Enable to output = 6 ns typ.
- **Delay variation:** Monotonic in one direction
- **Programmed delay tolerance:** ± 5% or 1 ns whichever is greater
- **Operating temperature:** 0-70°C.
- **Temperature coefficient:** 100 PPM/°C.

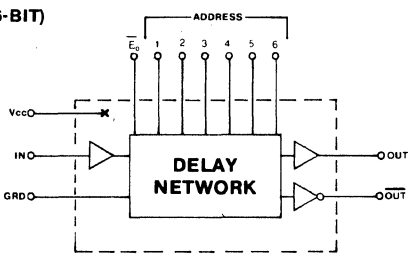
(3-BIT)

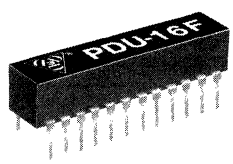


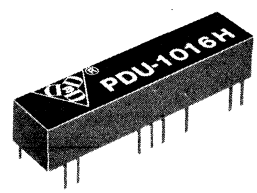




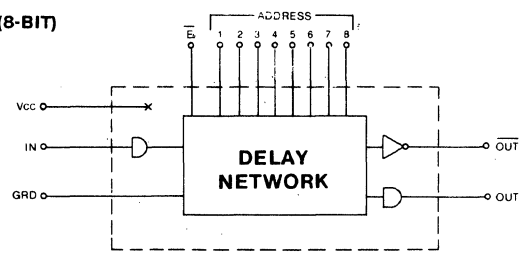
(6-BIT)

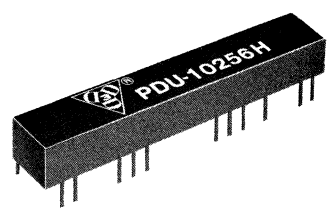






(8-BIT)





Part Numbers (TTL)						
PDU-13F	PDU-14F	PDU-15F	PDU-16F	PDU-17F	PDU-18F	Delay Increment
PDU-13F-.5	PDU-14F-.5	PDU-15F-0.5	PDU-16F-0.5	PDU-17F-.5	PDU-18F-.5	.5 ns
PDU-13F-1	PDU-14F-1	PDU-15F-1	PDU-16F-1	PDU-17F-1	PDU-18F-1	1 ns
PDU-13F-2	PDU-14F-2	PDU-15F-2	PDU-16F-2	PDU-17F-2	PDU-18F-2	2 ns
PDU-13F-3	PDU-14F-3	PDU-15F-3	PDU-16F-3	PDU-17F-3	PDU-18F-3	3 ns
PDU-13F-4	PDU-14F-4	PDU-15F-4	PDU-16F-4	PDU-17F-4	PDU-18F-4	4 ns
PDU-13F-5	PDU-14F-5	PDU-15F-5	PDU-16F-5	PDU-17F-5	PDU-18F-5	5 ns
PDU-13F-6	PDU-14F-6	PDU-15F-6	PDU-16F-6	PDU-17F-6	PDU-18F-6	6 ns
PDU-13F-7	PDU-14F-7	PDU-15F-7	PDU-16F-7	PDU-17F-7	PDU-18F-7	7 ns
PDU-13F-8	PDU-14F-8	PDU-15F-8	PDU-16F-8	PDU-17F-8	PDU-18F-8	8 ns
PDU-13F-9	PDU-14F-9	PDU-15F-9	PDU-16F-9	PDU-17F-9	PDU-18F-9	9 ns
PDU-13F-10	PDU-14F-10	PDU-15F-10	PDU-16F-10	PDU-17F-10	PDU-18F-10	10 ns
PDU-13F-12	PDU-14F-12	PDU-15F-12				12 ns
PDU-13F-15	PDU-14F-15	PDU-15F-15				15 ns
PDU-13F-20	PDU-14F-20	PDU-15F-20				20 ns
PDU-13F-25	PDU-14F-25					25 ns
PDU-13F-30	PDU-14F-30					30 ns
PDU-13F-35	PDU-14F-35					35 ns
PDU-13F-40	PDU-14F-40					40 ns
PDU-13F-45	PDU-14F-45					45 ns
PDU-13F-50	PDU-14F-50					50 ns
	PDU-14F-60					60 ns
	PDU-14F-80					80 ns
	PDU-14F-100					100 ns

Part Numbers (ECL)			Delay Increment
PDU-108H-.5	PDU-1016H-.5	PDU-10256H-.5	.5 ns
PDU-108H-1	PDU-1016H-1	PDU-10256H-1	1 ns
PDU-108H-2	PDU-1016H-2	PDU-10256H-2	2 ns
PDU-108H-3	PDU-1016H-3	PDU-10256H-3	3 ns
PDU-108H-4	PDU-1016H-4	PDU-10256H-4	4 ns
PDU-108H-5	PDU-1016H-5	PDU-10256H-5	5 ns
PDU-108H-6	PDU-1016H-6	PDU-10256H-6	6 ns
PDU-108H-7	PDU-1016H-7	PDU-10256H-7	7 ns
PDU-108H-8	PDU-1016H-8	PDU-10256H-8	8 ns
PDU-108H-9	PDU-1016H-9	PDU-10256H-9	9 ns
PDU-108H-10	PDU-1016H-10	PDU-10256H-10	10 ns
PDU-108H-12	PDU-1016H-12		12 ns
PDU-108H-15	PDU-1016H-15		15 ns
PDU-108H-20	PDU-1016H-20		20 ns
PDU-108H-25	PDU-1016H-25		25 ns
PDU-108H-30	PDU-1016H-30		30 ns
PDU-108H-35	PDU-1016H-35		35 ns
PDU-108H-40	PDU-1016H-40		40 ns
PDU-108H-45	PDU-1016H-45		45 ns
PDU-108H-50	PDU-1016H-50		50 ns
	PDU-1016H-60		60 ns
	PDU-1016H-80		80 ns
	PDU-1016H-100		100 ns

For complete details consult the specification sheet.

DATA DELAY DEVICES ■ 3 Mt. Prospect Avenue, Clifton, New Jersey 07013 ■ (973) 773-2299 ■ FAX (973) 773-9672

data delay devices

New Dimensions in Delay Line Techniques

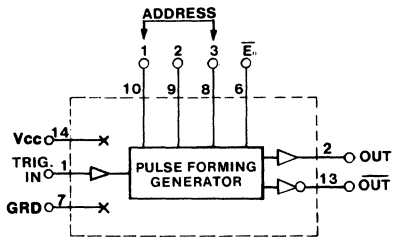
PROGRAMMABLE HYBRID PULSE GENERATORS

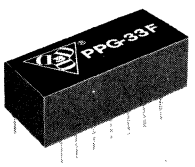
(Fast-TTL)

Features:

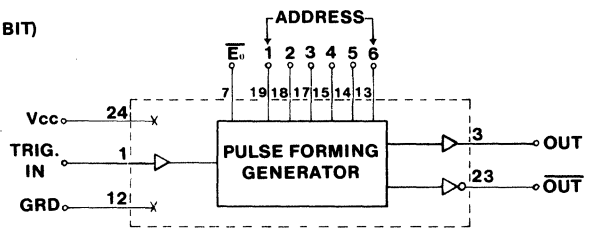
- **Input signal requirement:** TTL rising-edge.
- **Output fan-out:** TTL Schottky loads.
- **Trigger inherent delay:** 6 ns typ.
- **Inherent pulse-width:** 11 ns typ.
- **Pulse-width variation:** monotonic in one direction.
- **Programmed pulse-width tolerance:** ± 5% or 1 ns whichever is greater.
- **Propagation delay:**
  Address to output = 7 ns typ.
  Enable to output = 6 ns typ.
- **Min. down-time** = 1 X programmed PW.
- **Supply voltage:** 5 Vdc.
- **Operating temperature:** 0°C to 70°C.
- **Temperature coefficient:** 100 PPM/°C.

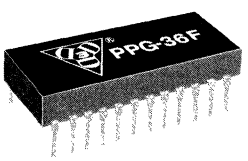
(3-BIT)



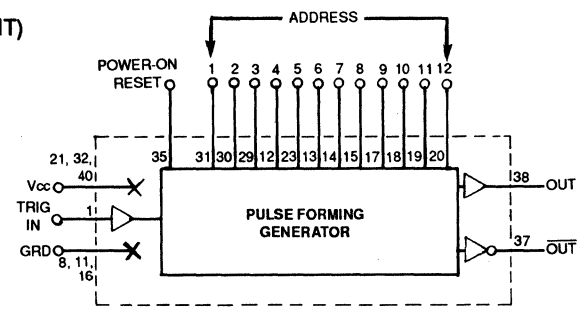


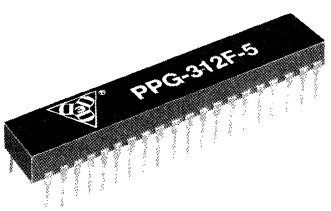
(6-BIT)





(12-BIT)





Digitally Programmable Part Numbers				Incremental Pulse-Width	Trimmer Part Number	Min. Pulse-Width Variation (ns)
PPG-312F-.5	PPG-33F-.5	PPG-36F-.5	PPG-38F-.5	.5 ns	VPG-40-25	15
PPG-312F-1	PPG-33F-1	PPG-36F-1	PPG-38F-1	1 ns	VPG-40-30	20
PPG-312F-2	PPG-33F-2	PPG-36F-2	PPG-38F-2	2 ns	VPG-40-40	30
PPG-312F-3	PPG-33F-3	PPG-36F-3	PPG-38F-3	3 ns	VPG-40-50	40
PPG-312F-4	PPG-33F-4	PPG-36F-4	PPG-38F-4	4 ns	VPG-40-60	50
PPG-312F-5	PPG-33F-5	PPG-36F-5	PPG-38F-5	5 ns	VPG-40-70	60
PPG-312F-6	PPG-33F-6	PPG-36F-6	PPG-38F-6	6 ns	VPG-40-80	70
PPG-312F-7	PPG-33F-7	PPG-36F-7	PPG-38F-7	7 ns	VPG-40-100	90
PPG-312F-8	PPG-33F-8	PPG-36F-8	PPG-38F-8	8 ns	VPG-40-120	100
PPG-312F-9	PPG-33F-9	PPG-36F-9	PPG-38F-9	9 ns	VPG-40-150	140
PPG-312F-10	PPG-33F-10	PPG-36F-10	PPG-38F-10	10 ns	VPG-40-200	180
PPG-312F-15	PPG-33F-15			15 ns		
PPG-312F-20	PPG-33F-20			20 ns		
PPG-312F-40	PPG-33F-40			40 ns		
PPG-312F-50	PPG-33F-50			50 ns		

Other pulse-widths available on request.

SCREW-DRIVER ADJUSTABLE

For complete details consult the specification sheet.

DATA DELAY DEVICES ■ 3 Mt. Prospect Avenue, Clifton, New Jersey 07013 ■ (973) 773-2299 ■ FAX (973) 773-9672

data delay devices

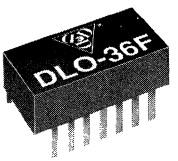
New Dimensions in Delay Line Techniques

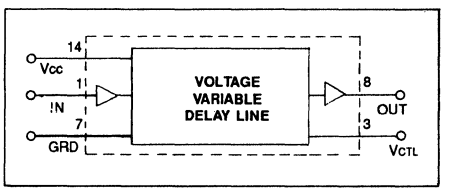
ACTIVE HYBRID MODULES (FAST TTL-LOGIC)

Voltage Variable Gated-Oscillator
Series DLO-36F
(Frequency Variable Range 9-21 MHz)

FEATURES:

- **Frequency settable comparable to crystal oscillator.**
- **Jitter-free operation.**
- **TTL interfaced.**
- **Continuous or keyable wavetrain.**
- **Locked syncronization achieved with random gating signal.**
- **14 pins DIP package.**
- **Low profile module.**





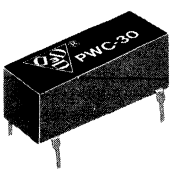
Pulse Width Controller
Series PWC-30

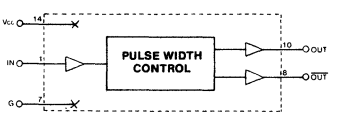
Specifications:

- **Input signal:** TTL.
- **Output fan-out:** 10 TTL loads.
- **Trigger inherent delay:** 5 NS typ.
- **Pulse-width tolerance** = 5% or 2 NS **(others on request)**
- **Min. PRR** = 1.1 × PW
- **Supply voltage:** 5 Vdc.
- **Supply current:**
  I_{CCL}: 32 ma.
  I_{CCH}: 7 ma.
- **Operating temperature:** 0 C to 70 C (−55 to 125 C on request).*
- **Temperature coefficient:** 100 PPM/ C.
- **Output rise-time:** 2 NS typ.

*DIL package used.

Part No.	Pulse Width
PWC-30-5	5 NS
PWC-30-10	10 NS
PWC-30-15	15 NS
PWC-30-20	20 NS
PWC-30-30	30 NS
PWC-30-40	40 NS
PWC-30-50	50 NS
PWC-30-60	60 NS
PWC-30-75	75 NS
PWC-30-100	100 NS
PWC-30-125	125 NS
PWC-30-150	150 NS
PWC-30-175	175 NS
PWC-30-200	200 NS
PWC-30-250	250 NS
PWC-30-300	300 NS
PWC-30-350	350 NS
PWC-30-400	400 NS
PWC-30-500	500 NS



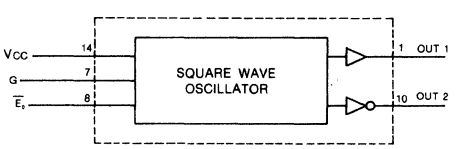


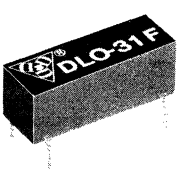
Gated-Oscillator
Series DLO-31F

Specifications:

- **Frequencies:** See table; others on request.
- **Tolerance:** ± 2%.
- **Temperature coefficient:** 100 PPM/ C.
- **Operating temperature:** 0 - 70 C.
- **Supply voltage:** 4.75 to 5.25 Vdc.
- **Supply current:** 40 ma.
- **Storage temperature:** −55 C to 125 C.
- **Enable signal:** TTL logic.
- **Output fan-out:** TTL Schottky load.
- **Inherent delay:** 4 NS typ.

For complete details consult the specification sheet.





Part Number	Frequency	Part Number	Frequency
DLO-31F-2	2 MHz	DLO-31F-10	10 MHz
DLO-31F-2.5	2.5 MHz	DLO-31F-11	11 MHz
DLO-31F-3	3 MHz	DLO-31F-12	12 MHz
DLO-31F-3.5	3.5 MHz	DLO-31F-13	13 MHz
DLO-31F-4	4 MHz	DLO-31F-14	14 MHz
DLO-31F-4.5	4.5 MHz	DLO-31F-15	15 MHz
DLO-31F-5	5 MHz	DLO-31F-20	20 MHz
DLO-31F-5.5	5.5 MHz	DLO-31F-25	25 MHz
DLO-31F-6	6 MHz	DLO-31F-30	30 MHz
DLO-31F-7	7 MHz	DLO-31F-35	35 MHz
DLO-31F-8	8 MHz	DLO-31F-40	40 MHz
DLO-31F-9	9 MHz		

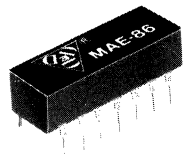
DATA DELAY DEVICES ■ 3 Mt. Prospect Avenue, Clifton, New Jersey 07013 ■ (973) 773-2299 ■ FAX (973) 773-9672

data delay devices

New Dimensions in Delay Line Techniques

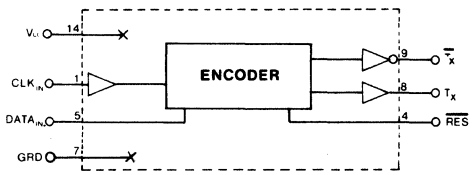
ACTIVE HYBRID MODULES (FAST-TTL LOGIC)

Manchester Encoder
Series MAE-86

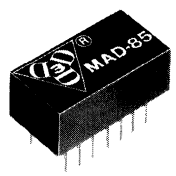


Specifications:

- **Input signal requirement:** TTL logic.
- **Output fan-out:** TTL Schottky load.
- **Operating temperature:** 0° to 70°C.
- **Temperature coefficient:** 100 PPM/°C.
- **Supply voltage V_{CC}:** 5 Vdc ± 5%.
- **Power dissipation:** 300 MW max.
- **CLK_{IN}** = 1 X operating data rates (15 NS min. PW).
- **Data rates up to 30 MB/S.**

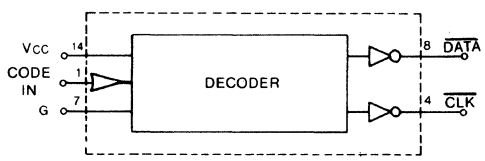


Manchester Decoder
Series MAD-85



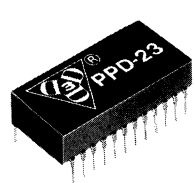
Specifications:

- **Input signal requirement:** TTL logic.
- **Output fan-out:** TTL Schottky load.
- **Operating temperature:** 0°C to 70°C.
- **Temperature coefficient:** 100 PPM/° C.
- **Supply voltage V_{CC}:** 5Vdc ± 5%.
- **Power dissipation:** 740 MW max.



Part No.	Operating Data Rates	Part No.	Operating Data Rates	Part No.	Operating Data Rates
MAD-85-1	1 MB/S	MAD-85-10	10 MB/S	MAD-85-18	18 MB/S
MAD-85-2	2 MB/S	MAD-85-11	11 MB/S	MAD-85-19	19 MB/S
MAD-85-3	3 MB/S	MAD-85-12	12 MB/S	MAD-85-20	20 MB/S
MAD-85-4	4 MB/S	MAD-85-13	13 MB/S	MAD-85-21	21 MB/S
MAD-85-5	5 MB/S	MAD-85-14	14 MB/S	MAD-85-22	22 MB/S
MAD-85-6	6 MB/S	MAD-85-15	15 MB/S	MAD-85-23	23 MB/S
MAD-85-7	7 MB/S	MAD-85-16	16 MB/S	MAD-85-24	24 MB/S
MAD-85-8	8 MB/S	MAD-85-17	17 MB/S	MAD-85-25	25 MB/S
MAD-85-9	9 MB/S				

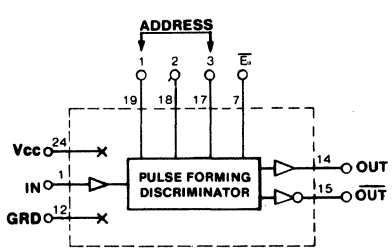
Programmable Pulse Discriminator
Series PPD-23



Specifications:

- **Input requirement:** TTL logic.
- **Inherent pulse width:** 5 NS typ.
- **Supply voltage:** 5 Vdc ± 5%.
- **Operating temperatures:** 0°C to 70°C.
- **Temperature coefficient:** 100 PPM/°C.
- **Power dissipation:** 850 MW max.

Part Number	Incremental Pulse Width Per Step	Total Programmed Pulse Width
PPD-23-1	1 NS ± .4NS	7 NS
PPD-23-2	2 NS ± .4NS	14 NS
PPD-23-3	3 NS ± .5NS	21 NS
PPD-23-5	5 NS ± .6NS	35 NS
PPD-23-10	10 NS ± 1.0 NS	70 NS
PPD-23-15	15 NS ± 1.3 NS	105 NS
PPD-23-20	20 NS ± 1.5 NS	140 NS
PPD-23-40	40 NS ± 2.0 NS	280 NS
PPD-23-50	50 NS ± 2.5 NS	350 NS



For complete details consult the specification sheet.

DATA DELAY DEVICES ■ 3 Mt. Prospect Avenue, Clifton, New Jersey 07013 ■ (973) 773-2299 ■ FAX (973) 773-9672

data delay devices

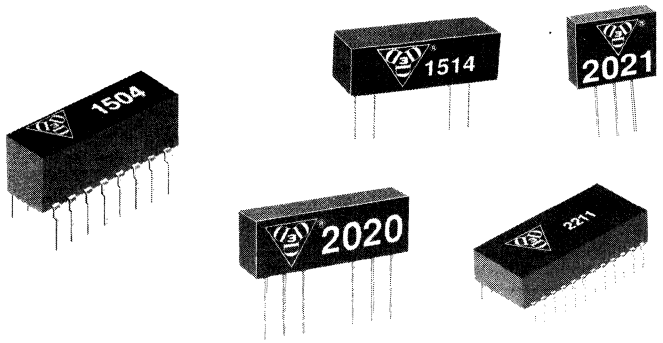
New Dimensions in Delay Line Techniques

PASSIVE DELAY LINES

(Fixed — One Output)

Features:

- **Standard DIP and SIP packages.**
- **TTL and DTL compatible.**
- **Delay tolerance:** +5% or 1 ns whichever is greater.
- **Temperature coefficient:** 100 PPM/° C.
- **Temperature range:** –55°C to +125°C.
- **Dielectric breakdown:** 50 Vdc.
- **Meets or exceeds MIL-D-23859C.**
- **Epoxy encapsulated.**



Part No.	Impedance (Ω)	Total Delay (ns)	Rdc (Ω)
2211-50A	50	50	3.2
2211-60A	50	60	3.5
2211-80A	50	80	5.0
2211-100A	50	100	6.0
2211-150A	50	150	6.0
2211-50B	100	50	6.0
2211-60B	100	60	6.0
2211-80B	100	80	6.5
2211-100B	100	100	7.0
2211-150B	100	150	8.0
2211-200B	100	200	8.5
2211-300B	100	300	11.0
2211-400B	100	400	12.0
2211-40C	200	40	7.0
2211-80C	200	80	8.0
2211-120C	200	120	10.0
2211-200C	200	200	13.0
2211-300C	200	300	12.0
2211-400C	200	400	15.0
2211-500C	200	500	17.0
2211-600C	200	600	23.0
2211-50D	250	50	7.0
2211-100D	250	100	10.0
2211-150D	250	150	12.0
2211-180D	250	180	14.0
2211-200D	250	200	22.0
2211-250D	250	250	21.0
2211-300D	250	300	23.0
2211-380D	250	380	25.0
2211-400D	250	400	26.0
2211-500D	250	500	30.0
2211-600D	250	600	37.0
2211-750D	250	750	40.0
2211-200G	500	200	20.0
2211-300G	500	300	37.0
2211-400G	500	400	40.0
2211-500G	500	500	45.0
2211-600G	500	600	52.0
2211-800G	500	800	80.0
2211-1000G	500	1000	100.0
2211-1200G	500	1200	110.0
2211-1500G	500	1500	130.0
2211-2000G	500	2000	156.0

Part No.	Total Delay (ns)	Imp. Ω	Rdc Ω	Part No.	Total Delay (ns)	Imp. Ω	Rdc Ω	Part No.	Total Delay (ns)	Imp. Ω	Rdc Ω
1504-20A	20	50	1.0	1504-140C	140	200	7.0	1504-600E	600	300	40.0
1504-25A	25	50	1.0	1504-160C	160	200	7.0	1504-40F	40	400	8.5
1504-30A	30	50	1.2	1504-180C	180	200	8.5	1504-80F	80	400	9.0
1504-40A	40	50	1.5	1504-240C	240	200	9.5	1504-120F	120	400	9.0
1504-45A	45	50	1.5	1504-300C	300	200	16.0	1504-160F	160	400	16.0
1504-60A	60	50	1.5	1504-400C	400	200	18.0	1504-200F	200	400	18.0
1504-75A	75	50	1.8	1504-25D	25	250	5.0	1504-240F	240	400	20.0
1504-100A	100	50	2.0	1504-50D	50	250	5.5	1504-320F	320	400	26.0
1504-10B	10	100	1.0	1504-75D	75	250	6.0	1504-360F	360	400	28.0
1504-20B	20	100	1.5	1504-100D	100	250	7.0	1504-480F	480	400	38.0
1504-30B	30	100	1.5	1504-125D	125	250	8.0	1504-600F	600	400	45.0
1504-40B	40	100	1.8	1504-150D	150	250	8.5	1504-800F	800	400	40.0
1504-50B	50	100	2.0	1504-200D	200	250	10.0	1504-50G	50	500	6.0
1504-60B	60	100	3.0	1504-225D	225	250	11.0	1504-100G	100	500	10.0
1504-80B	80	100	3.5	1504-300D	300	250	17.0	1504-150G	150	500	16.0
1504-90B	90	100	3.5	1504-375D	375	250	20.0	1504-200G	200	500	30.0
1504-100B	100	100	4.0	1504-500D	500	250	24.0	1504-220G	220	500	31.0
1504-120B	120	100	4.0	1504-30E	30	300	5.0	1504-250G	250	500	25.0
1504-150B	150	100	5.0	1504-60E	60	300	6.0	1504-300G	300	500	26.0
1504-200B	200	100	6.0	1504-90E	90	300	7.0	1504-380G	380	500	33.0
1504-250B	250	100	7.0	1504-120E	120	300	8.0	1504-400G	400	500	42.0
1504-20C	20	200	3.0	1504-150E	150	300	9.0	1504-450G	450	500	45.0
1504-40C	40	200	4.0	1504-180E	180	300	11.0	1504-500G	500	500	55.0
1504-60C	60	200	4.5	1504-240E	240	300	16.0	*1504-600G	600	500	58.0
1504-80C	80	200	5.5	1504-270E	270	300	18.0	*1504-750G	750	500	50.0
1504-100C	100	200	6.0	1504-360E	360	300	21.0	*1504-1000G	1000	500	65.0
1504-120C	120	200	6.5	1504-450E	450	300	24.0				

Part No.	Part No.	Delay (ps)	Impedance (Ω)
2021-100	2020-100	100	50
2021-150	2020-150	150	50
2021-200	2020-200	200	50
2021-250	2020-250	250	50
2021-300	2020-300	300	50
2021-350	2020-350	350	50
2021-400	2020-400	400	50
2021-500	2020-500	500	50
2021-600	2020-600	600	50
2021-700	2020-700	700	50
	2020-800	800	50
	2020-900	900	50
	2020-1000	1000	50
	2020-1100	1100	50
	2020-1200	1200	50
	2020-1300	1300	50
	2020-1400	1400	50
	2020-1500	1500	50
	2020-1700	1700	50
	2020-1750	1750	50

Part No.	Delay (ns)	Imp. Ω	Part No.	Delay (ns)	Imp. Ω	Part No.	Delay (ns)	Imp. Ω	Part No.	Delay (ns)	Imp. Ω
1514-2.5A	2.5	50	1514-3.5Y	3.5	75	1514-5B	5	100	1514-50D	50	250
1514-5A	5	50	1514-7.5Y	7.5	75	1514-10B	10	100	1514-70D	70	250
1514-10A	10	50	1514-15Y	15	75	1514-20B	20	100	1514-120D	120	250
1514-15A	15	50	1514-22.5Y	22.5	75	1514-30B	30	100	1514-130D	130	250
1514-20A	20	50	1514-30Y	30	75	1514-40B	40	100	1514-150D	150	250
1514-25A	25	50	1514-37.5Y	37.5	75	1514-50B	50	100	1514-170D	170	250
1514-30A	30	50	1514-45Y	45	75	1514-60B	60	100	1514-270D	270	250
1514-40A	40	50	1514-60	60	75	1514-80B	80	100	1514-70E	70	300
1514-50A	50	50	1514-75Y	75	75	1514-100B	100	100	1514-140E	140	300
1514-60A	60	50	1514-90Y	90	75	1514-120B	120	100	1514-45G	45	500
1514-70A	70	50	1514-105Y	105	75	1514-140B	140	100	1514-50G	50	500
1514-80A	80	50	1514-120Y	120	75	1514-150B	150	100	1514-80G	80	500
1514-90A	90	50	1514-135Y	135	75				1514-100G	100	500
1514-100A	100	50	1514-150Y	150	75				1514-190G	190	500

For complete details consult the specification sheet.

DATA DELAY DEVICES ■ 3 Mt. Prospect Avenue, Clifton, New Jersey 07013 ■ (973) 773-2299 ■ FAX (973) 773-9672

data delay devices

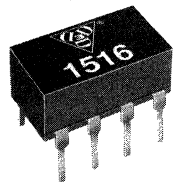
New Dimensions in Delay Line Techniques

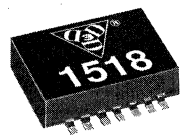
PASSIVE DELAY LINES

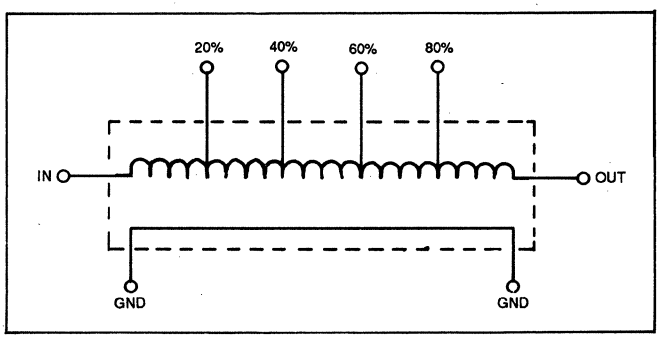
(Tapped — 5 & 10 Taps)

Features:

- **5 equal taps**
- **Meets or exceeds:** MIL-D-23859C
- **Operating temperature range:** –55°C to + 125°C
- **Storage temperature range:** –55°C to + 125°C
- **Temperature coefficient:** 100 PPM/°C
- **Dielectric breakdown:** 50 Vdc.
- **Epoxy encapsulated**







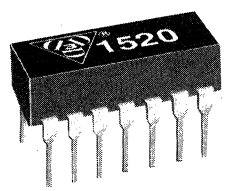
PART NUMBER MAKE-UP

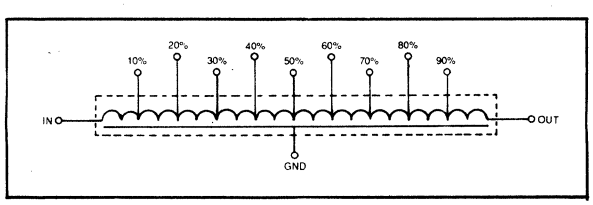
1516 A 101 151 A

- SERIES
- MOUNTING HEIGHT CODE (see Table II)
- DELAY TIME: Expressed in nanoseconds (ns). First two digits are significant figures. Last digit specifies number of zeros to follow.
- IMPEDANCE: Expressed in ohms. First two digits are significant. Last digit specifies number of zeros to follow.
- PIN SEQUENCE CODE: (SEE Table III). "STANDARD" Pin sequence if omitted.

Features:

- **1000 ns delay.**
- **10 taps.**
- **Standard 14 pins DIP and SMD cases.**
- **Low D.C. resistance.**
- **Fast delivery.**





PART NUMBER MAKE-UP

1520 A 101 151 A

- SERIES
- MOUNTING HEIGHT CODE (See Table II.)
- DELAY TIME: Expressed in nanoseconds (ns). First two digits are significant figures. Last digit specifies number of zeros to follow.
- IMPEDANCE: Expressed in ohms (Ω). First two digits are significant. Last digit specifies number of zeros to follow.
- PIN SEQUENCE CODE (See Table III). "STANDARD" Pin Sequence if omitted.

Series 1520

Td (ns)[1] (± 5%)	Td/tap (ns)[2] (± 5%)	Tr (ns) MAX	ATTENUATION (%) TYPICAL PER IMPEDANCE Ω 50	100	200	300	500
10	1	3		5			
20	2	5.5	3	5	5		
30	3	6.5	3	5	5		
40	4	8	3	5	5	5	
50	5	10	3	5	5	5	7
60	6	12	3	5	5	5	7
75	7½	15	3	5	5	5	7
100	10	20	3	5	5	7	7
120	12	24	3	5	6	7	8
150	15	30	3	5	6	7	8
180	18	36	4	5	6	7	8
200	20	40	4	5	6	7	8
220	22	44	4	5	6	7	8
250	25	50	4	5	6	7	8
300	30	60		5	8	10	10
375	37½	75		7	8	10	10
500	50	100		8	10	12	12
600	60	120				15	15
750	75	150				15	20
1000	100	200					20

[1] Or ±2 ns, whichever is greater. [2] Or ±1 ns, whichever is greater, referenced from input.

Series 1516 & 1518

Td (ns) [1]	Td/tap (ns)[2] (± 5%)	Tr (ns) MAX	ATTENUATION (%) TYPICAL PER IMPEDANCE 50	100	200	300	500
5	1	1		5			
10	2	4	3	5	5		
15	3	5	3	5	5		
20	4	6	3	5	5	5	
25	5	7	3	5	5	5	7
30	6	10	3	5	5	5	7
40	8	13	3	5	5	5	7
50	10	15	3	5	5	7	7
60	12	20	3	5	6	7	8
75	15	25	3	5	6	7	8
80	16	26	4	5	6	7	8
100	20	30	4	5	6	7	8
110	22	32	4	5	6	7	8
125	25	40	4	5	6	7	8
150	30	50		5	8	10	10
180	36	60		7	8	10	10
200	40	70		8	10	12	12

[1] or ± 2 ns, whichever is greater.
[2] or ± 1 ns, whichever is greater, referenced from input.

For complete details consult the specification sheet.

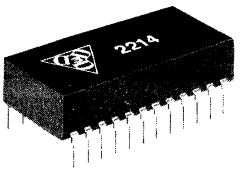
DATA DELAY DEVICES ■ 3 Mt. Prospect Avenue, Clifton, New Jersey 07013 ■ (973) 773-2299 ■ FAX (973) 773-9672

data delay devices

New Dimensions in Delay Line Techniques

PASSIVE DELAY LINES

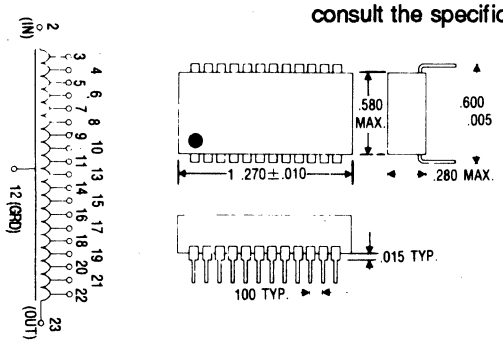
SERIES 2214
20 Taps



Specifications

- **20 Equally spaced taps.**
- **Td/Tr = 10/1.**
- **Delay tolerance:** ± 5% or 1 NS whichever is greater.
- **Tap tolerance:** ± 5% or 1 NS whichever is greater.
- **Temperature coefficient:** 100 PPM/°C.
- **Temperature range:** -55°C to +125°C.
- **Dielectric breakdown:** 50 Vdc.
- **Meets or exceeds MIL-D-23859C.**
- **Epoxy encapsulated.**

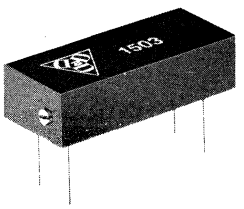
For complete details consult the specification sheet.



Part No.	Imp. (Ω)	Total Delay (NS)	Tap Increment (NS)	Rdc (Ω)
2214-50A	50	50	2.5	3.2
2214-60A	50	60	3.0	3.6
2214-80A	50	80	4.0	5.0
2214-100A	50	100	5.0	6.0
2214-150A	50	150	7.5	6.0
2214-200A	50	200	10.0	7.0
2214-50B	100	50	2.5	6.0
2214-60B	100	60	3.0	6.0
2214-80B	100	80	4.0	6.5
2214-100B	100	100	5.0	7.0
2214-150B	100	150	7.5	8.0
2214-200B	100	200	10.0	8.5
2214-300B	100	300	15.0	11.0
2214-400B	100	400	20.0	12.0
2214-40C	200	40	2.0	7.0
2214-80C	200	80	4.0	8.0
2214-120C	200	120	6.0	10.0
2214-200C	200	200	10.0	13.0
2214-300C	200	300	15.0	12.0
2214-400C	200	400	20.0	15.0
2214-500C	200	500	25.0	17.0
2214-600C	200	600	30.0	23.0
2214-800C	200	800	40.0	38.0
2214-50D	250	50	2.5	7.0
2214-100D	250	100	5.0	10.0
2214-150D	250	150	7.5	12.0
2214-200D	250	200	10.0	22.0
2214-250D	250	250	12.5	21.0
2214-300D	250	300	15.0	23.0
2214-400D	250	400	20.0	26.0
2214-500D	250	500	25.0	30.0
2214-600D	250	600	30.0	37.0
2214-800D	250	800	40.0	41.0
2214-1000D	250	1000	50.0	47.0
2214-200G	500	200	10.0	20.0
2214-300G	500	300	15.0	37.0
2214-400G	500	400	20.0	40.0
2214-500G	500	500	25.0	45.0
2214-600G	500	600	30.0	52.0
2214-800G	500	800	40.0	80.0
2214-1000G	500	1000	50.0	100.0
2214-1200G	500	1200	60.0	110.0
2214-1500G	500	1500	75.0	130.0
2214-2000G	500	2000	100.0	156.0

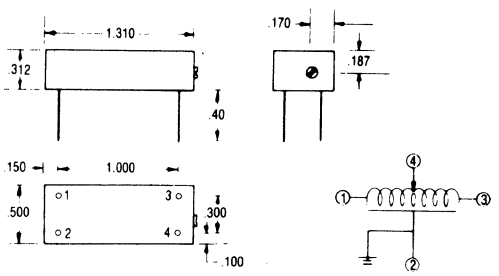
PASSIVE VARIABLE DELAY LINES

SERIES 1503



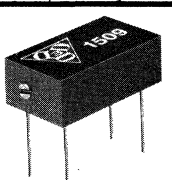
Specifications

- **Continuously variable delay.**
- **Multi-turn adjusting screw** (40 turns approx.).
- **Temperature coefficient:** 100 PPM/°C.
- **Rise-time:** 20% of time delay.
- **Flat leads** (.020 x .010).
- **Withstanding voltage:** 50 Vdc.
- **Resolution:** .12 NS approx.



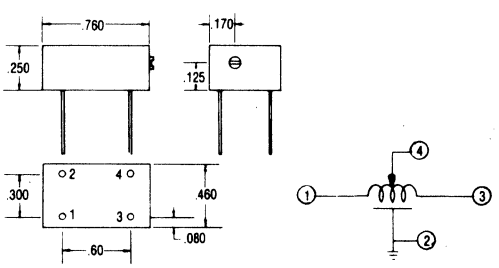
Part No.	Td (NS)	Imp. (Ω)	Rdc (Ω)	Part No.	Td (NS)	Imp. (Ω)	Rdc (Ω)
1503-15A	15	50	.7	1503-100B	100	100	6.0
1503-25A	25	50	.8	1503-120B	120	100	8.0
1503-30A	30	50	1.0	1503-160B	160	100	10.0
1503-40A	40	50	1.5	1503-200B	200	100	14.0
1503-50A	50	50	1.7	1503-30C	30	200	4.0
1503-60A	60	50	2.0	1503-60C	60	200	8.0
1503-80A	80	50	3.0	1503-100C	100	200	14.0
1503-100A	100	50	3.5	1503-20D	20	250	5.0
1503-15B	15	100	1.0	1503-20E	20	300	5.0
1503-30B	30	100	2.0	1503-30F	30	350	8.0
1503-50B	50	100	3.0	1503-25G	25	400	8.0
1503-60B	60	100	4.0	1503-40H	40	500	12.0
1503-80B	80	100	5.0				

SERIES 1509



Specifications

- **Low cost unit.**
- **Fits standard DIP sockets.**
- **Continuously variable.**
- **20 Turns approx.**
- **Resolution — .15 NS.**
- **Withstanding voltage — 100 Vdc.**
- **Temperature coefficient — 200 PPM/°C.**
- **Flat leads (.020 x .010).**



Part No.	Td (NS)	Impedance (Ω)	TR (NS)	Rdc (Ω)
1509-05B	5	100	3	.4
1509-20C	20	200	8	1.0
1509-30F	30	400	10	7.0
1509-40H	40	500	15	13.0

DATA DELAY DEVICES ■ 3 Mt. Prospect Avenue, Clifton, New Jersey 07013 ■ (973) 773-2299 ■ FAX (973) 773-9672

ELMEC®

High-Speed Delay Lines

CDA TYPE

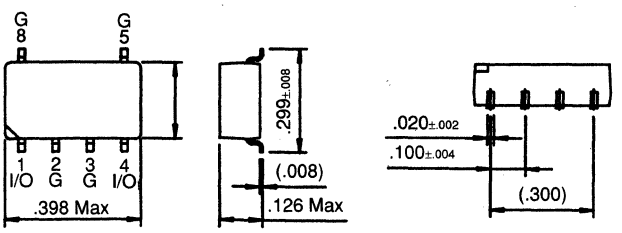
Passive Fixed-Value Delay Lines

- **Surface-mount Package**
- **ECL, TTL (FAST), or CMOS (FACT) logic compatible**
- **Digital or analog circuit applications**

Electrical Characteristics

- Waveform distortion (overshoot/preshoot): ±20% Max.
- Insulation resistance: DC50V, 100MΩ Min.
- Dielectric strength: DC 50V, 1 minute
- Operating temperature range: -10°C ~ +80°C
- Storage temperature range: -40°C ~ +120°C

Package Dimensions



Unit: inch

Standard Ratings 50Ω Type (characteristic impedance: 50Ω ± 10%)

CDA P/N	Time Delay	Rise Time * (Max.)	Bandwidth (Min.)	Td Temp. Coefficient
0005	50ps ± 25ps	200ps	1 GHz	0 ~ 150 ppm/°C
0105	100ps ± 50ps			
0205	200ps ± 50ps			
0305	300ps ± 50ps			
0405	400ps ± 50ps			
0505	500ps ± 50ps			
0605	600ps ± 50ps			
0705	700ps ± 50ps			
0805	800ps ± 50ps			
0905	900ps ± 50ps			
1005	1.0ns ± 50ps			
1105	1.1ns ± 50ps	300ps	900 MHz	
1205	1.2ns ± 50ps			
1305	1.3ns ± 50ps			
1505	1.5ns ± 50ps	500ps	700 MHz	
2005	2.0ns ± 0.2ns	550ps	600 MHz	
2505	2.5ns ± 0.2ns	600ps	500 MHz	
3005	3.0ns ± 0.2ns			
3505	3.5ns ± 0.25ns			
4005	4.0ns ± 0.3ns			
4505	4.5ns ± 0.3ns	675ps	440 MHz	
5005	5.0ns ± 0.3ns	750ps	400 MHz	
5505	5.5ns ± 0.3ns	825ps	360 MHz	-400±200 ppm/°C**
6005	6.0ns ± 0.3ns	900ps	330 MHz	
6505	6.5ns ± 0.4ns	975ps	300 MHz	
7005	7.0ns ± 0.4ns	1.1ns	285 MHz	
7505	7.5ns ± 0.4ns	1.2ns	250 MHz	
8005	8.0ns ± 0.4ns			
8505	8.5ns ± 0.5ns	1.3ns	235 MHz	
9005	9.0ns ± 0.5ns	1.4ns	220 MHz	
9505	9.5ns ± 0.5ns	1.5ns	200 MHz	
10005	10.0ns ± 0.5ns			
10505	10.5ns ± 0.6ns	1.6ns	190 MHz	
11005	11.0ns ± 0.6ns	1.7ns	180 MHz	
11505	11.5ns ± 0.6ns	1.8ns	165 MHz	
12005	12.0ns ± 0.6ns			
12505	12.5ns ± 0.7ns	1.9ns	160 MHz	
13005	13.0ns ± 0.7ns	2.0ns	150 MHz	
13505	13.5ns ± 0.7ns	2.1ns	140 MHz	
14005	14.0ns ± 0.7ns			
14505	14.5ns ± 0.8ns	2.2ns	135 MHz	
15005	15.0ns ± 0.8ns	2.3ns	130 MHz	
16005	16.0ns ± 0.8ns	2.4ns	125 MHz	
17005	17.0ns ± 0.8ns	2.6ns	115 MHz	
18005	18.0ns ± 0.9ns	2.8ns	110 MHz	
19005	19.0ns ± 1.0ns	3.0ns	105 MHz	
20005	20.0ns ± 1.0ns	3.2ns	100 MHz	
CDA22005	22.0 ns ± 1.1 ns	3.5 ns	90 MHz	
CDA25005	25.0 ns ± 1.3 ns	4.0 ns	80 MHz	
CDA27005	27.0 ns ± 1.4 ns	4.3 ns	70 MHz	
CDA30005	30.0 ns ± 1.5 ns	4.8 ns	60 MHz	

* Measured between the 20% and 80% points of the rising edge of the output waveform.
** 0 ~ 150ppm/°C is also available for certain parts.

Standard Ratings

100Ω Type (characteristic impedance: 100Ω ±10%)

CDA P/N	Time Delay	Rise Time * (Max.)	Bandwidth (Min.)	Td Temp. Coefficient
0010	50ps ± 25ps	200ps	1 GHz	0 ~ 150 ppm/°C
0510	500ps ± 100ps			
1010	1.0ns ± 0.1ns	300ps	900 MHz	
1510	1.5ns ± 0.15ns	500ps	700 MHz	
2010	2.0ns ± 0.2ns	550ps	600 MHz	
2510	2.5ns ± 0.2ns	600ps	500 MHz	
3010	3.0ns ± 0.2ns			
3510	3.5ns ± 0.25ns			
4010	4.0ns ± 0.3ns	650ps	450 MHz	
4510	4.5ns ± 0.3ns	700ps	400 MHz	
5010	5.0ns ± 0.3ns	800ps	360 MHz	
5510	5.5ns ± 0.3ns	880ps	325 MHz	
6010	6.0ns ± 0.3ns	960ps	300 MHz	
6510	6.5ns ± 0.4ns	1.0ns	275 MHz	
7010	7.0ns ± 0.4ns	1.1ns	255 MHz	
7510	7.5ns ± 0.4ns	1.2ns	240 MHz	
8010	8.0ns ± 0.4ns	1.3ns	225 MHz	
8510	8.5ns ± 0.5ns	1.4ns	210 MHz	
9010	9.0ns ± 0.5ns	1.5ns	190 MHz	
9510	9.5ns ± 0.5ns			
10010	10.0ns ± 0.5ns	1.6ns	180 MHz	
10510	10.5ns ± 0.6ns	1.7ns	170 MHz	- 400 ± 200 ppm/°C**
11010	11.0ns ± 0.6ns	1.8ns	160 MHz	
11510	11.5ns ± 0.6ns	1.9ns	150 MHz	
12010	12.0ns ± 0.6ns			
12510	12.5ns ± 0.7ns	2.0ns	140 MHz	
13010	13.0ns ± 0.7ns	2.1ns	135 MHz	
13510	13.5ns ± 0.7ns	2.2ns	130 MHz	
14010	14.0ns ± 0.7ns	2.3ns	125 MHz	
14510	14.5ns ± 0.8ns			
15010	15.0ns ± 0.8ns	2.4ns	120 MHz	
16010	16.0ns ± 0.8ns	2.6ns	110 MHz	
17010	17.0ns ± 0.9ns	2.7ns	105 MHz	
18010	18.0ns ± 0.9ns	2.9ns	100 MHz	
19010	19.0ns ± 1.0ns	3.1ns	95 MHz	
20010	20.0ns ± 1.0ns	3.2ns	90 MHz	

ELMEC Technology of America, Inc.
221 Main Street, Suite 560, San Francisco, CA 94105
(800) 554-7652 • (415) 495-4744
Fax: (415) 495-5051

ELMEC®

High-Speed Delay Lines

FDC/FDD Type

Passive Fixed-Value Delay Lines

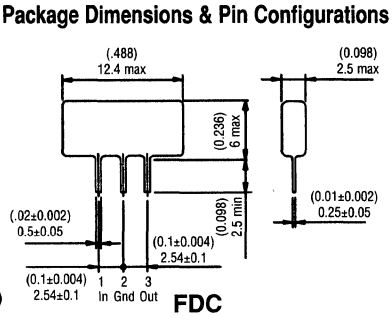
- **SIP Package**
- **ECL, TTL (FAST), or CMOS (FACT) logic compatible**
- **Digital or analog circuit applications**

Electrical Characteristics

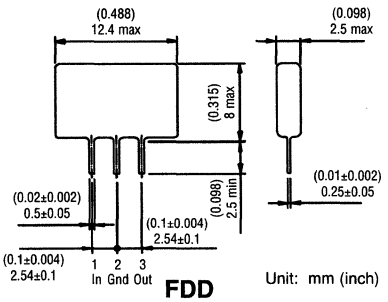
- Waveform distortion (overshoot/preshoot): ±20% Max.
- Insulation resistance: DC50V, 100MΩ Min.
- Dielectric strength: DC 50V, 1 minute
- Operating temperature range: -40°C ~ +85°C
- Storage temperature range: -40°C ~ +120°C
- Delay time temperature coefficient: ±100ppm/°C (FDC*)
  -400±200ppm/°C (FDD)

Standard Ratings

Package Dimensions & Pin Configurations



FDC



FDD

Unit: mm (inch)

FDC P/N	Time Delay	Rise Time ** (Max.)	Bandwidth (Min.)	Impedance
00505	50ps ± 25ps	150ps	2.5 GHz	50Ω
0105	100ps ± 50ps			
01505	150ps ± 50ps		2.0 GHz	
0205	200ps ± 50ps			
02505	250ps ± 50ps			
0305	300ps ± 50ps			
03505	350ps ± 50ps			
0405	400ps ± 50ps			
04505	450ps ± 50ps	200ps	1.5 GHz	
0505	500ps ± 50ps			
05505	550ps ± 25ps			
0605	600ps ± 50ps			
0705	700ps ± 50ps			
0805	800ps ± 50ps		1.0 GHz	
0905	900ps ± 50ps			
1005	1.0ns ± 50ps			
1105	1.1ns ± 50ps	250ps	900 MHz	
1205	1.2ns ± 50ps			
1305	1.3ns ± 50ps			
1405	1.4ns ± 50ps			
1505	1.5ns ± 50ps			
1605	1.6ns ± 50ps	300ps	800 MHz	
1705	1.7ns ± 50ps			
1805	1.8ns ± 50ps			
1905	1.9ns ± 50ps			
2005	2.0ns ± 50ps			
2505	2.5ns ± 0.20ns	500ps	700 MHz	
3005	3.0ns ± 0.20ns			
3505	3.5ns ± 0.25ns	600ps	600 MHz	
4005	4.0ns ± 0.30ns	700ps		
4505	4.5ns ± 0.30ns			
5005	5.0ns ± 0.30ns			
0510	0.5ns ± 0.10ns	300ps	1.5 GHz	100Ω
1010	1.0ns ± 0.10ns		1.0 GHz	
1510	1.5ns ± 0.15ns	400ps	900 MHz	
2010	2.0ns ± 0.20ns		800 MHz	
2510	2.5ns ± 0.20ns	500ps	700 MHz	
3010	3.0ns ± 0.20ns			
3510	3.5ns ± 0.25ns	600ps	600 MHz	
4010	4.0ns ± 0.30ns	700ps		
4510	4.5ns ± 0.30ns			
5010	5.0ns ± 0.30ns			

FDD P/N	Time Delay	Rise Time ** (Max.)	Bandwidth (Min.)	Impedance
5505	5.5ns ± 0.3ns	800ps	400 MHz	50Ω
6005	6.0ns ± 0.3ns	900ps		
6505	6.5ns ± 0.4ns		350 MHz	
7005	7.0ns ± 0.4ns	1.0ns		
7505	7.5ns ± 0.4ns		330MHz	
8005	8.0ns ± 0.4ns	1.1ns		
8505	8.5ns ± 0.5ns	1.2ns	300 MHz	
9005	9.0ns ± 0.5ns	1.3ns		
9505	9.5ns ± 0.5ns		250 MHz	
10005	10.0ns ± 0.5ns	1.4ns		
10505	10.5ns ± 0.6ns		200 MHz	
11005	11.0ns ± 0.6ns			
11505	11.5ns ± 0.6ns	1.5ns	170 MHz	
12005	12.0ns ± 0.6ns			
12505	12.5ns ± 0.7ns	1.6ns	150 MHz	
13005	13.0ns ± 0.7ns			
13505	13.5ns ± 0.7ns	1.7ns		
14005	14.0ns ± 0.7ns			
14505	14.5ns ± 0.8ns	1.8ns		
15005	15.0ns ± 0.8ns			
5510	5.5ns ± 0.3ns	800ps	400 MHz	100Ω
6010	6.0ns ± 0.3ns	900ps		
6510	6.5ns ± 0.4ns		350 MHz	
7010	7.0ns ± 0.4ns	1.0ns		
7510	7.5ns ± 0.4ns		330 MHz	
8010	8.0ns ± 0.4ns	1.1ns		
8510	8.5ns ± 0.5ns	1.2ns	300 MHz	
9010	9.0ns ± 0.5ns	1.3ns		
9510	9.5ns ± 0.5ns		250 MHz	
10010	10.0ns ± 0.5ns	1.4ns		
10510	10.5ns ± 0.6ns	1.4ns	200 MHz	
11010	11.0ns ± 0.6ns			
11510	11.5ns ± 0.6ns	1.5ns	170 MHz	
12010	12.0ns ± 0.6ns			
12510	12.5ns ± 0.6ns	1.6ns	150 MHz	
13010	13.0ns ± 0.7ns			
13510	13.5ns ± 0.7ns	1.7ns		
14010	14.0ns ±0.7ns	1.8ns	140 MHz	
14510	14.5ns ± 0.8ns	1.9ns	130 MHz	
15010	15.0ns ± 0.8ns	2.0ns		
16010	16.0ns ± 0.8ns	2.1ns	120 MHz	
17010	17.0ns ± 0.9ns	2.2ns	115 MHz	
18010	18.0ns ± 0.9ns	2.3ns	110 MHz	
19010	19.0ns ± 1.0ns	2.5ns	105 MHz	
20010	20.0ns ± 1.0ns	2.7ns	100 MHz	
21010	21.0ns ± 1.1ns	2.9ns	95 MHz	
22010	22.0ns ± 1.1ns	3.1ns	90 MHz	
23010	23.0ns ± 1.2ns	3.3ns	85 MHz	
24010	24.0ns ± 1.2ns	3.5ns	83 MHz	
25010	25.0ns ± 1.3ns	3.7ns	80 MHz	
27010	27.0ns ± 1.4ns	4.0ns	74 MHz	

*Except for FDC 4505,5000 which is -400 ± 200ppm/°C. – ** Measured between the 20% and 80% points of the rising edge of the output waveform.

NEW

Additions to the FDC Series

2.1 - 3.0 ns Delay, 100ps steps, Distributed Constant Type

To enhance the existing FDC series, ELMEC announces new FDC - 2105 through - 3005A parts available in incremental 0.1 ns steps. These new parts are of distributed constant design, and the 2.5 ns and 3.0 ns devices have suffix A to differentiate them from the existing parts. For applications which require the lowest possible DC resistance, we recommend the existing devices of the lumped constant design. The new parts should be used where higher precision / accuracy is needed.

Common Specifications

Impedance:	50Ω ± 10%
Delay time temperature coefficient:	±100ppm/C°
Waveform distortion (overshoot/preshoot):	±20% max
Insulation resistance:	DC 50V, 100 MΩ min.
Dielectric strength:	DC 50V, one minute
Operating temperature range:	-40°C to +85°C
Storage temperature range:	-40°C to 120°C

Specifications for New Parts

Part Number	Delay Time	Output Rise Time (20% to 80%)	- 3dB Passband
FDC2105	2.1 ns ±50 ps	Under 300 ps	Over 800 MHz
FDC2205	2.2 ns ±50 ps	Under 300 ps	Over 800 MHz
FDC2305	2.3 ns ±50 ps	Under 350 ps	Over 700 MHz
FDC2405	2.4 ns ±50 ps	Under 350 ps	Over 700 MHz
FDC2505A	2.5 ns ±50 ps	Under 350 ps	Over 700 MHz
FDC2605	2.6 ns ±50 ps	Under 400 ps	Over 600 MHz
FDC2705	2.7 ns ±50 ps	Under 400 ps	Over 600 MHz
FDC2805	2.8 ns ±50 ps	Under 400 ps	Over 600 MHz
FDC2905	2.9 ns ±50 ps	Under 450 ps	Over 550 MHz
FDC3005A	3.0 ns ±100/-50 ps	Under 450 ps	Over 550 MHz

ELMEC Technology of America, Inc.
221 Main Street, Suite 560, San Francisco, CA 94105
(800) 554-7652 • (415) 495-4744
Fax: (415) 495-5051

ELMEC®

High-Speed Delay Lines

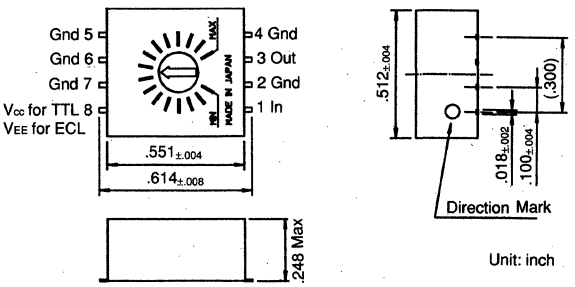
VDA Type
Active Variable-Range Delay Lines

- **Surface-mount Package**
- **ECL 10 KH, TTL (FAST), or CMOS (FACT) logic composition**
- **Digital or analog circuit applications**

Electrical Characteristics

- Variable steps: 31 irregular steps
  2 steps ≃ time delay variable range ÷15
- Internal Buffer Gates: VDA-CSxx: CMOS (FACT)
  VDA-ESxx: ECL 10KH
  VDA-TSxx: TTL (FAST)
- Rise Time: as appropriate for internal buffer gates
- Inherent Delay: VDA-CSxx: 7ns ± 3ns
  VDA-ESxx: 2ns ± 1ns
  VDA-TSxx: 4ns ± 2ns
- Electrical Voltage: VDA-CSxx: Vcc 3V ~ 5V
  VDA-ESxx: Vee -5.2V ± 0.25V
  VDA-TSxx: Vcc 5V ± 0.25V
- Power Consumption: VDA-CSxx: 70mA Typ.
  VDA-ESxx: 50mA Typ.
  VDA-TSxx: 80mA Typ.
- Delay Time Coefficient: as appropriate for internal buffer gates; internal delay elements, however, are ±100ppm/°C
- Operating Temperature Range: 0°C ~ +70°C
- Storage Temperature Range: -40°C ~ +120°C

Package Dimensions



Unit: inch

STANDARD RATINGS

VDA Part No.	Td Variable Range (±5%)	Td Increments	Accuracy of Increments	Max. Frequency for Guaranteed Accuracy	Signal Pass-through Frequency
ES7R5	0 ~ 7.5ns	0.5ns steps	±0.25ns or ±5%	133 MHz	150 MHz
ES15	0 ~ 15.0ns	1.0ns steps	±0.5ns or ±5%	66 MHz	150 MHz
CS15	0 ~ 15.0ns	1.0ns steps	±0.5ns or ±5%	66 MHz	100 MHz
TS15	"	"	"	"	"
ES30	0 ~ 30.0ns	2.0ns steps	±1.0ns or ±5%	33 MHz	75 MHz
CS30	0 ~ 30.0ns	2.0ns steps	±1.0ns or ±5%	33 MHz	60 MHz
TS30	"	"	"	"	"

QDB/QDD Type
Passive Voltage Control Variable-Range Delay Lines

- **SIP Package**
- **ECL logic compatible**
- **Digital or analog circuit applications**

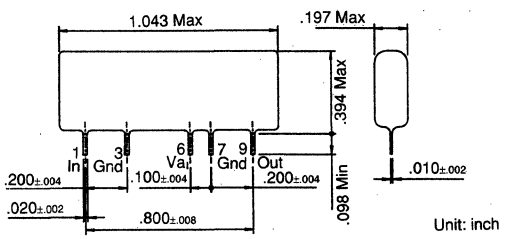
Electrical Characteristics

- Control voltage range: 1.3V + Vbias (Delay Max.)
  ~ 11.3V + Vbias (Delay Min.)
  Vbias: signal line DC bias voltage
- Impedance: 45Ω ~68Ω
- Waveform distortion (overshoot/preshoot): ±20% max.
- Operating temperature range: -10°C ~+80°C
- Storage temperature range: -40°C ~ +120°C

STANDARD RATINGS

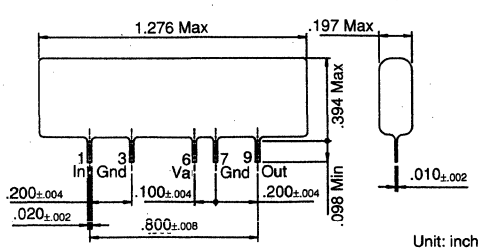
P/N	Variable Delay Range	Inherent Delay Time	Rise Time	Bandwidth (-3db)
QDB1005	1.0ns±0.1ns	3.0ns ~3.5ns	1.0ns Max.	300MHz Min.
QDD1305	1.3ns ± 0.1ns	4.3ns ~4.8ns	1.2ns Max.	250MHz Min.

Package Dimensions



Unit: inch

QDB



Unit: inch

QDD

ELMEC Technology of America, Inc.
221 Main Street, Suite 560, San Francisco, CA 94105
(800) 554-7652 • (415) 495-4744
Fax: (415) 495-5051

ELMEC®

High-Speed Delay Lines

VDJ1010 Type
Passive Variable-Range Delay Lines

- **DIP Package**
- **ECL logic compatible**
- **Digital or analog circuit applications**

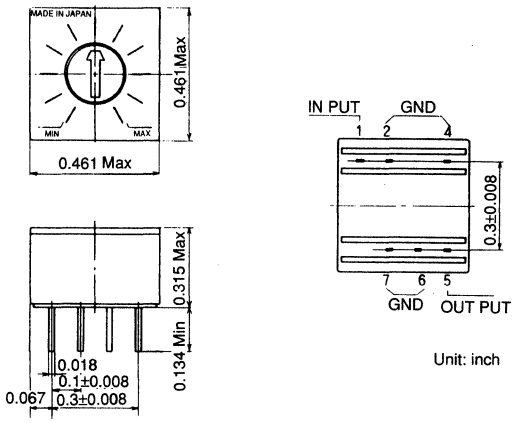
Electrical Characteristics

- DC Max. voltage: DC 2.5V Max. (constant)
- Bandwidth (-3dB): 1 GHz min.
- Waveform distortion (overshoot/preshoot): ±20% Max.
- Inherent delay: 230 ps max. at the minimum point within the variable range
- Operating temperature range: -40°C ~+85°C
- Storage temperature range: -40°C ~ +120°C
- Delay time temperature coefficient: ±100ppm/°C

Standard Ratings

Td Variable Range (±10%)	No. of Steps	Step Resolution	Rise Time (20% - 80%)	Input Impedance (±10%)	Output Impedance (±10%)
0 ~1.0ns	30 steps	33ps	300ps max.	50Ω	100Ω

Package Dimensions



Unit: inch

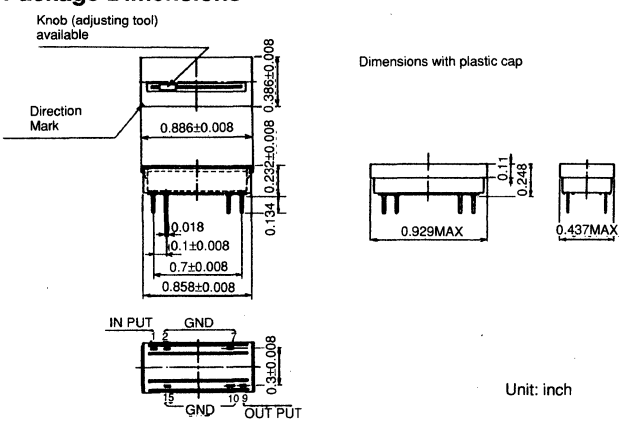
VDK/VDS Type
Passive Variable-Range Delay Lines

- **16-Pin DIP equivalent package**
- **Digital or analog circuit applications**

Electrical Characteristics

- Waveform distortion (overshoot/preshoot): ±20% Max.
- Inherent delay: 220ps max. at the minimum point within the variable range (VDK) 450ps max. at the minimum point within the variable range (VDS)
- Operating temperature range: -10°C ~+80°C
- Storage temperature range: -40°C ~ +120°C
- Bandwidth (-3dB): 800MHz Min.

Package Dimensions



Unit: inch

Standard Ratings

VDK P/N	Td Variable Range (+20% - 0%)	Step Resolution (40 Steps)	Rise Time (20% - 80%) Max.	Input Impedance (±10%)	Output Impedance (±10%)	Logic Family Compatibility
0510	0 - 0.5ns	12.5ps	300ps	50Ω	100Ω	ECL
2010	0 - 2.0ns	50ps		–		
0515	0 - 0.5ns	12.5ps		75Ω	150Ω	CML
2015	0 - 2.0ns	50ps		–		

VDS P/N	Td Variable Range (±20% -0%)	* Step Resolution 1.75%	* Step Resolution 3.25%	Rise Time (max.)		Input Impedance (±10%)	Output Impedance (±10%)	DC Max Voltage (Max.)	Logic Family Compatibility	Temperature Coefficient
5010	0 - 5ns	88ps	163ps	–	0.8ns**	50 Ω	100 Ω	3V	ECL 10KH	±100ppm/°C
1110	0 - 10ns	175ps	325ps	–	1.3ns**					±100ppm/°C
2110	0 - 20ns	350ps	650ps	–	2.3ns**				ECL 10K	-400±200ppm/°C
5020	0 - 5ns	88ps	163ps	–	2.0ns***	100 Ω	200 Ω	4.5V	TTL (FAST)	±100ppm/°C
1120	0 - 10ns	175ps	325ps	–	2.5ns***				CMOS (FAST)	±100ppm/°C
2120	0 - 20ns	350ps	650ps	–	3.5ns***					-400±200ppm/°C

* VDS has alternate step increments of 1.75% and 3.25%.

**VDS measured at 20% ~ 80%
***VDS measured at 10% ~ 90%

ELMEC Technology of America, Inc.
221 Main Street, Suite 560, San Francisco, CA 94105
(800) 554-7652 • (415) 495-4744
Fax: (415) 495-5051

ELMEC®

High-Speed Delay Lines

PDH 4-Bit Type

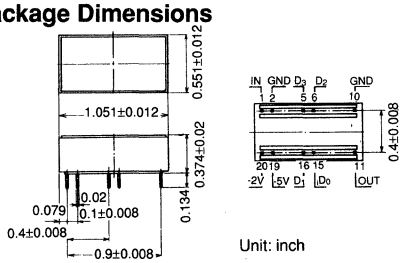
Active Programmable Delay Lines

- **DIP Package**
- **ECL10KH logic compatible**
- **Digital circuit applications**

Electrical Characteristics

- Max. frequency for guaranteed step accuracy: 80 MHz *
- No. of programmable steps: 16
- Supply voltage: -4.5V ~-5.7V
  -2V ± 5%
- Inherent delay: 4.5ns max.
- Output rise time: ECL10KH compatible
- Power consumption: -2V: 40mA (typical)
  -5V: 85mA (typical)
- Delay time temperature coefficient: ± 100ppm/°C
- Operating temperature range: -10°C ~ +60°C
- Storage temperature range: -40°C ~ +120°C

Package Dimensions



Unit: inch

Standard Ratings Logic 1: ECL (H) Level Logic 0: ECL (L) Level

Step	Address				PDH P/N					
	D_0	D_1	D_2	D_3	4050	4100	4125	4250	4500	4102
0	0	0	0	0	0 (ps)	0 (ps)	0 (ps)	0 (ps)	0 (ns)	0(ns)
1	1	0	0	0	50	100	125	250	0.5	1
2	0	1	0	0	100	200	250	500	1.0	2
3	1	1	0	0	150	300	375	750	1.5	3
4	0	0	1	0	200	400	500	1000	2.0	4
5	1	0	1	0	250	500	625	1250	2.5	5
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
13	1	0	1	1	650	1300	1625	3250	6.5	13
14	0	1	1	1	700	1400	1750	3500	7.0	14
15	1	1	1	1	750±5%	1500±5%	1875±5%	3750±5%	7.5±5%	15±5%
Step accuracy; ± 1/2 LSB up to 80 MHz					50ps±25ps	100ps±50ps	125ps±62.5ps	250ps±125ps	0.5ns±0.25ns	1ns±0.5ns

*Can be used at higher frequencies, but with broader tolerance range. For reference: ±1LSB at 150 MHz.

PDH 6-Bit Type

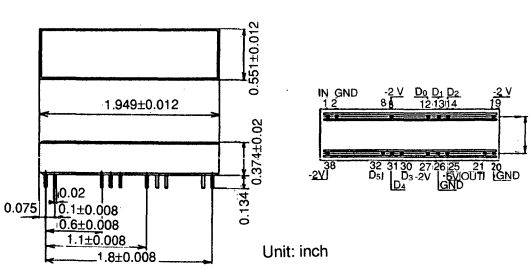
Active Programmable Delay Lines

- **DIP Package**
- **ECL10KH logic compatible**
- **Digital circuit applications**

ELECTRICAL CHARACTERISTICS

- Max. frequency for guaranteed step accuracy: 80 MHz *
- No. of programmable steps: 64
- Supply voltage: -4.5V ~-5.7V
  -2V ± 5%
- Inherent delay: 7ns max.
- Output rise time: ECL10KH compatible
- Power consumption: -2V: 90mA (typical)
  -5V: 120mA (typical)
- Delay time temperature coefficient: ± 100ppm/°C
- Operating temperature range: -10°C ~ +60°C
- Storage temperature range: -40°C ~ +120°C

Package Dimensions



Unit: inch

Standard Ratings Logic 1: ECL (H) Level Logic 0: ECL (L) Level

Step	Address						PDH P/N				
	D_0	D_1	D_2	D_3	D_4	D_5	6050	6100	6125	6200	6500
0	0	0	0	0	0	0	0 (ps)	0 (ps)	0 (ps)	0 (ns)	0 (ns)
1	1	0	0	0	0	0	50	100	125	0.2	0.5
2	0	1	0	0	0	0	100	200	250	0.4	1.0
3	1	1	0	0	0	0	150	300	375	0.6	1.5
4	0	0	1	0	0	0	200	400	500	0.8	2.0
5	1	0	1	0	0	0	250	500	625	1.0	2.5
6	0	1	1	0	0	0	300	600	750	1.2	3.0
7	1	1	1	0	0	0	350	700	875	1.4	3.5
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
61	1	0	1	1	1	1	3050	6100	7625	12.2	30.5
62	0	1	1	1	1	1	3100	6200	7750	12.4	31.0
63	1	1	1	1	1	1	3150±5%	6300±5%	7875±5%	12.6±5%	31.5±5%
Step accuracy; ± 1/2 LSB up to 80 MHz							50ps±25ps	100ps±50ps	125ps±62.5ps	0.2ns±0.1ns	0.5ns±0.25ns

*Can be used at higher frequencies, but with broader tolerance range. For reference: ±1LSB at 150 MHz.

ELMEC Technology of America, Inc.
221 Main Street, Suite 560, San Francisco, CA 94105
(800) 554-7652 • (415) 495-4744
Fax: (415) 495-5051

ELMEC®

High-Speed Delay Lines

PDL 6-Bit Type

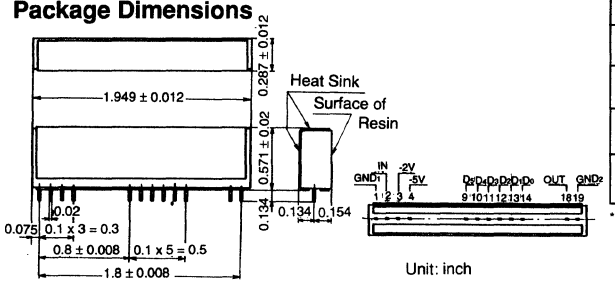
Active Programmable Delay Lines

- **SIP Package**
- **ECL10KH logic compatible**
- **Digital circuit applications**

Electrical Characteristics

- Max. frequency for guaranteed step accuracy: 80 MHz *
- No. of programmable steps: 64
- Supply voltage: -4.5V ~-5.7V
  -2V ± 5%
- Inherent delay: 7ns max.
- Output rise time: ECL10KH compatible
- Power consumption: -2V: 90mA (typical)
  -5V: 120mA (typical)
- Delay time temperature coefficient: ± 100ppm/°C
- Operating temperature range: -10°C ~ +60°C
- Storage temperature range: -40°C ~ +120°C

Package Dimensions



Unit: inch

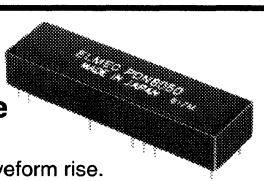
Standard Ratings **Logic 1: ECL (H) Level** **Logic 0: ECL (L) Level**

Step	Address						PDL P/N			
	D_0	D_1	D_2	D_3	D_4	D_5	6050	6100	6125	6500
0	0	0	0	0	0	0	0 (ps)	0 (ps)	0 (ps)	0 (ps)
1	1	0	0	0	0	0	50	100	125	0.5
2	0	1	0	0	0	0	100	200	250	1.0
3	1	1	0	0	0	0	150	300	375	1.5
4	0	0	1	0	0	0	200	400	500	2.0
5	1	0	1	0	0	0	250	500	625	2.5
6	0	1	1	0	0	0	300	600	750	3.0
7	1	1	1	0	0	0	350	700	875	3.5
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
61	1	0	1	1	1	1	3050	6100	7625	30.5
62	0	1	1	1	1	1	3100	6200	7750	31.0
63	1	1	1	1	1	1	3150±5%	6300±5%	7875±5%	31.5±5%
Step accuracy: ± 1/2 LSB up to 80 MHz							50ps±25ps	100ps±50ps	125ps±62.5ps	0.5ps±0.25ns

*Can be used at higher frequencies, but with broader tolerance range. For reference: ±1LSB at 150 MHz.

PDN 6-Bit Type

6-Bit High-Speed Programmable Delay Line

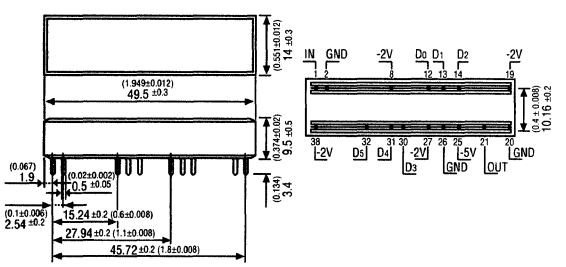


NOTES ON USE

- Adjust delay time with output waveform rise.
- A heat insulation plate is attached to the upper surface of the product.
- Be sure to use all -2 V.
- Terminate IN and the address part to match external impedance.
- The interior is not hermetically sealed, so use caution when washing. Soldering should be done afterward.

The PDN type is a high-speed, programmable delay line which combines our company's unique high-speed delay line with an ECL Super 300K. The Super 300K has replaced the PDE type ECL 100K, which is no longer manufactured. Due to this change, the new PDN type product is slightly inferior to the PDE type in terms of characteristics.

External Dimension Diagram & Pin Arrangement



Standard Ratings **Logic 1: ECL (H) Level** **Logic 0: ECL (L) Level**

Step	Address						PDH P/N					
	D_0	D_1	D_2	D_3	D_4	D_5	6050	6100	6125	6200	6250	6500
0	0	0	0	0	0	0	0 (ps)	0 (ps)	0 (ps)	0 (ns)	(0) ns	0 (ns)
1	1	0	0	0	0	0	50	100	125	0.2	0.25	0.5
2	0	1	0	0	0	0	100	200	250	0.4	0.50	1.0
3	1	1	0	0	0	0	150	300	375	0.6	0.75	1.5
4	0	0	1	0	0	0	200	400	500	0.8	1.00	2.0
5	1	0	1	0	0	0	250	500	625	1.0	1.25	2.5
6	0	1	1	0	0	0	300	600	750	1.2	1.50	3.0
7	1	1	1	0	0	0	350	700	875	1.4	1.75	3.5
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
61	1	0	1	1	1	1	3050	6100	7625	12.2	15.25	30.5
62	0	1	1	1	1	1	3100	6200	7750	12.4	15.50	31.0
63	1	1	1	1	1	1	3150±5%	6300±5%	7875±5%	12.6±5%	15.75±5%	31.5±5%
Step precision: Up to 85 MHz ± 1/2 LSB use is possible. Up to 100 MHz ± 1 LSB use is possible.							50ps ±25ps	100ps ±50ps	125ps ±62.5ps	0.2ns ±0.1ns	0.25ns ±0.125ns	0.5ns ±0.25ns

COMMON SPECIFICATIONS

Step precision guarantee frequency	85 MHz
Number of steps	64 steps
V_{EE} voltage	-4.2 V to -5.46 V (standard test cond.:-5V)
Residual delay time	4.5 ns max
Output rise time	ECL super 300K equivalent
Consumption current	-2 V 80mA (typ) -5 V 120mA (typ)
Delay time temperature coefficient	±100 ppm/°C
Usage temperature range	-10°C to + 60°C
Storage temeprature range	-10°C to + 120°C

ELMEC Technology of America, Inc.
221 Main Street, Suite 560, San Francisco, CA 94105
(800) 554-7652 • (415) 495-4744
Fax: (415) 495-5051

KAPPA® TECHNOLOGIES INC.

DELAY LINES

Passive Delay Lines

KAPPA Series No.	Tap Delay (ns)		No. of taps	T_D/T_R or $T_D \cdot BW$	Z_O (Ω) Range	Pin Config.	Package Type				Features
	Min	Max					DIL	DIP	SIP	SMD	
DP04 or SMP04	0.5	200	1	3.3	50–500	4		•		•	small size vs. delay-to-risetime ratio
SP04	0.5	25	1	3.5	55 or 93	4			•		very thin (0.12") SIP
SP08	5	500	1	5.0	50–500	8			•		wider delay range; faster risetime
DP124 or SMP124	50	10000	1	10.0	50–500	24		•		•	double the performance of SP08
DP08/SMP08	0.5	100	5	3.3	50–200	8		•		•	lower cost than DP04/SMP04
SP07	0.5	100	5	3.3	50–200	7			•		lower cost than DP08
SP57	1	100	5	5.0	50–200	7			•		50% better performance than SP07
SP77	5	100	5	7.5	50–200	7			•		50% better performance than SP57
DP14 or SMP14	0.5	250	10	5.0	50–500	14		•		•	extended delay & impedance ranges
SOP14	0.5	20	10	5.0	50–200	14				SO	small outline version of SMP14
DP16 or SMP16	5	50	10	5.0	50–500	16		•		•	16-pin version of DP14/SMP14
DP34 or SMP34	0.5	100	10	7.0	50–500	14		•		•	40% better performance than DP14/SMP14
DPH14 or SMPH14	5	50	10	10.0	50–500	14		•		•	twice the performance of DP14/SMP14
DP24 or SMP24	1	1500	20	10.0	50–500	24		•		•	extended delay range; faster risetime
DPH24 or SMPH24	1	1500	20	13.0	50–500	24		•		•	33% better performance than DP24/SMP24
DP44 or SMP44	5	500	20	20.0	50–500	24		•		•	twice the performance of DP24/SMP24
Tiny Trim™	0	160	Variable	4.0	330–500	4	•		•		T_{RES} <0.5%; 1/4 in^3 volume; all gold contacts
HV28	0	320	Variable	5.0	50 or 100	28	•				T_{RES} <1%; Hermetic seal; high reliability
DV14	1	50	10	5.0	75–200	14		•			A_R ±0.2db; $T_G \leq \pm 2\%$; –3db to 0.75 f_C
DV16	1	50	12	6.0	75–200	16		•			16-pin version of Dv14
DV24	1	25	20	13.0	75–200	24		•			A_R ±0.15db; $T_G \leq \pm 2\%$; –3db to 0.7 f_C
DV28	1	25	25	16.7	50–500	28		•			A_R ±0.1db; $T_G \leq \pm 2\%$; –3db to 0.7 f_C
VB55	1	500	multi-line	5.5 MHz	75	16–36		•			A_R <0.1db p-p; $T_G \leq \pm 2\%$; $R_L \geq$ -27db
VB11	1	500	multi-line	11 MHz	75	16–36	•				A_R <0.1db p-p; $T_G \leq \pm 2\%$; $R_L \geq$ -27db
HD75	1	50	multi-line	30 MHz	75	16–40	•				A_R <0.1db p-p/line; $T_G \leq \pm 2$ns/line; for HDTV

Active Delay Lines

KAPPA Series No. ("x"=Logic/Pkg Code)	Tap T_D (ns)		Taps / Bits	Lines/ Unit	Logic Type				Pin Config.	Package Type				Features
	Min	Max			FACT	ECL	FAST	STTL		DIL	DIP	SIP	SMD	
Dx18/Sx18/SMx18	5	1000	1	1	•		•	•	8	•	•	•	•	T_{PLH}-controlled; small size packages
Dx13/Sx13/SMx13	5	1000	1	1	•		•	•	14	•	•	•	•	wider delay range, lower cost than 8-pin parts
Lx13/SLx13	5	1000	1	1	•		•	•	14	•	•		•	T_{PLH} & T_{PHL}-ctl'd versions of Dx/Sx/SMx13
Dx28/Sx28/SMx28	5	500	2	1	•		•	•	8	•	•	•	•	Dx18/Sx18/SMx18 with centertap
Dx23/Sx23/SMx23	5	500	2	1	•		•	•	14	•	•	•	•	Dx13/Sx13/SMx13 with centertap
Lx23/SLx23	5	500	2	1	•		•	•	14	•	•		•	Lx13/SLx13 with centertap
Dx08/Sx08/SMx08	1	100	5	1	•		•	•	8	•	•	•	•	5-tap version of Dx18/Sx18/SMx18
Sx58	1	50	5	1	•		•	•	8			•		High-speed version of Sx08
Dx14/SMx14	1	200	5	1	•		•	•	14	•	•		•	5-tap version of Dx13/SMx13
Lx14/SLx14	1	200	5	1	•		•	•	14	•	•		•	T_{PLH} & T_{PHL}-controlled versions of Dx14/SMx14
Dx514/SMx514	1	200	5	1	•		•	•	14	•	•		•	High-speed versions of Dx14/SMx14
Dx16/SMx16	1	200	5	1	•	•	•	•	16	•	•		•	16-pin version of Dx14/SMx14
Dx56/SMx56	2	50	5	1		•			16	•			•	High-speed versions of Dx16/SMx16
DE24/DE324	0.5	25	8	1		100K			24	•				Standard and Hi-speed versions
Dx15/Sx14/SMx15	1	100	10	1	•		•	•	14	•	•	•	•	10-tap version of Dx13/Sx13/SMx13
Lx15/SLx15	1	100	10	1	•		•	•	14	•	•		•	T_{PLH} & T_{PHL}-controlled versions of Dx15/SMx15
Dx218/Sx218/SMx218	3	250	1	2	•		•	•	8	•	•	•	•	2-line version of Dx18/Sx18/SMx18
Dx214/Sx214/SMx214	3	500	1	2	•		•	•	14	•	•	•	•	2-line version of Dx13/Sx13/SMx13
Lx214/SLx214	3	500	1	2	•		•	•	14	•	•		•	2-line version of Lx13/SLx13
Dx228/Sx228/SMx228	4	100	2	2	•		•	•	8	•	•	•	•	Dx218/Sx218/SMx218 with centertaps
Dx224/Sx224/SMx224	4	100	2	2	•		•	•	14	•	•	•	•	Dx214/Sx214/SMx214 with centertaps
Lx224/SLx224	4	100	2	2	•		•	•	14	•	•		•	Lx214/SLx214 with centertaps
Dx254/Sx254/SMx254	1	200	5	2	•		•	•	14	•	•	•	•	2-line version of Dx14/Sx14/SMx14
Lx254/SLx254	1	200	5	2	•		•	•	14	•	•		•	T_{PLH} & T_{PHL}-ctl'd versions of Dx/Sx/SMx254
Dx38/Sx38/SMx38	3	250	1	3	•		•	•	8	•	•	•	•	3-line version of Dx18/Sx18/SMx18
Dx34/Sx34/SMx34	5	500	1	3	•		•	•	14	•	•	•	•	wider delay range, lower cost than 8-pin parts
Lx34/SLx34	5	500	1	3	•		•	•	14	•	•		•	T_{PLH} & T_{PHL}-ctl'd versions of Dx34/Sx34/SMx34
Dx36/SMx36	2	100	1	3		•			16	•			•	ECL 10K(H) versions of Dx34/SMx34
Dx44/Sx44/SMx44	3	100	1	4	•		•	•	14	•	•	•	•	4-line version of Dx13/Sx13/SMx13
DE424/DE444	1	25	1	4		100K			24	•				4-line versions of DE24/DE324
Dx64/Sx64/SMx64	3	100	1	6	•		•	•	14	•	•	•	•	6-line versions of Dx13/Sx13/SMx13
Px36/SPx36/SWx36	0.5	50	3	1	•	•	•	•	16	•	•		•	8-step programmable delay module
Px42	0.5	100	4	1	•	•	•	•	32	•	•		•	16-step programmable delay module
Px62	0.5	20	6	1	•	•	•	•	32	•	•		•	64-step programmable delay module
Px88	0.5	10	8	1	•	•	•	•	48	•	•		•	256-step programmable delay module

Kappa Technologies Inc. • 1443 Pinewood St., Rahway, N.J. 07065 • (732) 396-9400 • Facsimile: (732) 388-4786

14 Pin DIP and SMD 5 Tap Low-Profile TTL Compatible Active Delay Lines

Compatible with standard auto-insertable equipment and can be used in either infrared or vapor phase process.

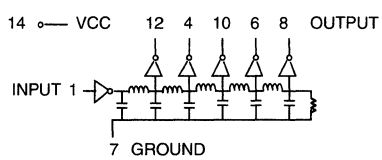
Delays are ±5% or ±2 nS Tap	Total	DIP Part Number	SMD Part Number	Delays are ±5% or ±2 nS Tap	Total	DIP Part Number	SMD Part Number
5, 10, 15, 20	25	EP8200-HL	EPA073HL-25	40, 80, 120, 160	200	EP8204-HL	EPA073HL-200
6, 12, 18, 24	30	EP8213-HL	EPA073HL-30	45, 90, 135, 180	225	EP8221-HL	EPA073HL-225
7, 14, 21, 28	35	EP8214-HL	EPA073HL-35	50, 100, 150, 200	250	EP8205-HL	EPA073HL-250
8, 16, 24, 32	40	EP8215-HL	EPA073HL-40	60, 120, 180, 240	300	EP8206-HL	EPA073HL-300
9, 18, 27, 36	45	EP8216-HL	EPA073HL-45	70, 140, 210, 280	350	EP8207-HL	EPA073HL-350
10, 20, 30, 40	50	EP8201-HL	EPA073HL-50	80, 160, 240, 320	400	EP8208-HL	EPA073HL-400
12, 24, 36, 48	60	EP8211-HL	EPA073HL-60	84, 168, 252, 336	420	EP8218-HL	EPA073HL-420
15, 30, 45, 60	75	EP8217-HL	EPA073HL-75	88, 176, 264, 352	440	EP8222-HL	EPA073HL-440
20, 40, 60, 80	100	EP8202-HL	EPA073HL-100	90, 180, 270, 360	450	EP8209-HL	EPA073HL-450
25, 50, 75, 100	125	EP8219-HL	EPA073HL-125	84, 188, 282, 376	470	EP8223-HL	EPA073HL-470
30, 60, 90, 120	150	EP8203-HL	EPA073HL-150	100, 200, 300, 400	500	EP8210-HL	EPA073HL-500
35, 70, 105, 140	175	EP8220-HL	EPA073HL-175				

Delay times referenced from input to leading edges at 25°C, 5.0V, with no load.

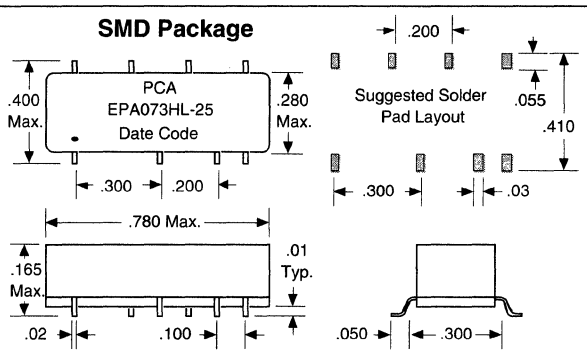
DC Electrical Characteristics

	Parameter	Test Conditions	Min	Max	Unit
V_{OH}	High-Level Output Voltage	V_{CC} = min. V_{IL} = max. I_{OH} = max	2.7		V
V_{OL}	Low-Level Output Voltage	V_{CC} = min. V_{IH} = min. I_{OL} = max		0.5	V
V_{IK}	Input Clamp Voltage	V_{CC} = min. I_I = I_{IK}		-1.2	V
I_{IH}	High-Level Input Current	V_{CC} = max. V_{IN} = 2.7V		50	µA
		V_{CC} = max. V_{IN} = 5.25V		1.0	mA
I_{IL}	Low-Level Input Current	V_{CC} = max. V_{IN} = 0.5V		-2	mA
I_{OS}	Short Circuit Output Current	V_{CC} = max. V_{OUT} = 0.	-40	-100	mA
		(One output at a time)			
I_{CCH}	High-Level Supply Current	V_{CC} = max. V_{IN} = OPEN		75	mA
I_{CCL}	Low-Level Supply Current	V_{CC} = max. V_{IN} = 0		75	mA
T_{RO}	Output Rise Time	Td ≤ 500 nS (0.75 to 2.4 Volts)		4	nS
		Td > 500 nS		5	nS
N_H	Fanout High-Level Output	V_{CC} = max. V_{OH} = 2.7V		20 TTL LOAD	
N_L	Fanout Low-Level Output	V_{CC} = max. V_{OL} = 0.5V		10 TTL LOAD	

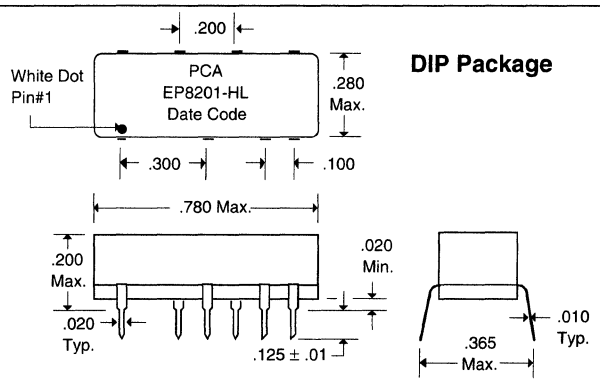
Schematic



SMD Package



DIP Package



Recommended Operating Conditions		Min	Max	Unit
V_{CC}	Supply Voltage	4.75	5.25	V
V_{IH}	High-Level Input Voltage	2.0		V
V_{IL}	Low-Level Input Voltage		0.8	V
I_{IK}	Input Clamp Current		-18	mA
I_{OH}	High-Level Output Current		-1.0	mA
I_{OL}	Low-Level Output Current		20	mA
P_W*	Pulse Width of Total Delay	40		%
d*	Duty Cycle		40	%
T_A	Operating Free-Air Temperature	0	+70	°C

**These two values are inter-dependent.*

Input Pulse Test Conditions @ 25° C			Unit
E_{IN}	Pulse Input Voltage	3.2	Volts
P_W	Pulse Width % of Total Delay	110	%
T_{RI}	Pulse Rise Time (0.75 - 2.4 Volts)	2.0	nS
P_{RR}	Pulse Repetition Rate @ Td ≤ 200 nS	1.0	MHz
	Pulse Repetition Rate @ Td > 200 nS	100	KHz
V_{CC}	Supply Voltage	5.0	Volts

PCA ELECTRONICS INC.
16799 SCHOENBORN ST.
NORTH HILLS, CA 91343
TEL: (818) 892-0761
FAX: (818) 894-5791

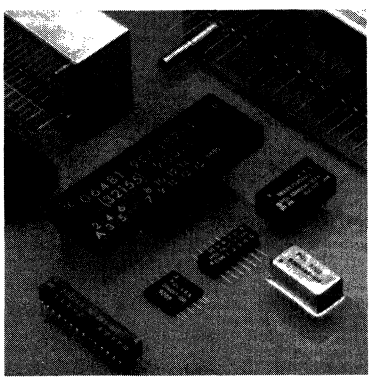
EP82XX-HL & EPA073HL 10/92

POLARA

THE ENGINEERS' CHOICE FOR CUSTOM AND STANDARD DELAY LINES, INDUCTORS, PULSE TRANSFORMERS, AND SPECIAL ELECTROMAGNETIC COMPONENTS.

View our home page on the internet at **http://www.polara.com**

LUMPED AND DISTRIBUTED CONSTANT DELAY LINES



Passive DIP Delay Lines

- Complete range of delay times
- 14-30 pin versions
- Various pinouts
- Miniature and low profile styles
- High performance types

Passive SIP Delay Lines

- 7-14 pin versions
- 5- and 10-tap styles
- Short-delay trimmers

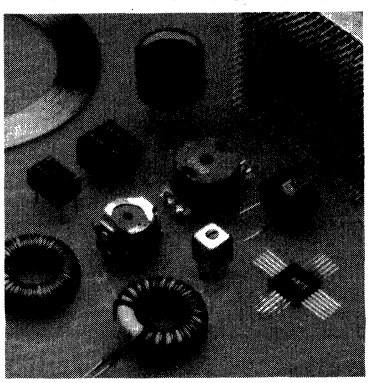
Passive Distributed Delay lines

- Very low distortion
- Fast rise-time versions
- 200-1000 ohms impedance

Active Delay Lines

- DIP, SIP, and mini-DIP packages
- TTL and ECL types
- Programmables
- 8-24 pin versions
- 5- and 10-tap styles
- Very high reliability models
- Surface mount varieties
- Hermetically sealed versions
- MIL spec models

MAGNETIC COMPONENTS



Inductors

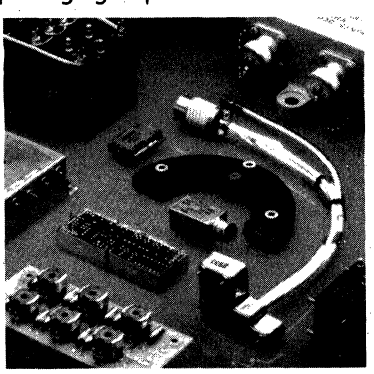
- IF-RF inductors
- Filtering inductors
- Linear and Toroidal
- Inductances from 0.1-10 μH
- Frequencies to 100 MHz
- Q to 100
- MIL spec models

Pulse Transformers

- Data communications interfaces
- Impedance matching
- SCR triggering
- Balanced-to-unbalanced line conversion
- Low profile packages
- Miniature packages
- Surface mount styles
- Hermetically sealed versions

SPECIAL COMPONENTS

Polara has a strong capability in the design of special components for unusual applications. This may mean achieving a difficult delay time, operating frequency, or pulse envelope. At other times the need is for small size or special shape to fit compact packaging requirements.



Polara Engineering, Inc., with headquarters in Southern California, has specialized for over 20 years in electromagnetic components of the highest quality and reliability. Applications include computers, avionics, space, communications, radars and sonars, and medical electronic instruments. As a Certified/MVP supplier, Polara is represented in many of the major military, aerospace, and defense programs, world-wide.

Offshore Facilities

To offer major cost savings to high-volume customers, Polara is able to provide manufacturing services with well qualified offshore sources.

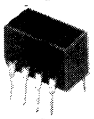
Contact Polara for a detailed proposal or quotation on your delay line or magnetic component requirements.

POLARA ENGINEERING, INC.

4115 Artesia Avenue • Fullerton, California 92833 • (714) 521-0900 • FAX: (714) 522-8001

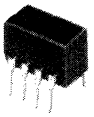
RCD delay lines...the low cost of high quality.
Now at prices starting below $1.00! Delivery from stock.

Active (Digital) Delay Lines–4nS to 2000nSec

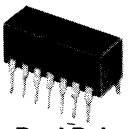


STOCK ITEM

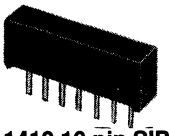
Series A01–Single Delay
Designed to meet MIL-D-23859 utilizing a molded DIP case, in 8-pin or 14-pin package sizes, standard delay times range from 10nS to 500nS. Available in Surface Mount version.



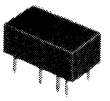
Series A0805 8 pin DIP, 5-Tap
Miniature 5-tap delay line is available in a wide range of values from 4nS to 500nS.



Series A02–Dual Delay, 8 pin
Series A03–Triple Delay, 14 pin
Series A04-Quad Delay, 14 pin
Single DIP package contains 2, 3, or 4 isolated delays, 5ns to 500ns.

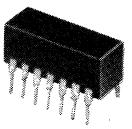


Series SA1410 10 pin SIP, 10-Tap
Series SA0805 8 pin SIP, 5-Tap
Space-saving SIP package offers a range of delay times from 4nS to 500nS.



STOCK ITEM

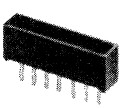
Series A1405 14-pin DIP, 5-Tap
Designed to meet MIL-D-23859, in encapsulated and molded versions. Wide range of delay times from 4nS to 1000nS.



Series A1410 14-pin DIP, 10-Tap
Features 10 uniform taps in a 14-pin package, in a wide range of delay times from 5nS to 1000nS.

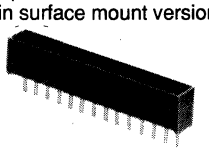
Passive (Analog) Delay Lines–0.1nS to 2000nSec

Series S01–Single Delay SIP
Lumped constant design per MIL-D-23859 offers a delay range of 1nS to 10nS in a 3.5 or 8-pin SIP. 100Ω impedance is standard, 50Ω & 200Ω available.

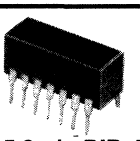


Series SP05 7-pin SIP, 5-Tap
Features 5 uniform taps in a molded 7-pin SIP case. Delay times range from 1nS to 100nS, in 50Ω and 100Ω impedance values.

Series P01–Single Delay DIP
Available in standard 8-pin or 14-pin DIP package sizes, or new ultra miniature 4-pin DIP. Delay times range from 100pS to 100nS. Impedance values of 50Ω-500Ω. Available in surface mount version.

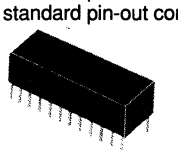


Series SP10 14-pin SIP, 10-Tap
Designed to meet applicable portions of MIL-D-23859 in delay times ranging from 10nS to 250nS, impedance values of 50Ω to 200Ω.



STOCK P1410

Series P0805 8-pin DIP, 5-Tap
Series P1410 14-pin DIP, 10-Tap
Features uniform taps in an 8 or 14-pin DIP (standard or low-profile). Values range from 10nS to 1000nS, impedances of 50Ω to 500Ω, and 4 standard pin-out configurations.

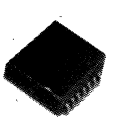


Series P2420 24-pin DIP, 20-Tap
Features 20 uniform taps in a standard 24-pin molded DIP package. Delay times range from 1nS to 1000nS, in 50Ω to 200Ω impedance values. 3 standard pin-out configurations.

Surface Mount Delay Lines–0.1nS to 1000nSec

SMP01 Chip, Single Delay Passive
Miniature delay line chip is the first of its kind in the industry, offering very small time adjustments in ECL circuits. Value range from 0.1nS to 1nS in 50Ω and 75Ω impedance values. Available on plastic Tape & Reel.

P0805AG 8-pin, 5-Tap, Passive
SMP1405 14-pin, 5-Tap, Passive
SMP1410 14-pin, 10-Tap, Passive
SMP1610 16-pin, 10-Tap, Passive
Small outline (.050" pin spacing) or standard (.100" pin spacing), 5 to 1000ns, in 3 standard pin-out configurations. Available on Tape & Reel.

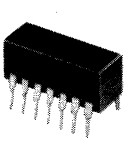


SMA0805 8-pin, 5-Tap, Active
SMA1405 14-pin, 5-Tap, Active
SMA1410 14-pin, 10-Tap, Active
Small outline (.050" pin spacing) or standard (.100" pin spacing), 2.5ns to 1000ns. Available on Tape & Reel.

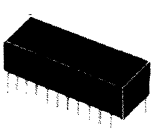
Custom Delay Lines

Programmable

Refer to EEM section 1800 for RCD inductors, and to section 4700 for RCD resistors, networks, and hybrids.

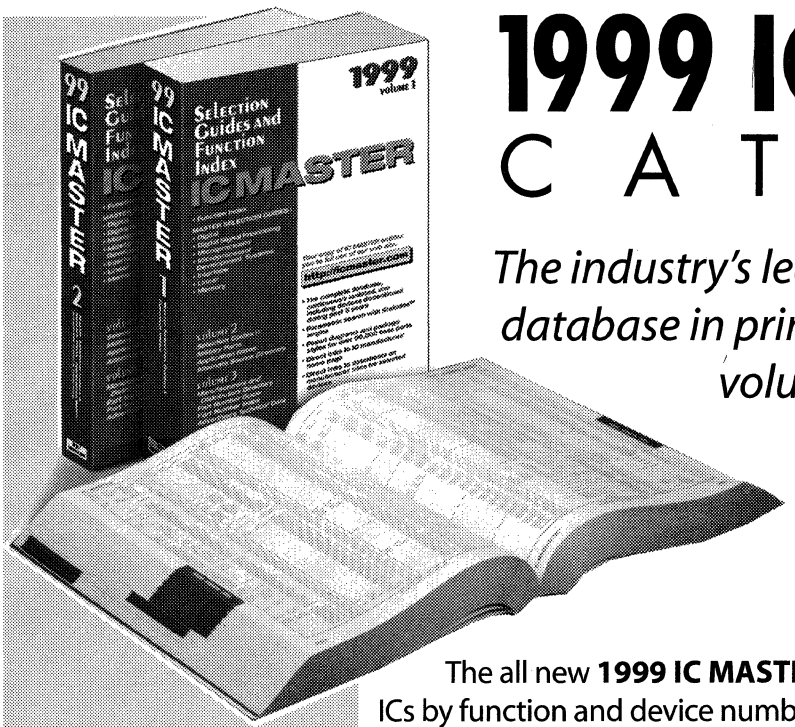


10K & 100K ECL
Hi-Speed CMOS



High Value
1μS to 20μS

RCD Components Inc. ***Resistors • Coils • Delay Lines***
520 E. Industrial Park Dr., Manchester, N.H. 03109 USA TEL (603) 669-0054 FAX (603) 669-5455
www: http//www.rcd-comp.com email: rcdcompinc@aol.com



1999 IC MASTER CATALOG

The industry's leading integrated circuit database in print. In three easy-to-use volumes you can:

- **Review current IC product information.**
- **Identify second-sources.**
- **Locate manufacturers with sales offices and distributors.**

The all new **1999 IC MASTER** catalog lists over 100,000 current ICs by function and device number. To make your search for information fast and easy, device data is organized in ten Master Selection Guides:

- **Digital**
- **Digital Signal Processing**
- **Microprocessor**
- **Interface**
- **Microprocessor Development Systems**
- **Linear**
- **Programmable Logic Devices**
- **ASIC/Custom**
- **Memory**
- **Chip Sets & Multifunction Devices**

The comprehensive, industry-wide Alternate Source Directory lists over 120,000 functional equivalents for current and discontinued ICs. It includes NTE and Philips ECG parts.

There's more. Other valuable sections include the Part Number Index, the Military Parts Directory, the Application Notes Directory, and the Manufacturers & Distributors Directory. You have access to pinout and package data for over 90,000 devices on the Internet at http://icmaster.com.

When you want a comprehensive overview of the IC industry, turn to the **1999 IC MASTER** catalog. An industry standard since 1974.

To order your 1999 IC MASTER

contact your local IC MASTER distributor or Marie Botta at:

Hearst Business Communications, Inc.
645 Stewart Avenue, Garden City, NY 11530
(516) 227-1314 FAX (516) 227-1453
Credit Card Hotline: 1-800-833-7138

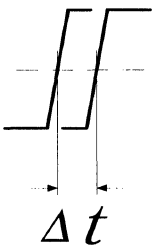
Tell Marie you saw IC MASTER in the 1999 EEM, and she'll take $10.00 off the subscription price!

The IC MASTER catalog is published annually in February.

See us on the World Wide Web at http://icmaster.com

Rhombus Industries Inc.
Transformers & Magnetic Products

Electromagnetic & Logic Buffered Delay Lines



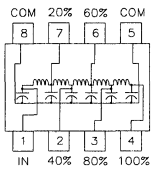
Founded in 1970, Rhombus Industries Incorporated is a leading designer and manufacturer of quality transformers and magnetic products. At our headquarters in Huntington Beach, California we have complete process capabilities, as well as engineering, research and development, and sales staff.

Our dedicated employees look forward to proving to you that Rhombus offers the price, delivery and application support advantages to address your critical needs.

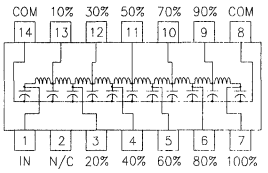
Full-Line Catalogs Available upon Request

Passive Delay Modules Including ...

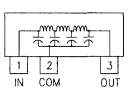
5-Tap DIP/SMD AMZ Series



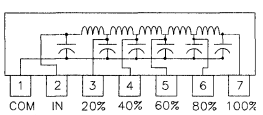
High BW 10-Tap TZB Series / 10-Tap DIP/SMD AIZ Series



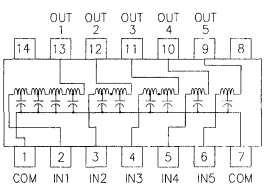
3-Pin Mini SIP SIL2 Series



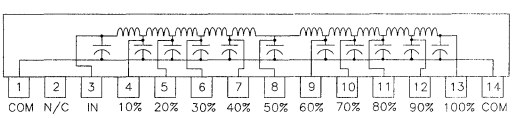
5-Tap SIP 7-Pin SIP4 Series



Multi-Line (Video Applications) DIP 14-Pin DLM5 Series

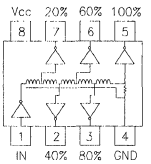


10-Tap SIP 14-Pin SIP5 Series

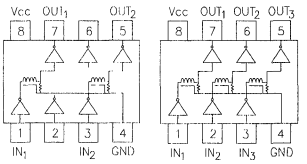


Active Delay Modules Including ...

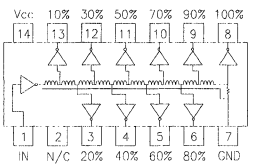
5-Tap FAST/TTL FAMDM Series



Dual & Triple FAM2D & FAM3D Series



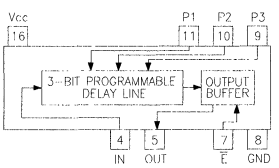
10-Tap 14-Pin FAST/TTL FAITD Series



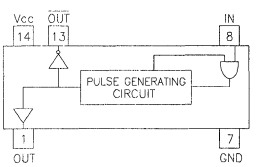
3V Logic

Most Active Series also available in Low Voltage CMOS

3-Bit Programmable PLDM7 Series



Pulse Width Control TTLPWG Series



Passive (Electromagnetic) • Active (Logic Buffered: FAST / TTL, ACT / CMOS & ECL)
Tapped / Multi / Programmables • Pulse Control • Gated Oscillators • DIP / SIP / SMD

Services & Capabilities

Standard Product Line
Broad range of Magnetic Products as listed in our various catalogs.

Custom Designs
Leaders in development, we welcome designs customized to your specific requirements.

Coil Winding
Rhombus Industries provides this service with the option of either customer, or Rhombus supplied raw materials.

Expedited Turn-around
For Critical needs Rhombus provides faster than standard lead times, from our prototype floor.

Additional Engineering Capabilities
Various Packaging Options:
High Density, Auto-Insertable, SMT

Cross Referencing
Rhombus can cross reference your current supplier part numbers.

In-House Design & Tooling Capabilities
Mechanical Engineering
Precision Tooling and Machining
Manufacturing & Test equipment
Software Development

Extensive In-House Environmental and Electrical Test Facilities
Thermal Shock, and Life Test
Humidity / Temperature Testing
Electrical Parameter Characterization
Screening and Sorting

For Information on our Transformer & Magnetic Products refer to Section 5600

Rhombus Industries Inc., 15801 Chemical Lane, Huntington Beach, CA 92649-1595
Phone: (714) 898-0960 • FAX: (714) 896-0971 • www.rhombus-ind.com • email: sales@rhombus-ind.com

TAMURA Designs OUT Custom EMI/RFI Ripple & Noise.

Design IN TAMURA

ISO REGISTERED 9001/9002

File: E92559 E105042

File: LR65763

File: 49913 49914 99973

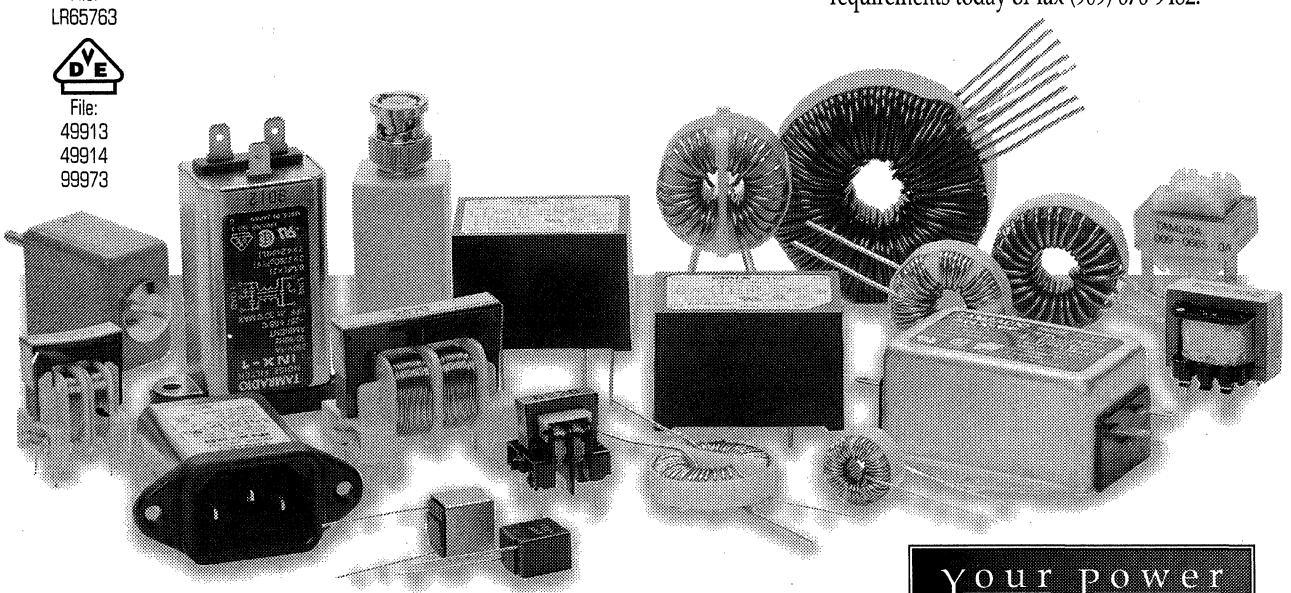
Low cost filters, common and normal mode coils & power inductors.

Serious designers conquer conducted noise problems with filters, coils and inductors custom-designed by TAMURA to your requirements.

- EMI/RFI line filters feature tab, pin and screw terminal type connectors.
- Common and normal mode coils for AC line and EMI/RFI filtering cover the range from 0.1 to 50 MHz.
- TAMURA offers a wide range of inductors for switch-mode power regulator control and energy storage circuits.

TAMURA HAS IT ALL.

For world-class manufacturing, reliability and responsibility, go to the source. Partner with TAMURA and you'll get it all. Send your requirements today or fax (909) 676-9482.



Your Power Partner

For world-class manufacturing, distribution, reliability, and responsibility, go to the sources...

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

Microtran Division, Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

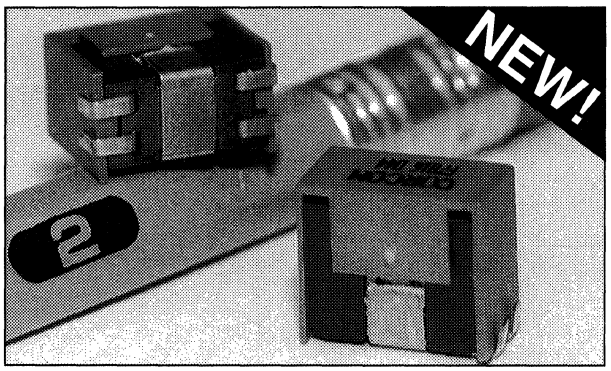
POWER LINE FILTERS

Manufacturer	Starting EEM Page No.	EMI		RFI		Modules											International Adapters	Approvals
								Features										
		AC	DC	AC	DC	Power Entry	International	Power Switch	Fuse Holder	Voltage Selector	Dual Mode	PC Mount	Surface Mount	Cord Conn.	Lighted	Custom		
Corcom, Inc.	A•1578	√	√	√	√	√	√	√	√	√	√		√	√				UL, CSA, VDE
Curtis Industries	A•1583	√	√	√	√	√	√	√	√	√	√	√		√		√	√	UL, CSA, VDE
Eichhoff Electronics	A•1585	√	√	√	√	√	√	√	√	√		√				√		√
Filter Concepts, Inc.	A•1586	√	√	√	√	√	√							√		√		UL, CSA, VDE, TUV
JMK Inc.	A•1590	√	√	√	√	√	√	√	√		√	√		√		√		
Lindgren RF Enclosures	A•1591	√	√	√	√	√	√				√					√		√
Mechatronics Inc.	A•1593	√		√		√	√	√	√	√	√	√		√		√		UL, CSA, VDE
Metuchen Capacitors	A•1594	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	ALL, VDE, CFE UL
Okaya Electric America, Inc.	A•1596	√		√			√				√	√		√		√		√
Power Dynamics Inc.	A•1602	√		√		√	√	√	√	√	√	√	√	√	√	√	√	UL, CSA, VDE, SEV, SEMKO, DEMKO, NEMKO
RFI Corp.	A•1605	√*	√*	√*	√*											√*		UL, MIL
SAE Power, Inc.	A•1606	√		√		√	√	√	√	√	√					√	√	√
Schaffner EMC, Inc.	A•1608	√	√	√	√	√	√	√	√	√	√	√		√	√	√		UL, CSA, VDE, SEV, SEMCO
Schurter, Inc.	A•1610	√		√		√	√	√	√	√	√	√		√	√	√		UL, CSA, VDE
Spectrum Control Inc.	A•1611	√	√	√	√	√	√	√	√			√	√	√	√	√		√
Tamura Corp./ AALTAM	A•1612	√	√	√	√	√	√					√		√		√		UL, CSA, VDE
Tri-Mag Inc.	A•1599	√	√	√	√	√	√	√	√	√	√	√		√	√	√	√	√

corcom
Libertyville, Illinois 60048 USA
TEL: (847) 680-7400
FAX: (847) 680-8169
http://www.cor.com

Surface Mountable Filters

BLF Series



Corcom introduces a new line of surface mountable RFI filters specifically designed to eliminate noise on the signal line. These board level filters attenuate noise on the signal line at the frequency range of 10 MHz to 1000 MHz with maximum attenuation at 40 MHz to 400 MHz.

The U shaped ferrite features a parallel first and second leg with a center leg surrounded by a grounding/shorting strap and a capacitor for each line. This unique design optimizes the filter performance by combining the elements into one low profile single piece filter. Each filter acts on two signal lines, but can be stacked as an array to allow performance over multiple lines.

The BLF. filter can withstand dielectric voltage of 1000VAC for 60 seconds, thereby allowing placement of this filter at the optimal location, immediately behind the connector. This placement allows immunity protection from signal line interference as well as significant reduction of RFI emissions. The filter can be used in conjunction with unfiltered RJ jacks, ganged jacks, or with filtered modular jacks for additional protection.

Specifications

Capacitors

Type:	Monolithic ceramic chip
Standard Value:	
BLF820	820pF
BLF082	82pF
Standard Tolerance	+/-20%

Ferrites

Type:	High resistivity, nickel zinc ceramic
Inductance:	2uH

Housing Materiai

Glass-filled polyester (UL94V-0)

Dielectric Withstanding Voltage

Line-to-line and line-to-ground	1000VAC for 60 seconds

Current

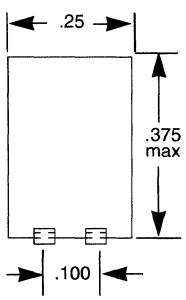
2.2 amps

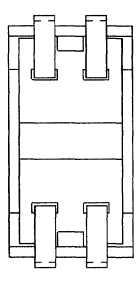
Passband
Minimum insertion loss in dB
Differential mode in a 50 ohm circuit
DC - 1MHz < 1dB
DC - 5MHz < 6dB

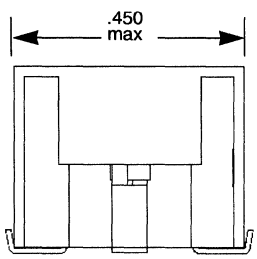
Stopband
Minimum insertion loss in dB
Common mode in a 50 ohm circuit

	Frequency-MHz							
	40	70	100	150	300	500	700	1000
BLF082	10	16	20	25	40	26	23	20
BLF820	30	40	50	40	30	25	22	13

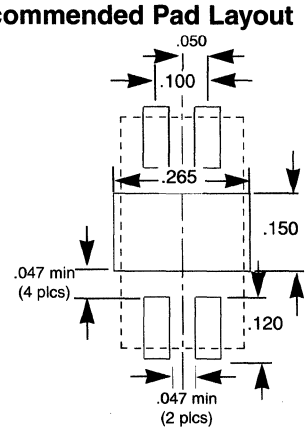
Dimensions







Recommended Pad Layout



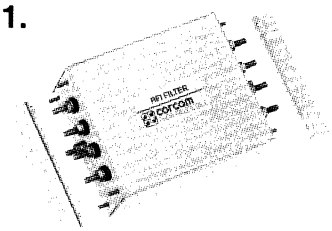
corcom
Three Phase RFI Power Line Filters

Libertyville, Illinois 60048 USA
TEL: (847) 680-7400
FAX: (847) 680-8169
http://www.cor.com

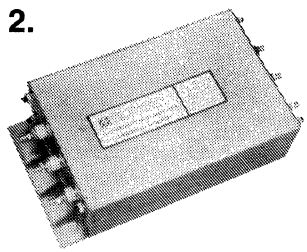
Corcom is an ISO9001 certified manufacturer of over 300 models of RFI filters. As a world leader in RFI technology, Corcom offers a wide range of filters specifically designed to bring equipment into compliance with strict FCC and VDE restrictions and to help systems meet CE Marking Requirements. Catalog filters are available off-the-shelf from over 175 distributor locations in the U.S. and a strong network of reps and sales offices worldwide.

For more information, call or write for our free catalog or find us on the internet at http://www.cor.com.

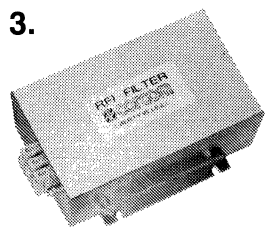
1.



2.



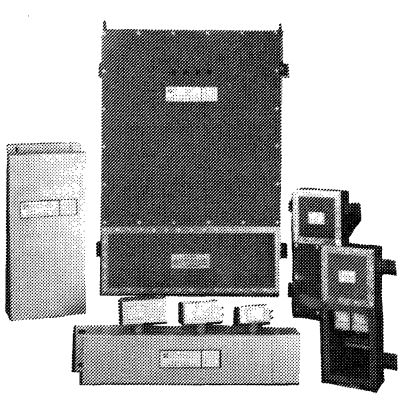
3.



Series	Application	Case Styles	Current Ratings
A	Industrial	1	20 - 60 amps
ADT	High Performance	2	63 - 200 amps
FCD	Frequency Converters	3	6 - 50 amps

Call Corcom for information on our new Three Phase offerings.

corcom
Facility Filters

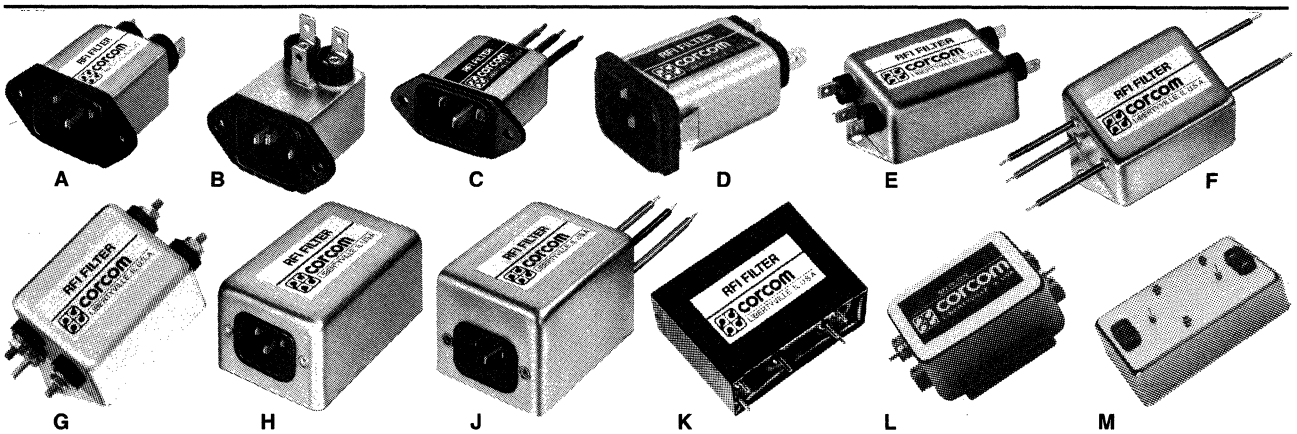


The Facility Applications Division offers high current facility filters for both protective and security functions. Each filter is stringently tested to customer specifications meeting electronic and environmental standards. Applications include shielded rooms, MRI equipment, as well as Communications equipment. All high current filters are designed to meet the general MIL -F-15733 military standard. Contact our Facility Applications Team at (847)680-7400 for more information.

corcom

Single Phase RFI Power Line Filters

Libertyville, Illinois 60048 USA
TEL: (847) 680-7400
FAX: (847) 680-8169
http://www.cor.com



Series	Application	Case Styles**	Current Ratings	Approvals
B*	General Purpose	E, F, G	1 - 30 amps	UL, CSA, VDE
EAH/EBH	Health Care	A	1 - 10 amps	UL, CSA, VDE
EAS/EBS	General Purpose	D	1 - 10 amps	UL, CSA, VDE
EC, ED	High Performance	A, B, C	1 - 15 amps	UL, CSA, VDE
EDP/EOP	PCB Mount	K	1 - 10 amps	UL, CSA, VDE
EEA/EEB, EEC	General Purpose	A, B	1 - 10 amps	UL, CSA, VDE
EP	Emissions	E, F, G, H	3 - 20 amps	UL, CSA, VDE
FC	Frequency Converters	L	6 - 36 amps	
G	Emissions	E	6 - 10 amps	UL, CSA, VDE
H*	Health Care	A, B, C, E	3 - 15 amps	UL, CSA, VDE
HQ, HT	Health Care	E, F, G, H, J	3 - 20 amps	UL, CSA, VDE
HZ	Health Care	E	3 amps	UL, CSA, VDE
K*	General Purpose	E, F, G, H	1 - 40 amps	UL, CSA, VDE
MV	Health Care	E	3 - 20 amps	UL, CSA, VDE
N	Emissions	E	6 - 10 amps	UL, CSA, VDE
Q	Emissions	E, F, J	3 - 20 amps	UL, CSA, VDE
R	General Purpose	E, F, G, H	1 - 20 amps	UL, CSA, VDE
S, V, W	Industrial	E, G, H	3 - 20 amps	UL, CSA, VDE
SK	Emissions	E, F, G	3 - 40 amps	UL, CSA, VDE
T	SMPS Emissions	E, F, G, H	3 - 15 amps	UL, CSA, VDE
U	Power Factor Power Supplies	E, M	6 amps	UL, CSA, VDE
X,Y,Z	High Performance	E, K	1 - 6 amps	UL, CSA, VDE

* Low Cost Versions Available
**Not all case styles are available for all current ratings, call Corcom for more information.

corcom
Power Entry Products

Libertyville, Illinois 60048 USA
TEL: (847) 680-7400
FAX: (847) 680-8169
http://www.cor.com

Corcom offers over 75 models of power entry products which provide the combination of functions to make a system easily adaptable for marketing anywhere in the world.

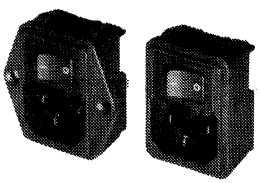
Both unfiltered and filtered models provide combinations of IEC connectors, fuse holders, voltage selectors, and on/off switches offering a cost-effective alternative to individual parts.

Filtered models are available with five levels of filtering for susceptibility and emissions applications including applications for FCC and VDE emissions levels.

All models have approvals from the major safety agencies in the world. The units are sold through a strong network of reps and distributors worldwide. For more detailed information, call or write for our catalog: or look on the internet at http://www.cor.com.

Unfiltered Models

C Series



- IEC connector and DPST switch
- 10 amp rating
- Snap-in or flange mount
- Fits existing panel cutouts

J Series

- 2 or 4 voltage selection
- North American fuse holder
- 6 amp current rating

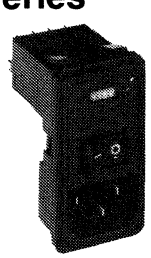
L Series

- North American OR European fuse holder
- Optional on/off switch or 4 voltage selection
- 6 amp current rating
- Snap-in or flange mount

M Series

- North American AND European fuse holder
- 6 amp current rating
- Optional on/off switch
- Optional 2 or 4 voltage selection

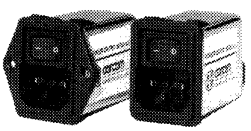
P Series



- IEC Connectors
- North American and European fuse holder
- Optional switch
- 2 Voltage selector
- Compact size
- 10 amp current rating
- Interconnection block available
- Flange or snap-in mounting

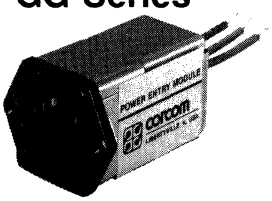
Filtered Models

C Series



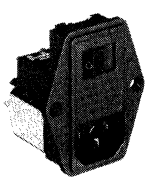
- IEC Connector, DPSTSwitch and filtering
- Filters rated for 1, 3, 6 and 10 amps
- General Purpose and Medical Filtering
- Snap-in or Flange Mount
- Fits existing panel cutouts

GG Series



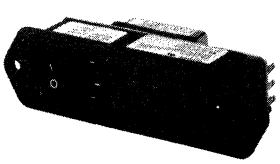
- Compact size
- European fuse holder
- Filters rated for 1, 3 and 6 amps
- Medical & General Purpose Filtering

L Series



- Filtering for medical or linear applications
- North American OR European fuse holder
- Optional on/off switch OR 4 voltage selection
- Current ratings of 1 to 6 amps
- Snap-in or flange mount

M Series



- Four levels of filtering including medical applications
- Current ratings of 3 to 5 amps
- Optional on/off switch
- Snap-in design available

P Series

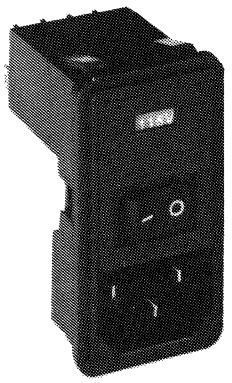
- Filtering for general purpose and medical applications
- Current ratings of 3, 6, and 10 amps
- North American and European fuse holder
- Optional switch
- 2 Voltage selector
- Compact size
- Flange or snap-in mounting

See Our Page in Vol. C, Section 2100

corcom
Libertyville, Illinois 60048 USA
TEL: (847) 680-7400
FAX: (847) 680-8169
http://www.cor.com

RFI Power Line Filters

P Series
The Chameleon Power Entry Modules



UL Recognized,
CSA Certified,
VDE Approval

P Series

The P Series power entry module offers full flexibility of design in the most compact package.

As the first 10 amp module to provide all five power entry functions in one compact design, the "Chameleon" readily adapts to its environment and the needs of international markets.

- IEC power line connector
- Both North American and European fusing capabilities
- Two voltage selection
- Optional DPST on/off switch
- Snap-in or flange mount

Also available is an interconnection block, B models. The block connects the fuse holder terminals with the switch and IEC connector to reduce external wiring on unfiltered units.

The Chameleon's compact design and modular construction will allow you to select all the power entry features you require—without altering the panel cut-out. And, the Chameleon, with adapters, will fit any standard panel cut-out you currently have designed.

Specifications

Hipot rating (one minute):	
line-to-ground	1500 VAC
line-to-line	1450 VDC
Operating frequency:	50/60 Hz
Rated voltage:	120/250 VAC
Rated Current all nonfiltered models:	10A @ 120VAC
	10A @ 250VAC
Operating Voltages:	
selectable or fixed	115/230 VAC
Fuseholder:	
Accepts one or two fuses	1/4" x 1-1/4" or 5 x 20 mm
Switch:	10A/250

10,000 operation at 51 amp inrush capability

P Series — Filtered

The Chameleon has two filter options. S models offer protection for general purpose applications where line-to-ground and line-to-line noise must be controlled. The filter is designed to meet low leakage requirements of SEV and VDE portable equipment. They are available in current ratings of 3, 6 and 10 amps.

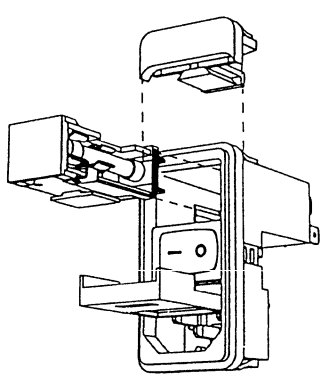
H models provide susceptibility protection without leakage current associated with line to ground capacitors. Designed to allow equipment to meet UL 544 or UL 2601 for patient care and nonpatient care equipment.

Also available in current ratings of 3, 6 and 10 amps.

Specifications — Filtered Models

Maximum leakage current, each line-to-ground		
@ 120 VAC 60 Hz:	H models	2μA
	S models	0.25 mA
@ 250 VAC 50 Hz:	H models	5μA
	S models	0.50 mA

Refer to unfiltered specifications for additional information.

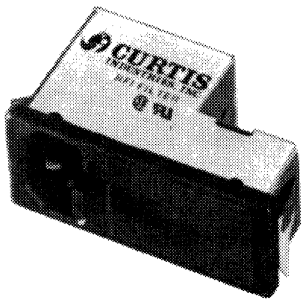


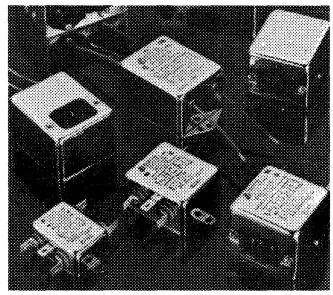
Power Entry Module CHAMELEON by Corcom

See Our Page in Vol. C, Section 2100

CURTIS INDUSTRIES

RFI POWER LINE FILTER SELECTION CHART



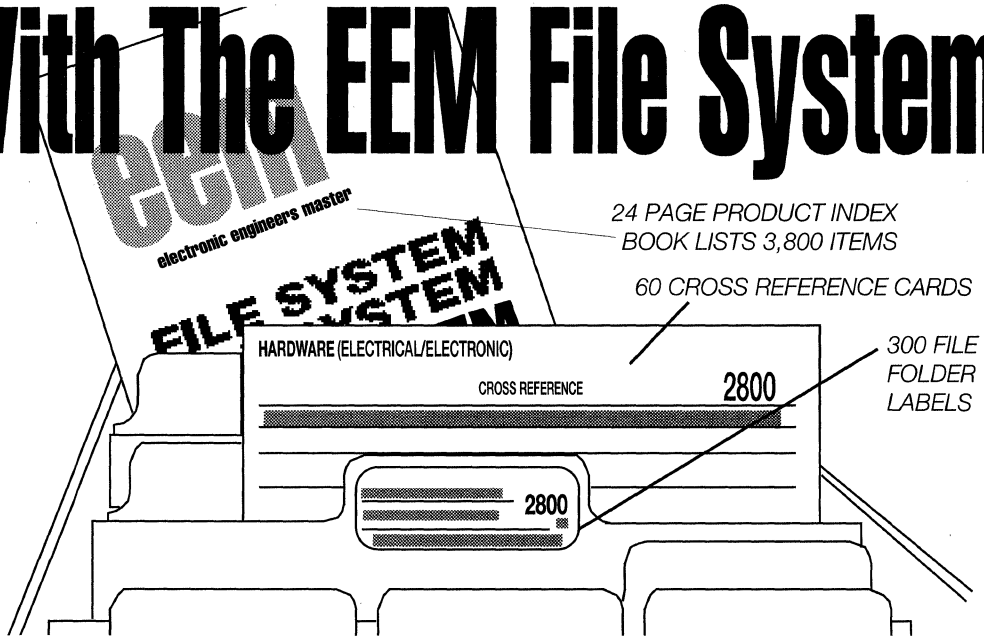


FULL RFI-EMI CONDUCTED EMISSIONS TESTING OFFERED

FILTER SERIES	APPLICATION	PERFORMANCE RELATIVE ATTENUATION		MAXIMUM LEAKAGE CURRENT		CURRENT RATING AMPS@ 115 VAC							SAFETY AGENCY APPROVALS			PACKAGING/TERMINATIONS							
		Common Mode	Differential Mode	mA @115VAC	mA @250VAC	1	3	6	10	15	20	30				Wire	Q.C.	I.E.C.	Fused I.E.C.	Volt Select	Switch	P.C. Term	Screw	Solder Term.
F1400	SMPS	●●●●●	●●●●	0.25	0.40		●	●	●				●	●	●	●	●	●						●
F1500	Linear/SMPS	●●●●	●●●	0.25	0.40		●	●	●	●			●	●	●		●	●	●					●
F1600	SMPS	●●●●●	●●●	0.25	0.40		●	●	●				●	●	●		●	●	●			●		●
F1700	General Off line SMPS	●●	●●●●	0.5	1.0		●	●	●		●	●	●	●	●	●	●	●					●	●
F2700	High Performance Switching Power	●●●●●	●●●●●	0.25	0.40		●	●					●	●	●	●	●	●	●		●			●
F2800	High Performance Switching Power	●●●●●	●●●●●	0.25	0.40		●	●	●	●			●	●	●	●	●							●
F1800	SMPS	●●●●	●●●	0.25	0.40		●						●	●		●			●		●			●
PE60	Power Entry	●	●	0.25	0.40		●	●					●	●	●		●		●	●				●
PM60	Power Entry Medical UL544	●	●	0.002	0.005			●					●	●	●		●		●	●				●
PE70	Power Entry	●	●	0.25	0.40		●	●					●	●	●		●		●	●				●
PM70	Power Entry Medical UL544	●	●	0.002	0.005		●	●					●	●	●		●		●	●				●
PE80	Power Entry	●	●	0.25	0.40		●	●					●	●	●		●		●		●			●
PM80	Power Entry Medical UL544	●	●	0.002	0.005		●	●					●	●	●		●		●		●			●
PE90	Power Entry	●	●	0.25	0.40		●	●					●	●	●		●		●	●	●			●
PM90	Power Entry Medical UL544	●	●	0.002	0.005		●	●					●	●	●		●		●	●	●			●
F3000	Medical UL544	●		0.002	0.005			●					●	●	●		●							●
F3100	Medical UL544	●		0.002	0.005			●					●	●	●		●	●						●
F3200	Medical UL544	●		0.002	0.005			●					●	●	●		●	●						●
F3400	Medical UL544	●	●	0.002	0.005		●	●					●	●			●	●						●
F3500	Medical UL544	●	●	0.002	0.005		●	●					●	●			●	●						●
F3300	Medical UL544	●	●	.014	.025		●	●					●	●			●		●			●		●
F2600	General Purpose	●	●	0.25	0.40		●	●					●	●	●		●		●			●		●
F2300	General Purpose	●●●	●●	0.25	0.40			●					●	●	●		●	●						●
F1100	General Purpose /Linear	●●		0.5	1.0	●	●	●	●		●		●	●	●	●	●					●	●	●
F1150	General Purpose /Linear	●		0.25	0.40	●	●	●	●		●		●	●	●	●	●						●	●
F1200	General Purpose /Linear	●●	●●	0.5	1.0	●	●	●	●		●	●	●	●	●	●	●	●					●	●
F1250	General Purpose /Linear	●	●●	0.25	0.40	●	●	●	●		●		●	●	●	●	●						●	●
F1300	Motor Capacitive, etc.	●●●●	●●	0.5	1.0	●	●	●	●	●			●	●	●	●	●	●				●		●
F1350	Motor, Capacitive, Low Impedance Loads	●●●	●●	0.25	0.40	●	●	●	●				●	●	●	●	●	●				●		●
F2100	General Purpose	●		0.25	0.40	●	●	●	●				●	●	●		●	●						●
F2200	General Purpose	●		0.25	0.40	●	●	●					●	●	●		●	●						●
F2400	General Purpose	●	●	0.25	0.40		●	●					●	●	●		●	●						●
F2500	General Purpose	●	●	0.25	0.40		●	●					●	●	●		●	●						●
F1900	UL1410 Consumer/Linear	●	●	0.25	0.40		●	●					●	●			●							●

CURTIS INDUSTRIES
Div. Powers Holdings Inc.
"We Build Confidence!"
2400 S. 43rd Street, Milwaukee, WI 53219
1-800-649-8905, FAX (414) 649-4279

Organize Your Files... With The EEM File System!



The EEM File System was developed 36 years ago to help you organize your catalog files the EEM way. The EEM File System follows the EEM cataloging system that organizes all electronic product information by the four-digit EEM Product Section Number. It puts an end to catalog clutter and filing frustration.

The EEM File System comes in one neat package:

Product Index Book - Tells you where to file information on each and every type of electronic product by generic product name and EEM Product Section Number.

300 File Folder Labels - Pressure sensitive labels are pre-printed with product names and EEM Product Section Number. You apply the labels to as many, or as few, file folders as you choose.

60 Cross Reference Cards - You'll never lose track of where you filed a catalog from a multi-product manufacturer.

With the EEM File System you can get organized and stay organized. You'll save countless hours of searching for elusive catalogs and data sheets. You'll be able to quickly find the catalog you need when you need it. The EEM File System is in everyday use in thousands of engineering and purchasing departments around the world. This proven, time-saving system belongs in your department!

The EEM File System is very affordable and easy to order...

- **Charge it to your VISA, AMEX or MasterCard by calling toll-free 1-800-833-7138.**
- **Or, mail your purchase order and check for US $30.00 plus local sales tax* to:**

EEM/Hearst Business Communications, Inc.
645 Stewart Avenue
Garden City, NY 11530
Att: Marie Botta
(516) 227-1314 • FAX (516) 227-1453

*Add sales tax in CA,FL,IL,MA,NJ,NY,PA,VA and GST tax in Canada.

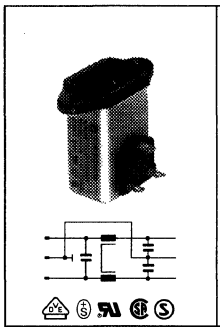
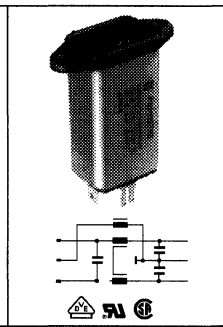
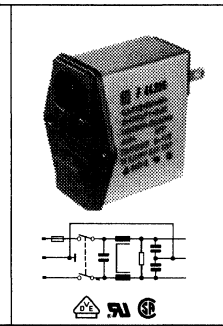
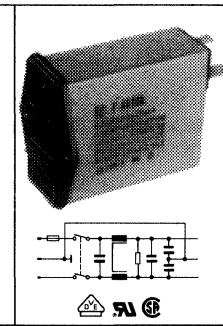
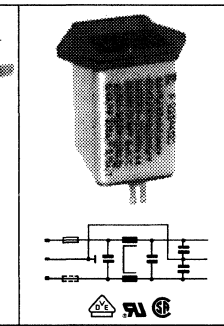
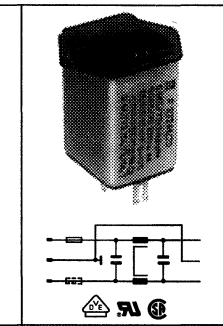
Pre-payment in U.S. dollars required for orders shipped outside the USA. Add $10 per set for foreign delivery.

EICHHOFF

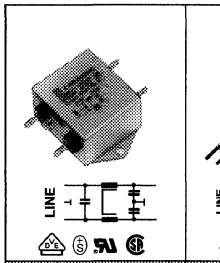
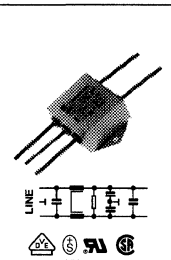
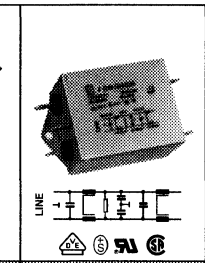
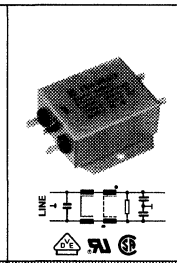
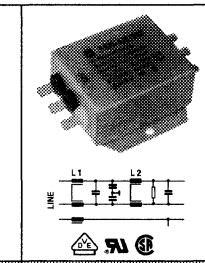
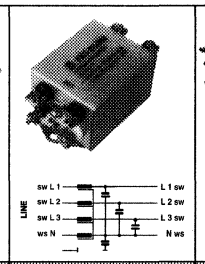
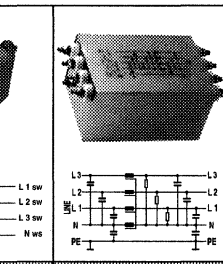
EMI / RFI Suppression Solutions

Power Line Filters & Suppression Components

IEC Input - with voltage selection, fuses, on/off switch to 10 Amps

					
F 022-301/2..– F 023-306/2.. F 023-331/2..– F 023-336/2..	F 022-331/7..– F 022-336/7..	F 044-201/...– F 044-206/...	F 044-101/...– F 044-106/...	F 023-541/...– F 023-546/... F 023-531/...– F 023-536/... F 023-511/...– F 023-516/...	F 023-241/...– F 023-246/... F 023-211/...– F 023-216/...

Chassis Mount - single & three phase to 200 Amp+

						
F 033-001/500– F 033-016/521	F 033-051/500– F 033-066/521	F 033-104/500– F 033-110/521	F 034-201/010– F 034-210/010	F 033-411/000– F 033-420/000	F 033-353/000– F 033-370/000	F 022-206/016 F 022-206/025 F 022-206/036 F 022-206/050

Also, Round, Oval, and PCB types - to 16 Amps, slim line design... fits into limited spaces; or custom designs to meet specific applications.

Call our toll free number and let our applications engineering help to design & test cost effective, quality EMI/RFI solutions to meet international EMC emissions standards. Complete catalog available upon request or visit us at *http://www.eichhoff.com*

Eichhoff Electronics, Inc. ISO 9001

205 Hallene Road, Warwick, RI 02886 • Tel: (401) 738-1440 • Fax: (401) 738-7154 **Toll Free 1-800-678-1040**

E-mail:sales@eichhoff.com • WebSite:www.eichhoff.com

FILTER CONCEPTS INC.

- **Industry's Widest Selection of Standard Power Line EMI Filters for single and 3Ø applications.**
- **Standard and Custom AC and DC Power Line Filters from 1 to 150 Amps.**
- **Applications oriented to solve emission problems in Switch Mode Power Supplies, Variable Frequency Drives/Motor Controllers, Lasers, UPS's Medical Equipment, Telephony (AC & DC), etc.**

π FILTERS

LE SERIES
ECONOMICAL LOW LEAKAGE π SECTION FILTER

FCI's most economical and compact π section filter provides a useful combination of differential (L/L) and common mode (L/G) performance in a low leakage current design.

LE Series filters are designed for general purpose applications including supplementary filtering of switch mode power supplies with internal EMI filters.

Part No.	Current	Case	Leakage
LE5	5.0A	7/8x1-3/4x3-3/16	.30mA
LE10	10.0A	1-1/8x1-3/4x3-3/16	.30mA
LE15	15.0A	1-1/2x2x3-11/16	.30mA
LE20	20.0A	1-13/16x2-3/16x4	.30mA
LE30	30.0A	2x2-15/16x4-1/4	.45mA
LE40	40.0A	1-3/4x4-1/8x5-1/6	.45mA
LE75	75.0A	2-1/4x4-1/4x8-1/16	1.2mA
LE100	100.0A	3x5-1/2x9-1/16	1.2mA

Rated Voltage: 250VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/L	8db	12db	45db	65db	65db	60db
L/G	10db	20db	32db	40db	45db	50db

LF SERIES
HIGH PERFORMANCE LOW LEAKAGE SWITCH MODE EMI FILTER

LF Series π section filters offer enhanced differential mode (L/L) and common mode (L/G) insertion loss for applications subject to the conducted limits of FCC, VDE and CISPR while maintaining low ground leakage current.

The LF Series filter can function as a stand alone filter for switch mode applications or in conjunction with the power supply's internal EMI filter.

Part No.	Current	Case	Leakage
LF2	2.0A	7/8x1-3/4x3-3/16	.45mA
LF3	3.0A	1-1/4x2x3-3/16	.45mA
LF5	5.0A	1-1/2x2x3-11/16	.45mA
LF7	7.5A	1-1/2x2x3-11/16	.45mA
LF10	10.0A	1-13/16x2-3/16x4	.45mA
LF15	15.0A	2x2-15/16x4-1/4	.45mA
LF20	20.0A	1-1/2x4-1/8x5-1/16	.80mA
LF40	40.0A	3x5-1/2x9-1/16	1.4mA

Rated Voltage: 250VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/L	6db	40db	60db	60db	60db	60db
L/G	18db	30db	42db	50db	50db	50db

LX SERIES
ENHANCED PERFORMANCE LOW LEAKAGE SWITCH MODE EMI FILTER

LX Series π section filters feature additional line inductors providing up to 30db of enhanced performance at the low frequency end of the VDE and CISPR conducted EMI spectrum.

The LX Series filter can augment existing EMI filters in switch mode power conversion/regulation equipment or function as the equipment's stand alone filter.

Part No.	Current	Case	Leakage
LX1	1.5A	1-1/4x2x3-3/16	.45mA
LX3	3.0A	1-1/2x2x3-11/16	.45mA
LX6	6.0A	2x2-15/16x4-1/4	.45mA
LX10	10.0A	2x2-3/4x6-7/16	.80mA
LX15	15.0A	3x3x6-13/16	1.5mA
LX20	20.0A	3x3x8-13/16	1.5mA
LX24	24.0A	2-1/4x4-1/4x11-1/16	1.5mA
LX30	30.0A	4x4x8-13/16	1.5mA
LX45	45.0A	4-3/4x5x13-1/4	1.5mA

Rated Voltage: 250VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/L	45db	65db	65db	65db	65db	60db
L/G	30db	42db	50db	50db	50db	50db

LM SERIES
HIGH PERFORMANCE LOW LEAKAGE EMI FILTER FOR MEDICAL APPLICATIONS

LM Series of EMI filters provides high insertion loss at low frequencies for medical applications subject to strict conducted emissions standards. This high performance is offered in an extremely low leakage filter design facilitating the development of equipment subject to stringent EMC specifications related to leakage current that are imposed upon electronic equipment used in the medical industry, specifically equipment classified in the"patient contact" category.

Part No.	Current	Case	Leakage
LM1	1.5A	1-1/4x2-3/16	5μA
LM3	3.0A	1-1/2x2x3-11/16	5μA
LM6	6.0A	2x2-15/16x4-1/4	5μA
LM10	10.0A	2x2-3/4x6-7/16	5μA
LM15	15.0A	3x3x6-13/16	10μA
LM20	20.0A	3x3x8-13/16	10μA

Rated Voltage: 250VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	50MHz
L/L	45db	65db	65db	65db	65db	60db
L/G	28db	40db	46db	34db	26db	20db

CORD CONNECTED

CF SERIES
HIGH ENERGY POWER LINE FILTER/CONDITIONER

CF filters provide convenient protection and isolation from power line disturbances including high voltage transients which saturate the typical internal EMI filter in electronic equipment.

The low cutoff frequency and high energy capability of the CF Series protects office equipment and laboratory instruments, reducing component failures and ghost faults.

Part No.	Rated Voltage	Current	Leakage
CF151	125VAC	15.0A	.50mA
CF152	250VAC	15.0A	1.0mA
CF201	125VAC	20.0A	.50mA

Insertion Loss: (50 ohms, typical)

	.02MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/L	20db	50db	65db	65db	65db	65db
L/G	18db	40db	60db	60db	60db	60db

Standard NEMA or CEE plug and receptacle interface is available for convenient installation.

FCI reserves the right to make specification changes without notice. Consult the factory for current information.

FILTER CONCEPTS INC.
2624 S. Rousselle St. ■ Santa Ana ■ California 92707 USA Tel. (714) 545-7003 Fax (714) 545-4607 http://www.filterconcepts.com

T FILTERS

SE SERIES
SWITCH MODE POWER SUPPLY FILTER

Our most compact and economical T section filter for applications using switch mode conversion & regulation technology and subject to FCC conducted EMI specifications.

SE Series EMI filters are designed to provide balanced differential (L/L) and common mode (L/G) insertion loss for maximum performance at 450KHz and above.

Available in standard packages from 3Amps to 60Amps, the SE Series is an excellent performer for many domestic applications.

Part No.	Current	Case	Leakage
SE3	3.0A	7/8x1-3/4x3-3/16	.80mA
SE7	7.5A	1-1/4x2x3-3/16	.80mA
SE15	15.0A	1-1/2x2x3-11/16	.80mA
SE20	20.0A	1-13/16x2-3/16x4	.80mA
SE30	30.0A	2x2-15/16x4-1/4	1.4mA
SE45	45.0A	2-3/4x3x6-1/16	1.4mA
SE50	50.0A	3x3x6-1/16	1.4mA
SE60	60.0A	3x3x6-13/16	1.6mA

Rated Voltage: 250VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/L	7db	15db	50db	60db	55db	50db
L/G	7db	15db	50db	65db	65db	55db

SF SERIES
HIGH PERFORMANCE SWITCH MODE EMI FILTER

SF Series T section filters are designed to effectively attenuate differential (L/L) and common mode (L/G) noise from switch mode power conversion & regulation circuits subject to FCC, VDE and CISPR conducted EMI limits.

Part No.	Current	Case	Leakage
SF3	3.0A	1-1/4x2x3-3/16	.80mA
SF7	7.5A	1-1/2x2x3-11/16	.80mA
SF10	10.0A	1-13/16x2-3/16x4	.80mA
SF15	15.0A	2x2-15/16x4-1/4	.80mA
SF20	20.0A	1-1/2x4-1/8x5-1/16	.80mA
SF24	24.0A	2-1/4x3-1/16x6-1/4	1.0mA
SF30	30.0A	2-3/4x3x6-1/16	1.4mA
SF45	45.0A	2-3/4x3x8-13/16	1.4mA
SF60	60.0A	4x4x8-13/16	1.6mA

Rated Voltage: 250VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/L	15db	45db	60db	60db	65db	60db
L/G	8db	45db	65db	65db	65db	60db

SX SERIES
ENHANCED PERFORMANCE SWITCH MODE EMI FILTER

With additional line inductors the SX Series T section filters provide up to 15db of enhanced performance to solve severe conducted EMI problems in the FCC, VDE and CISPR spectrums.

SX Series filters are available in standard current ratings of 3Amps to 60Amps providing high performance over a wide range of load currents and source impedances.

Part No.	Current	Case	Leakage
SX3	3.0A	1-1/2x2x3-11/16	.80mA
SX7	7.5A	2x2x5	.80mA
SX15	15.0A	2-3/4x3x6-1/16	1.4mA
SX20	20.0A	2-3/4x3x6-13/16	1.4mA
SX30	30.0A	2-3/4x3x8-13/16	1.4mA
SX45	45.0A	4x4x8-13/16	1.8mA
SX60	60.0A	4-3/4x5x10-1/4	1.8mA

Rated Voltage: 250VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/L	30db	60db	65db	65db	60db	50db
L/G	20db	60db	65db	65db	60db	55db

SW SERIES
WIDE BAND HIGH PERFORMANCE FILTER

Extended high and low frequency insertion loss is provided with the SW Series of power line filters.

Designed to provide wide band EMI performance for VDE, CISPR and MIL STD 461 ground equipment, the SW Series maintains moderate leakage current for enhanced safety. Available in current ratings from 3Amps to 45Amps, the SW Series remains effective independent of wide variations in impedances and noise characteristics.

Part No.	Current	Case	Leakage
SW3	3.0A	1-13/16x2-3/16x4	2.4mA
SW5	5.0A	2x2x5	2.4mA
SW10	10.0A	2-3/4x3x6-1/16	2.4mA
SW20	20.0A	3x3x8-13/16	2.4mA
SW30	30.0A	4x4x8-13/16	2.4mA
SW45	45.0A	4-3/4x5x13-1/4	3.5mA

Rated Voltage: 250VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.50MHz	1.5MHz	5.0MHz	50MHz	0.1GHz
L/L	50db	65db	65db	65db	60db	50db
L/G	35db	65db	65db	65db	60db	50db

TF SERIES
HIGH PERFORMANCE LOW LEAKAGE EMI FILTER

TF Series filters provide high performance differential (L/L) and common mode (L/G) insertion loss for switch mode power conversion & regulation circuits with a requirement for reduced leakage currents.

TF Series filters feature inductive common mode (L/G) and capacitive differential mode (L/L) output impedance for minimized rectifier commutation noise.

Part No.	Current	Case	Leakage
TF2	2.0A	1-1/8x1-3/4x3-3/16	.45mA
TF3	3.0A	1-1/4x2x3-3/16	.45mA
TF5	5.0A	1-1/2x2x3-11/16	.45mA
TF10	10.0A	2x2-15/16x4-1/4	.45mA
TF20	20.0A	2-3/4x3x6-1/16	.80mA

Rated Voltage: 250VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/L	15db	45db	55db	60db	60db	60db
L/G	10db	50db	65db	65db	65db	60db

DC FILTERS

DS SERIES
HIGH PERFORMANCE DC POWER FILTER

The DS Series of EMI filters provides effective attenuation in applications requiring DC power conversion.

The DS Series can be used successfully as an input or output filter in many applications.

Part No.	Current	Case
DS7	7.5A	7/8x1-3/4x3-3/16
DS15	15.0A	1-1/4x2x3-3/16
DS20	20.0A	1-1/4x2x3-3/16
DS30	30.0A	1-1/2x2x3-11/16
DS60	60.0A	2x2-15/16x4-1/4
DS100	100.0A	2-3/4x3x6-1/16
DS150	150.0A	4x4x6-13/16

Rated Voltage: 60 VDC
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/G	40db	60db	60db	60db	60db	55db

DC SERIES
HIGH PERFORMANCE DC POWER FILTER

The DC Series provides two independent π section EMI filters for effective attenuation of switch mode converter & regulator EMI on power inputs or outputs.

DC Series π sections work equally well with balanced or unbalanced load currents, with chassis returns or with positive or negative polarities.

Part No.	Current	Case
DC3	3.0A	1-1/8x1-3/4x3-3/16
DC7	7.5A	1-1/4x2x3-3/16
DC15	15.0A	1-1/2x2x3-11/16
DC20	20.0A	1-13/16x2-3/16x4
DC30	30.0A	2x2-15/16x4-1/4
DC60	60.0A	2-3/4x3x6-1/16
DC100	100.0A	4x4x8-13/16
DC200	200.0A	4-3/4x6-1/2x10

Rated Voltage: 60 VDC
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/G	40db	60db	60db	60db	60db	55db

DP SERIES
HIGH PERFORMANCE DC INPUT FILTERS

DP Series filters are designed for use as balanced input filters for DC input power supplies. By providing a very low impedance to their active loads, DP Series filters avoid power input overshoot and output regulation loop stability problems common to conventional EMI filters.

Polarity reversal and over voltage protection are additional features od the DP Series filters.

Part No.	Current	Case
DP5	5.0A	7/8x1-3/4x3-3/16
DP10	10.0A	1-1/8x1-3/4x3-3/16
DP15	15.0A	1-1/2x2x3-11/16
DP20	20.0A	1-13/16x2-3/16x4
DP30	30.0A	2x2-15/16x4-1/4
DP45	45.0A	3x3x6-1/16
DP60L	60.0A	2-1/4x4-1/4x8-1/16

Rated Voltage: 50 VDC
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/L	40db	60db	60db	60db	50db	50db
L/G	20db	30db	45db	50db	45db	40db

DF SERIES
DC OUTPUT FILTER

DF Series filters provide an economical solution to output noise from typical multiple output switch mode power supplies.

Available in 4 and 6 conductor models, the DF Series can also isolate sensitive analog circuits from noisy system power buses.

Part No.	Current	Case
DF104	4x10A	1-1/4x3-1/16x2-13/16
DF106	6x10A	1-1/2x3-1/16x3-5/16

Rated Voltage: 60 VDC
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/L	1db	10db	25db	35db	45db	40db
L/G	15db	25db	35db	50db	50db	50db

DL SERIES
MULTI CHANNEL DC INPUT/OUTPUT FILTER

DL Series filters provide independent multiple filter sections suitable for DC power or control lines.

Part No.	Current	Case
DL64	4x6.0A	1-1/4x3-1/16x2-13/16
DL66	6x6.0A	1-1/2x3-1/16x3-5/16

Rated Voltage: 60 VDC
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/G	10db	20db	36db	56db	60db	55db

DH SERIES
ITE & TELEPHONY DC POWERLINE FILTERS

EN 60 950

DH Series power line EMI filters provide effective EMI attenuation for switch-mode DC to DC converters and regulators with DC power inputs and outputs.

UL recognized, CSA certified for applications in the ITE and telephony industries, DH series filters are non-polar and perform equally well with balanced and unbalanced lead currents.

Part No.	Current	Case
DH5	5.0A	1-1/2x 2x3-11/16
DH10	10.0A	2x2x5
DH15	15.0A	2x2-15/16x4-1/4
DH30	30.0A	2-1/4x3-1/16x6-5/8
DH60	60.0A	3x3x6-13/16
DH100	100.0A	4x4x8-13/16
DH200	200.0A	4-3/4x6-1/2x12

Rated Voltage: 60 VDC
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/L	30db	60db	60db	60db	60db	60db
L/G	20db	55db	60db	60db	60db	55db

FCI reserves the right to make specification changes without notice. Consult the factory for current information.

FILTER CONCEPTS INC.
2624 S. Rousselle St. ■ Santa Ana ■ California 92707 USA Tel. (714) 545-7003 Fax (714) 545-4607 http://www.filterconcepts.com

MIL PERFORMANCE

A2T SERIES
PREMIUM PERFORMANCE SEVERE ENVIRONMENT EMI FILTER

A2T Series power line filters are designed for typical switch mode power converters & regulators subject to MIL STD 461 conducted emission specifications in a MIL STD 462 type test environment.

A2T Series filters are designed for 50Hz to 400Hz AC power. The moderate ground leakage design of the A2T Series minimizes EMI ground currents and provides enhanced safety.

Part No.	Current	Case	Leakage
A2T1	1.0A	1-1/2x2x3-11/16	1.8mA
A2T2	2.5A	1-1/2x2x6-3/16	1.8mA
A2T5	5.0A	1-3/4x2-3/4x8-11/16	1.8mA
A2T10	10.0A	2-1/4x3-3/4x11-3/8	1.8mA
A2T12	12.0A	4x4x8-13/16	2.4mA
A2T16	16.0A	4x4x10-13/16	2.4mA
A2T30	30.0A	4-3/4x5x15-1/4	3.5mA

Rated Voltage: 250VAC, 50/60Hz
125VAC, 400Hz
Insertion Loss: (50 ohms, typical)

	.02MHz	.05MHz	.15MHz	1.5MHz	5.0MHz	50MHz
L/L	20db	40db	65db	65db	65db	60db
L/G	20db	50db	65db	65db	65db	60db

A3T SERIES
3 PHASE DELTA SEVERE ENVIRONMENT EMI FILTER

A3T Series 3 phase power line filters are designed to filter typical switch mode power conversion devices required to meet MIL STD 461 conducted emissions while maintaining low ground leakage currents.

Part No.	Current	Case	Leakage
A3T5	5.0A/PH	4x4x8-13/16	2.0mA

Rated Voltage: 250VAC, 50/60Hz
125VAC, 400Hz
Insertion Loss: (50 ohms, typical)

	.02MHz	.05MHz	.15MHz	1.5MHz	5.0MHz	50MHz
L/L	24db	34db	65db	65db	65db	60db
L/G	21db	50db	65db	65db	65db	60db

A4T SERIES
3 PHASE WYE SEVERE ENVIRONMENT EMI FILTER

A4T Series 3 phase power line filters are designed to filter typical switch mode power conversion devices required to meet MIL STD 461 conducted emissions while maintaining low ground leakage currents.

Part No.	Current	Case	Leakage
A4T5	5.0A/PH	4x4x10-13/16	2.0mA

Rated Voltage: 250/440VAC, 50/60Hz
125/220VAC, 400Hz
Insertion Loss: (50 ohms, typical)

	.02MHz	.05MHz	.15MHz	1.5MHz	5.0MHz	50MHz
L/N	22db	35db	50db	65db	65db	60db
L/G	21db	50db	65db	65db	65db	60db

D1L SERIES
HIGH PERFORMANCE SEVERE ENVIRONMENT DC POWER FILTER

D1L Series filters are designed for applications subject to MIL STD 461 conducted emissions limits.

The non-polar design of the D1L Series allows complete applications flexibility.

Part No.	Current	Case
D1L5	5.0A	1-1/4x2x3-3/16
D1L10	10.0A	1-1/2x2x3-11/16
D1L20	20.0A	2x2x5
D1L40	40.0A	2-3/4x3x6-11/16
D1L75	75.0A	3x5-1/2x7-1/4
D1L100	100.0A	3x5-1/2x11-1/4

Rated Voltage: 60VAC
Insertion Loss: (50 ohms, typical)

	.02MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	50MHz
L/G	22db	55db	60db	60db	60db	50db

D2L SERIES
HIGH PERFORMANCE SEVERE ENVIRONMENT DC POWER FILTER

D2L Series dual filters are designed for typical DC switch mode power conversion & regulation applications subject to MIL STD 461 conducted emissions specifcations.

D2L Series functions equally well with balanced or unbalanced load currents, with chassis returns or with positive or negative polarities.

Part No.	Current	Case
D2L5	5.0A	1-13/16x2-13/16x4
D2L10	10.0A	2x2x5
D2L20	20.0A	2-3/4x3x6-1/16
D2L40	40.0A	4x4x6-13/16
D2L75	75.0A	5x4-3/4x9-7/8
D2L100	100.0A	5x4-3/4x11

Rated Voltage: 60 VDC
Insertion Loss: (50 ohms, typical)

	.02MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	50MHz
L/G	22db	55db	60db	60db	60db	50db
L/L	25db	55db	60db	60db	60db	60db

3Ø FILTERS

3E SERIES
3 PHASE SWITCH MODE EMI FILTER

3E Series T section filters are designed to attenuate differential (L/N) and common mode (L/G) EMI from switch mode power circuits and power supplies in balanced or unbalanced 3 phase load configurations.

The 3E Series is available in Wye or Delta configurations. The Wye version can also be used for Delta applications.

Part No.	Current	Case	Leakage
3E15	15A/PH	3x3x6-1/16	1.2mA
3E20	20A/PH	4x4x6-13/16	1.2mA
3E30	30A/PH	4x4x6-13/16	1.4mA
3E45	45A/PH	4x4x8-13/16	1.6mA
3E60	60A/PH	4-3/4x5x10-1/4	1.6mA
3E80	80A/PH	4-3/4x6-1/2x12-1/4	2.4mA
3E100	100A/PH	4-3/4x6-1/2x14-1/4	2.4mA
3E150	150A/PH	5-3/4x7-1/2x14-1/2	3.5mA

Rated Voltage: 250/440VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/N	12db	22db	50db	55db	50db	50db
L/G	3db	25db	55db	60db	50db	50db

3F SERIES
HIGH PERFORMANCE 3 PHASE SWITCH MODE EMI FILTER

With extended low frequency performance, 3F Series EMI filters provide enhanced differential (L/N) and common mode (L/G) insertion loss for switch mode power circuits and supplies to FCC, VDE and CISPR spectrums. The 3F Series is available in Wye or Delta configurations.

3F Series filters are reliable performers with either balanced or unbalanced 3 phase load currents.

Part No.	Current	Case	Leakage
3F7	7.5A/PH	3x3x6-13/16	.80mA
3F15	15A/PH	4x4x8-13/16	.80mA
3F30	30A/PH	4-3/4x5x10-1/4	1.4mA
3F45	45A/PH	4-3/4x5x13-1/4	1.4mA
3F60	60A/PH	4-3/4x6-1/2x14-1/4	1.6mA
3F80	80A/PH	4-3/4x6-1/2x17-1/4	2.4mA
3F100	100A/PH	5-3/4x7-1/2x17-1/2	2.4mA

Rated Voltage: 250/440VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/N	15db	50db	60db	60db	60db	55db
L/G	10db	50db	65db	65db	65db	60db

3X SERIES
ENHANCED PERFORMANCE 3 PHASE FILTER

The 3X Series of T section 3 phase EMI filters feature additional line inductors, providing up to 15 db of enhanced performance, for severe EMI requirements such as VDE and CISPR while maintaining moderate leakage current.

3X Series filters are available in Wye or Delta configurations.

Part No.	Current	Case	Leakage
3X3	3A/PH	3x3x6-13/16	.80mA
3X7	7.5A/PH	4x4x8-13/16	1.2mA
3X15	15A/PH	4-3/4x5x10-1/4	1.2mA
3X30	30A/PH	4-3/4x6-1/2x14-1/4	1.6mA
3X40	40A/PH	4-3/4x6-1/2x17-1/4	1.6mA
3X60	60A/PH	5-3/4x7-1/2x17-1/2	2.4mA

Rated Voltage: 250/440VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/N	30db	65db	65db	65db	60db	55db
L/G	20db	60db	65db	65db	60db	60db

3W SERIES
3 PHASE WIDE BAND HIGH PERFORMANCE FILTER

3W Series provides extended high and low frequency insertion loss while maintaining low ground leakage currents.

The unique design of the 3W filter maintains performance over a wide range of impedances.

Part No.	Current	Case	Leakage
3W10	10A/PH	4x4x10-13/16	2.4mA
3W20	20A/PH	4-3/4x5x15-1/4	3.2mA
3W30	30A/PH	4-3/4x6-1/2x17-1/4	3.2mA

Rated Voltage: 250/440VAC, 50/60Hz
125/220VAC, 400Hz
(at reduced current)
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	50MHz
L/N	52db	65db	65db	65db	65db	60db
L/G	40db	60db	65db	65db	65db	60db

FILTER CONCEPTS INC.

FCI reserves the right to make specification changes without notice. Consult the factory for current information.

2624 S. Rousselle St. ■ Santa Ana ■ California 92707 USA Tel. (714) 545-7003 Fax (714) 545-4607 http://www.filterconcepts.com

3Ø FILTERS

3B SERIES
3 PHASE ECONOMICAL
π SECTION FILTER

FCI's most economical and compact 3 phase filter provides both differential and common mode performance in a π section circuit configuration. 3B Series filters are designed for general purpose applications including supplementary filtering at the system level.

Part No.	Current	Case	Leakage
3B8D	8A/PH	1-13/16x2-2/16x4	.80mA
3B16D	16A/PH	2x2-15/16x4-1/4	1.4mA
3B30D	30A/PH	1-3/4x4-1/8x5-1/16	1.4mA
3B60D	60A/PH	2-1/4x4-1/4x8-1/2	1.4mA
3B100D	100A/PH	3x5-1/2x9-1/2	2.1mA
3B150D	150A/PH	4-3/4x5x8	2.1mA

Rated Voltage: 250VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/L	12db	20db	40db	60db	50db	50db
L/G	4db	18db	38db	44db	50db	50db

3L SERIES
3 PHASE ENHANCED
PERFORMANCE FILTER

The 3L Series 3 phase π section filters are for use with switch mode loads of all types. 3L Series filters provide stand alone or enhancement level performance for FCC, VDE and CISPR requirements.

Part No.	Current	Case	Leakage
3L15	15A/PH	2-1/4x4-1/4x8-1/16	.80mA
3L30	30A/PH	3x5-1/2x9-1/16	1.1mA
3L45	45A/PH	4-3/4x5x10	1.4mA

Rated Voltage: 250/440VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/N	20db	35db	60db	60db	60db	55db
L/G	15db	30db	42db	60db	60db	55db

3V SERIES
PREMIUM PERFORMANCE
3 PHASE π FILTER

The 3V Series provides extended low frequency performance for VDE and CISPR type applications with switch mode power supplies.

3V Series filters operate equally well with balanced or unbalanced loads and provides significant attenuation in the 10KHz to 150KHz band.

Part No.	Current	Case	Leakage
3V16	16A/PH	4x4x10-13/16	1.8mA
3V24	24A/PH	4-3/4x5x15-1/4	1.8mA

Rated Voltage: 250/440VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/N	40db	55db	60db	65db	50db	55db
L/G	22db	40db	50db	55db	55db	45db

3H SERIES
HIGH VOLTAGE
3 PHASE POWER FILTER

3H Series filters are designed for equipment in an industrial environment powered by 480 VAC 3 phase AC power. Typical applications include motor controllers, laser power supplies and uninterruptable power supplies.

Part No.	Current	Case	Leakage
3H15	15A/PH	4x4x6-13/16	3.9mA
3H30	30A/PH	4-3/4x5x10-1/4	3.9mA
3H45	45A/PH	4-3/4x5x13-1/4	3.9mA
3H60	60A/PH	4-3/4x6-1/2x14-1/4	3.9mA
3H100	100A/PH	5-3/4x7-1/2x17-1/2	3.9mA
3H140	140A/PH	5-3/4x7-1/2x20-1/2	3.9mA

Rated Voltage: 480VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/L	10db	40db	60db	60db	60db	55db
L/G	10db	50db	60db	60db	60db	55db

3C SERIES
3 PHASE SCR FILTER

SCR phase regulation input line filter designed to suppress transients generated by thyristor circuit commutation currents.

Part No.	Current	Case	Leakage
3C20D	20A/PH	4x4x8-13/16	1.6mA
3C40D	40A/PH	4-3/4x5x13-1/4	2.4mA
3C60D	60A/PH	4-3/4x6-1/2x14-1/4	2.4mA

Rated Voltage: 250VAC, 50/60Hz
Insertion Loss: (50 ohms, typical)

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/L	50db	60db	65db	65db	65db	60db
L/G	5db	18db	40db	55db	60db	50db

3MC SERIES
3 PHASE MOTOR
CONTROLLER FILTER

Motor controller output filter series designed to suppress the high frequency harmonics inherent with PWM wave forms.

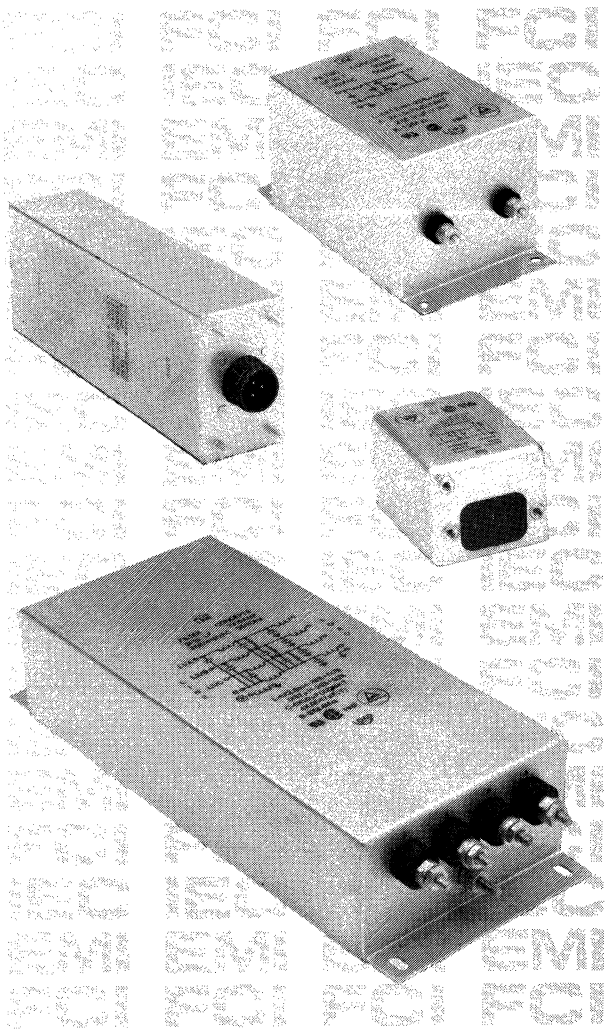
Part No.	Current	Case	Leakage
3MC15	15A/PH	2-3/4x3x8-13/16	1.6mA
3MC40	40A/PH	4x4x10-13/16	2.4mA
3MC100	100A/PH	4-3/4x6-1/2x14-1/4	4.8mA

Rated Voltage: 480VAC, DC-200Hz
Insertion Loss: (50 ohms, typical)

	.15MHz	.50MHz	1.5MHz	5.0MHz	15MHz	50MHz
L/L	5db	15db	35db	55db	60db	30db
L/G	10db	20db	30db	50db	50db	24db

FILTER CONCEPTS INC.

- **Industry's Widest Selection of Standard Power Line EMI Filters for single and 3Ø applications.**
- **Standard and Custom AC and DC Power Line Filters from 1 to 150 Amps.**
- **Applications oriented to solve emission problems in Switch Mode Power Supplies, Variable Frequency Drives/Motor Controllers, Lasers, UPS's Medical Equipment, Telephony (AC & DC), etc.**



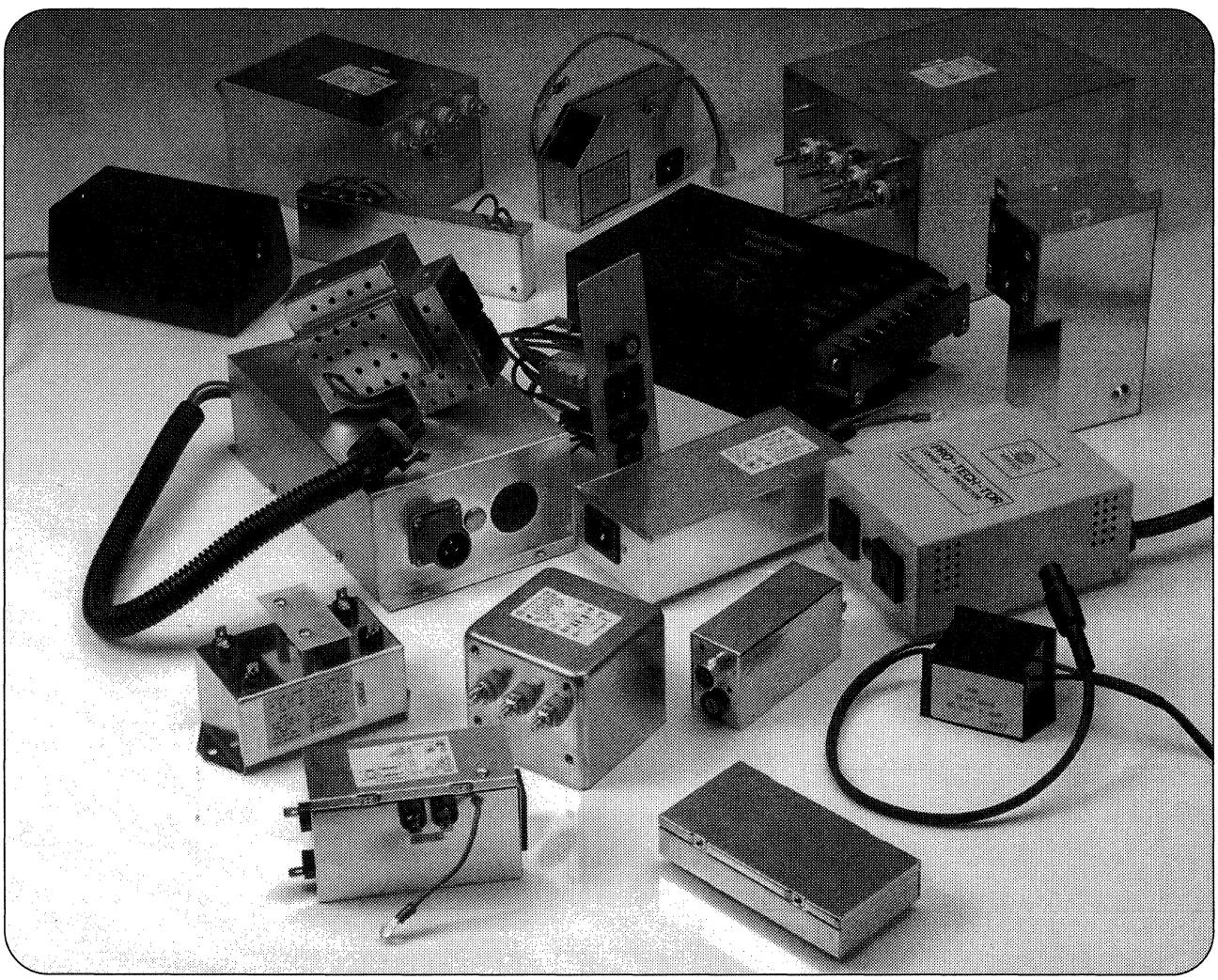
FCI reserves the right to make specification changes without notice. Consult the factory for current information.

FILTER CONCEPTS INC.

2624 S. Rousselle St. ■ Santa Ana ■ California 92707 USA Tel. (714) 545-7003 Fax (714) 545-4607 http://www.filterconcepts.com

JMK RF INTERFERENCE FILTERS

- Commercial
- Video
- Military
- Surge Suppression
- RF Distribution
- Automotive
- Telecommunications
- PWM Motor Controls
- Harmonic Distortion

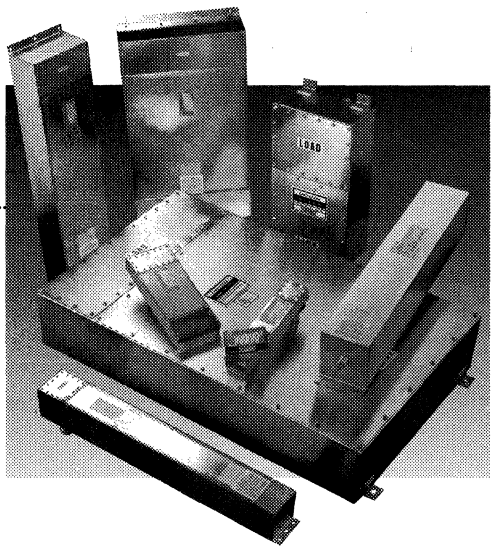


JMK has been in business for 25 years designing filters to meet unique or slightly different mechanical, electrical or environmental requirements. We have over 2200 designs which can be adapted to meet your needs. Most of our designs carry UL, CSA, TUV, VDE, or IEC certifications. The engineers in our applications department are comfortable discussing FCC, VDE, IEC, MIL-STD-461, MIL-STD-15733, or other specifications. Whether you have a simple or a complex application, we are anxious to help fulfill your requirement. Give us a call. You will like our service and our production lead times.

For more information see our home page on the web at www.jmkfilters.com.

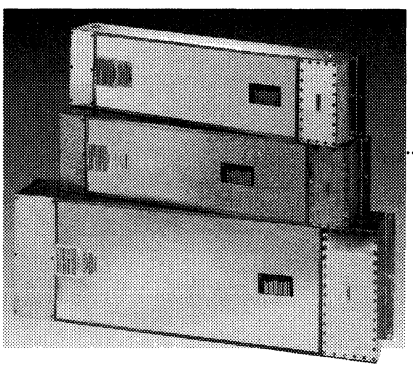
JMK, INC. • 15 CALDWELL DRIVE • AMHERST, NH 03031 • TEL: (603) 886-4100 • FAX: (603) 886-4115
JMK, LTD. • DUMBARTON SCOTLAND UK • TEL: 44-1389-751841 • FAX: 44-1389-751775

Need EMI/RFI Filters... Need Them Now?



Custom High Power Filters

- All EMC conductive emission applications
- Quick response time
- Filters to 1200 VAC, 3,000 Amp and beyond
- Built to UL specifications

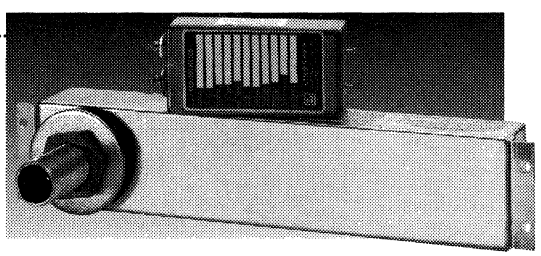


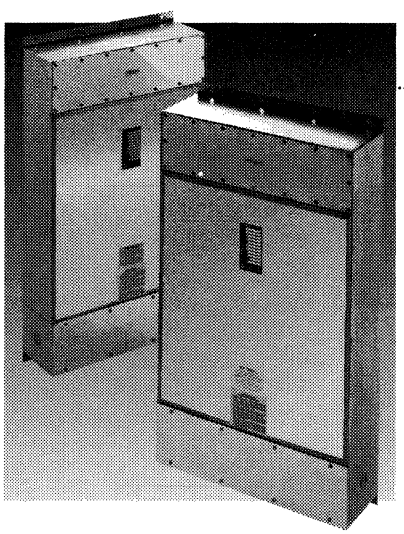
LRX Filters

- High performance individual, twin and multiple series configurations
- 100 dB 14kHz-10 GHz per MIL-STD-220A Full Load Condition
- 0-350/660 VAC, 0-60 Hz and 400 Hz, 0-600A
- Standard models are UL Listed
- Special voltage and current ratings upon request

LTC and LPTC Filters

- Communications, signal and control line applications
- 2-1200 wire circuit configurations
- RS232, RS422 and 10baseT filters available
- Custom filters and custom options available





LRE and LRC Filters

- Twin, triple and four line low cost filters for commercial power line applications
- LRE: 100 dB 150 kHz-10 GHz; LRC: 80 dB 1MHz-10 GHz
- 0-277/480 VAC, 0-60 Hz and 400 Hz, 0-400 A
- Designed and manufactured to UL specifications

To speak with an applications specialist, or for quick turn-around on our standard or custom designed LectroLine filters, call Elmag today.

LINDGREN
ELMAG DIVISION

3750 Prospect Avenue ▪ Riviera Beach, FL 33404
Tel: 561.881.9292 ▪ Fax: 561.844.4175

EEM MINIGLOSSARY POWER SUPPLIES

Ambient reference: Refers to the temperature of the still air surrounding the power supply

Case reference: One of the specs that make up the nominal rating. The temperature of the case with the temperature of the surrounding still air at a stated temperature (usually 25°C).

Crowbar circuit: Protects the load. A protective circuit that applies a short circuit across the output immediately upon overload. (See overvoltage).

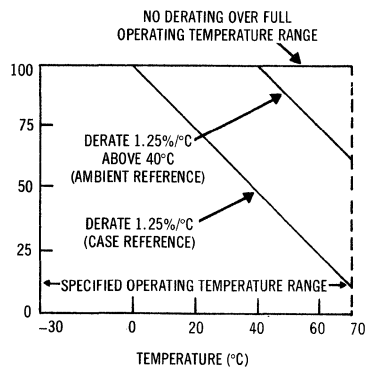


Fig. 1. Power output derating can be referred to ambient or case.

Derating: The degree output is reduced as temperature increases. Usually referenced to ambient case temperature and shown on a graph.

Efficiency: Ratio of the output power to the required input power. Usually expressed as a percentage given nominal environmental temperature.

EMI/RFI: Interference electronic circuitry caused by energy from electromechanical or radio frequency power supplies.

Foldback: Built-in protective circuits that automatically reduce the output voltage and/or current to very low levels in the event of an overload.

Holdover (Holdup): The interval that rated output will continue after input ceases. Usually milliseconds.

Input reflected current: The peak-to-peak alternating current generated by switching transients in DC/DC converters. Should not exceed 1%.

Inrush current limiting: Built-in circuits that monitor high currents through the rectifiers to the capacitors at turn ON. Circuit is usually inhibited as capacitors attain full charge.

Nominal rating: The spec value of the supply at stated conditions of input, output, and temperature.

Overshoot: A transient voltage change occurring during turn ON or OFF or during an abrupt load change.

Overvoltage (Overload) protection: Built-in circuits that protect the load or the supply by shutting it down or providing foldback.

Recovery: The time interval between the termination of an overload and restoration to normal operations.

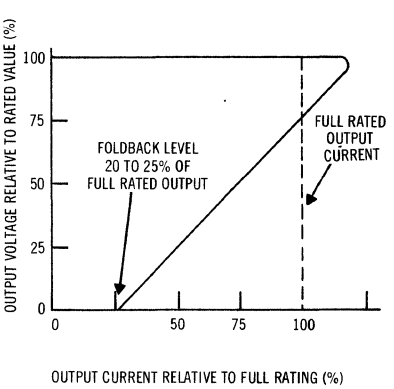


Fig. 2. Current foldback limiting self-resets with removal of fault.

Response: The time interval between a stated step change in input voltage or load current and return of output to normal operating conditions.

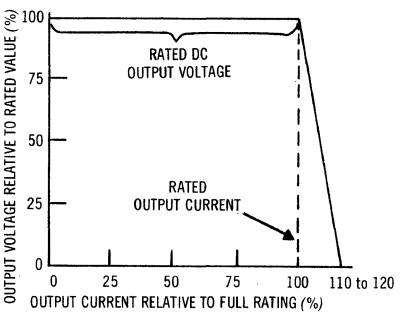


Fig. 3. Current limiting restrictions output current to a valve somewhat greater than full rated output; it resets when fault is removed.

Sensing: Regulation techniques that monitor output voltage and/or current. *Local sensing* refers to the output terminals. *Remote sensing* allows a feedback from the load circuit to the power supply.

Soft start: Allows the supply to start from zero current and/or voltage over a stated period of time during start up to prevent voltage overshoots and current imbalances.

Switchers: Power supplies using switching techniques to achieve high efficiency regulation. These techniques can have attendant EMI/RFI problems.

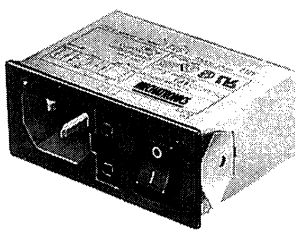
Tracking: The maintaining of fixed ratios between multiple outlets despite variations in line, load or temperature. Particularly important in supplies with symetrical (+)(−) outputs.

Transient protection: Circuitry designed to protect the supply from high amplitude line transients. Generally expressed in terms of peak voltage and maximum transient time duration.

EMI/RFI FILTERS

MECHATRONICS

Mutli-Function Power Entry Modules

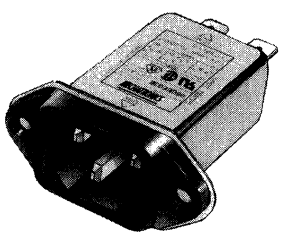


Multi-Function Power Entry Modules

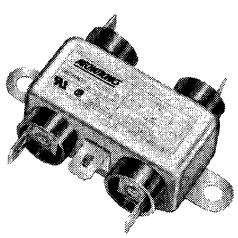
Combine IEC connector, fuses(s), filter, voltage selector switch, and power switch in one easily installed module.

- ***Reduce Cost of Individual Components***
- ***Reduce Design Time***
- ***Reduce Installation/Manufacturing Costs***

EMI/RFI Line Filters



IEC Connector Filters



Line Filters

STYLES INCLUDE:

- ***IEC Connector***
- ***PC Board Mount***
- ***Faston, Wire-leaded, Screw or Lug Connectors***
- ***Many Mounting Options***
- ***Snap-in Styles Available***

MECHATRONICS
8152 304th Avenue S.E. Preston, WA 98050
Tel: 425-222-5900 800-453-4569
Fax: 425-222-5155
Email #: SALES @ MECHATRONICSINC.COM

See our page in Vol. C, Section 2600

Metuchen Capacitors, Inc.

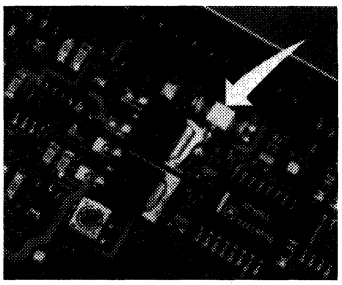
"We Offer Quick Solutions to Noise Pollution"

EMI Low Pass Filter

1-800-679-0516 • 732-679-3366 • FAX: 1-800-679-9959

METUCHEN CAPACITORS, INC. • 135 White Oak Lane • P.O. Box 499 • Old Bridge, NJ 08857

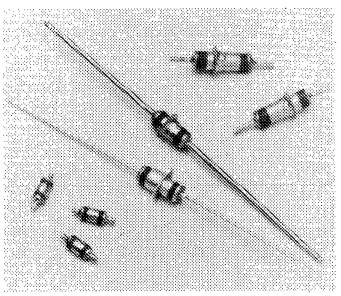
High Current Surface Mount EMI Filters



- High current up to 20 Amps
- High temperature construction
- Excellent high frequency noise suppression
- Capacitance values up to 10,000pF
- Superior performance in GHz applications
- Square mechanical geometry enhances SMT soldering

PSM Series filters are the first surface mount components to effectively filter EMI/RFI on printed circuit boards operating at currents up to 20 Amps. By eliminating the need to use conventional thru-hole filters at these higher currents, it will be possible to create an "RF fence" without expensive RFI bulkheads. PSM filters can be installed with pick and place equipment, providing time and cost savings compared to installing thru-hole filters.

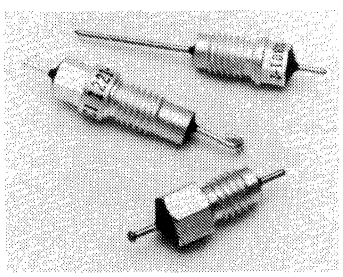
Solder-in Filters



- Small size to allow effective use of space
- Voltage ratings to 500 VDC
- Multiple circuit configurations: C, & Pi standard L circuit also available
- High temperature construction to prevent reflow during installation
- MIL-F-15733 QPL and MIL-C-11015 (CK99) filters available

Solder-in filters are ideal for use in critical areas where space does not allow use of mounting tools or hardware. The solder-in feature also allows installation in unison with other board mounted components. Primarily used in filtering signal/data lines and AC power lines.

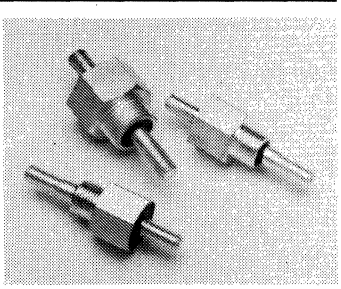
Resin Sealed Bolt-in Filters



- Wide range of sizes: 4-40 thread through 5/16-24 thread
- Voltage ratings to 500 VDC / 220 VAC
- MIL-F-15733 QPL filters available
- Multiple circuit configurations: C, L and Pi
- Metric Threaded filters available

These filters are easily mounted in a tapped hole or thru-hole with supplied nut and lock-washer. The rugged case with resin seals at both ends provides excellent environmental protection. Primarily used in filtering signal/data lines and DC power lines.

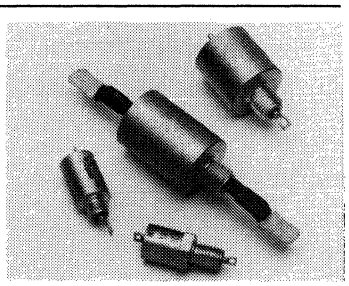
High Current/High Voltage Resin Sealed Filters



- Current ratings up to 100 AMPS
- Continuous voltage ratings up to 1250 VDC / 240 VAC
- U.L. 1459 recognized and CSA C22.2 certified versions available
- Rugged bolt-in style for easy installation

High current filters are ideal for use in high current 5 volt logic buss, but also can be used for +/-48 VDC telephone rack buss, high current switch mode power supplies and DC charging systems. High voltage filters find use in high voltage power supplies and applications requiring U.L. Hi-Pot.

Hermetically Sealed Case Filters



- Popular .375/.410" and .690" case diameters
- Voltage ratings from 50 VDC to 400 VDC / 240 VAC
- Filter configurations available: C, L, Pi, T and double T
- MIL-F-15733 and MIL-F-28861 QPL filters available

This series of filters features hermetic glass seals and high EMI filtering performance. They are excellent for critical applications that demand high reliability in the toughest environmental conditions and provide broadband high performance EMI filtering from 10 KHz to over 10 GHz.

For your convenience we welcome credit card purchases

For additional information please see our data pages in **Section 1500** (Resin-sealed bolt-in filters & feed-through capacitors), **Section 2100** (EMI Connectors).

Metuchen Capacitors, Inc.
"We Offer Quick Solutions to Noise Pollution"

1-800-679-0516 • 732-679-3366 • FAX: 1-800-679-9959

METUCHEN CAPACITORS, INC. • 135 White Oak Lane • P.O. Box 499 • Old Bridge, NJ 08857

EMI Low Pass Filter

For EMI Suppression on Retrofit Applications

FEATURES

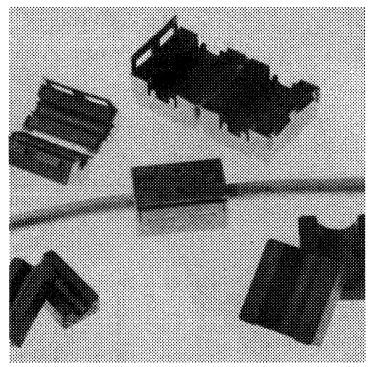
- Fits cables with 3/16" to 1/2" outside diameter
- Precision formed smooth surfaces prevent damage to wire insulation
- Custom designs available

APPLICATIONS

- Internal and external power cables
- Internal cables between PC boards and data connectors

For retrofit and post-assembly operations, MCI offers a selection of "split" components. Similar in performance to MCI's one piece designs, these components provide excellent common mode EMI suppression on round cable assemblies. Lightweight, inexpensive plastic snap on cases provide secure mounting of the ferrite to the cable.

The in-circuit impedance may be substantially increased by passing 2 turns of the wire conductor through the ferrite device.



HOW TO ORDER

28 A 0392 - 0 A 0

- **MATERIAL TYPE:**
- **SPLIT FERRITE FOR ROUND CABLE:**
- **PART IDENTIFIER:**
- **SELECTED DIMENSION:** (Usually Height)
- **SNAP ON ASSEMBLED:**
- **STANDARD CATALOG:** (White Plastic Case)

SPLIT ROUND CABLE FERRITES WITH PLASTIC CASE

Part Number	Fig. #	A mm (inches)	B mm (inches)	C mm (inches)	D mm (inches)	C_1	Typical Impedance (Ohms) 28 @ 100 MHz
A0392-0A*	2	25.0 (0.984)	11.2 (0.441)	12.8 (0.504)	5.0 (0.197)	5.95	130
A2024-0A*	1	32.5 (1.28)	29.0 (1.14)	29.6 (1.17)	13.0 (0.51)	3.33	240
A2025-0A*	1	32.5 (1.28)	17.9 (0.70)	18.4 (0.72)	7.0 (0.28)	2.86	279
A2029-0A*	1	32.5 (1.28)	21.5 (0.85)	22.3 (0.88)	10.0 (0.39)	3.73	209

* 0A0 = White Plastic Snap On Case
0A1 = Gray Plastic Snap On Case
0A2 = Black Plastic Snap On Case
0A3 = Beige Plastic Snap On Case (available only on part number A0392)

All impedance values are NET; they are based on the ferrite cores only.

Figure 1

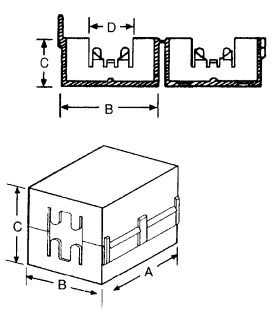
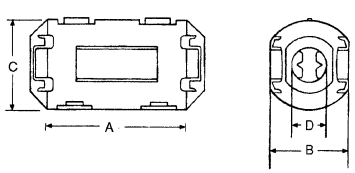
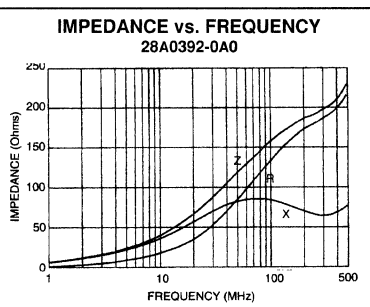
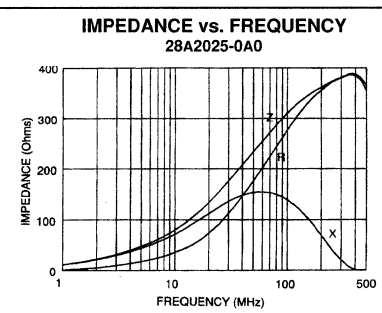


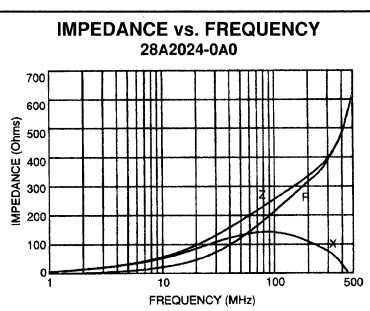
Figure 2

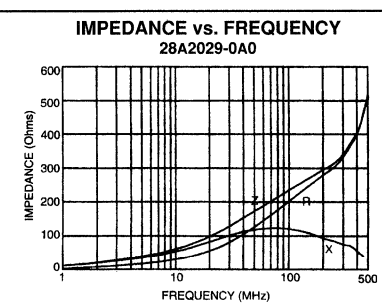


IMPEDANCE VS. FREQUENCY CHARTS









ALSO AVAILABLE: CYLINDRICAL EMI SUPPRESSION FERRITES FOR INTERNAL AND EXTERNAL COMPUTER DATA AND POWER CABLES

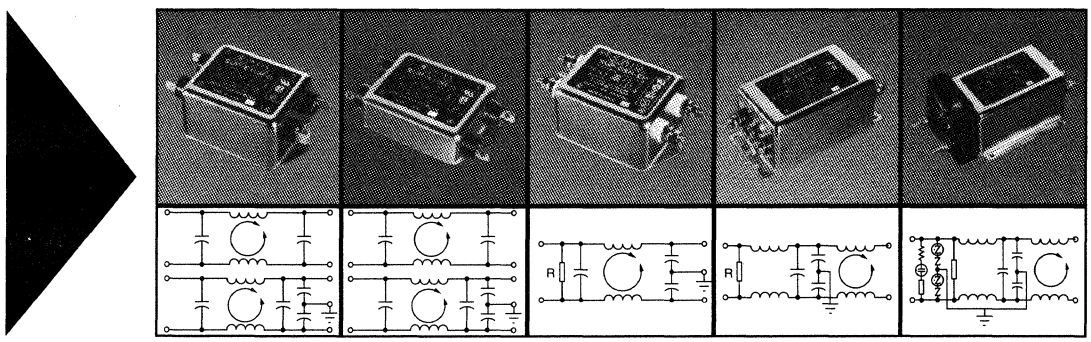
For your convenience we welcome credit card purchases

For additional information please see our data pages in **Section 1500** (Resin-sealed bolt-in filters & feed-through capacitors), **Section 2100** (EMI Connectors).

ISO 9001
Certified 1992
RCJ-92M-05

Okaya Electric America, Inc.
503 Wall Street
Valparaiso, IN 46383
Ph: (219) 477-4488
Fx: (219) 477-4856

Power Line Noise Filters



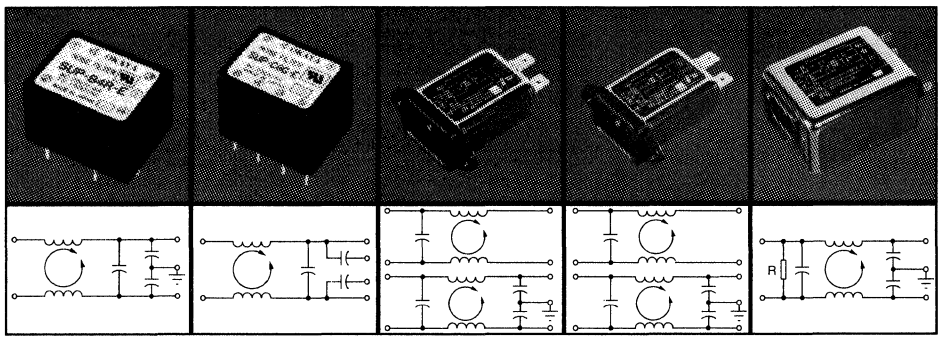
Series	SUP-E _ H	SUP-W _ H	SUP-G _ H	SUP-J _ H	SUP-K _ H
Category / Application	AC POWER LINE				
Case Style	Box Metal	Box Metal	Box Metal	Box Metal	Box Metal
Terminal Style	Faston, Solder, Screw, Wire	Faston, Solder, Screw	Faston, Solder, Screw	Screw	Screw
Voltage Rating	250VAC	250VAC	250VAC	250VAC	250VAC
Rating Amperes	1, 2, 3, 5, 10, 15, 20	3, 5, 10, 15, 20	5, 10, 15, 20	5, 10, 15, 20, 30	10, 15, 20, 30
Leakage Current 250Vrm 60Hz	10μA 0.6mA	10μA, 75μA, 0.5mA	0.6mA	1.0mA	0.5mA, 1.0mA
Voltage Drop (max)	1.0V	1.0V	1.0V	1.5V	1.5V
Operate Temperature Range	-25 ~ 55°C (1-5A) -25 ~ 50°C (10-20A)	-25 ~ 45°C	-25 ~ 55°C (1-5A) -25 ~ 50°C (10-20A)	-25 ~ 55°C	-25 ~ 55°C
Insertion Loss	Request Document as Charted Data is Large				
TVSS Pulse Attenuate	Yes	Yes	Yes	N/A	Yes
Medical	UL544 (UL 2601)	Pending	–	–	–
Comments	28 Models	Low Profile	2000V Pulse Attenuation	–	Plugable TVSS
Fax Back Document #	1305	1306	1307	1310	1311
Approvals		Pending			(others pending)

For complete data call our FAXBACK #:1-800-755-8561
or
Visit our Website at: http://www.okaya.com

ISO 9001
Certified 1992
RCJ-92M-05

Okaya Electric America, Inc.
503 Wall Street
Valparaiso, IN 46383
Ph: (219) 477-4488
Fx: (219) 477-4856

AC POWER LINE NOISE FILTERS FEATURING TVSS PROTECTION



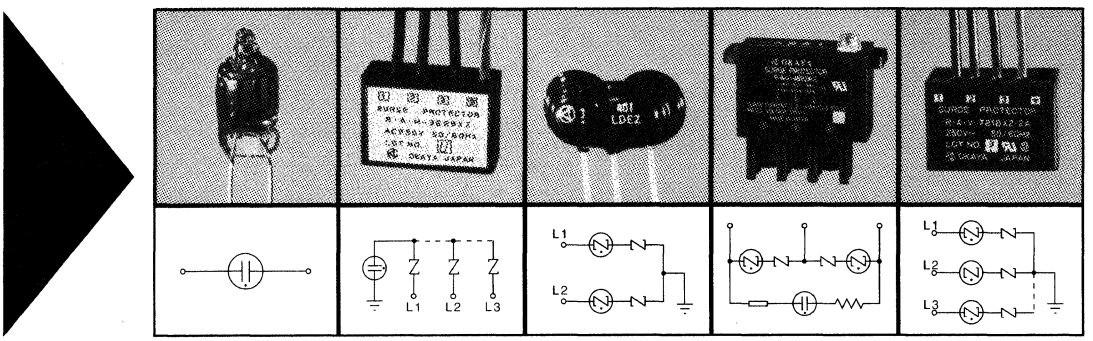
Series	SUP-B _ R	SUP-C _ G	SUP-J _ G	SUP-K _ G	SUP-F _ H
Category / Application	AC POWER LINE				
Case Style	Box Plastic	Box Plastic	IEC Input Metal	IEC Input Metal	IEC Input Metal
Terminal Style	PWB Mount	PWB Mount	Faston, Solder	Faston, Solder	Faston, Solder
Voltage Rating	250VAC	250VAC	250VAC	250VAC	250VAC
Rating Amperes	2, 4, 6	3, 6	3, 6, 10, 15	3, 6, 10, 15	3, 6, 10
Leakage Current 250Vrm 60Hz	1.0mA	1.0mA	10μA, 70μA, 0.5mA	10μA, 70μA, 0.5mA	0.5mA
Voltage Drop (max)	1.0V	0.6V	0.6V	0.6V	1.0V
Operating Temperature Range	-20 ~ 65°C	-20 ~ 55°C	-20 ~ 55°C (3, 6A) -20 ~ 40°C (10, 15A)	-20 ~ 55°C (3, 6A) -20 ~ 40°C (10, 15A)	-25 ~ 55°C
Insertion Loss	Request Document as Charted Data is Large				
TVSS Pulse Attenuate	N/A	N/A	N/A	N/A	Yes
Medical	–	–	UL544 (UL 2601)	UL544 (UL 2601)	–
Comments	Compact Size		24 Models	24 Models	28 Models
Fax Back Document #	1301	1301	1302	1303	1304
Approvals	ᴿᵁ	ᴿᵁ	ᴿᵁ CSA VDE S TÜV	ᴿᵁ (others pending)	ᴿᵁ CSA VDE S

For complete data call our FAXBACK #:1-800-755-8561
or
Visit our Website at: http://www.okaya.com

ISO 9001
Certified 1992
RCJ-92M-05

Okaya Electric America, Inc.
503 Wall Street
Valparaiso, IN 46383
Ph: (219) 477-4488
Fx: (219) 477-4856

Transient Voltage Surge Suppression



Series	RA-V7	RAM-BWZ RAM BXZ RAM LA	RAV-LDEZ	RAV-QWZ RAV-PWZ	RAV-BWZ RAV-BXZ RAV-BYZ
Category / Application	AC POWER LINE				
Max. Line Voltage	145Vrms 300Vrms	300Vrms 3φ300Vrms	145Vrms 300Vrms	145Vrms 300Vrms	145Vrms 300Vrms 3φ300Vrms
Clamp Voltage	2400- 3600V	940V	403 / 783V	403 / 783V	403 / 783V
Peak Surge Voltage 1.2/50μs (V)	N/A	N/A	12KV	20KV	20KV
Peak Surge Current 8/20μs (A)	100A	2000A	1000A	2500A	2500A
Operating Temperature Range	-20° to +70°C	-20° to +70°C	-20 ~ +70°C	-20 ~ +70°C	-20 ~ +70°C
Comments	Use With MOV	Single & Multi-Element	Compact Size	Indicator Light	4 Models 3-Phase
Lead Style	PCB Mount Solid Wire	PCB Mount or Flexible Wire	PCB Mount Solid Wire	Screw Terminals Plug In	PCB Mount or Flexible Wire
Fax Back Document #	1413	BXZ - 1415 BWZ - 1416 LA - 1417	1406	QWZ - 1407 PWZ - 1408	BWZ - 1404 BXZ - 1404 BYZ - 1414
Approvals					

For complete data call our FAXBACK #:1-800-755-8561
or
Visit our Website at: http://www.okaya.com

TRI-MAG, Inc.
your POWER Specialists

1601 N. Clancy Ct. • Visalia, CA 93291
(209) 651-2222
FAX: (209) 651-0188
sales@tri-mag.com.http://www.tri-mag.com

TPYA/TPYB SERIES

THREE PHASE WYE FILTERS WITH CAPABILITIES TO ATTENUATE DIFFERENTIAL AND COMMON MODE NOISE, TO LEVEL A OR B, FROM SWITCHING POWER SUPPLIES. THIS SERIES OF "T" SECTION FILTERS HAS THE EXTENDED LOW FREQUENCY RANGE NECESSARY TO EITHER SUPPRESS SINGLE OR MULTIPLE SWITCHING POWER SUPPLIES IN BALANCED OR UNBALANCED LOAD CONFIGURATIONS.

SIMPLY SPECIFY EITHER TPYA OR TPYB FOR THE CONDUCTED LIMITS THAT YOU WANT TO MEET. THIS SERIES MAY ALSO BE CONNECTED IN A DELTA CONFIGURATION.

Part No.	Current	Case	Leakage*
TPYB7	7.5A/PH	7 x 4 x 4	2.0mA
TPYB15	15A/PH	8 x 5 x 4	2.0mA
TPYB30	30A/PH	12 x 6.5 x 4	2.4mA

Rated Voltage: 420/250 VAC, 47-63 Hz **Insertion Loss:** (50 ohms)
Test Voltage: Line to Line: 1.5KVDC
Line to Gnd: 2.0KVAC

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/G	20db	60db	65db	65db	60db	60db
L/L	36db	65db	65db	65db	60db	55db

Part No.	Current	Case	Leakage*
TPYA15	15A/PH	7 x 4 x 4	2.0mA
TPYA30	30A/PH	8 x 5 x 4	2.4mA
TPYA45	45A/PH	12 x 6.5 x 4	3.0mA
TPYA60	60A/PH	12 x 6.5 x 4	3.0mA

Rated Voltage: 420/250 VAC, 47-63 Hz **Insertion Loss:** (50 ohms)
Test Voltage: Line to Line: 1.5KVDC
Line to Gnd: 2.0KVAC

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/G	10db	50db	65db	65db	65db	65db
L/L	20db	50db	60db	60db	60db	55db

* EACH LINE TO GND. @ 250VAC

K SERIES

TRI-MAG's "K" SERIES. RFI/EMI, LINE FILTERS HAVE BEEN DESIGNED AND DEVELOPED TO ALLOW ELECTRONIC EQUIPMENT, USING SWITCHING POWER SUPPLIES AND OTHER LOW IMPEDANCE NOISE SOURCES. TO MEET VDE 0871 AND THE RECENTLY ADOPTED FCC REGULATIONS GOVERNING THE INTERFERENCE POTENTIAL OF COMPUTER AND SIMILAR DIGITAL ELECTRONIC EQUIPMENT TO RADIO COMMUNICATIONS.

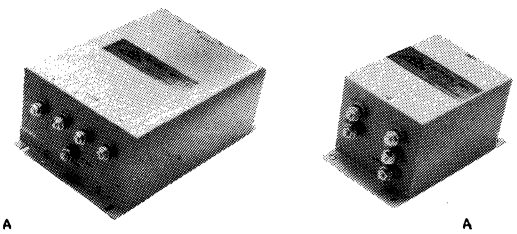
SERIES "K" FILTERS PROVIDE HIGH INSERTION LOSS FOR BOTH LINE-TO-GROUND AND LINE-TO-LINE GENERATED RFI/EMI INTERFERENCE. THESE FILTERS ARE RECOGNIZED BY UNDERWRITERS LABORATORIES, INC. UNDER ITS COMPONENT RECOGNITION SERVICES. OTHER APPROVALS (CSA, VDE, IEC) ARE IN PROCESS.

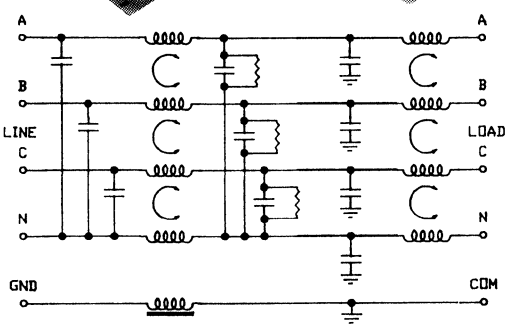
Part No.	Current	Case	Leakage*
K3	3A	2.5 × 2.0 × 1.5	1.0mA
K10	10A	2.8 × 2.2 × 1.5	1.0mA
K20	20A	3.8 × 3.3 × 1.5	1.0mA
K30	30A	4.25 × 3.0 × 2.7	1.0mA
K45	45A	8.0 × 5.0 × 4.0	1.0mA

Rated Voltage: 250VAC, 47-63 Hz **Insertion Loss:** (50 ohms)
Test Voltage: Line to Line: 1.5KVDC
Line to Gnd: 2.0KVAC

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/L	20db	60db	65db	65db	65db	60db
L/G	30db	60db	65db	65db	65db	60db

Three-Phase
Power Line Filters
FOR Switching Power Supplies
TO MEET FCC. VDE LEVEL A AND B

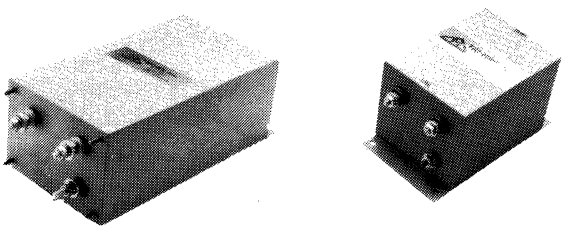




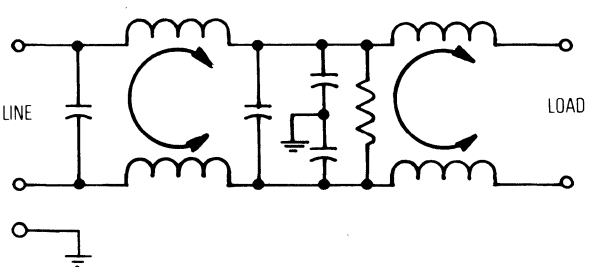
Part No.	Current	Case	Leakage*
TPY20	20A/PH	5 × 4 × 4	2.0mA
TPY30	30A/PH	5 × 4 × 4	2.0mA
TPY45	45A/PH	8 × 5 × 4	3.0mA
TPY60	60A/PH	8 × 5 × 4	3.0mA

Rated Voltage: 420/250 VAC, 47-63 Hz **Insertion Loss:** (50 ohms)
Test Voltage: Line to Line: 1.5KVDC
Line to Gnd: 2.0KVAC

	.05MHz	.15MHz	.50MHz	1.5MHz	5.0MHz	20MHz
L/G	12db	30db	55db	60db	50db	50db
L/L	18db	29db	50db	55db	50db	50db



SERIES "K"



For more Tri-Mag products see Volume D-4000 & 4025

TRI-MAG, Inc.
your POWER Specialists

1601 N. Clancy Ct. • Visalia, CA 93291
(209) 651-2222
FAX: (209) 651-0188
sales@tri-mag.com.http://www.tri-mag.com

MIF SERIES *MODULAR INTEGRATED FILTERS (Power entry module with filter)*

SPEED UP AND SIMPLIFY SYSTEM INTEGRATION

SPECIFICATIONS

1. ***Maximum Leakage Current Each***
   Line-to-Ground @ 115 VAC 60Hz, 0.5mA
   @ 250 VAC 50Hz, 1.0mA
2. ***Hipot Rating*** *(One Minute)*
   Line-to-Ground: 2000VAC
   Line-to-Line: 1500VDC
3. ***Operating Frequency:*** *47-63 Hz*
4. ***Rated Voltage:*** *115/250 VAC*

FEATURES

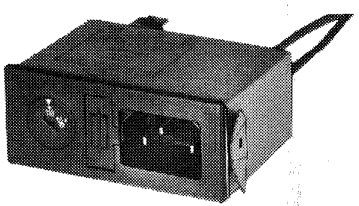
- *IEC Connector Input*
- *Fused Input Power*
- *Spare Fuse Holder*
- *DPDT On/Off Switch*
- *Voltage Selection Switch*
- *Minimum Space Requirement*
- *Cost Saving Integration*
- *Safety Interlock On Fuse*

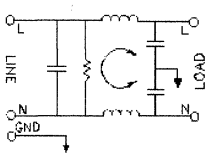
APPLICATIONS

- *Linear Power Supplies*
- *Data Terminals*
- *SMPs with Internal Filtering*
- *Up Grade FCC Level*

PERFORMANCE FREQUENCY - MHz

Model	0.15	0.20	0.50	10.0	20.0
A3 & A6	15dB	20dB	25dB	50dB	50dB



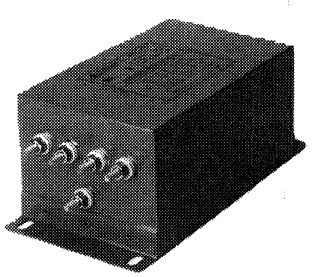


SERIES A FILTERS, CASE SIZE - 1.75" LONG X 2.65" WIDE X 1.15" HIGH

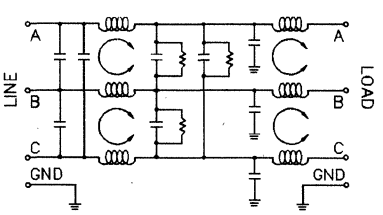
MODEL NUMBER	RATED CURRENT 115VAC	RATED CURRENT 250VAC	IEC CONNECTOR CONNECTOR	FUSE HYOLDER HOLDER	POWER SWITCH (DPDT)	VOLTAGE SELECTOR SW
A3-12S10EA	3A/6A	3A/6A	YES	YES	YES	NO
A6-12S10EA	3A/6A	3A/6A	YES	YES	YES	NO
A3-12VS10E	3A/6A	3A/6A	YES	YES	NO	YES
A6-12VS10E	3A/6A	3A/6A	YES	YES	NO	YES
A3-12S10EAVS	3A/6A	3A/6A	YES	YES	YES	YES
A6-12S10EAVS	3A/6A	3A/6A	YES	YES	YES	YES
A3-12SF10EA	3A/6A	3A/6A	YES	YES	YES	NO
A6-12SF10EA	3A/6A	3A/6A	YES	YES	YES	NO
A3-12SF10EAVS	3A/6A	3A/6A	YES	YES	YES	YES
A6-12SF10EAVS	3A/6A	3A/6A	YES	YES	YES	YES
A3-12AVS3	3A/6A	3A/6A	YES	YES	NO	YES
A6-12AVS3	3A/6A	3A/6A	YES	YES	NO	YES

3 PHASE DELTA FILTERS *(SF SERIES)*

SPECIFICATIONS



1. ***Maximum Leakage Current Each***
   Line-to-Ground @ 480VAC 60Hz, 2.5mA
2. ***Hipot Rating*** *(One Minute)*
   Line-to-Ground: 2000VAC
   Line-to-Line: 2400VDC
3. ***Operating Frequency:*** *47-63 Hz*
4. ***Rated Voltage:*** *480VAC*



APPLICATIONS

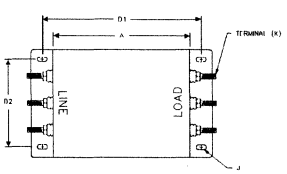
- *Large Computers*
- *Large Peripheral Equipment*
- *Industrial Applications*
- *Motor Control*

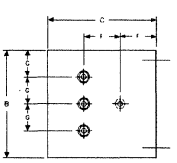
PERFORMANCE FREQUENCY - MHz

	0.05	0.15	0.05	1.50	5.00	20.00	30.00
L/G	20dB	60dB	65dB	65dB	60dB	60dB	60dB
L/L	36dB	65dB	65dB	65dB	60dB	55dB	55dB

3 PHASE DELTA SF SERIES

MODEL NUMBER	CURRENT RATING	A	B	C
SF1442	3A	5.00	4.00	4.00
SF1443	5A	7.00	4.00	4.00
SF1444	10A	7.00	4.00	4.00
SF1397	20A	7.00	4.00	4.00
SF1478	30A	8.00	5.00	4.75
SF1317	45A	11.00	5.00	4.75
SF1329	60A	12.00	6.50	4.75
SF1382	100A	12.00	6.50	4.75





SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

TRI-MAG, Inc.
your POWER Specialists

1601 N. Clancy Ct. • Visalia, CA 93291
(209) 651-2222
FAX: (209) 651-0188
sales@tri-mag.com.http://www.tri-mag.com

For more Tri-Mag products see Volume D-4000 & 4025

PEND'G

PA/PB SERIES

THE **TRI-MAG** PA/PB SERIES OF A.C. LINE FILTERS HAVE BEEN DEVELOPED PRIMARILY FOR COMPUTER SYSTEMS THAT USE SWITCHING POWER SUPPLIES. THE CURRENT RATINGS ARE HIGH ENOUGH TO ALLOW DESIGNERS TO PROTECT A COMPLETE COMPUTER SYSTEM FROM EXCEEDING THE CONDUCTED EMISSION LIMITS SPECIFIED EITHER BY FCC OR VDE.

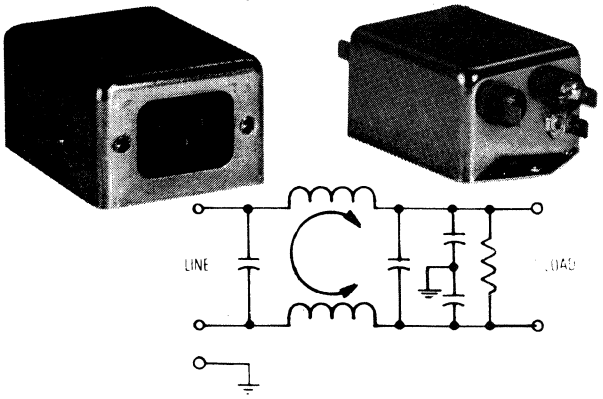
THE PA IS AVAILABLE IN CURRENT RATINGS OF 1, 3, 5, 6 AND 10 AMPS AND THE PB IS AVAILABLE IN 1.3 AND 5 AMPS FOR OPERATION ON A.C. LINES OF 115 TO 250 VOLTS 50/60 Hz.

SPECIFY EITHER PA OR PB FOR THE CONDUCTED LIMITS THAT YOU WANT TO MEET.

Part No.	Current	Case	Leakage
PB1	1	2.5 × 2 × 1.5	1mA @ 250VAC
PB3	3	2.5 × 2 × 1.5	1mA @ 250VAC
PB5	5	2.8 × 2.0 × 1.5	1mA @ 250VAC

Rated Voltage: 250VAC, 47-63 Hz **Insertion Loss:** (50 ohms)
Test Voltage: Line to Line: 1.5KVDC
Line to Gnd: 2.0KVAC

PB	.01MHz	.01MHz	.05MHz	.15MHz	.50MHz	1.0MHz	5.0MHz	10MHz	30MHz
	30db	35db	45db	65db	65db	65d	65db	65db	65db



Part No.	Current	Case	Leakage
PA1	1	2.5 × 2 × 1.5	1mA @ 250VAC
PA3	3	2.5 × 2 × 1.5	1mA @ 250VAC
PA5	5	2.5 × 2 × 1.5	1mA @ 250VAC
PA6	6	2.8 × 2.2 × 1.5	1mA @ 250VAC
PA10	10	2.8 × 2.2 × 1.5	1mA @ 250VAC

Rated Voltage: 250VAC, 47-63 Hz **Insertion Loss:** (50 ohms)
Test Voltage: Line to Line: 1.5KVDC
Line to Gnd: 2.0KVAC

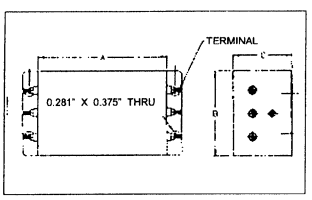
PA	.01MHz	.02MHz	.05MHz	.15MHz	.50MHz	1MHz	5MHz	10MHz	30MHz
	25db	30db	40db	60db	65db	65db	65db	65db	65db

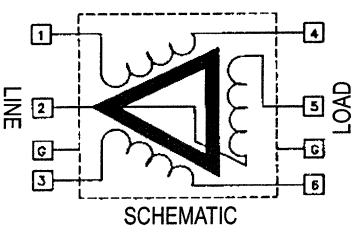
RFI LOAD REACTORS

TRI-MAG RFI LOAD REACTORS ARE USED ON THE OUTPUT SIDE OF VSD (VARIABLE-SPEED DRIVE) CONTROLLERS TO REDUCE RADIATED RFI WHENEVER THE LEAD LENGTHS TO THE MOTOR ARE LONG. (>6M)

A TYPICAL RADIATED PROBLEM IS WHEN THE MOTOR AND VSD ARE RUNNING, THE SURROUNDING NEIGHBORHOOD IS UNABLE TO RECEIVE AM RADIO CLEARLY.

THE SOLUTION TO THIS PROBLEM IS TO INSTALL **TRI-MAG** LOAD REACTOR IN SERIES WITH THE MOTOR LEADS. IN STUBBORN CASES, INSTALL A THREE PHASE RFI FILTER ON THE LINE SIDE OF THE VSD.





SCHEMATIC

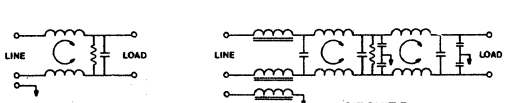
1.0 DIMENSIONS

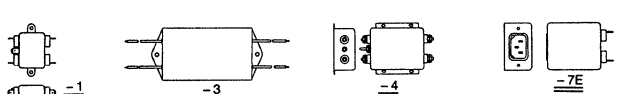
PART NUMBER	CURRENT RATING	INDUCT	CASE
TPDRO103RO	10A	3.00mH	3.88 X 3.31 X 1.50
TPDRO153RO	15A	3.00mH	3.88 X 3.31 X 1.50
TPDRO203RO	20A	3.00mH	3.88 X 3.31 X 1.50
TPDRO353RO	36A	3.00mH	3.88 X 3.31 X 1.50

PART NUMBER	CURRENT RATING	INDUCT	CASE
TPDRO601RO	50A	1.00mH	6.75 X 4.25 X 2.75
TPDRO601RO	60A	1.00mH	6.75 X 4.25 X 2.75
TPDRO800R3	80A	0.30mH	6.75 X 4.25 X 2.75
TPDR1000R2	100A	0.20mH	6.75 X 4.25 X 2.75

MEDICAL SERIES

1. **RATED VOLTAGE:** 115/250VAC, 47-63Hz
2. **TEST VOLTAGE:**
   LINE TO GROUND: 2500 VDC
   LINE TO LINE: 1500 VDC
3. **LEAKAGE CURRENT:**
   M=2μA, MA=50μA, MB=250μA @ 115VAC





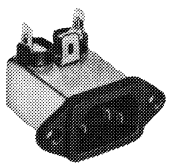
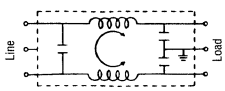
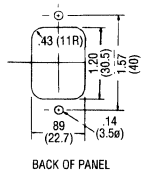
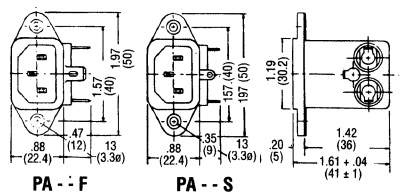
	CIRCUIT	CONFIGURATIONS AVAILABLE						
		-1	-3	-4	-7E	-10E	-11	-12S10E
M3	A	×	–	–	–	×	×	–
M6	A	×	–	–	–	–	×	–
MA3	B	–	×	–	×	×	–	×
MA6	B	–	×	–	×	×	–	–
MA10	B	–	×	–	–	×	–	–
MA15	B	–	–	×	–	–	–	–
MA20	B	–	–	×	–	–	–	–
MB3	B	–	×	–	×	×	–	×
MB6	B	–	×	–	×	×	–	–
MB10	B	–	×	–	–	×	–	–
MB15	B	–	–	×	–	–	–	–
MB20	B	–	–	×	–	–	–	–

PDI®
Power Dynamics, Inc.

FILTERED POWER ENTRY MODULES

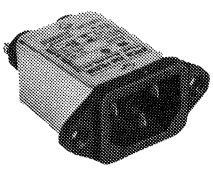
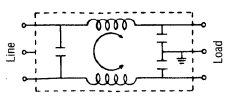
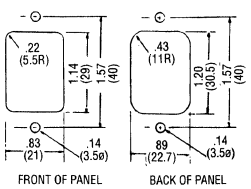
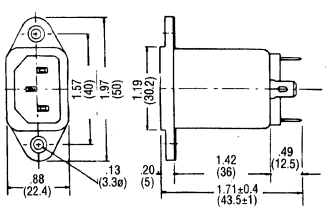
59 Lakeside Ave., West Orange, N.J. 07052 • (800) 999-5409 • Fax: (973) 736-8930 • www.powerdynamics.com

PA01F • PA03F • PA06F • PA10F • PA01S • PA03S • PA06S • PA10S

APPROVALS: UR CSA VDE	PRODUCT NUMBERS	AMPS	CIRCUIT DIAGRAM	PANEL CUT OUT	DIMENSIONS
	PA01F PA03F PA06F PA10F PA01S PA03S PA06S PA10S	1A 3A 6A 10A 1A 3A 6A 10A		 BACK OF PANEL	

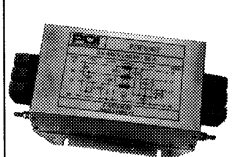
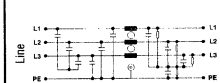
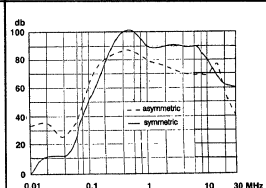
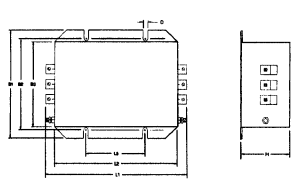
FEATURES: • General purpose filter with IEC Connector providing effective line-to-ground noise up to 10 amp., 250 VAC • Low cost • Compact design • Low leakage current: less than 0.5mA max • .250 Quick connect terminals (PA - - F) • Solder lug terminals (PA - -S)

PB01F • PB03F • PB06F • PB10F

APPROVALS: UR CSA VDE	PRODUCT NUMBERS	AMPS	CIRCUIT DIAGRAM	PANEL CUT OUT	DIMENSIONS
	PB01F PB03F PB06F PB10F	1A 3A 6A			

FEATURES: • General purpose filter with IEC Connector providing effective equipment protection of line-to-ground noise up to 10 amp., 250 VAC • Low cost • Compact design • Low leakage current: less than 0.5mA max • .250 Quick connect terminals

3 PHASE LINE FILTER • PDF016T • PDF032T • PDF050T • PDF100T

APPROVALS: UL CSA VDE (pending)	PRODUCT NUMBERS	AMPS	CIRCUIT DIAGRAM	ATTENUATION	DIMENSIONS
	PDF016T PDF032T PDF050T PDF100T	16A 32A 50A 100A			

PDI P/N	PDF016T	PDF032T
AMP	16A	32A
INDUCTORS	3 x 11 mH	3 x 10 mH
GND. THREAD	1 M5	2 M5
PDI P/N	PDF050T	PDF100T
AMP	50A	100A
INDUCTORS	3 x 4.3 mH	3 x 4.3 mH
GND. THREAD	3 M6	4 M10
CAPACITORS (for PDF Series)	3x2.2µF Cx2	4x4.4µF Cx2
	3x0.068µF Cy	

	L1	L2	L3	B1	B2	B3	D	H
PDF016T	175	150	85	125	112	100	6.4	55
PDF032T	180	150	85	125	112	100	6.4	55
PDF050T	265	200	115	150	135	120	6.4	64
PDF100T	340	260	150	180	165	150	10.5	80

NOTE: (Metric dimensions are shown above in parentheses.)

For engineering specifications, access our Website: www.powerdynamics.com

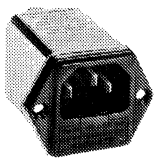
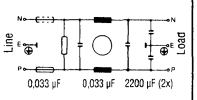
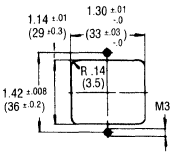
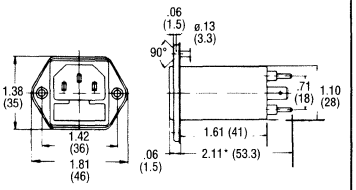
CALL OR FAX POWER DYNAMICS, INC. FOR COMPLETE 324 PAGE DESIGN ENGINEER'S CATALOG

PDI®
Power Dynamics, Inc.

FILTERED POWER ENTRY MODULES

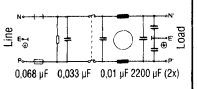
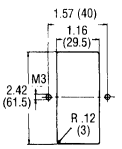
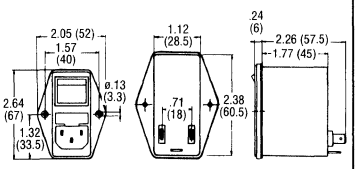
59 Lakeside Ave., West Orange, N.J. 07052 • (800) 999-5409 • Fax: (973) 736-8930 • www.powerdynamics.com

HGN-365

APPROVALS: UR CSA VDE	TECHNICAL DATA	CIRCUIT DIAGRAM	PANEL CUT OUT	DIMENSIONS
	**Operating voltage** 250V / 50Hz 110V / 60Hz **Rated current** 1A / 2A / 4A / 6A (6A for UL & VDEonly) **Leakage current** < 0,5mA / 250VAC **Temperature range** -25°C -+ 85°C **Test voltage (VDE 0565)** 1,8kV / 50Hz - 2s			

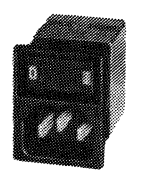
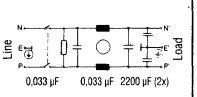
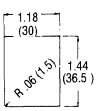
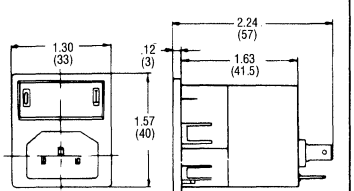
HGH-365 SERIES LINE FILTERS FEATURE an IEC Connector with an integral fuse holder; Available for one or two 5 x 20mm fuses. (IEC 601 prescribes fusing of both lines.) • Fully enclosed metal housing prevents input of high frequency noise and protects ultra-sensitive equipment.

HGN-375

APPROVALS: UR CSA VDE	TECHNICAL DATA	CIRCUIT DIAGRAM	PANEL CUT OUT	DIMENSIONS
	Operating voltage 250V / 50Hz 110V / 60Hz **Rated current** 1A / 2A / 4A / 6A (6A for UL & VDEonly) **Leakage current** < 0,5mA / 250VAC **Temperature range** -25°C -+ 85°C **Test voltage (VDE 0565)** 1,8kV / 50Hz - 2s			

The combi-filter **HGH-375 SERIES** protects electronic equipment from common and differential mode line interference in the range of 10KHZ up to 30MHZ. The "combi-unit" is equipped with IEC Connector, fuse holder for one or two 5 x 20mm fuses, 2 pole on/off switch and fully enclosed metal housing.

HGN-336

APPROVALS: UR CSA VDE	TECHNICAL DATA	CIRCUIT DIAGRAM	PANEL CUT OUT	DIMENSIONS
	**Operating voltage** 250V / 50Hz 110V / 60Hz **Rated current** 1A / 2A / 3A / 4A / 6A **Leakage current** < 0,5mA / 250VAC **Temperature range** -25°C -+ 85°C **Test voltage (VDE 0565)** 1.8kV / 50Hz - 2s **PANEL THICKNESS** .06 (1.5mm) = 150 .062 (1.6mm) = 160 .08 (2.0mm) = 200 *Please indicate the panel thickness !*			

HGH-336 LINE FILTERS FEATURE an IEC Connector and a two pole on/off switch. The unit protects electronic equipment against malfunction due to fast common mode and differential mode interferences. Designed for labor saving snap-in mounting.

NOTE: (Metric dimensions are shown above in parentheses.)

For engineering specifications, access our Website: www.powerdynamics.com

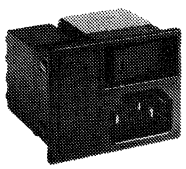
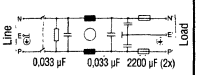
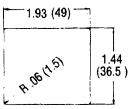
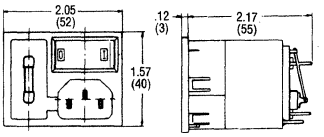
CALL OR FAX POWER DYNAMICS, INC. FOR COMPLETE 324 PAGE DESIGN ENGINEER'S CATALOG

PDI®
Power Dynamics, Inc.

FILTERED POWER ENTRY MODULES

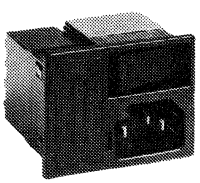
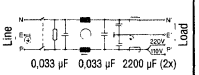
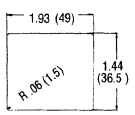
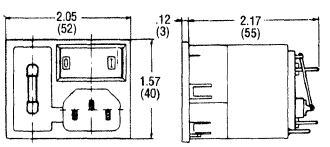
59 Lakeside Ave., West Orange, N.J. 07052 • (800) 999-5409 • Fax: (973) 736-8930 • www.powerdynamics.com

HGN-337

APPROVALS: UR CSA VDE	TECHNICAL DATA	CIRCUIT DIAGRAM	PANEL CUT OUT	DIMENSIONS
	**Operating voltage** 250V / 50Hz 110V / 60Hz **Rated current** 1A / 2A / 3A / 4A / 6A **Leakage current** < 0,5mA / 250VAC **Temperature range** -25°C -+ 85°C **Test voltage (VDE 0565)** 1.8kV / 50Hz - 2s **PANEL THICKNESS** .06 (1.5mm) = 150 .062 (1.6mm) = 160 .08 (2.0mm) = 200 *Please indicate the panel thickness !*			

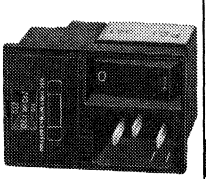
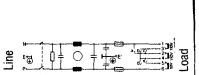
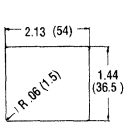
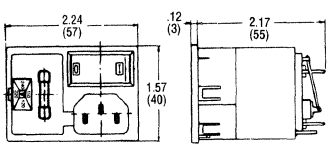
HGH-337 LINE FILTER MODULES FEATURE a combination IEC Connector, two pole on/off switch and fuse holder that accepts both European 5 x 20mm or 3 AG fuses in-line and neutral. The HGN-337 protects electronic equipment such as computers, terminals and typewriters from common mode and differential mode interferences.

HGN-339

APPROVALS: UR CSA VDE	TECHNICAL DATA	CIRCUIT DIAGRAM	PANEL CUT OUT	DIMENSIONS
	**Operating voltage** 250V / 50Hz 110V / 60Hz **Rated current** 1A / 2A / 3A / 4A / 6A **Leakage current** < 0,5mA / 250VAC **Temperature range** -25°C -+ 85°C **Test voltage (VDE 0565)** 1.8kV / 50Hz - 2s **PANEL THICKNESS** .06 (1.5mm) = 150 .062 (1.6mm) = 160 .08 (2.0mm) = 200 *Please indicate the panel thickness !*			

HGH-339 incorporates all the features of the HGN-337 with the addition of an integral voltage selector. It is designed for use in equipment intended for export enabling the fast change to other voltages.

HGN-341

APPROVALS: UR CSA VDE	TECHNICAL DATA	CIRCUIT DIAGRAM	PANEL CUT OUT	DIMENSIONS
	**Operating voltage** 250V / 50Hz 110V / 60Hz **Rated current** 1A / 2A / 3A / 4A / 6A **Leakage current** < 0.5mA / 250VAC **Temperature range** -25°C -+ 85°C **Test voltage (VDE 0565)** 1.8kV / 50Hz - 2s **PANEL THICKNESS** .06 (1.5mm) = 150 .062 (1.6mm) = 160 .08 (2.0mm) = 200 *Please indicate the panel thickness !*			

HGH-341 POWER MODULES FEATURE IEC Connector, two pole on/off switch, fuse holder that accepts both European 5 x 20mm or 3 AG fuses and a voltage selector with four different voltages. The voltage selector is designed to provide a simple means to change transformer primary connections.

NOTE: (Metric dimensions are shown above in parentheses.)

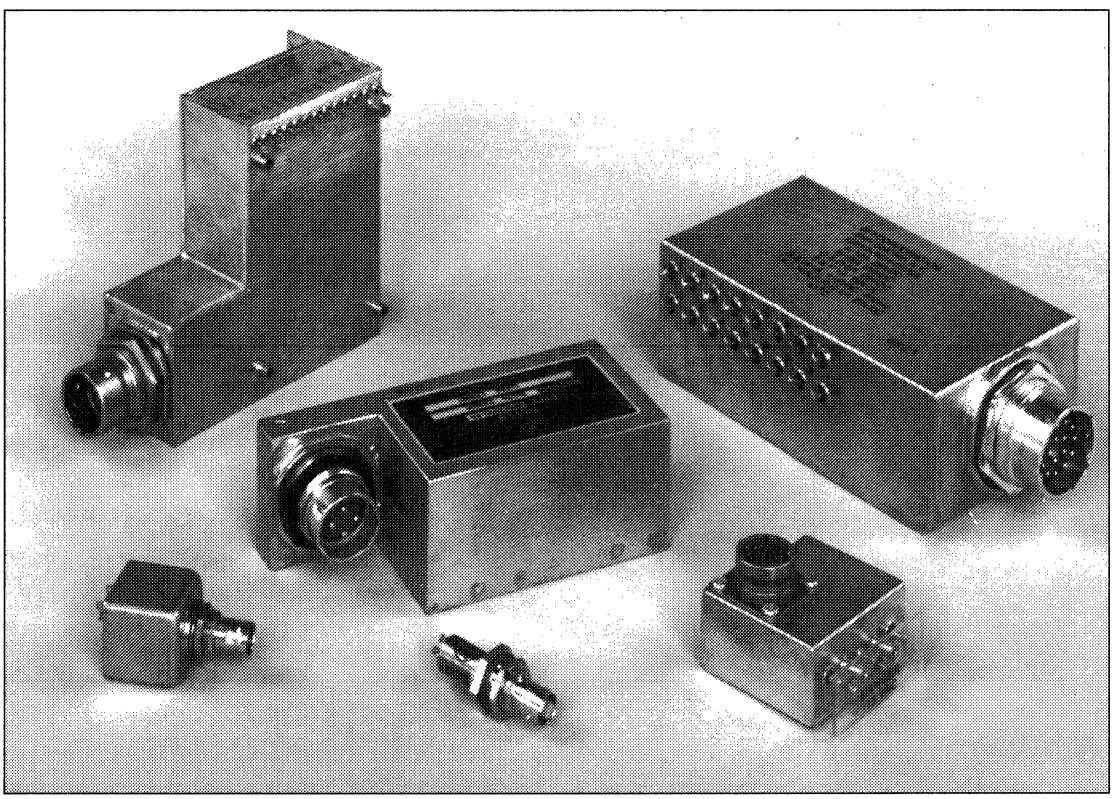
For engineering specifications, access our Website: www.powerdynamics.com

CALL OR FAX POWER DYNAMICS, INC. FOR COMPLETE 324 PAGE DESIGN ENGINEER'S CATALOG

RFI Corporation

MILITARY AND COMMERCIAL EMI/EMC/RFI FILTERS

Our innovative approach to solving problems has enabled us to be "The Leader" since 1961.



- Medical filters
- Tempest filters
- QPL filters
- Power line filters
- Low-leakage filters
- Telephone line filters
- Communication/Data line filters
- UL listed filters
- Multi-Agency listed filters
- Facility filters
- Custom design filters
- Multicircuit filters

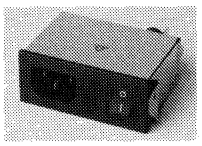
RFI Corporation

A DEL GLOBAL TECHNOLOGIES CORPORATION

100 Pine Aire Drive, Bay Shore, Long Island, New York 11706 • Phone 516-231-6400 • FAX: 516-231-6465
Visit our Website at http://www.rficorp.com E-Mail us at info@rficorp.com

SAE POWER INC.
280 MARTIN AVE. #5 • SANTA CLARA, CA 95050 • PHONE: (408) 987-2700 • FAX: (408) 986-8529

PM1 & PM2 SERIES POWER MODULE EMI FILTERS



APPLICATIONS

SAE Power's PM1 & PM2 Series EMI filters provide the convenience of single-point, snap-in mounting of an IEC connector, a fuse holder with optional power ON/OFF switch and voltage selector switch plus an EMI filter.

For unfiltered or dual fuse, consult factory.

- ***PM1 APPLICATIONS*** Entry module EMI filter.
- ***PM2 APPLICATIONS*** High performance EMI filtered power modules. These two-stage filters are ideal for applications with higher noise levels such as switching power supplies.

PERFORMANCE • Series PM1, PM2

Type	Frequency, MHz							Type	Frequency, MHz						
	.10	.15	.50	1.0	5.0	10	3		.10	.15	.50	1.0	5.0	10	30
Common Mode (L-G) in 50 Ohm System								**Differential Mode (L-L) in 50 Ohm System**							
PM1 (all)	22	28	35	40	46	50	50	PM1 (all)	22	28	35	40	46	50	50 (dB)
PM@ (all)	15	20	25	30	45	50	55	PM@ (all)	15	20	25	30	45	50	55 (dB)

SPECIFICATIONS

VOLTAGE RATING: 115/250 VAC
LINE FREQUENCY: 50/60 HZ
TEST VOLTAGE: Line to ground, 2250 VDC
Line to line, 1450 VDC

LEAKAGE CURRENT (line to ground):
0.25 mA maximum @ 115 VAC, 60 Hz
0.50 mA maximum @ 250 VAC, 50 Hz

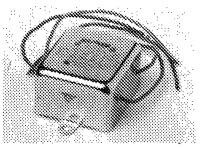
HOW TO ORDER • Series PM1, PM2

Part No.	PM _ A6	PM _ B6	PM _ C6	PM _ D6	PM _ E6	PM _ F6	PM _ G6
Rated 115 VAC	6A	6A	6A	6A	6A	6A	6A
Current 250 VAC	6A	6A	4A	5A	4A	5A	6A
Power Switch	—	SP1	DP2	SP1	DP2	—	—
Voltage Selector SW	—	—	—	Rear3	Rear3	Rear3	Front4

NOTES

1. **SINGLE POLE:** UL, CSA & VDE approved • **Current Rating:** UL & CSA, 6A both at 125 VAC & 250 VAC. VDE, 6A/250 VAC. • **Electrical Lifetime:** 50,000 cycles. • **Maximum Inrush Current:** 24A.
2. **DOUBLE POLE:** UL, CSA & VDE approved • **Current Rating:** UL & CSA, 6A/125 VAC & 4A/250 VAC. VDE, 4A/250 VAC. • **Electrical Lifetime:** 10,000 cycles. • **Maximum Inrush Current:** 51A
3. **VOLTAGE SELECTOR SWITCH:** UL, CSA & VDE approved • **Current Rating:** 10A/125 VAC & 5A/250VAC.
3. **VOLTAGE SELECTOR SWITCH:** UL, CSA & VDE approved • **Current Rating:** UL & CSA, 6A both at 125 VAC & 250 VAC. VDE, 6A/250 VAC.

GA SERIES GENERAL APPLICATION FILTERS



APPLICATIONS

SAE Power's general application filters are available in two circuit configurations to provide an economical solution to the majority of interference problems. All units are recognized under UL 1283 & CSA 22.2 No. 8-M1986 & are designed to meet the requirements of VDC or DIN specifications.

Circuit A Filters: These filters are designed for a wide variety of filtering applications. They offer lowest cost & smallest package size for effective control of common mode (line-to-ground) interference. They are available in a wide selection of mechanical configurations & current ratings.

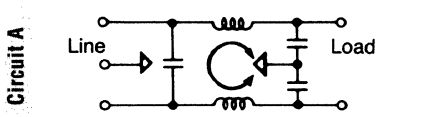
Circuit B Filters: These filters are used where differential mode (line-to-line) interference reduction is required as well as common mode rejection. They offer the same wide current rating selection & mechanical versatility as Circuit A filters.

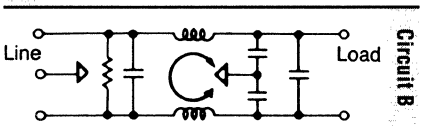
PERFORMANCE • GA Series

Current Rating	Frequency, MHz						
	.15	.50	1.0	5.0	10	20	30
Common Mode							
1, 2, 3 & 5 amp	15	30	38	50	50	50	50 (dB)
10, 20 & 30 amp	6	20	28	42	45	45	48 (dB)

Minimum insertion loss in 50-ohm system per MIL-STD-220A. Special low-leakage models are approximately 6 dB lower insertion loss than standard units.

ELECTRICAL SCHEMATICS



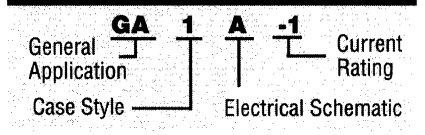


SPECIFICATIONS

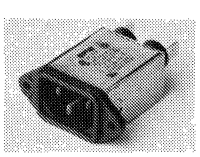
VOLTAGE RATING: 115/250 VAC
LINE FREQUENCY: 50/60 HZ
TEST VOLTAGE: Line to ground, 2250 VDC
Line to line, 1450 VDC
CURRENT OVERLOAD TEST: 6X rated for 8 sec
LEAKAGE CURRENT (line to ground*):
0.50 mA maximum at 115 VAC, 60 Hz
1.00 mA maximum at 250 VAC, 50 Hz
INSULATION RESISTANCE: 6000 megohms @ 100 VDC

* Special low-leakage-current models (less than 0.5 mA at 250 VAC, 50 Hz) may be ordered by using the prefix L on part number, e.g., LGA1A-1.

HOW TO ORDER



HPC SERIES HIGH-PERFORMANCE CONNECTOR FILTERS • SERIES C CONNECTOR FILTERS



APPLICATIONS

The HPC series high-performance connector filters offer higher attenuation in both common and differential modes than the standard C series filters, and are used as a replacement when C series filters do not adequately suppress noise to meet FCC or VDE requirements.

The 1-, 3-, and 6-ampere C series filters also utilize IEC power connectors. All units provide protection from line-to-line and line-to-ground interference.

HOW TO ORDER

For information on our more than 400 products, call us at (408) 987-2700 or Fax your requirements to (408) 986-8529.

PERFORMANCE • Series HPC, Series C

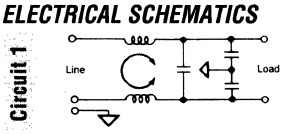
Current Rating	Frequency, MHz								Current Rating	Frequency, MHz							
	0.15	0.2	0.5	1	5	10	20	30		0.15	0.2	0.5	1	5	10	20	30
Common Mode									**Differential Mode**								
1 amp CA-1, CB-1	22	28	35	40	46	50	50	50 (dB)	1 amp CA-1, CB-1	0	0	1	4	33	37	37	36 (dB)
HPCA-1, HPCB-1	24	30	38	42	49	52	55	55 (dB)	HPCA-1, HPCB-1	3	10	15	20	37	37	37	36 (dB)
3 amp CA-3, CB-3	15	20	25	30	45	50	55	55 (dB)	3 amp CA-3, CB-3	0	0	1	3	33	37	37	36 (dB)
HPCA-3, HPCB-3	20	26	29	36	45	50	55	55 (dB)	HPCA-3, HPCB-3	3	10	15	20	37	37	37	36 (dB)
6 amp CA-6, CB-6	9	14	20	25	41	45	50	50 (dB)	6 amp CA-6, CB-6	0	0	0	1	25	35	35	34 (dB)
HPCA-6, HPCB-6	14	19	23	30	41	45	50	50 (dB)	HPCA-6, HPCB-6	3	8	15	20	31	35	35	34 (dB)
10 amp CA-10, CB-10	10	12	18	23	42	40	40	45 (dB)	10 amp CA-10, CB-10	0	0	2	5	35	40	40	36 (dB)

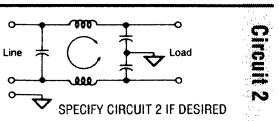
*Minimum insertion (see copy)

SPECIFICATIONS

VOLTAGE RATING: 115/250 VAC
LINE FREQUENCY: 50/60 HZ
TEST VOLTAGE: Line to ground, 2250 VDC
Line to line, 1450 VDC
LEAKAGE CURRENT: 0.25 mA maximum at 115 VAC, 60 Hz
(line to ground) (circuit 2 or 4, CA, CB, HPCA, HPCB)
0.50 mA maximum at 250 VAC, 50 Hz
(circuit 2 or 4, CA, CB, HPCA, HPCB)

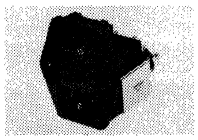
ELECTRICAL SCHEMATICS





SAE POWER INC.
280 MARTIN AVE. #5 • SANTA CLARA, CA 95050 • PHONE: (408) 987-2700 • FAX: (408) 986-8529

ES SERIES POWER ENTRY MODULE EMI FILTERS



APPLICATIONS

The ES Power entry module filters include the IEC receptacle, power switch and single or dual fuse functions. They feature either flange or snap-in mounting. ESM series provide low leakage current for UL544.

HOW TO ORDER

ESS 1 -1

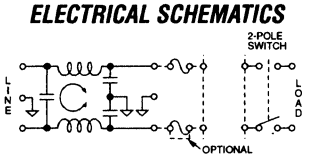
- ESS or ESMS (Snap-In Mounting)
- ESF or ESMF (Screw Mounting)
- No. of fuse holder: 1 – Single, 2 – Double
- Current Rating

PERFORMANCE • ES Series

Current Rating	Frequency, MHz								
	0.15	0.2	0.5	1	5	10	20	30	
Common Mode									
1 Amp	24	30	38	42	49	52	55	55	(db)
3 Amp	20	26	29	336	45	50	55	55	(db)
6 Amp	14	19	23	30	41	45	50	50	(db)
10 Amp	10	12	18	23	42	40	40	45	(db)
Differential Mode									
1 Amp	3	10	15	20	37	37	37	36	(db)
3 Amp	3	10	15	20	37	37	37	36	(db)
6 Amp	3	8	15	20	31	35	35	34	(db)
10 Amp	0	0	2	5	35	40	40	36	(db)

Minimum insertion loss in 50-ohm system per MIL-STD-220A.

ELECTRICAL SCHEMATICS



PERFORMANCE • ESM Series

Current Rating	Frequency, MHz							
	.10	.15	.50	1.0	5.0	10	30	
Common Mode								
ESM	5	9	20	23	26	25	18	(dB)
Differential Mode								
ESM	2	4	14	20	32	38	42	(dB)

Minimum insertion loss in 50-ohm system per MIL-STD-220A.

SPECIFICATIONS

VOLTAGE RATING: 115/250 VAC

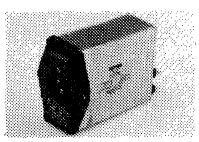
LINE FREQUENCY: 50/60 HZ

LEAKAGE CURRENT (line to ground):

0.25 mA maximum @ 115 V, 60 Hz
0.50 mA maximum @ 250 V, 50 Hz
3µA maximum @ 115V 60Hz (ESM)
5µA maximum @ 230V 50Hz (ESM)

TEST VOLTAGE: Line to ground, 2250 VDC
Line to line, 1450 VDC

EX/EY SERIES POWER ENTRY MODULE EMI FILTERS



APPLICATIONS

The EX power entry module filters include the IEC receptacle, power switch and single or dual fuses in a fully enclosed metal can to improve radiated shielding. The EY modules add an additional X capacitor for improved differential noise performance. The EXG versions provide a ground choke for improved high frequency attenuation.

HOW TO ORDER

EX/EY 1 -3

- EX or EY Series (High Performance Filter)
- No. of fuse holder: 1 – Single, 2 – Double
- Current Rating

PERFORMANCE • EX/EY/EXG Series

Current Rating	Frequency, MHz						
Common Mode	.10	.15	.50	1.0	5.0	10	30
EX							
3 Amp	25	30	38	38	38	38	25
6 Amp	15	20	30	35	45	50	30
10 Amp	15	20	20	30	40	40	30
EY							
3 Amp	25	30	38	38	38	38	25
6 Amp	15	20	30	35	45	50	30
10 Amp	15	20	20	30	40	40	30
EXG							
3 Amp	25	30	40	40	40	45	30
6 Amp	15	20	25	30	40	45	30
10 Amp	15	20	25	30	45	50	30

Current Rating	Frequency, MHz						
Differential Mode	.10	.15	.50	1.0	5.0	10	30
EX							
3 Amp	9	12	30	40	30	45	30 (dB)
6 Amp	5	8	20	30	30	40	40 (dB)
10 Amp	5	8	15	30	40	45	35 (dB)
EY							
3 Amp	10	15	35	40	40	45	40 (dB)
6 Amp	6	10	25	35	35	40	45 (dB)
10 Amp	6	10	20	35	40	45	40 (dB)
EXG							
3 Amp	8	12	30	40	35	40	30 (dB)
6 Amp	5	10	20	30	45	50	40 (dB)
10 Amp	5	8	20	30	50	50	40 (dB)

Minimum insertion loss in 50-ohm system per MIL-STD-220A.

SPECIFICATIONS

VOLTAGE RATING: 115/250 VAC

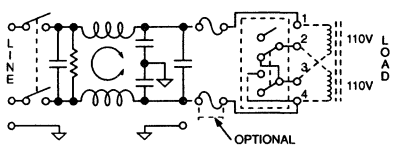
LINE FREQUENCY: 50/60 HZ

LEAKAGE CURRENT (line to ground):

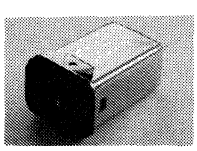
0.25 mA maximum @ 115 V, 60 Hz
0.50 mA maximum @ 250 V, 50 Hz

TEST VOLTAGE: Line to ground, 2250 VDC
Line to line, 1450 VDC

ELECTRICAL SCHEMATICS



CC SERIES HIGH PERFORMANCE CONNECTOR FILTERS, SNAP-IN MOUNTING



APPLICATIONS

The CC series high performance connector filters offer the same attenuation as our HPC series in a convenient snap-in mounting package.

The Filters utilize IEC power connectors, and provide protecting from line-to-line and ground-to-line interference.

HOW TO ORDER

CC A -1

- High-Performance Connector
- Case Style
- Current Rating

PERFORMANCE • Series CC

Current Rating	Frequency, MHz								
	0.05	0.15	0.2	0.5	1	5	10	20	30
Common Mode									
1 amp CCA-1, CCB-1	18	28	30	35	38	38	40	40	40 (dB)
3 amp CCA-3, CCB-3	12	20	23	25	30	38	40	40	40 (dB)
6 amp CCA-6, CCB-6	6	12	16	18	24	35	40	40	40 (dB)
10 amp CCA-10, CCB-10	1	4	7	10	13	28	35	37	40 (dB)

Current Rating	Frequency, MHz								
	0.05	0.15	0.2	0.5	1	5	10	20	30
Differential Mode									
1 amp CCA-1, CCB-1	0	3	10	15	20	37	37	37	36 (dB)
3 amp CCA-3, CCB-3	0	3	10	15	20	37	37	37	36 (dB)
6 amp CCA-6, CCB-6	0	3	8	15	20	31	35	35	34 (dB)
10 amp CCA-10, CCB-10	0	0	0	2	5	35	40	40	36 (dB)

Minimum insertion loss in 50-ohm, system per MIL-STD-220A.

SPECIFICATIONS

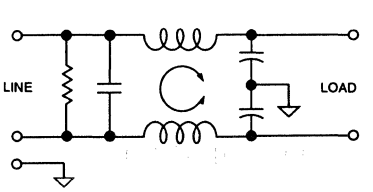
VOLTAGE RATING: 115/250 VAC

LINE FREQUENCY: 50/60 HZ

LEAKAGE CURRENT: (line to ground) 0.2 mA maximum at 115 VAC, 60 Hz
0.4 mA maximum at 250 VAC, 50 Hz

TEST VOLTAGE: Line to ground, 2250 VDC
Line to line, 1450 VDC

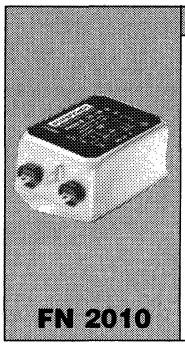
ELECTRICAL SCHEMATICS



FILTERS FOR CHASSIS MOUNTING

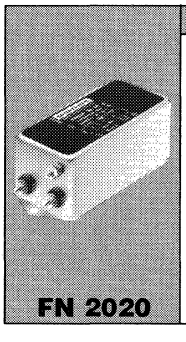
SCHAFFNER

COMPACT SINGLE X-CAPACITOR FILTER



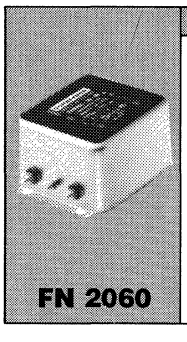
TYPE	AMPS	L (mH)	Cx (uF)	Cy (nF)
FN 2010-1-06	1	12	0.1	4.7
FN 2010-3-06	3	2.5	0.1	4.7
FN 2010-6-06	6	1	0.1	4.7
FN 2010-10-06	10	0.8	0.1	4.7
FN 2010-12-06	12	0.7	0.1	4.7
FN 2010-16-06	16	0.65	0.1	4.7
FN 2010-20-06	20	0.6	0.1	4.7
FN 2010-30-08	30	0.67	0.47	10

COMPACT DUAL X-CAPACITOR FILTER



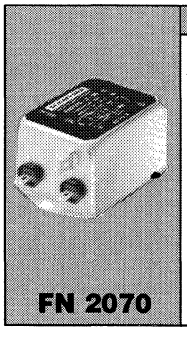
TYPE	AMPS	L (mH)	2*Cx	Cy (nF)
FN 2020-1-06	1	12	0.1	4.7
FN 2020-3-06	3	2.5	0.1	4.7
FN 2020-6-06	6	1	0.1	4.7
FN 2020-10-06	10	0.8	0.1	4.7
FN 2020-12-06	12	0.7	0.1	4.7
FN 2020-16-06	16	0.65	0.1	4.7
FN 2020-20-06	20	0.6	0.1	4.7
FN 2020-30-08	30	0.67	0.47	10

COMPACT DUAL X-CAPACITOR 2 INDUCTOR FILTER



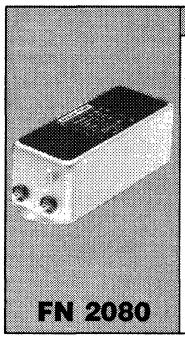
TYPE	AMPS	L (mH)	2*Cx	Cy (nF)
FN 2060-1-06	1	12	0.22	4.7
FN 2060-3-06	3	2.5	0.22	4.7
FN 2060-6-06	6	0.97	0.22	4.7
FN 2060-10-06	10	0.8	0.47	4.7
FN 2060-12-06	12	0.58	0.47	4.7
FN 2060-16-06	16	0.65	0.33	4.7
FN 2060-20-06	20	0.6	1	4.7
FN 2060-30-08	30	0.6	1	10

HIGH PERFORMANCE DUAL X-CAPACITOR 2 INDUCTOR FILTER



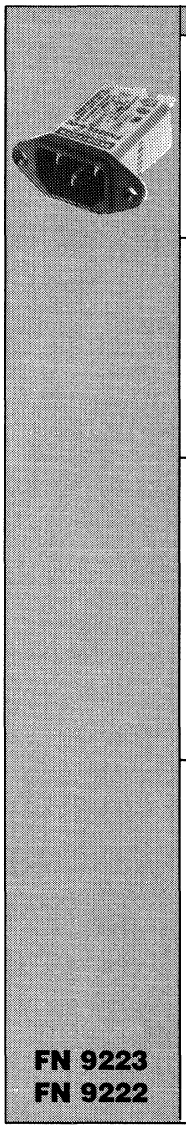
TYPE	AMPS	L (mH)	2*Cx	Cy (nF)
FN 2070-1-06	1	22	0.33	4.7
FN 2070-3-06	3	9.8	0.47	4.7
FN 2070-6-06	6	7.8	1	4.7
FN 2070-10-06	10	4.5	1	4.7
FN 2070-12-06	12	3.2	1	4.7
FN 2070-16-06	16	2.8	1	4.7

MULTISTAGE FILTER WITH DIFFERENTIAL INDUCTOR



TYPE	AMPS	L (mH)	L (mH)	2*Cx	Cy (nF)
FN 2080-1-06	1	22	0.49	0.33	4.7
FN 2080-3-06	3	9.8	0.16	0.47	4.7
FN 2080-6-06	6	7.8	0.11	1	4.7
FN 2080-10-06	10	4.5	0.06	1	4.7
FN 2080-12-06	12	3.2	0.05	1	4.7
FN 2080-16-06	16	2.8	0.04	1	4.7

IEC INLET FILTERS



TYPE	AMPS	L (mH)	Cx (uF)	Cy (nF)
FN 9223-1/06	1	2.8	0.047	2.2
FN 9223-3/06	3	0.7	0.047	2.2
FN 9223-6/06	6	0.3	0.047	2.2
FN 9223-10/06	10	0.13	0.047	2.2
FN 9223B-1/06	1	2.8	0.047	-
FN 9223B-3/06	3	0.7	0.047	-
FN 9223B-6/06	6	0.3	0.047	-
FN 9223B-10/06	10	0.13	0.047	-
FN 9222-1/06	1	12.0	0.1	2.2
FN 9222-3/06	3	2.5	0.1	2.2
FN 9222-6/06	6	0.8	0.1	2.2
FN 9222-10/06	10	0.2	0.1	2.2
FN 9222-12/06	12	0.1	0.1	2.2
FN 9222-15/06	15	0.08	0.1	2.2
FN 9222B-1/06	1	12.0	0.1	-
FN 9222B-3/06	3	2.5	0.1	-
FN 9222B-6/06	6	0.8	0.1	-
FN 9222B-10/06	10	0.2	0.1	-
FN 9222B-12/06	12	0.1	0.1	-
FN 9222B-12/06	12	0.1	0.1	-
FN 9222B-15/06	15	0.08	0.1	-

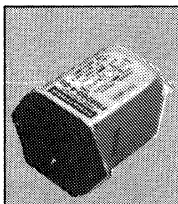
SCHAFFNER

Schaffner EMC Inc.
9-B Fadem Rd., Springfield, N.J. 07081 • Tel. (973) 379-7778 • **(800) 367-5566** • Fax (973) 379-1151
12 Hughes St.: Ste. D-106, Irvine, C.A. 92718 • Tel. (714) 457-9400 • Fax (714) 457-9510

FILTERS FOR CHASSIS MOUNTING

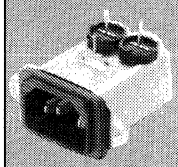
SCHAFFNER

DUAL FUSE IEC INLET FILTERS



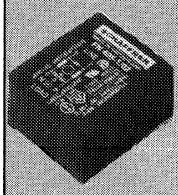
TYPE	AMPS	L (mH)	Cx (uF)	Cy (nF)
FN 9260-1/06	1	5.3	0.1	2.2
FN 9260-2/06	2	2.7	0.1	2.2
FN 9260-4/06	4	1.0	0.1	2.2
FN 9260-6/06	6	0.3	0.1	2.2
FN 9260B-1/06	1	5.3	0.1	-
FN 9260B-2/06	2	2.7	0.1	-
FN 9260B-4/06	4	1.0	0.1	-
FN 9260B-6/06	6	0.3	0.1	-

ULTRA-COMPACT POWER ENTRY MODULE



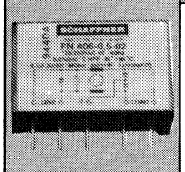
TYPE	AMPS	L (mH)	Cx (uF)	Cy (nF)
FN 9226 -1/01	1	4.65	47	2.2
FN 9226 -3/02	3	1.24	47	2.2
FN 9226 -6/06	6	0.52	47	2.2
FN 9226 -10/10	10	0.27	47	2.2

PC MOUNT FILTERS



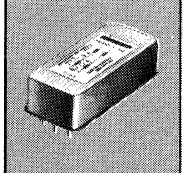
TYPE	AMPS	L (mH)	Cx (uF)	Cy (nF)
FN 405-0.5/02	0.5	24	0.015	2.2
FN 405-1/02	1	10	0.015	2.2
FN 405-3/02	3	2	0.015	2.2
FN 405-6/02	6	0.8	0.015	2.2

PCB MOUNT FILTER



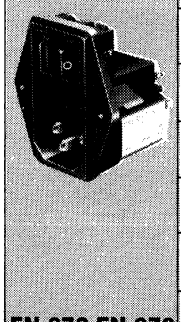
TYPE	AMPS	L (mH)	Cx (uF)	Cy (nF)
FN 406-0.5/02	0.5	24	.01	2.2
FN 406-1/02	1	12	.01	2.2
FN 406-3/02	3	2.5	.01	2.2
FN 406-6/02	6	0.8	.01	2.2

TWO-STAGE PCB MOUNT FILTER



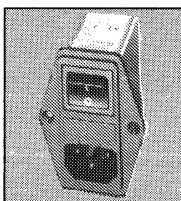
TYPE	AMPS	L (mH)	Cx (uF)	Cy (nF)
FN 410-0.5/02	0.5	24	0.033	2200
FN 410-1/02	1	10	0.033	2200
FN 410-3/02	3	2	0.033	2200
FN 410-6/02	6	0.8	0.033	2200

FUSED INLET FILTERS WITH SWITCH OR VOLTAGE SELECT



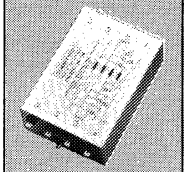
TYPE	AMPS	L (mH)	Cx (uF)	Cy (nF)
*FN 372-2/22	2	0.7	0.047	2200
*FN 372-6/22	6	0.2	0.047	2200
FN 378-2/22	2	0.7	0.047	2200
FN 378-6/22	6	0.2	0.047	2200
FN 379-2/22	2	2.0	0.047	2200
FN 379-6/22	6	0.5	0.047	2200
FN 379B-2/22	2	2.0	0.047	-
FN 379B-6/22	6	0.5	0.047	-
*FN 382-2/22	2	0.7	0.047	2200
*FN 382-6/22	6	0.2	0.047	2200
FN 388-2/22	2	0.7	0.047	2200
FN 388-6/22	6	0.2	0.047	2200
FN 389-2/22	2	2.0	0.047	2200
FN 389-6/22	6	0.5	0.047	2200
FN 389B-2/22	2	2.0	0.047	-
FN 389B-6/22	6	0.5	0.047	-
273-008 5X20	METRIC FUSE HOLDER FOR THE FILTERS LISTED			

HIGH PERFORMANCE FUSED FILTER WITH SWITCH



TYPE	AMPS	L (mH)	Cx (uF)	Cy (nF)
FN 284-1/06	1	7.5	0.22	2200
FN 284-2/06	2	2.0	0.22	2200
FN 284-4/06	4	1.0	0.22	2200
FN 284-6/06	6	0.45	0.22	2200
FN 286-1/06	1	7.5	0.22	2200
FN 286-2/06	2	2.0	0.22	2200
FN 286-4/06	4	1.0	0.22	2200
FN 286-6/06	6	0.45	0.22	2200

THREE-PHASE POWER LINE FILTER



TYPE	AMPS	L (mH)	Cx (uF)	Cy (nF)
FN 356-16-06	16	1.2	0.68	15
FN 356-25-24	25	1.3	2.0	15
FN 356-36-24	36	0.95	2.0	15
FN 356-50-24	50	0.55	2.0	15
FN 356-100-28	100	0.32	2.0	15

SCHAFFNER EMC INC.

- Precompliance Testing
- Custom Filter Design
- http://www.schaffner.com

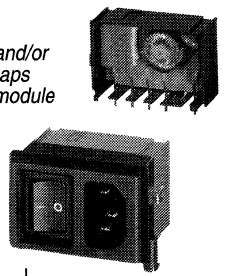
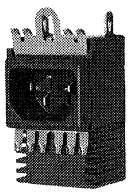
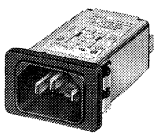
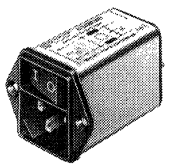
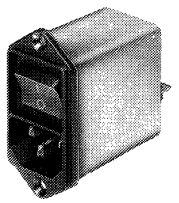
SCHAFFNER

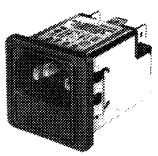
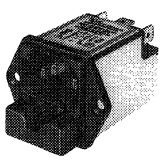
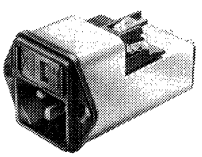
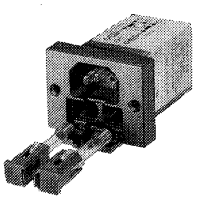
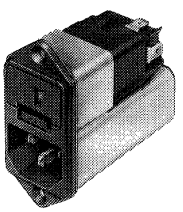
Schaffner EMC Inc.
9-B Fadem Rd., Springfield, N.J. 07081 • Tel. (973) 379-7778 • **(800) 367-5566** • Fax (973) 379-1151
12 Hughes St.: Ste. D-106, Irvine, C.A. 92718 • Tel. (714) 457-9400 • Fax (714) 457-9510

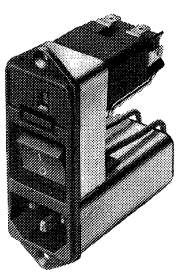
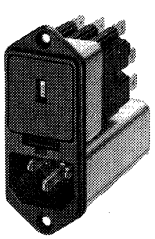
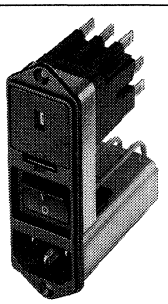
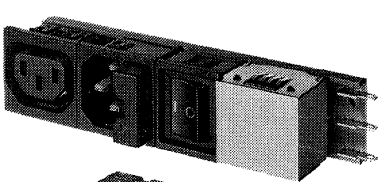
SCHURTER

Power Entry Modules with RFI Line Filter

ISO 9001 / ISO 14001

	NEW *"Back-pack" filter and/or surge protector snaps onto power entry module* 	NEW *EMI shield* 	*Snap-in or screw mount* 		
Series	**KPF / KPS**	**GRF**	**5100 / KFS / KFX**	**KFB I**	**KFB II**
Rated current / voltage	1A – 10A / 250V	500mA – 15A / 250V	1A – 10A / 250V	1A – 6A / 250V	1A – 6A / 250V
AC inlet	• outlet optional	•	•	•	•
Fuseholder (5x20mm)	optional				
On/off line switch	optional			• 1-pole	• 2-pole

					
Series	**5200**	**5220**	**KFA**	**8843**	**KFC**
Rated current / voltage	1A – 6A / 250V	1A – 6A / 250V	1A – 6A / 250V	1A – 10A / 250V	1A – 6A / 250V
AC inlet	•	•	•	•	•
Fuseholder (5x20mm)	•	•	•		
Fuseholder (5x20mm or 1/4 x 1 1/4")				•	•
Voltage selector			• step		• step

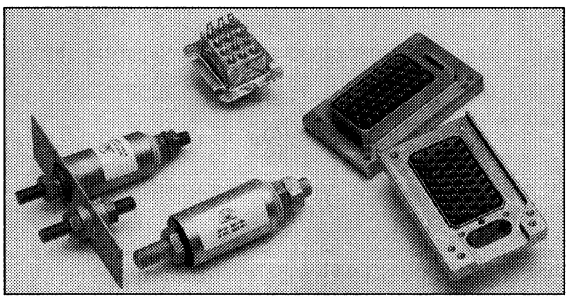
				 *Felcom®* *5500 RFI filter only*	
Series	**CD**	**CE**	**CG**	**Felcom®**	**5500**
Rated current / voltage	1A – 6A / 250V	1A – 6A / 250V	1A – 6A / 250V	1A – 6A / 250V	1A – 6A / 250V
AC inlet	•	•	•	• with or without outlet	
Fuseholder (5x20mm)				with or without fuseholder	
Fuseholder (5x20mm or 1/4 x 1 1/4")	•	•	•		
On/off line switch	•		•	with or without switch	
Voltage selector	• step	• series/parallel	• series/parallel		

For order numbers, pricing, samples and technical information contact Schurter at 707-778-6311; Fax 707-778-6401; E-mail 73024.2314@compuserve.com; Website http://www.schurter.com

EMI Filter Products for Power Entry and Power Conditioning

SPECTRUM CONTROL INC.

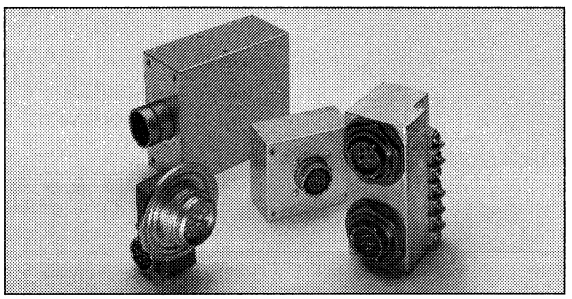
Single Line Filters and Power Arrays



New high current single line feed-thru filters are ideal for high current applications. This series provides EMI/RFI filtering for systems rated at 150-500 Amps. Power filter arrays are a space saving way to achieve electronic system interface and EMI filtering. Custom designs are also available to meet specific requirements and simplify installation.

Applications: High current 5 Volt logic bus, cellular base stations, telephone rack bus, high current switch mode power supplies, DC charging systems, high voltage power supplies, telecommunications switching networks and high reliability commercial and military applications.

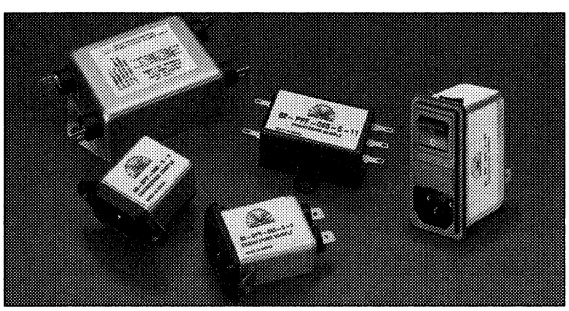
Multi-Section Filters



These filters have been designed for products which require high common and differential mode attenuation. The filters maximize system performance by reducing emissions for FCC and tempest requirements. These filters are available in various circuit configurations and provide excellent EMI filtering from 10 KHz to 10 GHz. In addition, our filters are built to withstand MIL-STD environmental conditions.

Applications: High current filtering for moderate to high voltage applications. Multi-section filters are used extensively in high reliability military applications, secure "Tempest" equipment, commercial avionics, satellites, power supplies, UPS, telecommunications, and industrial applications.

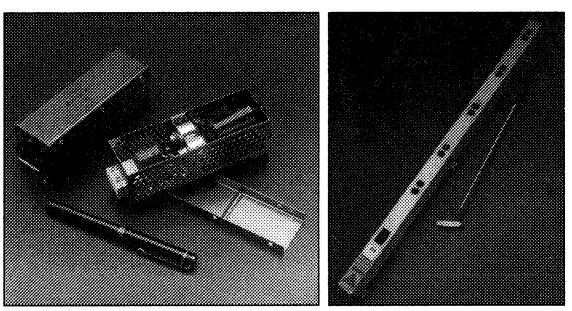
Power Entry Modules and Power Line Filters



These EMI filters are available in a wide range of models to accommodate varied power entry requirements. Spectrum Control's standard power entry modules and power line filters are ideally suited for products that must conform to FCC part 15 regulations. These products may be specified for a range of filter performance levels and are available in bolt-in, PCB and snap-in configurations, as well as with numerous termination options.

Applications: General purpose, cost effective solutions for broad band filtering. Excellent low cost filtering solution for power supplies, switching devices, communications equipment, computers and peripherals, digital and medical equipment.

Custom Assemblies and Power Distribution Systems



Spectrum Control's dedicated design and manufacturing teams are prepared to help with your specific application. Using these teams to address EMI filtering and related circuit issues allows your engineering resources to focus on the needs of your market. We can obtain agency approvals, integrate circuits, and provide assembly services . . . saving you time and lowering your cost of production.

Applications: Spectrum Control can satisfy virtually any requirement for custom power products. We have assisted in designs for a wide range of power assemblies including alarm circuitry, surge suppression and removable MOV's. We will design and develop custom power distribution and conditioning systems to meet your most stringent requirements.

ISO 9001 CERTIFIED

SPECTRUM CONTROL INC.

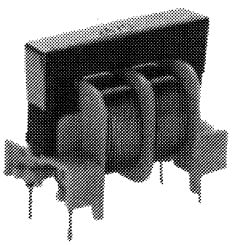
A Control Products and Systems Company

For more information on our EMI filter products, see our catalog under Filters, RF & Signal.

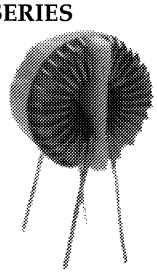
6000 West Ridge Road, Erie, PA 16506 ■ Phone: 814-835-1510 ■ Fax: 814-835-9000 ■ http://www.spectrumcontrol.com

tamura
MICROTRAN

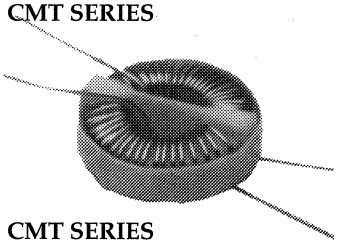
COMMON MODE COILS FOR AC LINE & EMI-RFI FILTERING, 0.1 to 50 MHz.



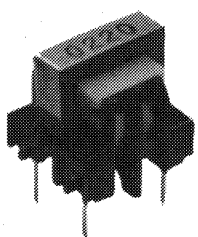
CMF SERIES



CMT SERIES



CMT SERIES



CMF SERIES

FEATURES

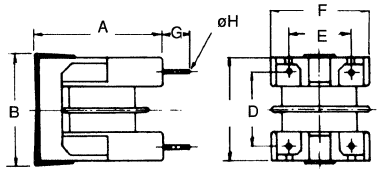
- Rated Voltage: 250VAC, 50/60 Hz.
- Rated Current: Spec'd at max. temp. rise.
- Insulation Resistance: 100 Megohms, 500 VDC.
- Direct Current Resistance (DCR): Spec'd per line, input to output.
- Dielectric Voltage: 1.5kVAC (line to gnd); 2.0kVAC, CMF Series.
- Temperature Rise: ≤30°C, CMT; ≤55°C, CMF.
- Operating Temperature: -25°C to +85°C, CMT; -25°C to +60°C, CMF.
- Creepage Distance: 3.2mm min., CMF Series.

COMMON MODE NOISE FILTERING COILS

PART NO.	INDUCTANCE AMPS	INDUCTANCE mH min	DCR (Ω)	DIA mm
CMT-01102	1.00	2.0	0.25	0.40
CMT-01104	1.00	4.0	0.35	0.40
CMT-01202	2.00	2.0	0.15	0.55
CMT-01301	3.00	1.0	0.10	0.70
CMT-02105	1.00	5.0	0.40	0.40
CMT-02107	1.00	7.0	0.50	0.40
CMT-02203	2.00	3.0	0.20	0.55
CMT-02302	3.00	2.0	0.10	0.70
CMT-03110	1.00	10.0	0.55	0.40
CMT-03305	3.00	5.0	0.15	0.70
CMT-03502	5.00	2.0	0.04	0.95
CMT-03801	8.00	1.0	0.02	1.20
CMF-0470	0.15	47.0	7.00	0.70
CMF-0330	0.20	33.0	6.00	0.70
CMF-0220	0.30	22.0	4.50	0.70
CMF-0100	0.45	10.0	3.00	0.70
CMF-0056	0.55	5.6	1.00	0.70
CMF-0033	0.80	3.3	0.70	0.70
CMF-6470	0.45	47.0	3.00	0.70
CMF-6330	0.50	33.0	2.50	0.70
CMF-6220	0.65	22.0	2.00	0.70
CMF-6100	0.90	10.0	0.60	0.70
CMF-6056	1.00	5.6	0.40	0.70
CMF-6033	2.00	3.3	0.30	0.70
CMF-8470	0.50	47.0	4.00	0.80
CMF-8330	0.65	33.0	3.00	0.80
CMF-8220	0.80	22.0	2.00	0.80
CMF-8100	1.00	10.0	0.70	0.80
CMF-8056	1.50	5.6	0.40	0.80
CMF-8033	2.00	3.3	0.30	0.80
CMF-2470	1.00	47.0	2.00	1.00
CMF-2330	1.20	33.0	0.80	1.00
CMF-2220	1.40	22.0	0.60	1.00
CMF-2100	2.20	10.0	0.30	1.00
CMF-2056	2.70	5.6	0.25	1.00
CMF-2033	4.00	3.3	0.08	1.00

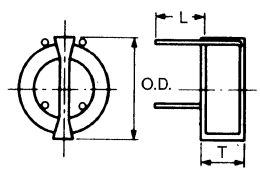
CMF SERIES (dim. mm)
MECHANICAL DIMENSION

SERIES PREFIX	A	B	C±1	D±1	E±.4	F±1	G±.8
CMF-0	20.5	17.5	18.0	12.5	10.0	16	4
CMF-6	28.0	22.5	18.0	12.5	10.0	18	4
CMF-8	31.0	24.0	22.0	16.0	10.0	20	4
CMF-2	33.5	38.5	37.0	30.0	12.5	21	4

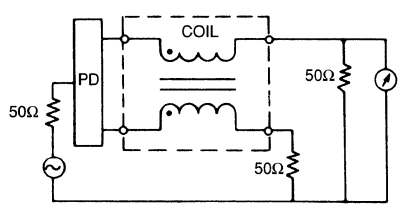


CMT SERIES (dim. mm)
MECHANICAL DIMENSIONS

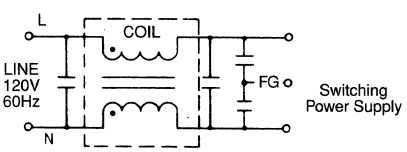
SERIES PREFIX	O.D.	T	L±3mm
CMT-01	28	12.5	20
CMT-02	28	14.5	20
CMT-03	32	22.0	20



CIRCUIT 1



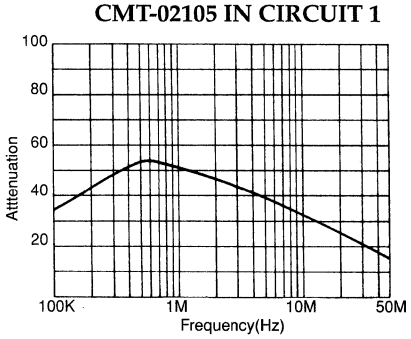
CIRCUIT 2



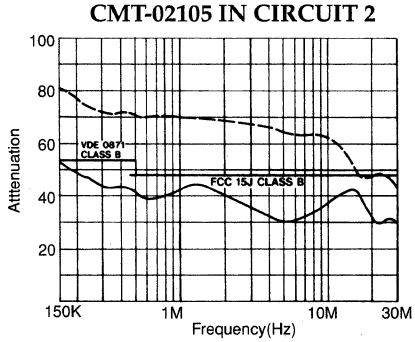
Cy: 2200pf (line-to-FG)
Cx: 0.1μF (line-to-line)

TYPICAL PERFORMANCE CHARACTERISTICS

STATIC CHARACTERISTIC
CMT-02105 IN CIRCUIT 1



DYNAMIC CHARACTERISTIC
CMT-02105 IN CIRCUIT 2



For additional inductor information see pages A•1158 to A•1161.

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

EMI/FILTER LINE FILTERS

Featuring Wire, Tab, Pin & Screw Terminal Type Connectors

tamura MICROTRAN

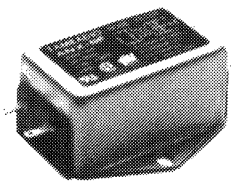
UL File No.s E92559, E105042

CSA File No. LR65763

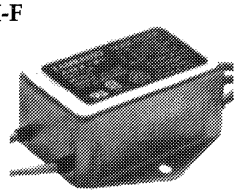
VDE File No.s 49913, 49914, 49973

FEATURES

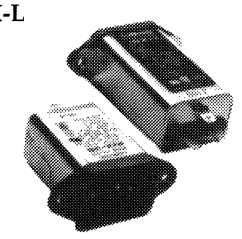
- Rated Voltage: 250VAC, 50/60 Hz.
- Output Connectors:
  ANX-L-lead wire
  ANX-F-fast-on-tabs
  INX-inlet type
  ONX-pin type
- Leakage Current: ≤0.5ma
- Insulation Resistance: 6,000 MΩ., min Line-gnd, 250VDC.
- Direct Current Resistance (DCR): Spec'd per line, input to output.
- Dielectric Voltage: 2.0kVAC, 1 minute (line gnd); INX, X-S, ONX-C, D, 1.5kVAC.
- Temperature Rise: ≤30°C.
- Operating Temp: -25°C to +85°C.
- UL File No: E92559, E105042
- CSA File No: LR65763.
- VDE File No:
  INX, ANX-L, F, ONX; 49913
  INX-S; 49973
  ONX-C, D: 49914



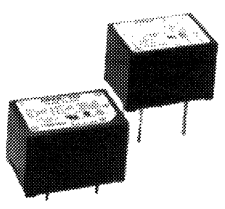
ANX-F



ANX-L



INX



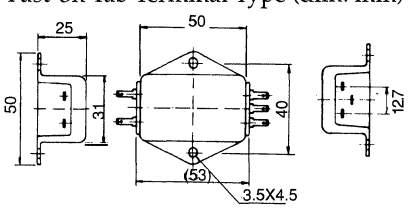
ONX

EMI/RFI LINE FILTERS RATING TABLE

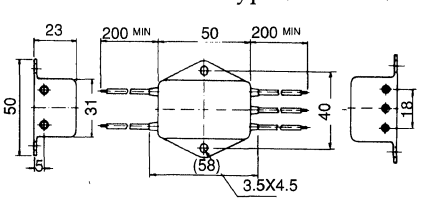
MODEL NO.	AMPS	DCR (Ω)	ATTENUATION[1] NORMAL MODE	COMMON MODE
ANX-1L,F[2]	1.0	0.500	25dB,0.5-20MHz.	20dB,0.1-10MHz.
ANX-3L,F[2]	3.0	0.150	25dB,0.7-20MHz.	20dB,0.2-10MHz.
ANX-6L	6.0	0.070	25dB,1.0-20MHz.	20dB,0.5-10MHz.
ANX-6F[2]	6.0	0.050	25dB,1.0-20MHz.	20dB,0.5-10MHz.
INX-1	1.0	0.500	20dB,1.0-20MHz.	20db,0.2-20MHz.
INX-3	3.0	0.200	20dB,2.0-20MHz.	20dB,0.3-20MHz.
INX-6	6.0	0.150	20dB,3.0-20MHz.	20dB,2.0-20MHz.
INX-05S	0.5	0.150	20dB,2.0-30MHz.	20dB,0.1-30MHz.
INX-1S	1.0	0.100	20dB,3.0-30MHz.	20dB,0.2-30MHz.
INX-3S	3.0	0.020	20dB,6.0-30MHz.	20dB,3.0-30MHz.
INX-6S	6.0	0.007	20dB,8.0-30MHz.	20dB,7.0-30MHz.
INX-10S	10.0	0.005	20dB,9.0-30MHz.	20dB,8.0-30MHz.
ONX-1	1.0	0.500	25dB,0.3-20MHz.	20dB,0.1-20MHz.
ONX-2	2.0	0.200	25dB,0.4-20MHz.	20dB,0.2-20MHz.
ONX-3	3.0	0.150	25dB,0.5-20MHz.	20dB,0.3-20MHz.
ONX-05C,D[3]	0.5	1.500	20dB,0.3-30MHz.	25dB,0.1-30MHz.
ONX-1C,D[3]	1.0	0.400	20dB,0.5-30MHz.	25dB,0.1-30MHz.
ONX-2C,D[3]	2.0	0.100	20dB,1.0-30MHz.	25dB,0.4-30MHz.
ONX-3C,D[3]	3.0	0.050	20dB,1.5-30MHz.	25dB,2.0-30MHz.
ONX-5C,D	5.0	0.020	20dB,2.0-30MHz.	25dB,4.0-30MHz.

NOTE 1: Contact Tamura for static and dynamic attenuation characteristic curves.
NOTE 2: "L" or "F" suffix denotes lead wire or fast-on tab terminals, respectively...example: ANX-1L, ANX-1F.
NOTE 3: "C" or "D" suffix designates different models (example: ONX-1C, ONX-1D). "C" suffix has lower conducted emission under 3MHz while "D" suffix exhibits a flatter response above 10MHz. See note 1.

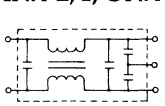
ANX-F Series:
Fast-on Tab Terminal Type (dim. mm)



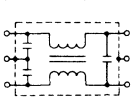
ANX-L Series:
Lead Wire Terminal Type (dim. mm)



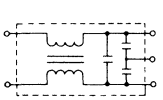
ANX-L, F, ONX



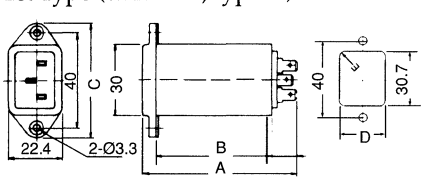
INX, INX-S, ONX-C



ONX-D



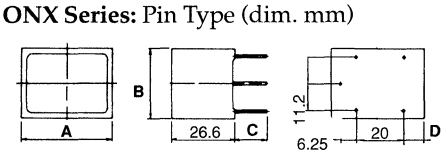
INX Series:
Inlet Type (dim. mm, typical)



INX SERIES DIMENSIONS (mm)

SERIES PREFIX	A	B	C	D CONNECTOR FRONT/BACK	E CONNECTOR FRONT/BACK
INX	64.7±1	48	50	21.8/23.2	r=4/r=5.5
INX-S	51.7±1	35	48	21.8/23.2	r=4/r=5.5

ONX Series: Pin Type (dim. mm)



ONX SERIES DIMENSIONS (mm)

SERIES PREFIX	A	B	C	D
ONX	38.5	29.5	≥15	8.3
ONX-C,D	41.4	28.7	≥4.2	9.5

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

http://eemonline.com

your search engine for electronic products!

- Faster search times and less time online
- Easy search of multiple products & companies
- Round-the-clock solutions to your design needs
- You can retrieve more detailed information, if necessary.
- As fast as a fax, faster than mail & overnight delivery.

Be sure to check out
our other websites devoted
to helping those in the design
and purchasing of
electronic products—

eemupdate.com
eemlocalsources.com
icmaster.com
electronicproducts.com

EEM Online—your search engine for electronic products.

Hearst Business Communications, Inc./UTP Division
645 Stewart Avenue, Garden City, NY 11530 • Tel: 516.227.1300 • FAX: 516.227.1901

SIGNAL FILTERS

Manufacturer	Starting EEM Page No.	LC Filters				Frequency					Signal Conditioners			
		Low Pass	High Pass	Band pass	Band Reject	AF	IF	RF	UHF/ VHF	Video	Pro-gram-mable	Digital	Vari-able	Equal-izer
Aerocomm	A•1618	√*	√*	√*	√*			√*	√*			√*		
Allen Avionics, Inc.	A•1619	√§*	√§*	√§*	√§*			√§*	√§*	√§*				
Communication Coil, Inc.	A•1621	√§*	√§*	√§*	√§*		√§*	√§*	√§*					
Frequency Devices, Inc.	A•1622	√§	√§	√§	√§						√	√	√	
Globtek, Inc.	A•1623	√§	√§	√§	√§	√§	√§					√§		
Kappa Technologies, Inc.	A•1624							√*				√		
KR Electronics, Inc.	A•1626	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§				√§
Maxconn, Inc.	A•1628											√		
Microwave Filter, Inc.	A•1629	√§*	√§*	√§*	√§*		√§*	√*	√§*	√*			√	
Mini-Circuits	A•1630	√§*	√§*	√§*	√§*		√§*	√§*	√§*					√§*
NTK Technical Ceramics	A•1632						√§	√§	√§				√§	
Oxley	A•1616	√§						√	√					
PCA Electronics	A•1634											√		
Precision Filters, Inc.	A•1638	√	√	√	√	√	√				√	√	√	
Pulse	A•1640	√										√		
RFI Corp.	A•1644	√*	√*	√*	√*	√*	√*	√*	√*					
Spectrum Control, Inc.	A•1645	√*						√*						
Toko America, Inc.	A•1648			√			√	√	√					
TTE Incorporated	A•1650	√§	√§	√§	√§	√§	√§	√§	√§					
Tusonix, Inc.	A•1658	√§*												

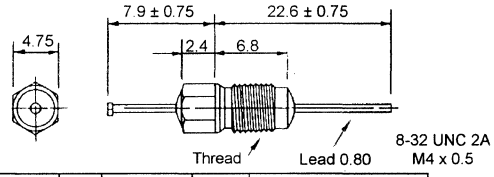
* MIL Spec. § Surface Mount.

EMI Filters

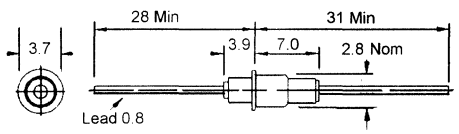
Pi Circuit Filters

- Low pass EMI/RFI filters
- Feedthrough, board mount, surface mount or arrays
- Wide range of styles
- Custom options available

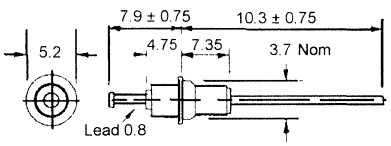
All dimensions mm



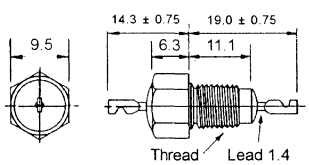
Oxley Part Number	Min. Cap. pF	Rated Voltage (V d.c.) 85°C	125°C	Current (Amps d.c.)	Minimum No Load Insertion Loss (dB) at 25°C 10 MHz	100 MHz	1 GHz	10 GHz
TPT050A	1500	350	210	10	5	45	65	60



Oxley Part Number	Min. Cap. pF	Rated Voltage (V d.c.) 85°C	125°C	Current (Amps d.c.)	Minimum No Load Insertion Loss (dB) at 25°C 10 MHz	100 MHz	1 GHz	10 GHz
TPS051A	1500	350	210	10	6	45	60	60

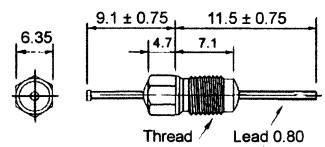


Oxley Part Number	Min. Cap. pF	Rated Voltage (V d.c.) 85°C	125°C	Current (Amps d.c.)	Minimum No Load Insertion Loss (dB) at 25°C 10 MHz	100 MHz	1 GHz	10 GHz
TPS003A	1500	600	360	10	5	45	70	70



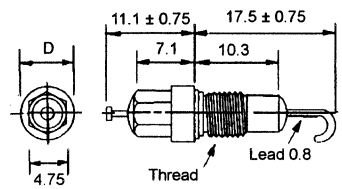
A & C: 5/16-32 UNEF 2A
B & D: 5/16-24 UNF 2A
A, B, C & D: M8 x 1.0

Oxley Part Number	Min. Cap. pF	Rated Voltage (V d.c.) 85°C	125°C	Current (Amps d.c.)	Minimum No Load Insertion Loss (dB) at 25°C 10 MHz	100 MHz	1 GHz	10 GHz
TPT002A	2000	1000	600	25	5	50	65	65
TPT002B	3000	830	500	25	8	55	70	70
TPT002C	3000	830	500	25	8	55	70	70



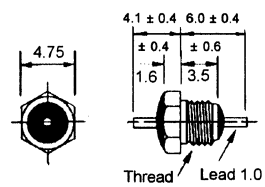
A: 12-28 UNF 2A
B & C: 12-32 UNEF 2A
A, B & C: M6 x 0.75

Oxley Part Number	Min. Cap. pF	Rated Voltage (V d.c.) 85°C	125°C	Current (Amps d.c.)	Minimum No Load Insertion Loss (dB) at 25°C 10 MHz	100 MHz	1 GHz	10 GHz
TPT001A	1500	500	300	10	5	45	70	70
TPT001B	1500	500	300	10	20	45	70	70
TPT001C	5500	300	180	10	20	68	70	70



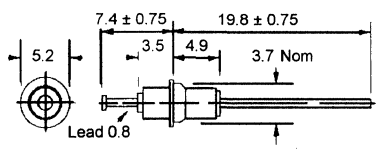
12-32 UNEF 2A D=6.35
M6 x 0.75 D=7.00

Oxley Part Number	Min. Cap. pF	Rated Voltage (V d.c.) 85°C	125°C	Current (Amps d.c.)	Minimum No Load Insertion Loss (dB) at 25°C 10 MHz	100 MHz	1 GHz	10 GHz
TPT021A	4000	500	300	10	15	65	70	70

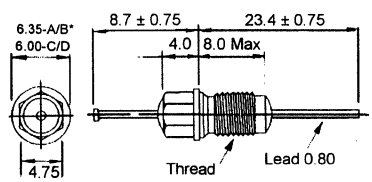


8-32 UNC 2A
M4 x 0.5

Oxley Part Number	Min. Cap. pF	Rated Voltage (V d.c.) 85°C	125°C	Current (Amps d.c.)	Minimum No Load Insertion Loss (dB) at 25°C 10 MHz	100 MHz	1 GHz	10 GHz
TPT050B	1500	200	120	15	5	40	60	60



Oxley Part Number	Min. Cap. pF	Rated Voltage (V d.c.) 85°C	125°C	Current (Amps d.c.)	Minimum No Load Insertion Loss (dB) at 25°C 10 MHz	100 MHz	1 GHz	10 GHz
TPS014A	1750	350	210	10	5	50	60	60



12-32 UNEF 2A
M6x0.75
*Increased by 0.7 for M6 threads

Oxley Part Number	Min. Cap. pF	Rated Voltage (V d.c.) 85°C	125°C	Current (Amps d.c.)	Minimum No Load Insertion Loss (dB) at 25°C 10 MHz	100 MHz	1 GHz	10 GHz
TPT070A	1500	500	300	10	5	45	70	70
TPT070B	5000	300	180	10	20	65	70	70
TPT070D	5000	300	180	10	20	65	70	70

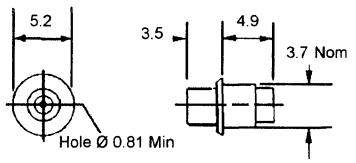
Oxley Inc. 25 Business Park Drive, PO Box 814,
Branford, CT 06405, USA
Tel: (203) 488-1033 Fax: (203) 481-6971 e-mail oxleyus@aol.com

ISO 9002

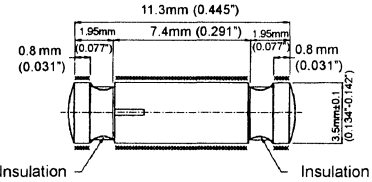
EMI Filters

Pi Circuit Filters

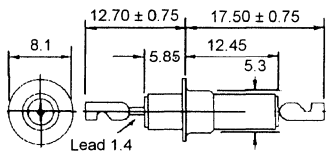
All dimensions mm



Oxley Part Number	Min. Cap. pF	Rated Voltage (V d.c.) 85°C	125°C	Current (Amps d.c.)	Minimum No Load Insertion Loss (dB) at 25°C 10 MHz	100 MHz	1 GHz	10 GHz
TPS014C	1750	350	210	10	5	35	50	50



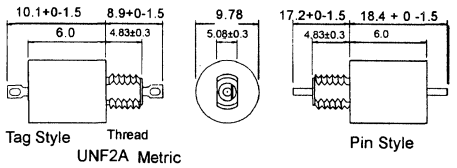
Oxley Part Number	Min. Cap. pF	Rated Voltage (V d.c.) 85°C	125°C	Current (Amps d.c.)	Minimum No Load Insertion Loss (dB) at 25°C 10 MHz	100 MHz	1 GHz	10 GHz
SLT/P/1500/SM3	1500	200	100	10	16	53	65	65
SLT/P/22000/SM3	22000	200	100	10	48	65	65	65



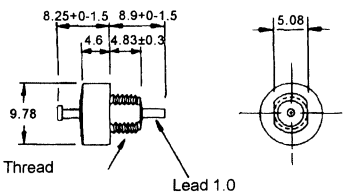
Oxley Part Number	Min. Cap. pF	Rated Voltage (V d.c.) 85°C	125°C	Current (Amps d.c.)	Minimum No Load Insertion Loss (dB) at 25°C 10 MHz	100 MHz	1 GHz	10 GHz
TPS004A	3000	830	500	25	8	50	70	70

L Circuit Filters

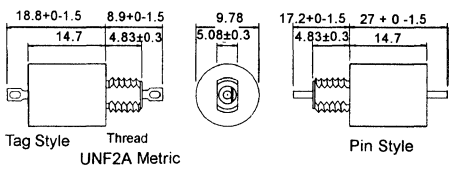
All dimensions mm



Oxley Part Number	Rated Current Amps	Min. Cap µF	Rated Voltage (V d.c.) + 85°C	+125°C	Typical Insertion Loss (dB) at Full Load Current -55° to +125°C 30 KHz	100 KHz	150 KHz	300 KHz	1 MHz	10 MHz	1 GHz
DLT326P	15	1.4	80	70	14	25	27	34	44	54	70

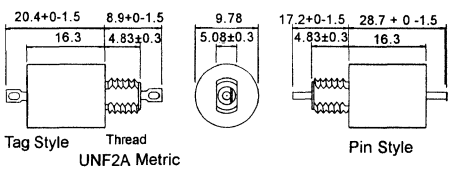


Oxley Part Number	Rated Current Amps	Min. Cap µF	-55°C to + 85°C V d.c.	-55°C to +125°C V d.c.	-55°C to +125°C V a.c. 400 Hz	Typical Insertion Loss (db) at Full Load Current -55° to + 126°C 30 KHz	100 KHz	150 KHz	300 KHz	1 MHz	10 MHz	1 GHz
DLT425PR	15.0	1.4	100	87	62	9	20	23	29	39	52	70
DLT050B	15.0	1.2	80	50	-	15	25	28	34	44	60	70



Oxley Part Number	Rated Current Amps	Min. Cap µF	Rated Voltage (V d.c.) 85°C	125°C	Typical Insertion Loss (dB) at Full Load Current -55° to + 125°C 30 KHz	100 KHz	150 KHz	300 KHz	1 MHz	10 MHz	1 GHz
DLT200F	10.0	1.2	80	50	15	24	28	33	44	64	70

Oxley Part Number	Rated Current Amps	Min. Cap µF	-55°C to + 85°C V d.c.	-55°C to +125°C V d.c.	-55°C to +125°C V a.c. 400 Hz	Typical Insertion Loss (dB) at Full Load Current -55° to + 125°C 30 KHz	100 KHz	150 KHz	300 KHz	1 MHz	10 MHz	1 G-Hz
DPT533G	0.5	0.66	150	130	90	6	39	50	68	80	80	80
DPT533H	1.0	0.66	150	130	90		28	40	59	80	80	80
DPT533M	5.0	0.66	150	130	90				26	63	80	80
DPT633M	5.0	0.2	200	175	125					43	80	80

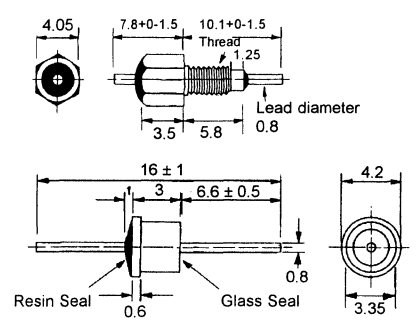


C Circuit Filters

All dimensions mm

Oxley Part Number	Rated Current Amps	Min. Cap nF	-55°C to +85°C V d.c.	-55°C to +125°C V d.c.	-55°C to +125°C V a.c. 400 Hz	Typical Insertion Loss (dB) at Full Load Current -55° to + 125°C 10 MHz	100 MHz	1 GHz	10 GHz
DCT205N-05N0	10	5.0	70	60	-	14	30	45	55
DCT705N-100P	10	0.1	300	260	185	-	2	17	28

Oxley Part Number	Rated Current Amps	Min. Cap pF	-55°C to +85°C V d.c.	-55°C to +125°C V d.c.	-55°C to +125°C V a.c. 400 Hz	Typical Insertion Loss (dB) at Full Load Current -55° to + 125°C 10 MHz	100 MHz	1 GHz	10 GHz
DCS204N-05N0	10	5000	70	60	-	14	30	45	55
DCS704N-100P	10	100	300	260	185	-	3	20	28
DCS704N-500P	10	500	300	260	185	-	13	30	40
DCS704N-01N2	10	1200	300	260	185	3	20	35	45



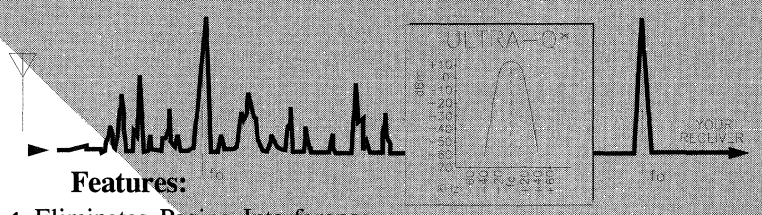
Oxley Inc. 25 Business Park Drive, PO Box 814,
Branford, CT 06405, USA
Tel: (203) 488-1033 Fax: (203) 481-6971 e-mail oxleyus@aol.com

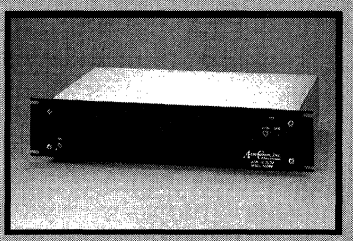
ISO 9002

E-MAIL: mail@aero-comm.com
WEBSITE: www.aero-comm.com
19516 Amaranth Drive, Germantown, MD 20874
Phone: 301.540.0700 FAX: 301.540.5743

AeroComm, Inc.
A Wireless Systems Company

30 Years of Wireless for Commercial and Military Communications





Ultra-Q*
Filter

Features:

- ✔ Eliminates Paging Interference
- ✔ Plug-N-Play Operation
- ✔ Improves Fade Margin: nom 10dB Gain
- ✔ Compatible with *any* MAS Equipment
- ✔ Adapts to All Receivers
- ✔ Improves Marginal Sites
- ✔ Narrow Bandwidth
- ✔ Compact Size
- ✔ Built-in Diagnostics
- ✔ Very High Q
- ✔ Field Tested and Proven
- ✔ AeroComm Guarantee of Reliability

If you're having problems with your MAS System, we have your solution!

HOW DO WE KNOW?

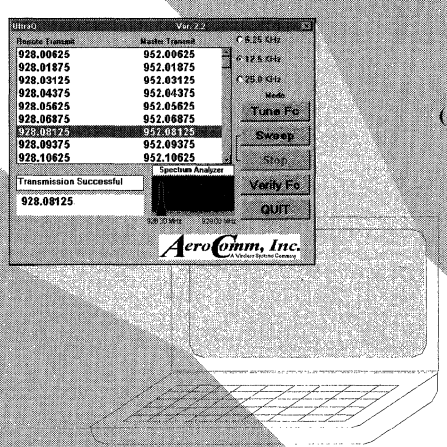
Ultra-Q* solved *our* MAS interference problems!

Custom designed to eliminate interference at any frequency.

(See *our* MAS products in Section 2200)

SPECIFICATIONS
Model 50368FS
Frequency Agile

6.25 KHz Channel Spacing
12.5 KHz Channel Spacing
25 KHz Channel Spacing



ELECTRICAL

FCC AUTHORIZED CHANNELS:
928.00625 to 928.99375 MHz
932.00625 to 932.49375 MHz
941.00625 to 941.49675 MHz
952.00625 to 952.99375 MHz

ACCURACY: As Received
GAIN: 10dB
Zin/Zout: 50 ohms
BANDWIDTHS: 30KHz@3dB
70KHz@60dB
MAX INPUT (No Damage): +15dBm
POWER SOURCE: AC 115V
(DC/DC Option)

ENVIRONMENTAL

OPERATING TEMP: -30° to +60°C

MECHANICAL

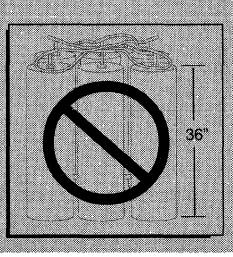
SIZE: 17" x 11" x 3.5"
WEIGHT: ~8LBS
STYLE: 19" RACK MOUNT
I/O CONNECTORS:TYPE N (Female)

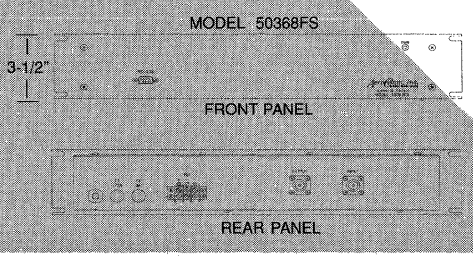
Also available in Fixed Frequency models:
Model 50368F (Fixed Frequency),
VHF Bands,
and UHF Bands.
Call for other models not shown and custom designs.

☞ ***Now is the time*** to do away with large cavity filters, long-lead times, and single frequency limitations. Measuring only 3-1/2" high, this 19" rack mountable unit blows the competition away!

☞ ***User friendly software*** provided with each unit features frequency and channel spacing selection from a laptop or personal computer, in the field or in the radio shop.

☞ ***Ultra-Q's* in-line installation*** adapts easily and quickly to your system, making this filter like no other product in todays market. Call us today - demo units available for trial tests.



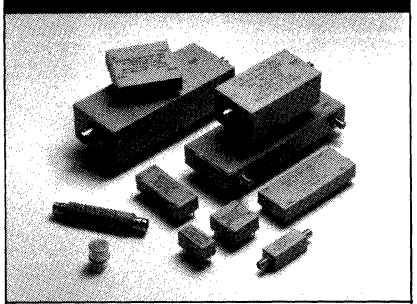


* PATENT PENDING SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE CALL FACTORY FOR DETAILS

ALLEN AVIONICS, INC.

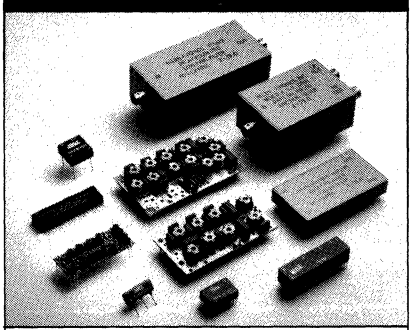
The world's most complete source of:
Video Delay Lines • General Purpose Delay Lines
Video Filters • LC Filters from 20Hz to 3GHz
Video Hum Eliminators & Isolation Transformers
Digital Delay Lines and Video Instrumentation.

LC FILTERS 20Hz TO 3GHz



- Lowpass, Highpass Bandpass Band Reject
- Linear Phase
- Delay Equalized
- Anti-Aliasing
- Low Profile
- Sub-Miniature
- TO8
- Tubular
- Butterworth, Chebyshev, Eleptic, Bessel, Gaussian
- High-Rel Space Grade
- Commercial & Military
- Amplitude & Phase Matching
- Tempest

VIDEO FILTERS



- NTSC & PAL
- General Purpose Delay Equalized Lowpass Filters
- Component Signal Processing
- Pre & Post Filters for 4:2:2 Digital Signal Processing
- Triple Filters
- Brick Wall Filters
- High Performance Filters for HDTV
- Video Networks
- Bandpass
- Bandstop
- Gaussian

VIDEO HUM ELIMINATORS (HUMBUCKER) VIDEO ISOLATION TRANSFORMERS

HEC 1000
HEC 2000
Designed to remove all 50-60 Hz hum in video signals

VNE 75
Designed for HDTV systems and other high frequency bandwidth requirements

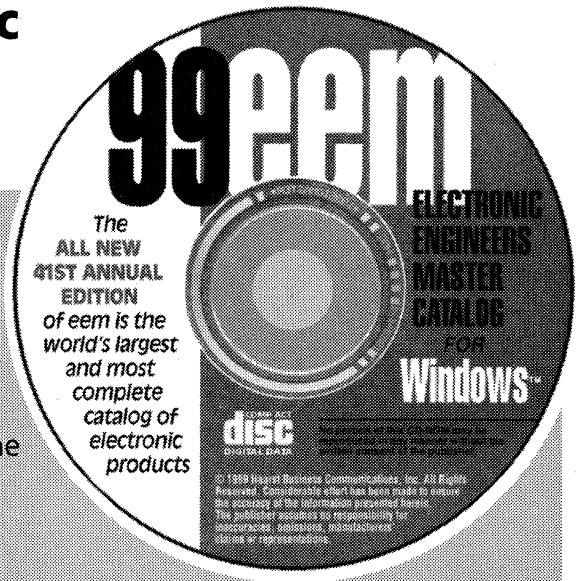
VIT 75
Video isolation transformer designed to eliminate ground loop problems in video signals

ALLEN AVIONICS, INC.

224 East Second Street, Mineola, NY 11501 • (516) 248-8080 • FAX (516) 747-6724

1999 EEM CD-ROM *for Windows*

The entire EEM/Electronic Engineers Master on a single compact disk!



With this time-saving search tool on your PC, you have immediate access to all the data that is in the 4-volume 1999 EEM catalog, the world's largest catalog of electronic components, equipment, and services.

The fast and easy-to-use CD-ROM search engine helps you find the Product or Manufacturer you need ... in minutes.

*** Search by Product**
All products are organized by their generic name in 64 main product categories with thousands of sub-categories. Your product search can be as general as "Power Supplies" or as specific as "Power Supplies, Switching, Medical".

*** Search by Manufacturer**
Complete contact information is listed for over 5,300 manufacturers including e-mail and web addresses.

*** Locate, View and Print-Out Product Catalog Data Pages**
Over 4,200 Product Catalog Data Pages supplied by more than 1,000 manufacturers provide you with valuable additional product information.

Save time! Make your job easier!

Order your copy of the

1999 EEM CD-ROM for Windows today!

To order contact Marie Botta at:

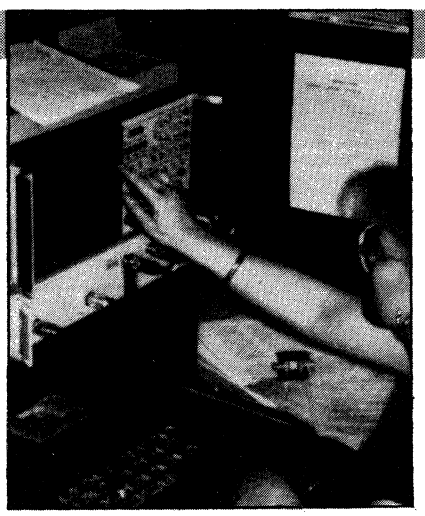
Hearst Business Communications, Inc.
645 Stewart Avenue, Garden City, NY 11530
(516) 227-1314 FAX (516) 227-1453
CREDIT CARD HOTLINE: 1-800-833-7138

The EEM CD-ROM for Windows is published annually in October.

See us on the World Wide Web at http://eemonline.com

LC FILTER NETWORKS

COMMUNICATION COIL , INC. ✦ ASSURED RELIABILITY ✦ CUSTOM DESIGNS ✦ TIMELY DELIVERY ✦ MANUFACTURED TO SPEC.



COMMUNICATION COIL, INC. has been designing and producing high reliability Filter Networks since 1944... to high exacting standards for communications and signal processing in military, avionics, satellite, telemetry, marine, GPS and commercial applications.

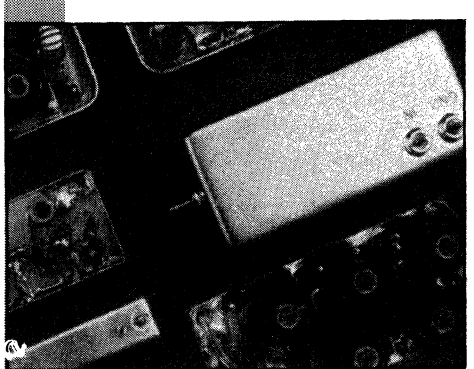
Using the latest CAE and CAD technology our engineers use patented and proprietary synthesis software to perform complete simulations of your unique design requirements. Our optimization system enables us to rapidly reproduce reliable up-to-date designs **(plus we extensively use surface mount technology where ever appropriate).** We will custom design **networks** to meet the exacting requirements of **time or frequency domain and attenuation levels** required for tomorrow's needs.

Each and every unit is 100% parametric tested. Our ultra-modern **HP®** computerized **network** testing equipment also provides complete printouts and performance curves of each **filter network**, if desired. Complete lot traceability is available.

Our award-winning quality control program is approved by major customers world-wide.

Our **filter networks** are designed and manufactured in Schiller Park (Chicago), IL U.S.A. to meet rigid global marketplace demands.

Call us at 847/671-1333 today and speak directly to the Communication Coil design & applications engineering staff with your questions, orders or sample requests...or FAX your requirements to 847/671-9191.



LC FILTER NETWORKS

20 Hz TO 2 GHz...*Proven Reliability*

- LO-PASS
- BAND PASS
- NOTCH
- BUTTERWORTH
- ELLIPTIC
- PHASE MATCHING
- ANTI-ALIASING
- LO-PROFILE
- SUBMINIATURE
- HI-SELECTIVITY
- MIL-I-45208
- MIL-Q-9858A
- HI-PASS
- BAND REJECT
- BESSEL
- CHEBYSHEV
- GAUSSIAN
- DELAY MATCHING
- MULTI-POLE
- MINIATURE
- SURFACE MOUNT
- HERMETICALLY SEALED
- MIL-F-18327
- MIL-F-15733

APPLICATIONS • MILITARY • INDUSTRIAL • COMMERCIAL • AVIONICS • TELECOMMUNICATIONS • GPS • NAVCOM • SATCOM • EMI • RFI • VDE • UL

COMMUNICATION COIL, INC. • 9601 Soreng Avenue
Schiller Park (Chicago), IL 60176
847-671-1333 • FAX 847-671-9191
www.communicationcoil.com

...BALUNS, COILS, CHOKES, INDUCTORS, TOROIDS, FILTERS, TRANSFORMERS...

FREQUENCY DEVICES™

Signal Conditioning Solutions

For a complete summary of our signal conditioning solutions, **visit our website** at:

http://www.freqdev.com

or utilize our **Fax-on-Demand Hot Line** for detailed product information at:

978/521-5178

Available Standard and Custom Products Include:

Components and Modules:

Filters: Low pass (anti-alias), High pass, Band pass, Band reject (Notch)

- Low harmonic distortion with wide signal-to-noise ratio to 16-bit resolution and beyond
- Fixed Frequency, Resistive Tunable, and Programmable from 0.001 Hz to 1MHz
- Butterworth, Bessel, elliptic, linear phase, and constant delay
- 5B, C-message, Modem, Psophometric, and Narrow Band Notch
- Small size down to 16-pin Dip package

Amplifiers: Differential input and buffered or differential output

- Programmable and fixed gain amplifiers from -12 dB to +60 dB in a 32-pin DIP package

Oscillators: Quadrature Sine Wave

- Fixed, Resistive Tunable, and Programmable for 0.05 Hz to 25.6 kHz

Instruments:

Bench Top and Rack Mount: Tunable, Front Panel, and Remote operation

- 1 to 64 channels/instrument for application requiring 100's of channels
- Filters available with corner frequency's from 0.1 Hz to 204.8 kHz
- Gain to +60 dB

VMEbus - B size (6U): Simultaneous access from 4 to 32 channels of filtering and/or gain

- Programmable or fixed frequency filters with from 0.1 Hz to 102.4 kHz
- Programmable or selectable gain available from -12 dB to +60 dB
- Inter-channel cross-talk from <-80 dB to <-100 dB

VXI*bus* - C size: Simultaneous access from 4 to 32 channels of filtering and/or gain

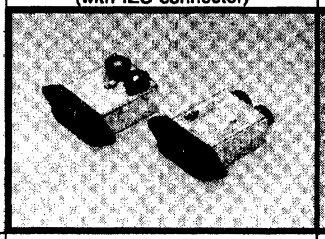
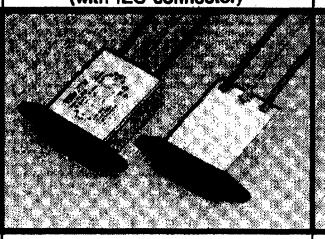
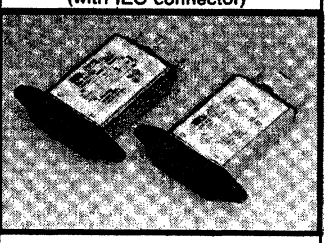
- Programmable or fixed frequency filters with from 0.1 Hz to 102.4 kHz
- Programmable or selectable gain available from -12 dB to +60 dB
- Inter-channel cross-talk <-90 dB

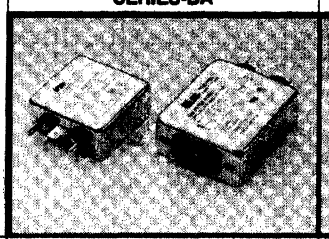
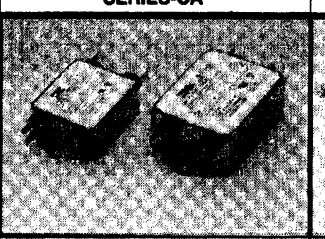
Other Available Analog Solutions

- Applications requiring tight phase and amplitude match
- Providing solutions for extended temperature range applications
- Components that operate on reduced power, down to 3mA
- Solution to reduce sine X/X errors
- Products that operate with +5 TTL input logic
- Custom transfer functions, packing, and pin-out
- DSP implementations

25 Locust St., Haverhill, Massachusetts 01830 • Tel: 800/252-7074, 978/374-0761 • FAX: 978/521-1839
e-mail: sales@freq.dev.com • Web Address: http://www.freqdev.com • Fax on Demand: 978/521-5178

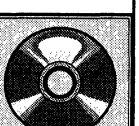
LINE FILTERS

EMI POWER LINE FILTERS		SERIES-AB & AC (with IEC connector)			SERIES-AD (with IEC connector)				SERIES-AE & AF (with IEC connector)			
ITEM												
RATED VOLTAGE		115/250 VAC			115/250 VAC				115/250 VAC			
POWER LINE FREQUENCY		50/60 Hz			50/60 Hz				50/60 Hz			
RATED CURRENT		1A	3A	6A	1A	3A	6A	10A	1A	3A	6A	10A
TYPICAL INSERTION LOSS (dB) Line-to-Ground In 50 ohm system	0.15 MHz	20	15	10	20	15	10	8	20	15	10	8
	0.5 MHz	33	25	20	33	25	20	15	33	25	20	15
	1 MHz	40	30	25	40	30	25	20	40	30	25	20
	5 MHz	45	45	42	45	45	42	38	45	45	42	38
	10 MHz	47	50	45	47	50	45	40	47	50	45	40
	30 MHz	50	53	50	50	53	50	45	50	53	50	45
MAXIMUM LEAKAGE CURRENT (line-to-Ground)		@ 115VAC 60HZ 0.25mA @ 250VAC 50HZ 0.5mA			@ 115VAC 60HZ 0.25mA @ 250VAC 50HZ 0.5mA				@ 115VAC 60Hz 0.25mA @ 250VAC 50Hz 0.5mA			
DIELECTRIC STRENGTH	Line-to-Ground	2250VDC, one minute			2250VDC, one minute				2250VDC, one minute			
	Line-to-Line	1450VDC, one minute			1450VDC, one minute				1450VDC, one minute			

ITEM		SERIES-BA		SERIES-CA		SERIES-AA	
							
RATED VOLTAGE		115/250 VAC		115/250 VAC		115/250 VAC	
POWER LINE FREQUENCY		50/60 Hz		50/60 Hz		50/60 Hz	
RATED CURRENT		1A, 2A, 3A	5A, 10A, 20A	1A, 2A, 3A	5A, 10A, 20A	1A, 2A, 3A	5A, 10A, 20A
TYPICAL INSERTION LOSS (dB) Line-to-Ground In 50 ohm system	0.15 MHz	15	8	30	11	15	8
	0.5 MHz	30	22	65	50	30	22
	1 MHz	38	28	65	62	38	28
	5 MHz	50	42	65	65	50	40
	10 MHz	50	45	65	65	50	45
	30 MHz	50	50	60	60	50	48
MAXIMUM LEAKAGE CURRENT (Line-to-Ground)		@ 115VAC 60HZ 0.5mA @ 250VAC 50HZ 1.0mA		@ 115VAC 60HZ 0.5mA @ 250VAC 50HZ 1.0mA		@ 115VAC 60HZ 0.5mA @ 250VAC 50HZ 1.0mA	
DIELECTRIC STRENGTH	Line-to-Ground	2250VDC, on minute		2250VDC, one minute		2250VDC, one minute	
	Line-to-Line	1450VDC, on minute		1450VDC, one minute		1450VDC, one minute	

GlobTek, Inc.
186 VETERANS DR. • NORTHVALE, NJ 07647 • USA
TEL: 201-784-1000 • FAX: 201-784-0111
e-mail: *globtek1@idt.net*

Ask for our NEW 265 pg. Catalog and CD-ROM.



Internet Web Site (150 pages):
http://www.globtek.com

KAPPA® TECHNOLOGIES INC.

LAN FILTERS

10BaseT Ethernet over Twisted-pair Cable[1]

IC Mfr's Name	TPI Controller Part Number	Kappa **Standard** Filter (includes XMT & RCV Filters plus Isolation Transformers only)		Kappa **Enhanced** Filter (same as **Standard** Module plus Common Mode Filter Chokes)		Kappa **Optimized** Filter (same as **Enhanced** Module plus Pre-emphasis and Termination Resistors)	
		Adapter Card & 1-port Solutions	Multiport Repeater Solutions	Adapter Card & 1-port Solutions	Multiport Repeater Solutions	Adapter Card & 1-port Solutions	Multiport Repeater Solutions
AMD	Am79C98/100	FM2146(*)	–	FM2146C(*)	–	FM2176C(*)	–
AMD	Am79C940	FM2146(*)	–	FM2146C(*)	–	FM2148(*)	–
AMD	Am79C960/961/961A	FM2146(*)	–	FM2146C(*)	–	FM2148(*)	–
AMD	Am79C965/970A	FM2146(*)	–	FM2146C(*)	–	FM2148(*)	–
AMD	Am79C981/982	–	FM2146S	–	FM2146CS	–	FM2172S
AMD	Am79C984A/985	–	TP8003D	–	TP8005D	–	–
AMD	Am79C988/989	–	TP8003D	–	TP8005D	–	–
Davicom	DM9008	FM2146(*)	FM2146S	FM2195(*)	FM2146CS	–	–
DEC	21040	FM2212S	–	FM2212CS	–	FM2213S	–
DEC	21043	FM2212S	–	FM2212CS	–	FM2213S	–
DEC	21143	–	FM2212S	FM2248(*)	FM2212S	–	–
Fujitsu	MB86951/61/64/65	TP2031(*)	TP8007D	TP2032(*)	TP8008D	–	–
Level One	LXT901	TP2031(*)	TP8007D	TP2032(*)	TP8008D	–	–
Level One	LXT902	FM2146(*)	FM2146S	FM2146C(*)	FM2146CS	–	–
Level One	LXT903	FM2146(*)	FM2146S	FM2146C(*)	FM2146CS	–	–
Level One	LXT906	FM2146(*)	–	FM2146C(*)	–	–	–
Level One	LXT907	TP2031(*)	TP8007D	TP2032(*)	TP8008D	–	–
Level One	LXT914–918 (Tx)	TP4003(*)	TP8007D	TP4007W	TP8008D	–	–
Level One	LXT914–918 (Rx)	TP497(*)101	TP8003D	TP4006W	TP8005D	–	–
Level One	LXT944	–	–	–	TP8004D	–	–
LSI Logic	L64381	FM2146(*)	FM2146S	FM2146C(*)	FM2146CS		
Lucent	T7201	–	–	FM2195(*)	–	FM2206(*)	–
Lucent	T7210	FM2146(*)	–	FM2146C(*)	–	–	–
Lucent	T7213	–	–	FM2195(*)	–	FM2187(*)	–
Lucent	T7220	–	–	FM2195(*)	–	FM2187(*)	–
Lucent	T7240A	–	FM2146S	–	FM2146CS	–	FM2307S
Lucent	T7241	–	–	FM2195(*)	–	FM2206(*)	–
Motorola	MC68160	FM2146(*)	–	FM2146C(*)	–	–	–
National	DP83902A	FM2146(*)	–	FM2146C(*)	–	FM2169(*)	–
National	DP83905	FM2146(*)	–	FM2146C(*)	–	FM2169(*)	–
National	DP83916	FM2146(*)	–	FM2146C(*)	–	–	–
National	DP83932C	FM2146(*)	–	FM2146C(*)	–	–	–
National	DP83934CVUL	FM2146(*)	–	FM2146C(*)	–	FM2203(*)	–
National	DP83950B	–	FM2146S	–	FM2146CS	–	FM2231S
National	DP83952	–	FM2146S	–	FM2146CS	–	FM2170S
National	DP83955A/56A	FM2146(*)	FM2146S	FM2146C(*)	FM2146CS	FM2169(*)	FM2170S
Philips	NE86C92	FM2146(*)	–	FM2146C(*)	–	–	–
Seeq	83C902	FM2146(*)	–	FM2146C(*)	–	FM2206(*)	–
Seeq	83C94	FM2146(*)	–	FM2146C(*)	–	–	–
Silicon Sys	78Q902	FM2146(*)	–	FM2146C(*)	–	–	–
SMC	SMC91C92	FM2146(*)	–	FM2146C(*)	–	FM2192(*)	–
SMC	83C694D	FM2146(*)	–	FM2146C(*)	–	FM2191(*)	–
Symbios Logic	NCR92C902/905	FM2146(*)	–	FM2146C(*)	–	FM2169(*)	FM2170S
Symbios Logic	NCR92C350	FM2146(*)	–	FM2146C(*)	–	–	–
Texas Inst	SN75LB086PW	FM2146(*)	–	FM2146C(*)	–	–	–

100BaseX *Fast* Ethernet (CSMA/CD)

IC Mfr's Name	TPI or PHY Chip Part Number	Application	Ask for **Kappa** Part#		XMT, RCV, Both or Either	Functional Blocks[2] (applied to XMT Channel only)			
			1-port Solutions	2-port Solutions		Input CMC	Isolation XFR	Output CMC	CMT Coil
AT&T/Lucent	3X01	100BaseT4	–	FM2308D	Either		√	√	
Broadcom	BCM5000	100BaseT4	–	FM2233D	Either		√	√	

Notes

[1] "(*)" = substitute desired Package Code as applicable: "**D**"=SOIC (0.050" pitch) SMD; "**G**"=Standard (0.100" pitch) SMD; "**P**"=DIP; "**S**"=SIP; or "**W**"=Wide-body DIL. Consult individual data sheets, in conjunction with the Package Outlines section of catalog, for availability and details.

[2] All Receive channels have a transformer and common mode filter choke.

Kappa Technologies Inc. • 1443 Pinewood St., Rahway, N.J. 07065 • (732) 396-9400 • Facsimile: (732) 388-4786

KAPPA® TECHNOLOGIES INC.

LAN FILTERS

ATM, Fibre Channel and TP-FDDI

IC Mfr's Name	TPI or PHY Chip Part#	Application	Ask for **Kappa** Part Number	XMT, RCV, Both or Either	Pre-emphasis Resistors	Input Common Mode Choke	Isolation Xfr	Low-pass L-C Filter	Output Common Mode Choke	Common Mode Term. Coil
IDT	77105	ATM-25.6	FM2304GW	Both			√	√	√	
Transwitch	ALF-25T	ATM-25.6	FM2304GW	Both			√	√	√	
Generic Modules for TP-FDDI			Series FM-FDDX	Both		√	√	√	√	√
Lucent	2X01	100BaseVG	FM2199D	Either	√		√	√	√	
Lucent	2X01	100BaseVG	FM2267D	Either	√		√	√	√	

Token Ring (4/16 Mb/s) over Twisted-pair Cable[1]

IC Mfr's Name	TPI or PHY Chip Part Number	Ask for **Kappa** Part Number	XMT, RCV, Both or Either	Over-Voltage Protection	Input Isolation & Impedance -Matching	Waveform Signal Cond'g	EMI/RFI Noise Reduction	Output Isolation & Impedance -Matching	Phantom Drive Connects
National	DP8025	FM2163W	Either		150 Ω	√	√	STP	√
		FM2219(*)	Either		150 Ω	√	√	STP & UTP	√
		FM2305W	Either		100 Ω	√	√	UTP	√
Novacom	NOV16TR6-CK	FM2207GW	Both		120 Ω	√	√	STP or UTP	√
Pericom	PI2C3020	FM2236S	Both		600 Ω	√	√	UTP	√

Data Line Filters[1]

Kappa Part Number (*)="D", "P", "W"	L_P (µHy) ±20%	Turns Ratio (±5%)	Recommended Frequency Range	ET (V-µs) min	T_R (ns) max	$C_{W/W}$ (pf) max	L_L (µHy) max	DCR (Ω) max	Isolation (V_{RMS}) min
FC4317(*)	4	1:1	10 – 500	1.8	2.5	6.0	0.20	0.17	500
FC4334(*)	4	1:1 (x2)	10 – 500	1.8	2.5	6.0	0.20	0.17	500
FC4335(*)	4	1:1 (x3)	10 – 500	1.8	2.5	6.0	0.20	0.17	500
FC4318(*)	4	1:1:1:1	10 – 500	1.8	2.5	6.0	0.20	0.17	500
FC4319(*)	4	1:1:1:1 (x2)	10 – 500	1.8	2.5	6.0	0.20	0.17	500
FC4348W	5 min	1:1:1	10 – 500	1.8	2.5	7.0	0.20	0.11	500
FC4336(*)	8	1:1	15 – 100	2.0	2.7	10.0	0.20	0.25	500
FC4337(*)	8	1:1 (x2)	15 – 100	2.0	2.7	10.0	0.20	0.25	500
FC4338(*)	8	1:1 (x3)	15 – 100	2.0	2.7	10.0	0.20	0.25	500
FC4320(*)	8	1:1:1:1	15 – 100	2.0	2.7	10.0	0.20	0.25	500
FC4339(*)	8	1:1:1:1 (x2)	15 – 100	2.0	2.7	10.0	0.20	0.25	500
FC4343W	18	1:1:1:1	5 – 100	2.1	2.8	15.0	0.20	0.30	500
FC4347P	27	1:1 (x4)	5 – 100	2.1	5.5	25.0	0.30	0.20	500
FC4311(*)	27	1:1:1:1	5 – 100	2.1	5.5	25.0	0.30	0.07	2000
FC4321(*)	27	1:1:1:1 (x2)	5 – 100	2.1	5.5	25.0	0.30	0.07	2000
FC4328(*)	35	1:1 (x2)	5 – 300	2.2	3.0	12.0	0.20	0.25	500
FC4333(*)	35	1:1 (x2)	5 – 300	2.2	3.0	12.0	0.20	0.25	500
FC4340(*)	35	1:1:1:1	5 – 300	2.2	3.0	12.0	0.20	0.25	500
FC4312(*)	40	1:1:1:1	5 – 300	2.2	5.5	25.0	0.30	0.25	500
FC4345D	50	1:1	10 – 100	2.2	3.0	15.0	0.25	0.50	500
FC4341(*)	50	1:1 (x2)	5 – 300	2.2	3.0	15.0	0.20	0.35	500
FC4349D	50	1:1 (x4)	5 – 300	2.2	3.0	15.0	0.20	0.30	500
FC4313(*)	50	1:1:1:1	5 – 300	2.2	3.0	22.0	0.11	0.20	500
FC4326(*)	85	1:1	5 – 85	2.4	3.0	10.0	0.25	0.30	500
FC4325(*)	85	1:1 (x3)	5 – 85	2.4	3.0	10.0	0.25	0.30	500
FC4327(*)	85	1:1 (x2)	5 – 85	2.4	3.0	10.0	0.25	0.30	500
FC4314(*)	85	1:1:1	5 – 85	2.4	3.0	10.0	0.25	0.30	500
FC4315(*)	85	1:1:1 (x2)	5 – 85	2.4	3.0	10.0	0.25	0.30	500
FC4322(*)	85	1:1:1:1	5 – 85	2.4	3.0	10.0	0.25	0.30	500
FC4316(*)	85	1:1:1:1 (x2)	5 – 85	2.4	3.0	10.0	0.25	0.30	500
FC4342(*)	100	1:1 (x2)	5 – 85	2.5	3.0	25.0	0.25	0.65	500
FC4332(*)	125	1:1 (x3)	5 – 85	2.7	3.0	8.0	0.10	0.20	500
FC4330(*)	125	1:1 (x4)	5 – 85	2.7	3.0	10.0	0.10	0.30	500
FC4350W	150	1:1	5 – 85	2.7	3.0	10.0	0.30	0.90	500
FC4346D	150	1:1 (x3)	5 – 85	2.7	3.0	10.0	0.10	0.20	500
FC4344W	175	1:1 (x2)	5 – 100	2.7	3.1	10.0	0.15	0.60	500
FC4351W	200	1:1 (x2)	5 – 100	2.8	3.1	15.0	0.30	1.00	500

Kappa Technologies Inc. • 1443 Pinewood St., Rahway, N.J. 07065 • (732) 396-9400 • Facsimile: (732) 388-4786

Custom & Standard Filters

KR ELECTRONICS

KR Electronics Inc., 91 Avenel Street, Avenel, NJ 07001
Phone: (732) 636-1900 • Fax: (732) 636-1982

For over twenty years KR Electronics has specialized in the design and manufacture of all types of custom LC Filters. Thanks to excellent quality and competitive pricing, our filters are used by prestigious manufacturers worldwide.

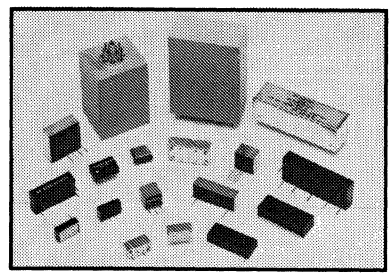
Choose from one of our standard filters or let us modify or design a filter to your exact requirements. Whether you have a filter you are currently using or a new requirement, let us send you a quotation.

- **Technical review of your specification**
- **Computer synthesis, optimization & analysis**
- **Computerized testing & data**
- **MIL-F-18327 & MIL-I-45208A**
- **Fast Response**
- **Low Cost**

Send for our catalog of standard filters or **call** or **fax** your filter specifications for a prompt technical review and quotation.

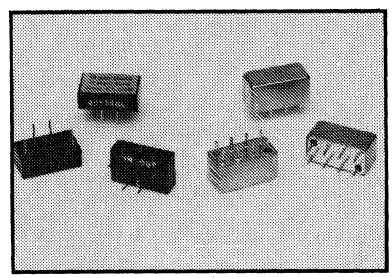
Custom Filters

KR Electronics manufactures all the major filter families and uses computer synthesis and optimization to design filters with special characteristics.



- Bandpass
- Lowpass
- Band Reject
- Highpass
- Linear Phase
- Anti-Aliasing
- Group Delay Equalized
- Sin(x)/x Compensated
- Video Filters
- Nyquist Filters - Square Root & Full Cosine
- Optimized Pulse Response
- Optimized Step Response
- Constant Group Delay
- Phase Splitters
- Custom Coils

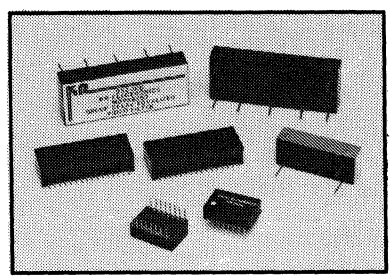
Standard Dip Filters



- Bandpass
- Bessel Lowpass
- Elliptic Lowpass
- Butterworth
- Chebyshev
- Customizable

Video Filters

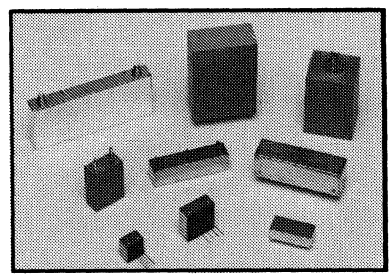
KR Electronics manufactures a full line of video filters for the manufacturers of video equipment.



- Anti-Aliasing
- Pre and Post Filters
- Sin(x)/x Compensated
- Constant Group Delay
- Low Cost DIP & SIP Filters
- Chromanance & Luminance
- Filters for Oversampling

High Performance Filters

KR Electronics designs and manufactures precision filters for commercial and military applications.



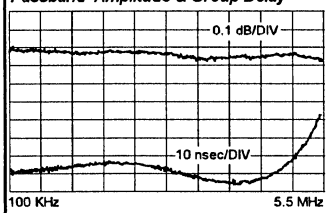
- Phase Matched Filters
- Amplitude Matched Filters
- Environmental Testing
- MIL-F-18327 & MIL-I-45208A
- Sonar & ASW
- Communications
- Tone & Telemetry
- Matched Nyquist (Cosine) Filters

Custom & Standard Filters

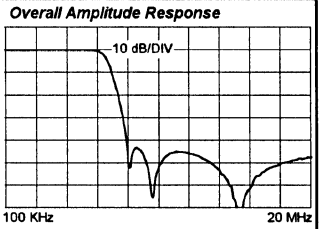
KR ELECTRONICS
KR Electronics Inc., 91 Avenel Street, Avenel, NJ 07001
Phone: (732) 636-1900 ■ Fax: (732) 636-1982

Series 2124 Video Lowpass Filter

Passband Amplitude & Group Delay



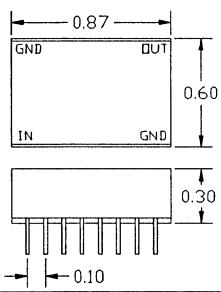
Overall Amplitude Response



Specifications

KR Part Number	2124
Filter Type	Video Lowpass
Insertion Loss	< 1 dB
End of Passband	5.5 MHz
Passband Ripple	< 0.15 dB
Start of Stopband	8.0 MHz
Stopband Attenuation	> 40 dB
Group Delay Ripple	< 20 nsec
Group Delay Control to	5.0 MHz
Approximate Group Delay	210 nsec
Source and Load Impedance	75 Ω

Outline Drawing

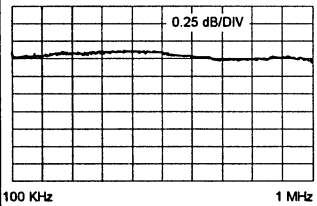


Epoxy DIP Package
0.600 inch Row Spacing
Pin 1 - IN
Pin 9 - OUT
Pin 8 - GND
Pin 16 - GND
Standard IC Type Pins 0.02 x 0.01

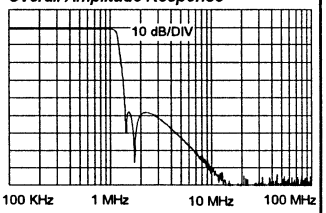
All Dimensions Shown in inches

Series 2297 Series Lowpass Filter

Passband Amplitude



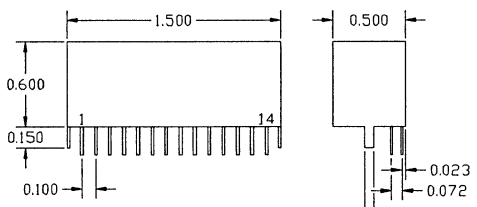
Overall Amplitude Response



Specifications

KR Part Number	2297-1
Filter Type	Lowpass
Insertion Loss	< 1 dB
End of Passband (0.5 dB)	1 MHz or user specified to 100 MHz
Passband Ripple	< 0.5 dB p-p
Start of Stopband	1.4 x End of Passband
Stopband Attenuation	> 45 dB
Source and Load Impedance	50 Ω

Outline Drawing

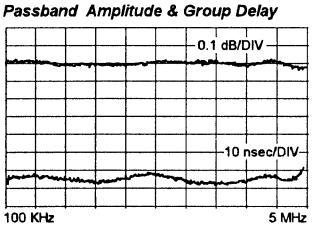


Metal Case 5 Sides
Pin 1 - Input
Pin 14 -Output
Pins 2 thru 13 Ground
Pins 0.02 x 0.01

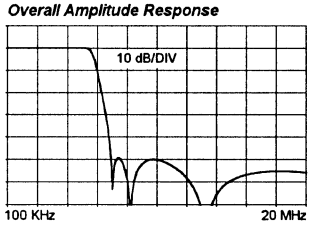
All Dimensions Shown in inches

2170 and 2170-S Video Lowpass Filter

Passband Amplitude & Group Delay



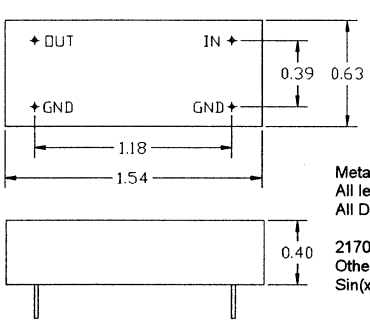
Overall Amplitude Response



Specifications

KR Part Number	2170	2170-S
Filter Type	Video Lowpass	Video Lowpass with Sin(x)/x
Insertion Loss	< 1 dB	< 4.5 dB Sampling Freq 12.5 MHz
End of Passband	5.0 MHz	5.0 MHz
Passband Ripple	< 0.10 dB	< 0.2 dB
Start of Stopband	7.25 MHz	7.25 MHz
Stopband Attenuation	> 45 dB	>45 dB
Group Delay Ripple	< 15 nsec	< 15 nsec
Group Delay Control to	4.5 MHz	4.5 MHz
Approximate Group Delay	550 nsec	550 nsec
Source and Load Impedance	75 Ω	75 Ω

Outline Drawing

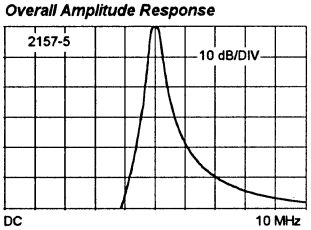


Metal Can (5 sides)
All leads .030" diameter
All Dimensions in inches

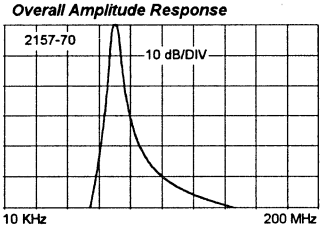
2170 and 2170-S use the same case
Other sampling frequencies available for Sin(x)/x correction.

Series 2157 Bandpass Filter

Overall Amplitude Response



Overall Amplitude Response



Specifications

KR Part Number	2157-5-5-50	2157-10.7-5-50	2157-21.4-5-50	2157-70-5-50
Filter Type	Bandpass	Bandpass	Bandpass	Bandpass
Center Frequency	5 MHz	10.7 MHz	21.4 MHz	70 MHz
3 dB Bandwidth	5%	5%	5%	5%
40 dB Bandwidth	2 MHz	4.28 MHz	8.56 MHz	28 MHz
Source and Load	50 Ω	50 Ω	50 Ω	50 Ω

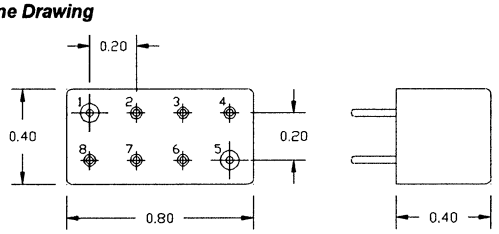
Customized

To Specify your own filter

2157 - 70 - 5 - 50

Filter Series
Center Frequency in MHz
3 dB Bandwidth in %
Source and Load in Ω

Outline Drawing



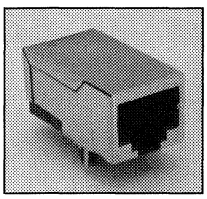
Pin 1 is Input, Pin 5 is Output, all other Pins are Ground

MODULAR JACKS-FILTERED TRANSFORMER

Maxconn INCORPORATED

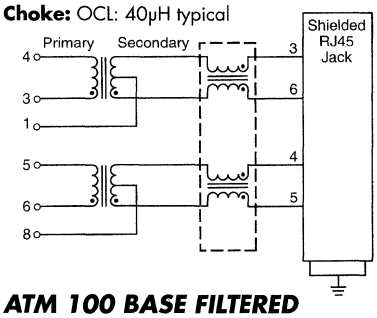
MJFS SERIES

Filtered Transformer, Shielded, Standard PCB Footprint



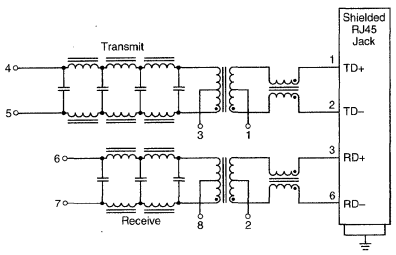
ISDN TRANSFORMER SPECIFICATIONS

Electrical Specifications
Isolation Voltage: 1000 Vrm:
Turns Ratio: 1:2CT±2% (Pri:Sec)
OCL: TX:22mH minimum @ 10kHz, 0.1V
CD: 180pF maximum (Pri)
Cw/w: 100 pF maximum (Pri/Sec) @ 100kHz 0.1V
LL: (Sec): 11µH maximum @ 100kHz 0.1V (Pri Shorted)
DCR: 2.4±25% ohms (Pri)
DCR: 4.4±25% ohms (Sec)
Idc: 1mA maximum
Choke: OCL: 40µH typical



10 BASE-T FILTERED TRANSFORMER SPECIFICATIONS

Electrical Specifications
Isolation Voltage: 1500 Vrms
Insertion Loss: (1-10MHz): -1dB maximum
Attenuation at 30 MHz:
Transmit: 30dB minimum
Receive: 18dB minimum
Return Loss: (1-10MHz): 15dB minimum
Cutoff Frequency: 17MHz typical
Cross Talk: (1-10MHz): -30dB minimum
I/O Impedance: 100 ohms



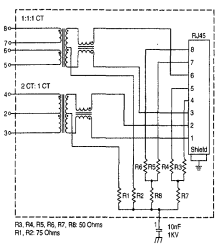
100 BASE COMBO FILTERED TRANSFORMER SPECIFICATIONS

Electrical Specifications
Isolation Voltage: 1500 Vrms (Input to Output)
Turns Ratio: TX: 2:1 (±2%), RX: 1:1:1 (±2%)
OCL: TX: 140µH minimum, RX: 350µH minimum @ 100kHz, 100mV
Rise Time: (10-90%): 3.0ns typical
Insertion Loss: (1M - 125 MHz): -1.0dB maximum
Return Loss:

100kHz-60 MHz	-15dB minimum (Tx)/ -17 dB minimum Rx
60 MHz - 100MHz	-11 dB minimum (Tx)/ -15dB minimum (Rx)

Common Mode to Differential Mode Attenuation:

100 kHz - 60 MHz	-45dB minimum (Tx)/ -40 dB minimum Rx
60 MHz - 100 MHz	-40dB minimum (Tx)/ -35dB minimum Rx



ATM 100 BASE FILTERED TRANSFORMER SPECIFICATIONS

Electrical Specifications
Isolation Voltage: 1500 Vrms
Rise Time: 2.5ns typical @ 10 – 90%
Insertion Loss: (0.1 - 125 MHz): -1.1dB maximum
Return Loss:

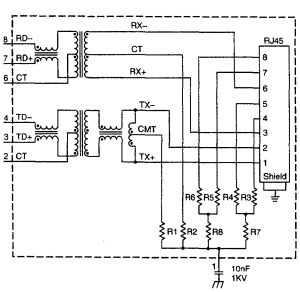
(0.1 - 60 MHz)	-15dB (Tx)/ -17 dB Rx typical
(60 - 125MHz)	-11 dB (Tx)/ -15dB (Rx) typical

Cross Talk:

(0.1 - 60 MHz)	-40dB minimum
(60 - 125MHz)	-38dB minimum

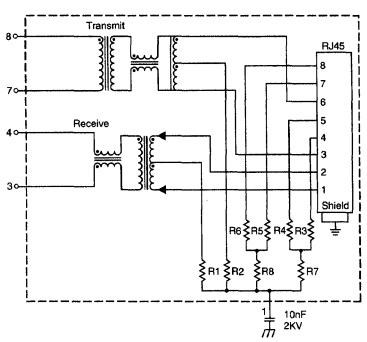
Common Mode to Differential Mode Rejection:

(0.1 - 60 MHz)	-45dB (Tx)/ -40 dB Rx minimum
(60 - 125 MHz)	-40dB (Tx)/ -35dB Rx minimum



10/100 BASE TX FILTERED TRANSFORMER SPECIFICATIONS

Electrical Specifications
Isolation Voltage: 2000 Vrms
Turns Ratio: 1:1CT
Pri/Sec DCR: 0.90 ohms maximum
Rise Time/Fall Time: 4ns maximum
Cw/w (Pri/Sec): 15pF maximum
Leakage Inductance: (pri): 0.4µH maximum
Insertion Loss: (0.1-125MHz) -1.1dB maximum
Return Loss: (0.1-60MHz) -18dB maximum
(60-125MHz) -12dB minimum
Cross Talk: (0.1-125MHz) -38dB minimum



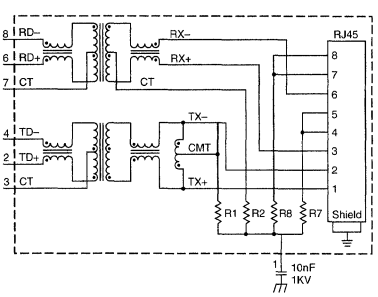
ATM 100 BASE FILTERED TRANSFORMER SPECIFICATIONS

Electrical Specifications
Isolation Voltage: 1500 Vrms
Rise Time: 2ns typical @ 10 – 90%
Insertion Loss: (0.1 - 125 MHz): -1.1dB maximum
Return Loss:

0.1 - 60 MHz	-15dB (Tx)/ -17 dB Rx typical
60 - 125MHz	-11 dB (Tx)/ -15dB (Rx) typical

Common Mode to Differential Mode Rejection:

100 kHz - 60 MHz	-45dB minimum (Tx)/ -40 dB minimum Rx
60 MHz - 100 MHz	-40dB minimum (Tx)/ -35dB minimum Rx

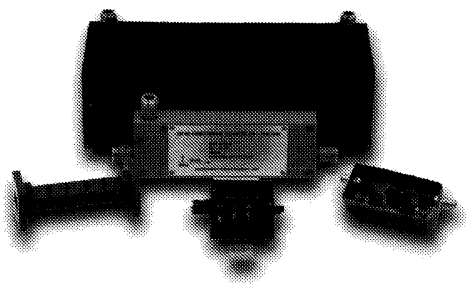


CALL TODAY FOR PRICE AND DELIVERY

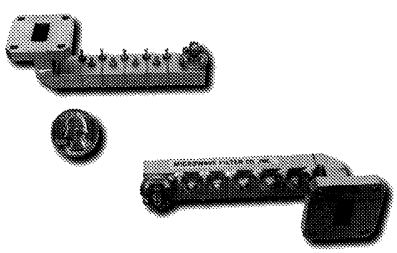
Maxconn INCORPORATED
CALL "MAX" for Spec/Samples
1-888-50-MAXCN
2151 Del Franco Street • San Jose • California • 95131-1570
Tel 408-435-5050 • FAX: 408-435-8377

FILTERS FOR 5 Hz - 40 GHz

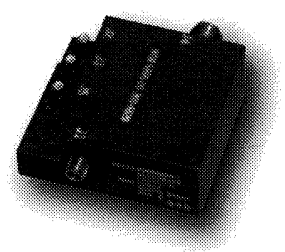
INNOVATION & SERVICE FOR OVER 26 YEARS



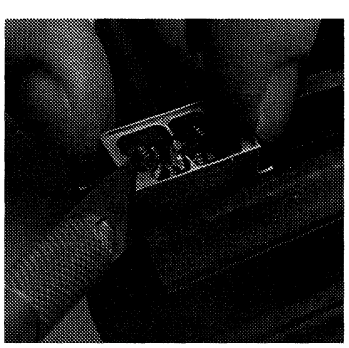
Full RF/Microwave OEM Component Offerings.



Waveguide Bandpass Filters



Integrated Stripline/Cavity Filter Network



Subminiature Filters

Microwave Filter Company, Inc. offers a wide range of products to meet custom or standard requirements for small or large program orders.

MFC has a reputation for quick service which is evident in its ability to quote quickly and supply custom filters in as little as 3 days. Supporting its reputation, is the latest technology in simulation, design and test equipment, and a high level of quality assurance, including conformance to such military standards as MIL-I-45208 and MIL-STD-2000 to insure the reliability of all products.

MFC makes filters for all applications in RF & Microwave including: CATV, SMATV, In-House TV/LAN, Satellite, LPTV, FM/TV Broadcast, Mobile Radio, Microwave TV (ITFS/MMDS), RF/MW Communications, Radar, Navigation, Electronic Warfare, Medical/Physics Research.

FILTER SPECIALTIES

- Bandpass
- High Pass
- Low Pass
- Bandstop
- Multiplexers
- Tunable Notch
- Tunable Bandpass
- High Power Filters
- Filter Networks
- Couplers
- Amplitude Equalized
- Delay Equalized
- Microwave Absorbers

FILTER DESIGNS

- Waveguide
- Stripline/Microstrip
- Transmission Line
- Miniature/Subminiature
- Lumped Constant

For more information, ask for an RF/MW CATALOG!

MFC
MICROWAVE FILTER COMPANY
6743 KINNE STREET
EAST SYRACUSE, NY 13057
800-448-1666 • 315-438-4700
FAX: 315-463-1467 • Toll Free: 888-411-8860
http://www.microwavefilter.com
E-MAIL: mfcsales@microwavefilter.com

FILTERS

low pass, high pass, bandpass dc-3GHz from $11.45

• less than 1dB insertion loss • greater than 40dB stopband rejection • surface mount • BNC, Type N, SMA available
• 5-section, 30dB/octave rolloff • VSWR less than 1.7(typ.) • rugged hermetically sealed pin models • constant phase
• meets MIL-STD-202 tests • over 100 off-the-shelf models • immediate delivery

Please refer to our complete catalog in Volume A, Section 3450

Mini-Circuits®

P.O Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718)332-4661 ***INTERNET*** http://www.minicircuits.com

CIRCLE READER SERVICE CARD

For detailed specs on all Mini-Circuits products refer to • 760- pg. HANDBOOK • INTERNET • THOMAS REGISTER • MICROWAVE PRODUCT DATA DIRECTORY • EEM

ISO 9001 CERTIFIED

INNOVATIVE COUPLERS

•smaller size •better performance •lower cost *5 to 1000MHz from* $6.95 (qty.10-49)

it™ *innovative technology*

Monitor, measure, and take control of signal levels with these super flat, exceptionally broadband ADC directional couplers. Excellent for use with cable TV and VHF/UHF communication technologies in the 5MHz to 1000MHz band, these ADC's *really deliver* by providing a vast selection of coupling values for 50 and 75 ohm systems plus high directivity, power input capability up to 1W, and very low SWR over the entire frequency range. Built with Mini-Circuits unique "Innovative Technology", they're the only surface mount couplers incorporating an ultra-slim 0.105" patent pending package, better performance, and an awesome price that allows you to tap the signal without tapping out your budget! If high quality and value price are your priorities...ADC is *it*™

ADC Couplers...Innovations Without Traditional Limitations!

ADC* SPECIFICATIONS:

Model	Freq. (MHz)	Coupling (dB) Nom.	Max. Flat	Mainline Loss (Midband Typ. dB)	Directivity	VSWR Typ.(:1)	Price ($ea.) Qty.10-49
ADC-6-1R	5-200	6.2±0.3	±0.3	1.7	25	1.33	7.95
ADC-10-1R	5-900	10.5±0.5	±0.5	0.8	30	1.3	7.95
ADC-10-4	5-1000	10.5±0.5	±0.75	0.8	40	1.20	6.95
ADC-15-4	5-1000	15.5±0.5	±0.5	0.6	24	1.20	6.95
ADC-20-4	5-1000	20.0±0.5	±0.8	0.5	21	1.1	6.95
ADC-8-4-75	5-1000	7.9±0.5	±0.5	1.60	17	1.20	6.95
ADC-10-4-75	5-1000	10.5±0.5	±0.5	0.9	18	1.20	6.95
ADC-15-4-75	5-1000	15.5±0.5	±0.5	0.7	20	1.20	6.95
ADC-18-4-75	20-1000	17.4±0.5	±0.5	0.4	18	1.15	6.95
ADC-20-4-75	5-1000	19.7±0.5	±0.5	0.5	23	1.15	6.95

Max. power input is 1W except ADC-6-1R which is 0.5W.
Models with R suffix are equipped with internal resistor.
Available in tape and reel.

Package and Circuit Patent Pending.

Please refer to our complete catalog in Volume A, Section 3450

Mini-Circuits®

US INT'L

CIRCLE READER SERVICE CARD

P.O Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718)332-4661 ***INTERNET*** http://www.minicircuits.com

For quick access to product information see MINI-CIRCUITS CATALOG & WEB SITE • EEM • MICROWAVE PRODUCT DATA DIRECTORY • WWW.RFGLOBALNET.COM

ISO 9001 CERTIFIED

F 272 Rev. A

TECHNICAL CERAMICS

NGK SPARK PLUGS (U.S.A.), INC.
CHICAGO OFFICE Telephone: (847) 824-1133, Fax: (847) 390-6482, 1200 Business Center Dr., Suite 300, Mount Prospect, IL 60056
75 Main St., Milburn, NJ 07041 Telephone: (201) 376-6070
CALIFORNIA OFFICE Telephone: (408) 727-5180, 3255-2 Scott Blvd., Suite 101, Santa Clara, CA 95054

TECHNICAL CERAMICS

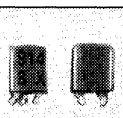
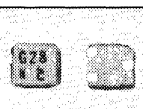
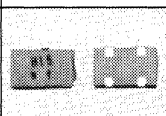
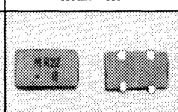
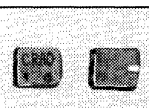
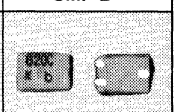
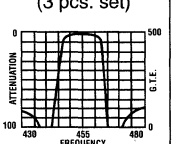
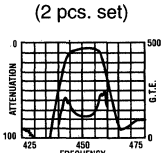
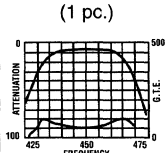
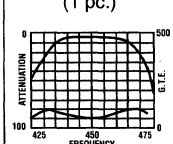
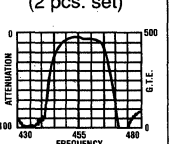
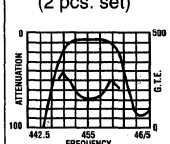
Since its founding in 1936, NTK Technical Ceramics has expanded its role in ceramics technology from industrial ceramics to piezoelectric and dielectric ceramics. From these new ceramics, NTK has developed a broad line of products for microwave, acoustic, electronic, and electromechanical applications. The company's substantial efforts in research and development in ceramics and related technologies has gained for NTK a position of leadership and reliability in state of the art modern technical ceramics.

455 KHZ FILTERS

☐ Miniature ☐ Surface Mount

Featuring a complete line of filter characteristics, NTK's Ceramic Filters are temperature stable and cost effective.

NTK SMD TYPE 455kHz BAND CERAMIC FILTERS

Model Number	MLF-B	MLF-G	MLF-H	MLF-M	SMF-C	SMF-B
Appearance & Dimensions						
Height (mm)	3.0	4.0	3.5	3.0	3.0	2.5
Length x Width (mm)	7.0(8.5) x 6.0	7.0 x 6.0	7.0 x 11.5	7.0 x 11.5	6.5 x 5.5	8.5 x 5.5
Nominal Base Area (mm2)	51.0	42.0	80.5	80.5	35.8	46.8
Applications	✻ Pager	Pager Celiular (AMPS,TACS, ✻NMT NTT,USDC,PDC)	Pager Celluar (AMPS,TACS, ✻NMT NTT,USDC,✻PDC)	Pager Celluar (✻AMPS,TACS,NMT NTT,USDC,PDC)	✻ Pager Celluar (NMT,NTT)	Pager Celluar (NMT,✻NTT
Electrical Characteristics Typical Data: marking '✻'	(3 pcs. set) 	(2 pcs. set) 	(1 pc.) 	(1 pc.) 	(2 pcs. set) 	(2 pcs. set) 
Insertion Loss at fo (dB)	1.7	5.0	6.4	3.1	7.3	6.0
6dB Bandwidth (kHz)	(-) 7.5 / (+) 7.3	(-) 6.8 / (+) 7.0	(-) 14.4 / (+) 14.2	(-) 16.2 / (+) 15.5	(-) 8.2 / (+) 8.0	(-) 4.7 / (+) 4.6
Attenuation fo ±50kHz(dB)	73.0 / 70.5	72.2 / 68.3	78.0 / 66.0	78.7 / 66.9	67.8 / 64.1	64.2 / 61.4

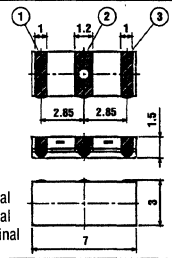
13MHz FILTERS

☐ Surface Mount

APPLICATION : GSM

Characteristics / Model No.	To (MHz)	1dB Band Width Khz MIN.	Ripple (dB) Max.	Stop band rejection (dB) Min. ±400kHz	Stop band rejection (dB) Min. ±600kHz	Insertion loss (dB) Max.	G.D.T. ±90k (µsec) Max.	In/Out Impedance (ohm)
13.0 HCF-SA180E	13.0	±90	1.0	25	35	6	1.5	330

HCF type Ceramic Filters H=1.5mm / 13MHz Band for GSM

Picture of appearance	Configuration / Dimensions
	TOL. ±0.3 UNIT:mm  1) Input Terminal 2) Earth Terminal 3) Output Terminal

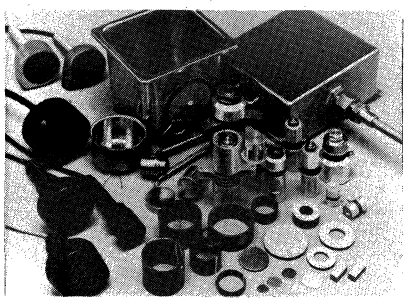
TECHNICAL CERAMICS

NGK SPARK PLUGS (U.S.A.), INC.
CHICAGO OFFICE Telephone: (847) 824-1133, Fax: (847) 390-6482, 1200 Business Center Dr., Suite 300, Mount Prospect, IL 60056
75 Main St., Milburn, NJ 07041 Telephone: (201) 376-6070
CALIFORNIA OFFICE Telephone: (408) 727-5180, 3255-2 Scott Blvd., Suite 101, Santa Clara, CA 95054

ULTRASONICS

☐ Transducers ☐ Meters ☐ Generators ☐ Cleaners

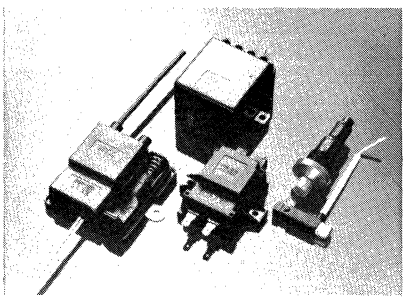
NTK's complete line of Ultrasonic Transducers and equipment include devices for air acoustics, fish finders, ultrasonic cleaners and power tools.



GAS IGNITOR PRODUCTS

☐ Piezo Ignitors ☐ Electronic Ignitors

State of the art PZT materials and 20 years of experience in gas ignition applications has resulted in the most comprehensive high-rel line of components for ignition systems.



PIEZOELECTRIC AUDIO TRANSDUCERS

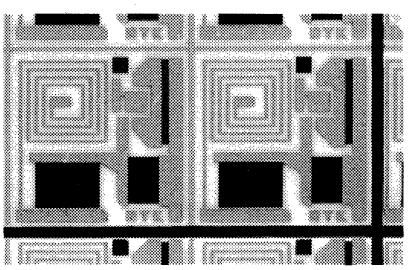
☐ Diaphragms ☐ Buzzers ☐ Speakers
☐ Tweeter Elements

NTK offers a complete line of high efficiency sound transducers in both standard and custom designs with a wide range including single, low frequency devices to broad-band voice and tweeter elements.

CERAMIC & THIN FILM PRODUCTS FOR WIRELESS COMMUNICATION

☐ LC Filters ☐ Capacitors ☐ Couplers ☐ Inductors
☐ Resistors ☐ Glass Ceramic Substrates

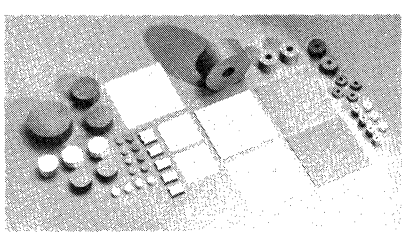
NTK has developed superb thin-film products that meet with today's communication market demands along with excellent characteristics of meeting high frequency zones.



MICROWAVE DIELECTRICS

☐ Resonators ☐ Substrates ☐ Metalized Substrates ☐ Filters
☐ TEM Resonator

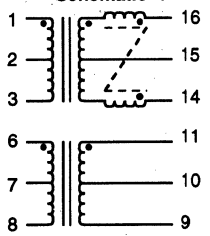
NTK offers the most complete line of high-Q Dielectrics for microwave applications available. Resonators and substrates are available in both standard and custom configurations.



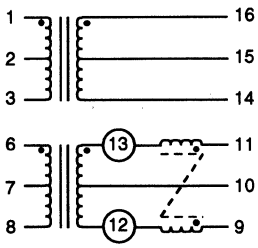
PCA ELECTRONICS INC.

Isolation Transformers with/without Common Mode Chokes

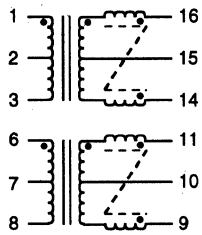
Schematic 1



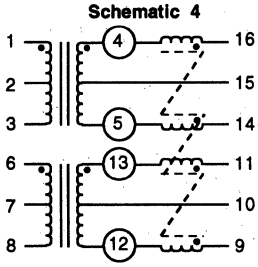
Schematic 2



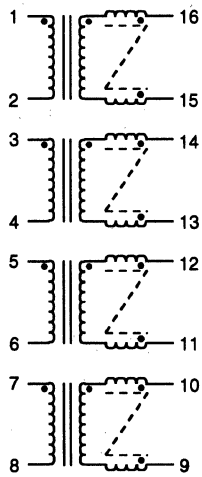
Schematic 3



Schematic 4

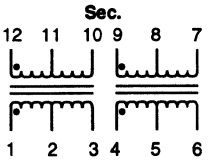


Schematic 5



Schematic 6

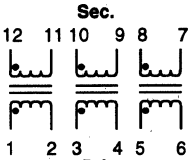
Sec.



Pri.

Schematic 7

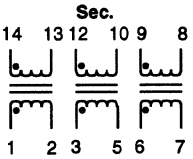
Sec.



Pri.

Schematic 8

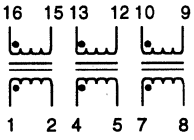
Sec.



Pri.

Schematic 9

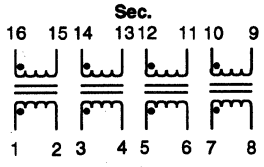
Sec.



Pri.

Schematic 10

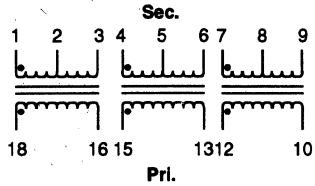
Sec.



Pri.

Schematic 11

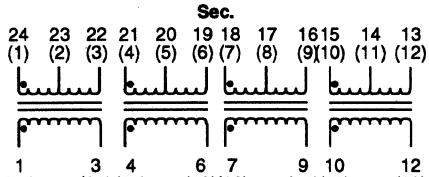
Sec.



Pri.

Schematic 12 & (13)

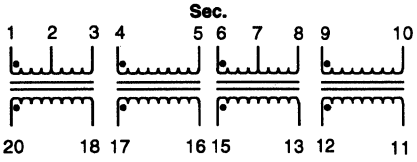
Sec.



Pri.

Schematic 14

Sec.



Pri.

PCA Part No.	OCL µH (*Min.)	LE µH (Max.)	CW pF (Max.)	Primary DCR Ω (Max.)	Secondary DCR Ω (Max.)	Turns Ratio Pri/Sec:Pri/Sec	Isolation Vrms	Schem.	No. of Pins, Style	Packages L / W / H †Optional Packages
EPE6087A	50*	0.30	12	0.35	1.0	1ct:2ct/1ct:1ct	2000	1	16, DIP	.900 / .280 / .250
EPE6165S	140*	0.20	12	0.30	---	1ct:1ct/1ct:√2ct	2000	2	16, SOIC/SMD	.490 / .270 / .190 †
EPE6173S	140*	0.20	12	0.30	---	1ct:1ct/1ct:1ct	2000	2	16, SOIC/DIP	.490 / .270 / .190 †
EPE6046S	140*	0.20	12	0.30	---	1ct:1ct/1ct:√2ct	2000	3	16, SOIC/DIP	.490 / .270 / .190 †
EPE6062S	200*	0.20	12	0.30	---	1ct:1ct/1ct:√2ct	2000	4	16, SOIC	.450 / .270 / .190
EPE6065S	140*	0.20	12	0.30	---	1ct:1ct/1ct:√2ct	600	4	16, SOIC	.490 / .270 / .190
EPE6141S	200*	0.30	20	0.30	---	1ct:1ct/1ct:√2ct	2000	3	16, SOIC	.490 / .270 / .190
EPE6172AS	100*	0.20	12	0.30	---	1ct:1ct/1ct:1ct	2000	3	16, SOIC/DIP	.490 / .270 / .190 †
EPE6174	50*	0.30	12	0.35	1.0	1ct:2ct/1ct:1ct	2000	3	16, SMD/DIP	.900 / .280 / .250 †
EPE6177	100*	0.30	12	0.30	---	1:1 (x4)	2000	5	16, DIL	1.00 / .400 / .350
EPE6178	100*	0.30	12	0.30	---	1:√2 (x4)	2000	5	16, DIL	1.00 / .400 / .350
EPE6190	150±20%	0.30	10	0.40	---	1:1 (x4)	2000	5	16, DIL	1.00 / .400 / .350
EPE6191	150±20%	0.30	10	0.40	---	1:√2 (x4)	2000	5	16, DIL	1.00 / .400 / .350
EPE6045S	140*	0.20	12	0.30	0.30	1ct:1ct/1ct:√2ct	2000	6	16, SOIC	.800 / .280 / .188 †
EPE6047S	200*	0.17	10	0.45	0.45	2ct:1ct/1ct:1ct	2000	6	16, SOIC	.500 / .270 / .200 †
EPE6060GM	75±20%	0.20	12	0.30	0.30	1:1 (x3)	2000	7	16, PCMCIA	.560 / .360 / .094
EP9531-X	25-350	---	---	---	---	1:1 (x3)	2000/500	9	16, SMD/DIP	.800 / .400 / .188
EP9547-X	25-350	---	---	---	---	1:1 (x3)	2000/500	8	14, SMD/DIP	.800 / .400 / .188
EPA1473J-X	25-350	---	---	---	---	1:1 (x3)	2000/500	9	16, SMD (J)	.460 / .360 / .220
EPA1885-X	25-350	---	---	---	---	1:1 (x3)	2000/500	9	16, SOIC	.460 / .360 / .220
EPE6131S	3*/3*/0.3*	4.0	40	1.0	2.0	1:1/1:2ct/1:2ct	1500	11	18, SOIC	.550 / .430 / .260
EPE6009	200*	0.15	10	0.35	0.35	1:1 (x4)	2000	10	16, SOIC	.460 / .360 / .220
EPE6010	200*	0.25	10	0.35	---	1:√2 (x4)	2000	12	24, SOIC	.710 / .360 / .220
EPE6129S	350*	1.0	15	0.28	0.50	1:2 (x4)	1500	13	24, SOIC	.700 / .430 / .260
EPE6130S	200*	0.40	15	0.30	0.60	1:2√2 (x4)	1500	14	20, SOIC	.600 / .430 / .260

Contact PCA for additional individual part number specifications

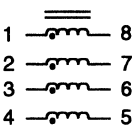
PCA ELECTRONICS, INC.
16799 SCHOENBORN ST.
NORTH HILLS, CA 91343

TEL: (818) 892-0761
FAX: (818) 894-5791
http://www.pcainc.com

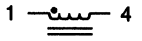
PCA ELECTRONICS INC.

Common Mode Chokes

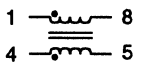
Schematic 1



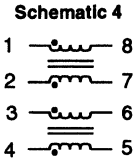
Schematic 2



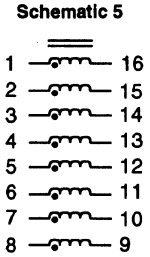
Schematic 3



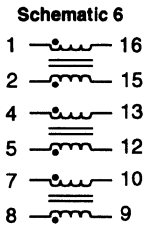
Schematic 4



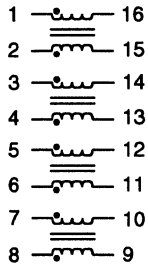
Schematic 5



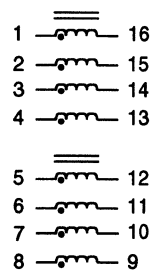
Schematic 6



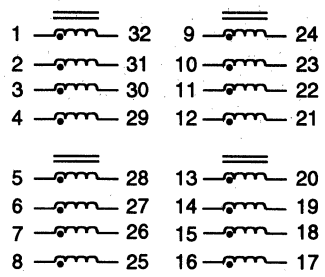
Schematic 7



Schematic 8



Schematic 9



PCA Part No.		Primary OCL	Impedance Ω (Min.) or (*Typ.) vs Frequency (MHz)	Number of Chokes Number of Lines Schematic	Packages Style L / W / H (in inches)
1	EPA 120	5.5 µH to 8.5 µH	350 @ 30 450 @ 50-70 350 @ 100	1 Choke 4 Lines Schematic 1	8 pin DIP .420 / .280 / .175
2	EPA 1511	4.0 µH Min.	210 @ 10 400 @ 40 310 @ 100	1 Choke 4 Lines Schematic 1	8 pin DIL .585 / .400 / .300
3	EPA 1846	36 µH Min.	1000 @ 10 2000 @ 30-40 500 @ 300	1 Choke 4 Lines Schematic 1	8 pin DIL .500 / .400 / .250
4	EPA2163	85 µH ± 20%	400 @ 5 700 @ 10 200 @ 70-100	1 Choke 2 Lines Schematic 2	4 pin DIP .220 / .280 / .230
5	EPA 2165S	85 µH ± 20%	400 @ 5 700 @ 10-20 200 @ 70-100	1 Choke 4 Lines Schematic 1	8 pin SOIC .200 / .250 / .220
6	EPA 2408-4 EPA 2604	8 µH Min.	550 @ 10 1100 @ 30 520 @ 100	1 Choke 4 Lines Schematic 1	8 pin DIP or DIL .420 / .280 / .250
7	EPA 2591	140 µH Min.	750 @ 5 2200 @ 20-30 1000 @ 70	1 Choke 2 Lines Schematic 3	8 pin SMD .420 / .280 / .395
8	EPA 2655 EPA 2655G	------	326 @ 30 425 @ 50 328 @ 100	1 Choke 8 Lines Schematic 5	16 pin DIP or SMD .880 / .280 / .190
9	EPT7022S	48 µH Typ.	1000 @ 10 2000 @ 30-50 500 @ 300	1 Choke 4 Lines Schematic 1	8 pin SOIC .290 / .280 / .200
10	EPA2794	22.5 µH Min.	200* @ 1 2200* @ 25 250* @ 300	1 Choke 4 Lines Schematic 1	8 pin SMD .475 / .400 / .340
11	EPA 2743 EPA 2743G	------	326 @ 30 425 @ 50 328 @ 100	1 Choke 4 Lines Schematic 1	8 pin DIP & SMD .450 / .280 / .165
12	EPA2851	8.0 µH Min.	1000 @ 10 2000 @ 30-40 500 @ 300	1 Choke 4 Lines Schematic 1	8 pin DIL & SMD .475 / .400 / .340
13	EPA 2809	76 µH Typ.	275* @ 1 2200* @ 25 850* @ 300	2 Chokes 2 Lines each Schematic 4	8 pin DIL .500 / .500 / .300
14	EPA2818	22.5 µH Min.	1000 @ 10 2000 @ 30 500 @ 300	2 Chokes 2 Lines each Schematic 4	8 pin DIL .500 / .500 / .300
15	EPA2836-2	36 µH Min.	1000 @ 10 2000 @ 30 500 @ 300	2 Chokes 4 Lines each Schematic 8	16 pin DIP .795 / .280 / .375
16	EPE 6026	36 µH Min.	1000 @ 10 2000 @ 30 500 @ 300	2 Chokes 4 Lines Schematic 8	32 pin DIP 1.800 / .280 / .375
17	EPA3191S	100 µH Min.	60 @ 100 KHz 1.4K @ 20 700 @ 200	3 Chokes 2 Lines each Schematic. 6	16 pin SMD .470 / /.285 / /.200
18	EPA2836-4	36 µH Min.	100 @ 10 2000 @ 30 500 @ 300	4 Chokes 4 Lines each Schematic 9	16 pin DIL .800 / .400 / .250
19	EPE 6028	36 µH Min.	1000 @ 10 2000 @ 30 500 @ 300	4 Chokes 2 Lines each Schematic 7	16 pin DIL .800 / .400 / .320

PCA ELECTRONICS, INC.
16799 SCHOENBORN ST.
NORTH HILLS, CA 91343

lease contact PCA for additional individual part number specificatior

TEL: (818) 892-0761
FAX: (818) 894-5791
http://www.pcainc.com

PCA ELECTRONICS INC.

Selection Guide for Transceiver Chips

Transceiver	Network Interface Card	Multiport
AMD (10 Base-T)		
79C100/79C980	EPE6042	
79C940	EPE6121G EPE6152M	
79C960	EPE6030 EPE6051GM EPE6066	
79C970	EPE6070	
79C981		EPE6117 EPE6253S EPE6204S
79C984A/85		EPE6271S
79C988		EPE6224S
AMD (10/100 Base-X)		
79C850/79C971	See MicroLinear ML6692/94 for 100 Base-X	
AMD (Telecom)		
79C30/32	EPA1155-3/-12 EPA2731 EPA2787	
ASICS (10 Base-T Card Bus)	EPE6051GM EPE6133AG EPE6138G EPE6219G EPE6268G	
Broadcom (100 Base-X)		
BCM5208		EPF8034S EPF8047S EPF8049S
Broadcom (100 Base-T4)		
BCM5000		EPE6208 EPE6251S EPE6255S
Brooktree (Telecom)		
R8069	EPA1066 EPA1069 EPA1074 EPA2853	
Crystal Semiconductor (10 Base-T)		
CS8900 & CS8904	EPE6062S	EPE6265S EPE6275S
Crystal Semiconductor (Telecom)		
61534	EPA1071 EPA2559 EPA2853	
661535A/74A/75	EPA2853 EPA3010	
Dallas (Telecom)		
DS2185/6/7	EPA2865 EPA2866	
DEC (10 Base-T)		
21041	EPE6272	
DEC (10/100 Base-X)		
21140(A)	See MicroLinear for 100 Base-X	
21141/42/43	See Broadcom for 100 Base-T4	
ICS (10/100 Base-X)		
ICS1890/91	EPF8010GM EPF8017GM EPF8037 EPF8041G	EPF8034S EPF8047S

Transceiver	Network Interface Card	Multiport
IDT (25.6 MB/S ATM Products)		
IDT77105	EPT7079 EPT7087G	
Intel (10 Base-T)		
82595TX (FX)	EPA1990 (Suggested) EPE6268G (Suggested)	
Intel (100 Base-T4)		
82553	EPE6212 EPE6213	
Intel (100 Base-X)		
82557	EPF8010GM (Suggested) EPF8017GM (Suggested) EPF8041GM (Suggested)	
Level One (10 Base-T)		
LXT901	EPE6037	EPE6267S EPE6277S EPE6279S
LXT902/906	EPE6049	
LXT904	EPA1885-5	
LXT905	EPE6001	EPE6199S EPE6210S EPE6248S
LXT907 LXT914 LXT915 LXT944	EPE6009 EPE6010 EPE6038	EPE6067S EPE6209S EPE6267S EPE6077S EPE6279S
Level-One (Telecom)		
LXT300/1/5	EPA1071	
LXT304A/5A	EPA2465 EPA2726	
LXT301/11	EPA2559 EPA3103	
LXT324/25	EPA2797	
LSI Logic (10 Base-T)		
L64381		EPE6179S EPE6243S
Lucent Technology (Formerly AT &T) (10 Base-T)		
ATT1RX04/ATT1MX10		EPE6016
T7213		EPE6024
T7220	EPE6091	
T7240A	EPE6014 EPE6138A	EPE6016
T7241A	EPE6092	
Lucent Technology (Fast Ethernet T4)		
LUC3X01	EPE6245G	EPE6251S EPE6255S
Lucent Technology (10/100 Base-X)		
LUC3X04	EPF8010G	
LUC3X14	EPF8016 EPF8037 EPF8041G	EPF8034S EPF8038S

PCA ELECTRONICS, INC.
16799 SCHOENBORN ST.
NORTH HILLS, CA 91343

Contact PCA for additional individual part number specifications

TEL: (818) 892-0761
FAX: (818) 894-5791
http://www.pcainc.com

PCA ELECTRONICS INC.

Selection Guide for Transceiver Chips

Transceiver	Network Interface Card	Multiport
Lucent Technology (100VG-Any LAN)		
ATT2X01		EPE6137S
ATT2X02		EPE6227S
Lucent Technology (TPDDI/CDDI 155 Mb/s)		
T7352	EPF8007M EPF8010GM EPF8016	
Lucent Technology (Telecom)		
LATT7289	EPA2722	
ATT7290	EPA2559 EPA2865 EPA2866	
ATT7296	EPA2886 EPA3133	
Microlinear (10 Base-T)		
ML2652	EPE6231	
ML2653	EPE6127	
ML4652	EPE6154	
ML4658	EPF8019GM	
Microlinear 100 Base-X (for 10 Base-T, consider DEC 21142 MAC/10 B T PHY)		
ML6671 & ML6673	EPF8007M	
ML6692	EPF8019GM EPF8048G	
ML6694	EPF8019GM EPF8046G	EPF8053S
Motorola (10 Base-T)		
MC68160	EPE1829 EPE6037 EPE6049	
Motorola (Telecom)		
MC145475/5	EPA1155-1 EPA1155-11 EPA1155-6	
National Semiconductor (10 Base-T)		
DP83902/05/07	EPE6167	
DP83924		EPE6258S EPE6259S EPE6269S
DP83924		EPE6233S
DP83932	EPE6167	
DP83934CVUL	EPE6011 EPE6013	
DP83950B	EPE6104	EPA2188B
National Semiconductor (10/100 Base-X)		
DP83223& DP83840A	EPF8001GM EPF8007M EPF8013GM EPF8016 EPF8037	EPF8022S EPF8032S EPF8034S EPF8038S EPF8047S
Percom (Token Ring)		
PI3000/3020	EPT7066	
Quality Semiconductor Inc. (QSI)		
QSI6611 QS6612	EPF8015GM EPF8024GM EPF8028GM	EPF8050S

Transceiver	Network Interface Card	Multiport
Quality Semiconductor Inc. (QSI)		
QSI6611 QS6612	EPF8044G EPF8051G	
SEEQ (10 Base-T)		
83C902 83C92A 83C94 80C24	EPE6016 EPA1885-5 EPE6086 EPE6047S(TP) EPE6085S(G) EPE6130S	
SEEQ (10/100 Base-X)		
80C220	EPF8025G	
SEEQ (25.6 MB/S ATM)		
93C95A	EPF8025 EPF8019GM	
Siemens (Telecom)		
PEB2085/86 ISACS PEB2254	EPA2647 EPA3372S	
Silicon Systems (10 Base-T)		
SSI 78Q8373	EPE6111G	
SSI 78Q8377A	EPE6011	
SSI 78Q8378	EPE6052GM	
SSI 78Q8392	EPA1885-5	
SSI 78Q902	EPA1829B EPA1990 EPA2013D	
Silicon Systems (10/100 Base-X)		
78Q2120	EPF8010GM EPF8017G EPF8023GM EPF8037GM EPF8041G	EPF8034S EPF8047S EPF8049S
Standard Micro Systems (10 Base-T)		
91C92	EPE6268G	
91C94 91C95	EPE6133AG EPE6268G	
Texas Instrument (10 Base-T)		
TNETE100	EPE6046S	
TNETE110	EPE6062 EPE6174	
TNETE2004		EPE6214S EPE6267S EPE6277S
Texas Instrument (Token Ring)		
TMS38054	EPT7008A EPT7039GM EPT7045GM EPT7090	
TI380C30 TI380C60	EPT7055AM EPT7061GM EPT7062GM EPT7063GM EPT7068GM EPT7069GM EPT7074GM EPT7075 EPT7076 EPT7081GM EPT7082GM EPT7083G EPT7084G	

PCA ELECTRONICS, INC.
16799 SCHOENBORN ST.
NORTH HILLS, CA 91343

Please contact PCA for additional individual part number

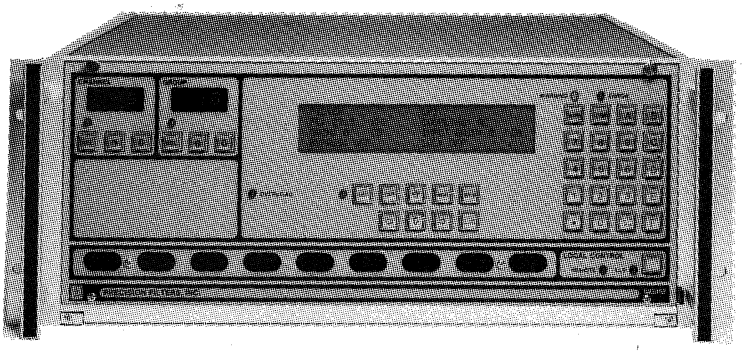
TEL: (818) 892-0761
FAX: (818) 894-5791
http://www.pcainc.com

PRECISION FILTERS, INC.

Filters, Amps, Band Translators, Switch Matrices, DC to 2 MHz, 128 Channels.

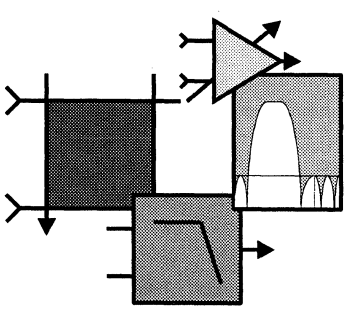
Friendly High Density
- 128 prog. filter/amp channels.
- 64 band-pass channels.
- 128 prog. amplifier channels.
- Differential input, gain, calibration, monitor, and other options, of course.

Friendly Performance
- Band-pass with Q > 10,000.
- 2 MHz prog. filters, 80 dB/octave.
- 204.7 kHz filters, 130 dB/octave.
- Filter match 0.25° and 0.25% typical



All In One Precision 6000 System.

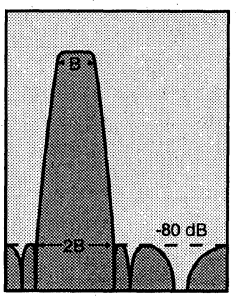
That's system friendly.
Get all you need today.
Change and upgrade later.



Friendly Functions
- Cal subsystem for go/no-go cal and end-to-end cal.
- Group configuration for easy control.
- Graphical User Interface.
- Up-load and down-load setups.
- Overload detection.
- System status, other reports.

Friendly Choice
- Programmable filters—HP, LP, BP, notch, anti-alias, one-third octave.
- Programmable amplifiers—pre, post, auto-gain ranging.
- Prog. frequency-band translators.
- Switch matrices—4x4 to 32x32.
- Buffered I/O to sense/control other devices.
- Proto-cards for custom circuitry.
- Serial or GPIB computer interfaces.
- Custom systems from standard proven hardware that's available.
- Buy only what you need now, add and change as your needs change.

Frequency-Band Translators



Applications
- Prog. matched band-pass filters
- Beam forming arrays
- Direction finding
- Sonar
- Frequency hopping
- Under-sampling anti-alias filters
- Increase dynamic range—reduce sampling rate

Custom Applications
- Matched programmable IF filters for direction finders
- Matched anti-alias filters for MRI
- Sonar arrays

Filter Type:	BBT1	BBT2
60 dB Shape Factor	< 1.8	< 4.5
1% Settling Time	10/B	3/B
Outband Rejection	75 dB	80 dB
Overshoot	19%	0

6772 Base-band Translator
- 2 to 32 Channel base-band array
- Prog. frequency: 20 Hz-200 kHz
- Prog. bandwidth: 25 Hz-31.5 kHz
- Pre- and post-translator gain

1776B Band-pass Translator
- 1-8 Channel band-pass array
- 1-16 Channel base-band array
- Prog. origination freq.: 10 Hz-400 kHz
- Prog. destination freq.: 10 Hz-400 kHz
- Prog. bandwidth: 1 Hz-50 kHz

PRECISION FILTERS, INC.
CONDITIONERS•SWITCHES•DATA ACQUISITION•SYSTEMS
240 Cherry Street, Ithaca, NY 14850
(607) 277-3550, FAX: (607) 277-4466
E-Mail: pfinfo @ pfinc.com

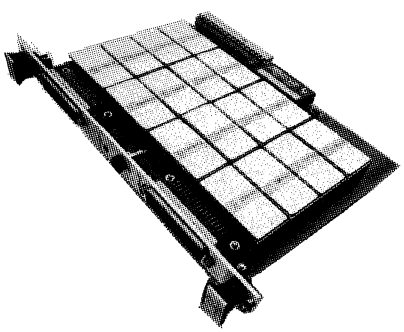
PRECISION FILTERS, INC.

VMEbus Filters

The high density VMF08 and VMF16 filter cards allow for larger channel count filter systems to be implemented in a few available 6U VMEbus slots. Thanks to their precision filter characteristics, the VMF08 and VMF16 are suitable for use as anti-alias filters in front of high-resolution A/D converters. Extensive electrostatic shielding, DC-to-DC power converters for each card and individual power regulators for each channel guaranty optimal performance.

VMF08 Programmable Filters

- 8 channels in a 6U VMEbus format
- Three standard 6-pole filter characteristics: LP1, HP1 and TD6
- Cutoff frequencies from 10 Hz to 127.5 kHz over a 255-to-1 range
- 0.01 dB and 0.1° match, typical
- Calibration input and output monitor
- Programmable filter bypass
- Differential input with selectable AC/DC coupling
- Optional X10 fixed input gain



VMF16 Fixed Frequency Filters

- 16 channels in a 6U VMEbus format
- Three standard 5-pole filter characteristics: LP5A, LP5B and TD5A
- Fixed cutoff freq.: 10 Hz to 25 kHz
- 0.01 dB and 0.1° match, typical

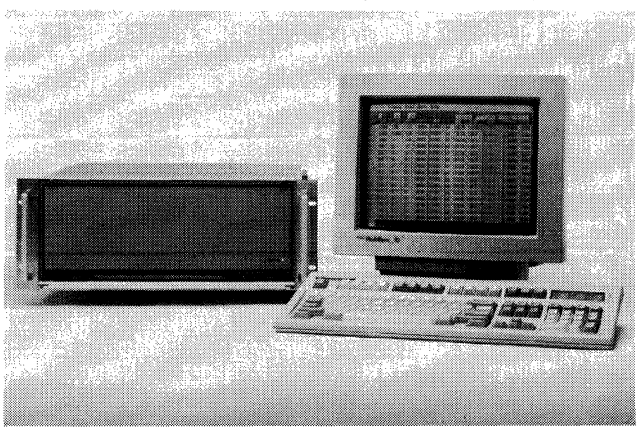
The Precision 27000 Signal Conditioning Wizard™

Programmable Filter Amps

Designed for use in the Precision 27000 Signal Conditioning Wizard system, the Precision 27604 and 27608 filter/amplifier modules allow for up to 64 and 128 channels respectively of programmable precision filtering in one 7"-high chassis. The 27XXX filter modules can be combined with a mix of transducers for different test regimens: choose strain, charge, voltage, ...

Superior Specifications

- Programmable cutoff frequencies to 127.5 kHz
- Programmable distributed gain to x4096
- Hi-Z, Hi-CMRR differential input
- ±10 Vpk linear operation
- Less than 1 mV offset at any gain
- 0.1° phase match, typical
- 0.01 dB amplitude match, typical



Your Choice of Filters

Real anti-alias filters. Select from:

- Elliptic LP & HP
- Butterworth LP
- Bessel LP
- The TD series of constant time delay low-pass filters

These filters are each available in 4-, 6-, and 8-pole configurations.

Manage Hundreds of Channels

The GUI provides control panels for configuration, setup, operation and testing. The Wizard's algorithms transmute tedious and complex engineering calculations into simple setup entries. System scaling is as simple as using a spreadsheet. Change one parameter and the Wizard makes all calculations.

You won't have to pore over filter plots to calculate the tradeoffs between cutoff frequency, sampling rate, and attenuation of aliases. The Wizard's algorithm does it for you!

Powerful Features

- Input and output overload detection
- Constant current source for ICP transducers, RTDs
- Auto-offset for automatic DC offset correction
- Test input and output monitor busses
- Hot replacement of cards in frame for uninterrupted system operation

System Integrity

The Precision 27000's built-in self tests ensure end-to-end system performance. The test subsystem lets you generate test signals, measure performance, and pinpoint problems. From the transducers to the data interface, you can be confident everything works properly before your test begins.

Refer to Section 2325 for Additional Information about the Precision 27000 and other Data Acquisition Products.

PRECISION FILTERS, INC.
CONDITIONERS • SWITCHES • DATA ACQUISITION • SYSTEMS

LAN Modules/IC Cross Reference

Pulse
A TECHNITROL COMPANY

10Base-T Network Components

10Base-T Modules/IC Cross Reference

IC Manufacturer	IC Part No.	Pulse Part No.	Ports Supported	Configuration		Turns Ratio*		Package		Data Sheet
				TX	RX	TX	RX	Style	L/W/H (in.)**	
AMD	AM79C90	PE-68056	Single Port	F, T, C	F,T	1CT :1	1CT :1	SMT	.930 / .510 / .230	E115
	AM 79C98	PE-68026	Single Port	F, T, C	F, T, C	1CT:1CT	1CT :1CT	SMT	.930 / .510 / .230	E115
	AM 79C100	E2003	Single Port	R, F, T, C	R, F, T, C	1CT:1	1CT:1	SMT	1.000 / .500 / .230	E115
	AM79C900	PE-68032	Single Port	F, T, C	F, T	1CT:1	1CT:1	SMTS	.800 /.675 / .094	E103
	AM79C940	PE-68035	Single Port	R, F, T, C	R, F, T	1CT :1	1CT :1	SMTS	.800 / .675 / .094	E103
	AM79C960/961/961A	PE-68017S	Single Port	F, T, C	F, T, C	1CT:1	1CT:1	SIL	1.000 / .210 / .450	E104
	AM79C965/970A	78Z1120B-01	Single Port	F,T	F,T	1CT:1CT	1CT:1CT	DIL	1.000 / .400 / .250	E104
	AM79C971/971B	78Z034C	Single Port	F, T, C	F,T	1CT:1CT	1CT:1CT	DIL	.800 / .400 / .250	E104
	AM 79C981/982	78Z1122B-01	Single Port	F, T, C	F, T, C	1CT:1CT	1CT:1CT	DIL	1.000 / .400 / .250	E104
	AM7996	E2010	Single Port	R, F, T, C	R, F, T	1CT:1	1CT:1	DIL	1.000 / .405 / .310	E104
	AM79C984A	E5017	Single Port	T, C	T	1CT:1CT	1CT:1CT	SMT	.500 / .370 / .200	EC100
	AM79C985	PE-68050	Quad Port	T	T	1CT:1CT	1:1	SMT	1.125 / .640 / .230	E102
	AM79C988	PE-68049	Quad Port	T, C	T	1CT:1CT	1:1	SMT	1.125 / .640 / .230	E102
	AMC79C989	PE-68051	Quad Port	F, T, C	T	1CT:1CT	1:1	SMT	1.125 / .640 / .230	E102
Crystal	CS8900	PE-65745	Single Port	T	T	1CT:1.414CT	1CT:1CT	SMT	.500 / .370 / .200	EC100
	CS8920	PE-68048	Single Port	T, C	T	1CT:1.414CT	1CT:1CT	SMT	.500 / .370 / .200	EC100
	CS8904-CM5	23Z128SM	Single Port	T	T	1CT:1.414CT	1CT:1CT	SMT	.450 / .360 / .215	EC100
		23Z356SM	Single Port	T, C	T, C	1CT:1.414CT	1CT:1CT	SMT	.450 / .360 / .215	EC100
		23Z128	Single Port	T	T	1CT:1.414CT	1CT:1CT	DIP	.800 / .340 / .250	EC100
		PE-68065L	Quad Port	T	T	1CT:1.414CT	1:1	SMT	1.125 / .640 / .230	E113
		PE-68062L	Quad Port	T,C	T	1CT:1.414CT	1:1	SMT	1.125 / .640 / .230	E113
		PE-68820	Quad Port	T	—	1:1.414 (4X)	—	SMT	.500 / .370 / .200	EC100
		PE-68810	Quad Port	—	T	—	1:1 (4X)	SMT	.500 / .370 / .200	EC100
Davicom	DM9008	PE-68056	Single Port	F, T, C	F,T	1CT:1	1CT:1	SMT	.930 / .510 / .230	E115
		PE-68026	Single Port	F, T, C	F, T, C	1CT:1CT	1CT:1CT	SMT	.930 / .510 / .230	E115
		PE-68032	Single Port	F, T, C	F, T	1CT:1	1CT:1	SMTS	.800 / .675 / .094	E103
		PE-68017S	Single Port	F, T, C	F, T, C	1CT:1	1CT:1	SIL	1.000 / .210 / .450	E104
		78Z1120B-01	Single Port	F,T	F,T	1CT:1CT	1CT:1CT	DIL	1.000 / .400 / .250	E104
		78Z034C	Single Port	F, T, C	F,T	1CT:1CT	1CT:1CT	DIL	.800 / .400 / .250	E104
		78Z1122B-01	Single Port	F, T, C	F, T, C	1CT:1CT	1CT:1CT	DIL	1.000 / .400 / .250	E104
DEC	21143	E2009	Single Port	F, T, C	F, T	1CT:1.414	1CT:1	SMT	1.000 / .500 / .230	E115
		PE-68054	Single Port	R, F, T, C	R, F, T	1CT:1.414	1CT:1	SMTS	.800 / .675 / .094	E103
Fujitsu	MB86961/A	PE-65745	Single Port	T	T	1CT:1.414CT	1CT:1CT	SMT	.500 / .370 / .200	EC100
	MB86964	PE-68048	Single Port	T, C	T	1CT:1.414CT	1CT:1CT	SMT	.500 / .370 / .200	EC100
	MB86951	23Z128SM	Single Port	T	T	1CT:1.414CT	1CT:1CT	SMT	.450 / .360 / .215	EC100
	MB86965A & B	23Z356SM	Single Port	T, C	T, C	1CT:1.414CT	1CT:1CT	SMT	.450 / .360 / .215	EC100
		E2009	Single Port	F, T, C	F, T	1CT:1.414	1CT:1	SMT	1.000 / .500 / .230	E115
		23Z128	Single Port	T	T	1CT:1.414CT	1CT:1CT	DIP	.800 / .340 / .250	EC100
Level One	LXT901	PE-68048	Single Port	T, C	T	1CT:1.414CT	1CT:1CT	SMT	.500 / .370 / .200	EC100
	LXT907	PE-65745	Single Port	T	T	1CT:1.414CT	1CT:1CT	SMT	.500 / .370 / .200	EC100
		23Z128SM	Single Port	T	T	1CT:1.414CT	1CT:1CT	SMT	.450 / .360 / .215	EC100
		23Z356SM	Single Port	T, C	T, C	1CT:1.414CT	1CT:1CT	SMT	.450 / .360 / .215	EC100
		23Z128	Single Port	T	T	1CT:1.414CT	1CT:1CT	DIP	.800 / .340 / .250	EC100
	LXT905	E4001	Single Port	T,C	T	1CT:2CT	1CT:1CT	SMT	.500 / .370 / .200	EC100
	LXT908	PE-68023	Single Port	T,C	T	1CT:2CT	1CT:1CT	SMT	.500 / .370 / .200	EC100
	LXT902	PE-68023	Single Port	T,C	T	1CT:2CT	1CT:1CT	SMT	.500 / .370 / .200	EC100
		PE-68023	Single Port	T,C	T	1CT:2CT	1CT:1CT	SMT	.500 / .370 / .200	EC100
		PE-68023	Single Port	T,C	T	1CT:2CT	1CT:1CT	SMT	.500 / .370 / .200	EC100
		PE-68023	Single Port	T,C	T	1CT:2CT	1CT:1CT	SMT	.500 / .370 / .200	EC100
		PE-68056	Single Port	F, T, C	F,T	1CT:1	1CT:1	SMT	.930 / .510 / .230	E115
		PE-68026	Single Port	F, T, C	F, T, C	1CT:1CT	1CT:1CT	SMT	.930 / .510 / .230	E115
		PE-68032	Single Port	F, T, C	F, T	1CT:1	1CT:1	SMTS	.800 / .675 / .094	E103
		PE-68017S	Single Port	F, T, C	F, T, C	1CT:1	1CT:1	SIL	1.000 / .210 / .450	E104
		78Z1120B-01	Single Port	F,T	F,T	1CT:1CT	1CT:1CT	DIL	1.000 / .400 / .250	E104
		78Z034C	Single Port	F, T, C	F,T	1CT:1CT	1CT:1CT	DIL	.800 / .400 / .250	E104
		78Z1122B-01	Single Port	F, T, C	F, T, C	1CT:1CT	1CT:1CT	DIL	1.000 / .400 / .250	E104
	LXT914	PE-68820	Quad Port	T	—	1:1.414 (4X)	—	SMT	.500 / .370 / .200	EC100
	LXT915	PE-68810	Quad Port	—	T	—	1:1 (4X)	SMT	.500 / .370 / .200	EC100
	LXT916	PE-68065L	Quad Port	T	T	1CT:1.414CT	1:1	SMT	1.125 / .640 / .230	E113
	LXT917	PE-68062L	Quad Port	T,C	T	1CT:1.414CT	1:1	SMT	1.125 / .640 / .230	E113
	LXT918	PE-68008	Quad Port	T	—	1:1.414 (4X)	–	DIL	.800 / .300 / .220	EC100
	LXT944	PE-68007	Quad Port	—	T	—	1:1 (4X)	DIL	.800 / .300 / .220	EC100
LSI Logic	L64381	PE-68056	Single Port	F, T, C	F,T	1CT:1	1CT:1	SMT	.930 / .510 / .230	E115
		PE-68026	Single Port	F, T, C	F, T, C	1CT:1CT	1CT:1CT	SMT	.930 / .510 / .230	E115
		PE-68032	Single Port	F, T, C	F, T	1CT:1	1CT:1	SMTS	.800 / .675 / .094	E103
		E2004	Single Port	R, F, T, C	R, F, T	1CT:1	1CT:1	SMT	1.000 / .500 / .230	E115
		PE-68017S	Single Port	F, T, C	F, T, C	1CT:1	1CT:1	SIL	1.000 / .210 / .450	E104
		78Z1120B-01	Single Port	F,T	F,T	1CT:1CT	1CT:1CT	DIL	1.000 / .400 / .250	E104
		78Z034C	Single Port	F, T, C	F,T	1CT:1CT	1CT:1CT	DIL	.800 / .400 / .250	E104
		78Z1122B-01	Single Port	F, T, C	F, T, C	1CT:1CT	1CT:1CT	DIL	1.000 / .400 / .250	E104
		PE-68080	Quad Port	R, F, T, C	R, F, T	1CT:1	1CT:1	QFP	1.15 / 1.15 / .260	E108
Lucent Technologies	T7213	PE-68056	Single Port	F, T, C	F,T	1CT:1	1CT:1	SMT	.930 / .510 / .230	E115
	T7241A	PE-68026	Single Port	F, T, C	F, T, C	1CT:1CT	1CT:1CT	SMT	.930 / .510 / .230	E115
		PE-68032	Single Port	F, T, C	F, T	1CT:1	1CT:1	SMTS	.800 / .675 / .094	E103
		PE-68017S	Single Port	F, T, C	F, T, C	1CT:1	1CT:1	SIL	1.000 / .210 / .450	E104
		78Z1120B-01	Single Port	F,T	F,T	1CT:1CT	1CT:1CT	DIL	1.000 / .400 / .250	E104
		78Z034C	Single Port	F, T, C	F,T	1CT:1CT	1CT:1CT	DIL	.800 / .400 / .250	E104
		78Z1122B-01	Single Port	F, T, C	F, T, C	1CT:1CT	1CT:1CT	DIL	1.000 / .400 / .250	E104

12220 WORLD TRADE DRIVE • SAN DIEGO, CA 92128 • TEL: 619/674/8100 • FAX: 619/674/8262 • QUICK-FACTS: 619/674/9672 • WEB: http://www.pulseeng.com

LAN Modules/IC Cross Reference

Pulse
A TECHNITROL COMPANY

10Base-T Network Components (continued)

10Base-T Modules/IC Cross Reference

IC Manufacturer	IC Part No.	Pulse Part No.	Ports Supported	Configuration		Turns Ratio*		Package		Data Sheet
				TX	RX	TX	RX	Style	L/W/H (in.)**	
Micro Linear	ML2652/2653	23Z435SM	Single Port	T	T	2CT:1CT	1CT:1CT	SMT	.450 / .360 / .215	EC100
	ML4652/4658	PE-68052	Single Port	T, C	T	2CT:1CT	1CT:1CT	SMT	.500 / .370 / .200	EC100
		23Z435	Single Port	T	T	2CT:1CT	1CT:1CT	DIP	.800 / .340 / .250	EC100
Motorola	MC68160	PE-68056	Single Port	F, T, C	F,T	1CT:1	1CT:1	SMT	.930 / .510 / .230	E115
		PE-68026	Single Port	F, T, C	F, T, C	1CT:1CT	1CT:1CT	SMT	.930 / .510 / .230	E115
		E2007	Single Port	R, F, T, C	R, F, T	1CT:1	1CT:1	SMT	1.000 / .500 / .230	E115
		PE-68032	Single Port	F, T, C	F, T	1CT:1	1CT:1	SMTS	.800 / .675 / .094	E103
		PE-68036	Single Port	R, F, T, C	R, F, T	1CT:1	1CT:1	SMTS	.800 / .675 / .094	E103
		PE-68017S	Single Port	F, T, C	F, T, C	1CT:1	1CT:1	SIL	1.000 / .210 / .450	E104
		78Z1120B-01	Single Port	F,T	F,T	1CT:1CT	1CT:1CT	DIL	1.000 / .400 / .250	E104
		78Z034C	Single Port	F, T, C	F,T	1CT:1CT	1CT:1CT	DIL	.800 / .400 / .250	E104
		78Z1122B-01	Single Port	F, T, C	F, T, C	1CT:1CT	1CT:1CT	DIL	1.000 / .400 / .250	E104
National Semiconductor	DP83902A	PE-68056	Single Port	F, T, C	F,T	1CT:1	1CT:1	SMT	.930 / .510 / .230	E115
	DP83905	PE-68026	Single Port	F, T, C	F, T, C	1CT:1CT	1CT:1CT	SMT	.930 / .510 / .230	E115
	DP83916	E2001	Single Port	R, F, T, C	R, F, T	1CT:1	1CT:1	SMT	1.000 / .500 / .230	E115
	DP83932	PE-68027	Single Port	R, F, T, C	R, F, T, C	1CT:1CT	1CT:1CT	SMT	.930 / .510 / .230	E115
	DP83950	PE-68032	Single Port	F, T, C	F, T	1CT:1	1CT:1	SMTS	.800 / .675 / .094	E103
	DP83952	PE-68017S	Single Port	F, T, C	F, T, C	1CT:1	1CT:1	SIL	1.000 / .210 / .450	E104
		78Z1120B-01	Single Port	F,T	F,T	1CT:1CT	1CT:1CT	DIL	1.000 / .400 / .250	E104
		78Z034C	Single Port	F, T, C	F,T	1CT:1CT	1CT:1CT	DIL	.800 / .400 / .250	E104
		78Z1122B-01	Single Port	F, T, C	F, T, C	1CT:1CT	1CT:1CT	DIL	1.000 / .400 / .250	E104
		PE-68040	Quad Port	R, F, T, C	R, F, T	1CT:1	1CT:1	QFP	1.150 / 1.150 / .260	E108
	DP83934	PE-68056	Single Port	F, T, C	F,T	1CT :1	1CT :1	SMT	.930 / .510 / .230	E115
	DP83902	PE-68026	Single Port	F, T, C	F, T, C	1CT :1CT	1CT :1CT	SMT	.930 / .510 / .230	E115
		PE-68034	Single Port	R, F, T, C	R, F, T	1CT : 1	1CT : 1	SMTS	.800 / .675 / .094	E103
		PE-68032	Single Port	F, T, C	F, T	1CT : 1	1CT : 1	SMTS	.800 / .675 / .094	E103
		PE-68017S	Single Port	F, T, C	F, T, C	1CT : 1	1CT:1	SIL	1.000 / .210 / .450	E104
		78Z1120B-01	Single Port	F,T	F,T	1CT :1CT	1CT :1CT	DIL	1.000 / .400 / .250	E104
		78Z034C	Single Port	F, T, C	F,T	1CT :1CT	1CT :1CT	DIL	.800 / .400 / .250	E104
		78Z1122B-01	Single Port	F, T, C	F, T, C	1CT :1CT	1CT :1CT	DIL	1.000 / .400 / .250	E104
	DP83907	E4001	Single Port	T,C	T	1CT :2CT	1CT :1CT	SMT	.500 / .370 / .200	EC100
	DP83953	PE-68059	Single Port	T	T	1 : 2 (2X)	1 : 1 (2X)	SMT	.500 / .370 / .200	EC100
		PE-68023	Single Port	T,C	T	1CT :2CT	1CT :1CT	SMT	.500 / .370 / .200	EC100
		PE-68029	Single Port	T,C	T	1CT :2CT	1CT :1CT	DIL	1.000 / .390 / .215	EC100
		23Z466SM	Single Port	T	T	1CT :2CT	1CT :1CT	SMT	.450 / .360 / .215	EC100
		23Z467SM	Single Port	T,C	T,C	1CT :2CT	1CT :1CT	SMT	.450 / .360 / .215	EC100
SEEQ	80C24	23Z435SM	Single Port	T	T	2CT : 1CT	1CT : 1CT	SMT	.450 / .360 / .215	EC100
		PE-68052	Single Port	T, C	T	2CT : 1CT	1CT : 1CT	SMT	.500 / .370 / .200	EC100
		23Z435	Single Port	T	T	2CT : 1CT	1CT : 1CT	DIP	.800 / .340 / .250	EC100
Symbios Logic	NCR92C350	PE-68056	Single Port	F, T, C	F,T	1CT :1	1CT :1	SMT	.930 / .510 / .230	E115
		PE-68026	Single Port	F, T, C	F, T, C	1CT :1CT	1CT :1CT	SMT	.930 / .510 / .230	E115
		E2003	Single Port	R, F, T, C	R, F, T	1CT : 1	1CT : 1	SMT	1.000 / .500 / .230	E115
		PE-68032	Single Port	F, T, C	F, T	1CT : 1	1CT : 1	SMTS	.800 / .675 / .094	E103
		PE-68068	Single Port	R, F, T, C	R, F, T	1CT : 1	1CT : 1	ULP	.600 / .800 / .084	E100
		PE-68017S	Single Port	F, T, C	F, T, C	1CT : 1	1CT : 1	SIL	1.000 / .210 / .450	E104
		78Z1120B-01	Single Port	F,T	F,T	1CT :1CT	1CT :1CT	DIL	1.000 / .400 / .250	E104
		78Z034C	Single Port	F, T, C	F,T	1CT :1CT	1CT :1CT	DIL	.800 / .400 / .250	E104
		78Z1122B-01	Single Port	F, T, C	F, T, C	1CT :1CT	1CT :1CT	DIL	1.000 / .400 / .250	E104
		E2010	Single Port	R, F, T, C	R, F, T	1CT : 1	1CT : 1	DIL	1.000 / .405 / .310	E104
		PE-68040	Quad Port	R, F, T, C	R, F, T	1CT : 1	1CT : 1	QFP	1.150 / 1.150 / .260	E108
Texas Instruments	TNETE100A	PE-65745	Single Port	T	T	1CT :1.414CT	1CT :1CT	SMT	.500 / .370 / .200	EC100
		PE-68048	Single Port	T, C	T	1CT :1.414CT	1CT :1CT	SMT	.500 / .370 / .200	EC100
		23Z128SM	Single Port	T	T	1CT :1.414CT	1CT :1CT	SMT	.450 / .360 / .215	EC100
		23Z356SM	Single Port	T, C	T, C	1CT :1.414CT	1CT :1CT	SMT	.450 / .360 / .215	EC100
		23Z128	Single Port	T	T	1CT :1.414CT	1CT :1CT	DIP	.800 / .340 / .250	EC100
	TNETE2004	PE-65745	Single Port	T	T	1CT :1.414CT	1CT :1CT	SMT	.500 / .370 / .200	EC100
		PE-68048	Single Port	T, C	T	1CT :1.414CT	1CT :1CT	SMT	.500 / .370 / .200	EC100
		23Z128SM	Single Port	T	T	1CT :1.414CT	1CT :1CT	SMT	.450 / .360 / .215	EC100
		23Z356SM	Single Port	T, C	T, C	1CT :1.414CT	1CT :1CT	SMT	.450 / .360 / .215	EC100
		23Z128	Single Port	T	T	1CT :1.414CT	1CT :1CT	DIP	.800 / .340 / .250	EC100
		PE-68820	Quad Port	T	–	1 :1.414 (4X)	–	SMT	.500 / .370 / .200	EC100
		PE-68810	Quad Port	–	T	–	1 :1 (4X)	SMT	.500 / .370 / .200	EC100
		PE-68065L	Quad Port	T	T	1CT :1.414CT	1:1	SMT	1.125 / .640 / .230	E113
		PE-68062L	Quad Port	T,C	T	1CT :1.414CT	1:1	SMT	1.125 / .640 / .230	E113
		PE-68008	Quad Port	T	–	1 :1.414 (4X)	–	DIL	.800 / .300 / .220	EC100
		PE-68007	Quad Port	–	T	–	1:1 (4X)	DIL	.800 / .300 / .220	EC100

KEY for 10Base-T

***Turns Ratio** is referenced chip side to media side.

****Package:** L/W/H is measured on surface mount parts tip to tip (height includes the wash area).

NOTE: ICs are shown in groups. Each IC in a group works with all Pulse parts adjacent to that group.

Configuration: T = *Transformer*, F = *Low Pass Filter*, C = *Choke*, R = *Pre-distortion resistors*

Package Styles: DIL – *Dual-in-line package*, SIL – *Single-in-line package*, SMT – *Surface mount package*, QFP — *Quad Flat Pack (surface mount)*, SMTS — *ThinSet Modules*, ULP — *Ultra Low Profile*

12220 WORLD TRADE DRIVE • SAN DIEGO, CA 92128 • TEL: 619/674/8100 • FAX: 619/674/8262 • QUICK-FACTS: 619/674/9672 • WEB: http://www.pulseeng.com

LAN Modules/IC Cross Reference

Pulse
A TECHNITROL COMPANY

100 Mb Technology Network Components

100 Mb Technology Cross Reference

IC Manufacturer	IC Part No.	Pulse Part No.	Ports Supported	Configuration*		Turns Ratio**		Package		Data Sheet
				TX	RX	TX	RX	Style	L/W/H (in.)***	
AMD	AM79C871 (QFEXr)	PE-68517L	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 /.370	H303
		PE-68515L	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 /.370	H303
		H1019	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .230	H303
		H1012	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .230	H303
		H1042	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 /.370	H303
		H1026	Dual Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1028	Dual Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1036L	Quad Port	T, C	C, T	1CT:1CT	1:01	SMT	1.125 / .640 / .230	H316
		H1044	Quad Port	T, C	C, T	1CT:1CT	1:01	SMT	1.125 / .640 / .230	H316
Broadcom	BCM5203	H1036L	Quad Port	T, C	C, T	1CT:1CT	1:01	SMT	1.125 / .640 / .230	H316
	BCM5205	H1053	Quad Port	T, C	C, T	1CT:1CT	1:01	SMT	1.125 / .640 / .230	H316
	BCM5208	H1060	Quad Port	T, C	C, T	1CT:1CT	1:01	SMT	1.125 / .640 / .230	H316
		H1062	Quad Port	T, C	C, T	1CT:1CT	1:01	SMT	1.125 / .640 / .230	H316
Crystal	CS8952	PE-68517L	Single Port	C, T, C, S	C, T	1CT:1CT	1:01	SMT	1.00 / .510 /.370	H303
		PE-68515L	Single Port	T, C, S	C, T	1CT:1CT	1:01	SMT	1.00 / .510 /.370	H303
		H1019	Single Port	C, T, C, S	C, T	1CT:1CT	1:01	SMT	1.00 / .510 / .230	H303
		H1012	Single Port	T, C, S	C, T	1CT:1CT	1:01	SMT	1.00 / .510 / .230	H303
		H1026	Dual Port	T, C	C, T	1CT:1CT	1:01	SMT	1.125 / .640 / .230	H322
		H1028	Dual Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1036L	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
		H1044	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
Davicom	DM9101	PE-68517L	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .370	H303
	DM9181	PE-68515L	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .370	H303
		H1019	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .230	H303
		H1012	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .230	H303
		H1028	Dual Port	T, C, S	C, T	1CT:1CT	1:01	SMT	1.125 / .640 / .230	H322
		H1036L	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
		H1044	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
Intel	S82555	PE-68517L	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .370	H303
	S82558	PE-68515L	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .370	H303
		H1019	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .230	H303
		H1012	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .230	H303
		H1026	Dual Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1028	Dual Port	T, C, S	C, T	1CT:1CT	1:01	SMT	1.125 / .640 / .230	H322
		H1036L	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
		H1044	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
ICS	ICS1890	PE-68517L	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .370	H303
	ICS1891	H1019	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .230	H303
		H0002	Single Port	T, C	T, C	1CT:1CT	1:01	PCMCIA	.560 / .560 / .084	H304
		PE-69012	Single Port	T, C	T, C	1CT:1CT	1CT:1CT	PCMCIA	.800 / .685 / .094	H304
		H1028	Dual Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1036L	Quad Port	T, C	C, T	1CT:1CT	1:01	SMT	1.125 / .640 / .230	H316
		H1044	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
Level One	LXT970	PE-68517L	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .370	H303
		PE-68515L	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .370	H303
		H1019	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .230	H303
		H1012	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .230	H303
		H1026	Dual Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1028	Dual Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1036L	Quad Port	T, C	C, T	1CT:1CT	1:01	SMT	1.125 / .640 / .230	H316
		H1044	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
	LXT974/975/980	H1068	Quad Port	T, C	C, T	2CT:1CT	1:01	SMT	1.125 / .640 / .230	H321
	981/982/983	H1069	Quad Port	T, C	C, T	2CT:1CT	1:01	SMT	1.125 / .640 / .230	H321
		H1074	Quad Port	T, C	C, T	2CT:1CT	1:01	SMT	1.125 / .640 / .230	H321
		H1076	Quad Port	T, C	C, T	2CT:1CT	1:01	SMT	1.125 / .640 / .230	H321
Lucent Technologies	LUC3X04	PE-68517L	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .370	H303
	LUC3X14	PE-68515L	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .370	H303
	LUC3X24	H1019	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .230	H303
		H1012	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .230	H303
		H1026	Dual Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1028	Dual Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1036L	Quad Port	T, C	C, T	1CT:1CT	1:1	SMT	1.125 / .640 / .230	H316
		H1044	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
	LUC3X54	H1071	Quad Port	T, C	C, T	1CT:1CT	1:1	SMT	1.125 / .640 / .230	H316
Mitel (Formerly Plessey)	NWK918	PE-68517L	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .370	H303
	NWK954	PE-68515L	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .370	H303
		H1019	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .230	H303
		H1012	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.00 / .510 / .230	H303
		H1026	Dual Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1028	Dual Port	T, C, S	C, T	1CT:1CT	1:1	SMT	1.125 / .640 / .230	H322
		H1036L	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
		H1044	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
		H1053	Quad Port	T, C	C, T	1CT:1CT	1:1	SMT	1.125 / .640 / .230	H316
MicroLinear	ML6673	PE-68517L	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .370	H303
	ML6694	H1019	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .230	H303
		H1028	Dual Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1036L	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
		H1044	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316

12220 WORLD TRADE DRIVE • SAN DIEGO, CA 92128 • TEL: 619/674/8100 • FAX: 619/674/8262 • QUICK-FACTS: 619/674/9672 • WEB: http://www.pulseeng.com

LAN Modules/IC Cross Reference

Pulse A TECHNITROL COMPANY

100 Mb Technology Network Components

100 Mb Technology Cross Reference

IC Manufacturer	IC Part No.	Pulse Part No.	Ports Supported	Configuration*		Turns Ratio**		Package		Data Sheet
				TX	RX	TX	RX	Style	L/W/H (in.)***	
National	DP83840A DP83223 (Twister)	PE-68515L	Single Port	T, C, S	C, T	1CT:1CT	1:1	SMT	1.000 / .510 / .370	H303
		H1012	Single Port	T, C, S	C, T	1CT:1CT	1:1	SMT	1.000 / .510 / .230	H303
		H1028	Dual Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1049	Dual Port	T, C, S	C, T	1CT:1CT	1CT:1CT	QFP	1.125 / .640 / .230	H322
		H1001	Quad Port	T, C, S	C, T	1CT:1CT	1CT:1CT	QFP	1.150/1.150 / .265	H311
		H1036L	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1044	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
	DP83843 (Phyter)	H1086	Single Port	T, C, S	C, T	1CT:1CT	1:1	SMT	1.000 / .510 / .230	H303
Quality Semi	QS6611	H0001	Single Port	T, C	T, C	1.41CT:1CT	1CT:1CT	PCMCIA	.800 / .685 / .094	H314
		H0008	Single Port	T, C	C, T	1.25CT:1CT	1:1	PCMCIA	.560 / .560 / .084	H304
		H0010	Single Port	T, C	C, T	1.414:1	1CT:1CT	PCMCIA	.560 / .560 / .084	H304
		H1033	Single Port	T, C	T, C	1.41CT:1CT	1CT:1CT	SMT	1.000 / .510 / .230	H314
		H1035	Single Port	T, C	C, T	1.41CT:1CT	1CT:1CT	SMT	1.000 / .510 / .230	H314
	QS6612	H1043	Single Port	T, C	T, C	1.25CT:1CT	1CT:1CT	SMT	1.000 / .510 / .230	H314
		H1045	Single Port	T, C	C, T	1.25CT:1CT	1CT:1CT	SMT	1.000 / .510 / .230	H314
		H1047	Single Port	T, C, S	T, C	1.25CT:1CT	1:1	SMT	1.000 / .510 / .230	H314
		H1048	Single Port	T, C, S	C, T	1.25CT:1CT	1:1	SMT	1.000 / .510 / .230	H314
Texas Instruments	TNETE2101	PE-68517L	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .370	H303
		PE-68515L	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .370	H303
		H1019	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .230	H303
		H1012	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .230	H303
		H1026	Dual Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1028	Dual Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1036L	Quad Port	T, C	C, T	1CT:1CT	1:1	SMT	1.125 / .640 / .230	H316
		H1044	Quad Port	T, C	C, T	1CT:1CT	1:1	SMT	1.125 / .640 / .230	H316
	TNETE2104	H1036L	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
		H1044	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
TDK	TSC78Q2120	PE-68517L	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .370	H303
		PE-68515L	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .370	H303
		H1019	Single Port	C, T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .230	H303
		H1012	Single Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.000 / .510 / .230	H303
		H1026	Dual Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1028	Dual Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
		H1036L	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
		H1044	Quad Port	T, C	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H316
		PE-69012	Single Port	T, C	T, C	1CT:1CT	1CT:1CT	PCMCIA	.800 / .685 / .094	H304
		H0002	Single Port	T, C	T, C	1CT:1CT	1:1	PCMCIA	.650 / .600 / .084	H304
		H0007	Single Port	T, C	C, T	1CT:1CT	1:1	PCMCIA	.560 / .560 / .084	H304

ATM Network Components

ATM Cross Reference

Speed	IC Manufacturer	IC Part No.	Pulse Part No.	Ports Supported	Configuration*		Turns Ratio**		Package		Data Sheet
					TX	RX	TX	RX	Style	L/W/H (in.)***	
25.6 ATM	IDT	IDT 77105	PE-67583	Single Port	T, F, C	T, F, C	1CT : 1CT	1CT : 1CT	SMT	1.000 / .510 / .370	H306
	NEC	UPD98408	PE-67588	Single Port	C, T, F, V	C, T, V	1.22 : 1.22 : 1 : 1	1.22 : 1.22 : 1 : 1	SMT	1.145 / .625 / .215	H306
	Novacom	NOV25PMD6	PE-67582	Single Port	T	T	2CT : 1	1 : 1	SMT	.505 / .375 / .245	H306
	SEEQ	93C95	PE-67582	Single Port	T	T	2CT : 1	1 : 1	SMT	.505 / .375 / .245	H306
	Transwitch	ALI25T	PE-67583	Single Port	T, F, C	T, F, C	1CT : 1CT	1CT : 1CT	SMT	1.000 / .510 / .370	H306
155 ATM	National	83223	PE-68508	Single Port	C, T	T, C	1CT : 1CT	1CT : 1CT	SIL	.805 / .220 / .300	H307
	MicroLinear	ML6674	PE-68517L	Single Port	C, T, C, S	C, T	1CT:1	1CT:1CT	SMT	1.000 / .510 /.370	H307
	PMC Sierra	PM5350	PE-68515L	Single Port	T, C, S	C, T	1CT:1	1CT:1CT	SMT	1.000 / .510 /.370	H307
			PE-69037	Quad Port	C, T, C, S	C, T	1CT:1	1CT:1CT	SMT	1.150 /1.150/.265	H307
			H1019	Single Port	C, T, C, S	C, T	1CT:1	1CT:1CT	SMT	1.000 / .510 / .230	H307
			H1012	Single Port	T, C, S	C, T	1CT:1	1CT:1CT	SMT	1.000 / .510 / .230	H307
			H1026	Dual Port	T, C	C, T	1CT:1	1CT:1CT	SMT	1.125 / .640 / .230	H307
			H1027	Dual Port	C, T, C, S	C, T	1CT:1	1CT:1CT	SMT	1.125 / .640 / .230	H307
			H1028	Dual Port	T, C, S	C, T	1CT:1	1CT:1CT	SMT	1.125 / .640 / .230	H307
			H1049	Dual Port	T, C, S	C, T	1CT:1CT	1CT:1CT	SMT	1.125 / .640 / .230	H322
			H1036L	Quad Port	T, C	C, T	1CT:1	1CT:1CT	SMT	1.125 / .640 / .230	H307
			H1044	Quad Port	T, C	C, T	1CT:1	1CT:1CT	SMT	1.125 / .640 / .230	H307
	Pulse	PE-68532G	PE-68532G	Single Port	X, C ,T	X, C ,T	–	–	DIL	1.53 / .990 / .550	H309
		PE-68538G	PE-68538G	Single Port	X, C ,T	X, C ,T	–	–	DIL	1.53 / .990 / .550	H309

NOTE: ICs are shown in groups. Each IC in a group works with all Pulse parts adjacent to that group.

***Configuration:** X = *Transceiver*, T = *Transformer*, F = *Low Pass Filter*, C = *Choke*, S = *Shunt Transformer*, V = *Voltage Suppression*, S = *Shunt Choke*

****Turns Ratio** is referenced chip side to media side.

*****Package:** L/W/H is measured on surface mount parts tip to tip (height includes the wash area).

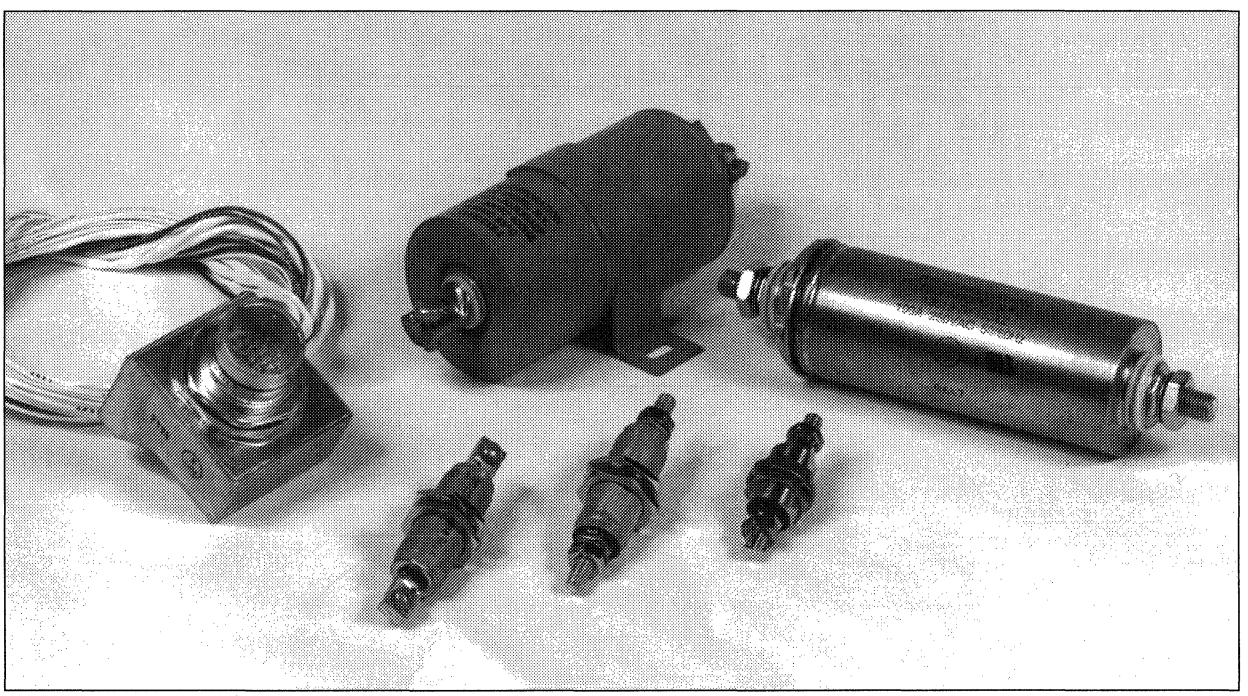
Package Styles: DIL – *Dual-in-line package*, SIL – *Single-in-line package*, SMT– *Surface Mount Package*, QFP — *Quad Flat Pack (surface mount)*, SMTS — *ThinSet Modules*, ULP — *Ultra Low Profile*

12220 WORLD TRADE DRIVE • SAN DIEGO, CA 92128 • TEL: 619/674/8100 • FAX: 619/674/8262 • QUICK-FACTS: 619/674/9672 • WEB: http://www.pulseeng.com

RFI Corporation

EMI/EMC/RFI/EMP FILTERS

- Tubular and subminiature filters
- Military and commercial filters
- High current/voltage EMP filters
- Secure/Shielded installations filters
- Power factor correction coil assemblies
- Filtered circuit breaker panels



RFI's long history in the EMI/RFI filter business has established a long-term quality reputation in the market. RFI's filter products include EMI/EMC/RFI power filters, UL listed filters, QPL filters to MIL-F-15733 and MIL-F-28861, and communication and data filters.

RFI has acquired, and integrated into our facility, the FILTRON COMPANY which was one of the first major EMI/RFI filter companies to emerge in the mid-1940's. The Filtron line of facility-type filters are known worldwide for price/performance features which are superior to any of RFI's competitor's similar offerings.

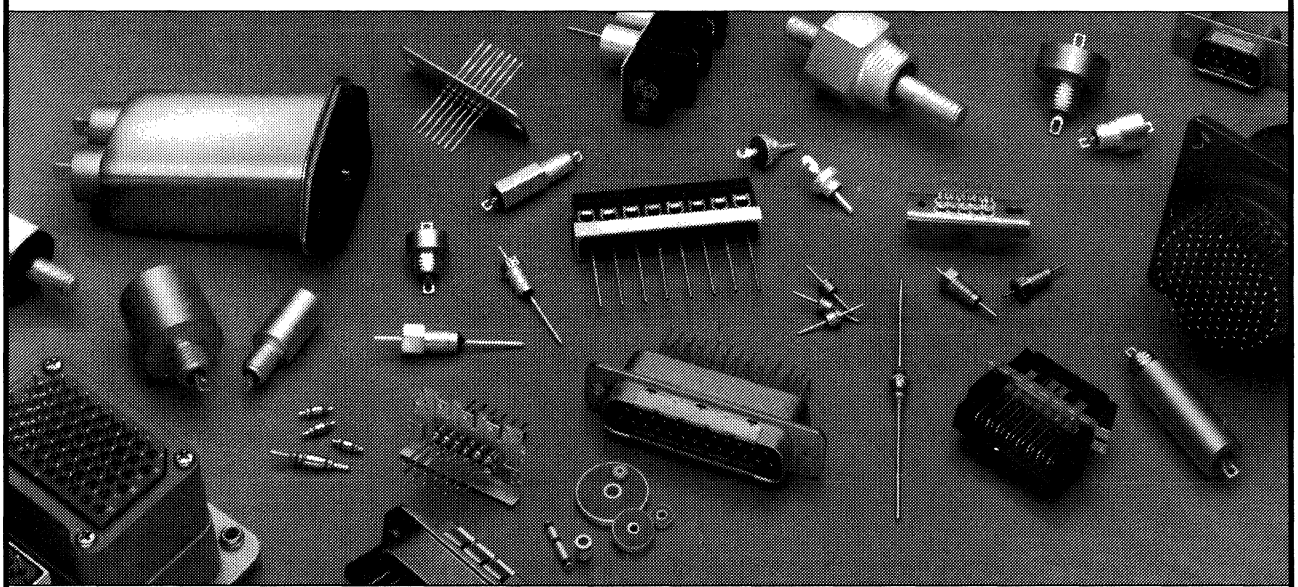
RFI also owns the sole manufacturing rights to the SPRAGUE Electric military line of standard and custom engineered filters.

RFI Corporation

A DEL GLOBAL TECHNOLOGIES CORPORATION

100 Pine Aire Drive, Bay Shore, Long Island, New York 11706 • Phone 516-231-6400 • FAX: 516-231-6465
Visit our Website at http://www.rficorp.com E-Mail us at info@rficorp.com

Clean up Electronic Pollution



with Spectrum Control EMI/RFI Filters and Connectors

Spectrum Control

Since its founding in 1968, Spectrum Control has focused on designing and manufacturing products to suppress or eliminate electromagnetic interference (EMI). We offer a comprehensive line of EMI/RFI solutions, capacitors, filtered arrays, filtered connectors, power products and EMC testing services. We are committed to providing an integrated approach to EMC problem solving by offering customers consulting, diagnostic testing and manufacturing services.

Spectrum products are used in virtually all industries worldwide, including telecommunications, medical, government, military, aerospace, computer and industrial controls.

Rapid Response

Recognizing the importance of on-time delivery, Spectrum Control has instituted a flow "Rapid Response" production system to achieve consistent, on-time delivery performance. This system has enabled Spectrum to establish the industry's shortest product cycle times. Whether it be flow manufacturing or just-in-time . . . we deliver to meet our customer's needs.

Value Added Services

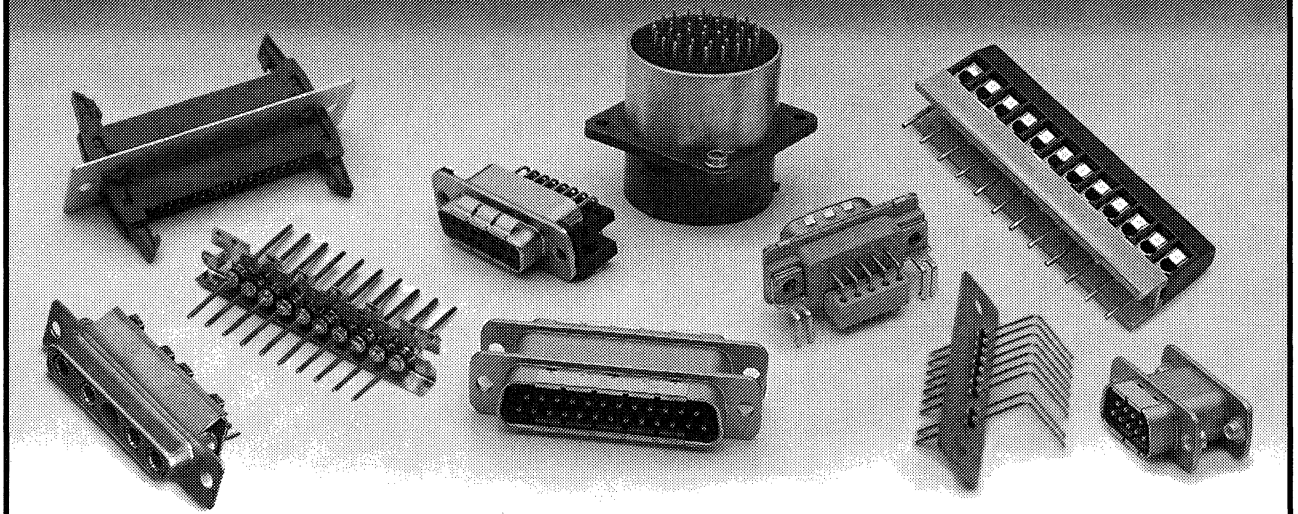
- Wire and cable termination to individual filter assemblies
- Installation of quick disconnects
- Integration of any filter or non-filter product into upper level module to simplify custom assembly
- Flex cable terminations
- Installation of EMI gasketing material to simplify installation

ISO 9001 CERTIFIED

SPECTRUM CONTROL INC.
A Control Products and Systems Company

6000 West Ridge Road, Erie, PA 16506 ■ Phone: 814-835-1510 ■ Fax: 814-835-9000 ■ http://www.spectrumcontrol.com

Great Connections to Global EMC Compliance



Solve your EMI problems with the industry's most complete line of filtered interconnect products

EMI Filtering Expertise

Satisfying your requirements for EMC and physical packaging can be a challenging process. We can help. Our foundation as a producer of capacitors, EMI filters and filtered connectors gives us the design expertise and manufacturing flexibility to develop the most effective and space efficient solution to your EMI problem.

We offer a broad range of EMI filtered connectors including economical ferrite and capacitive types, high performance Pi filter connectors, and high reliability connectors for commercial applications.

Our Complete Filtered Interconnect Line

- D-subminiature connectors (0.318" and 0.590" footprints)
- Hi-density D-subminiature connectors
- High reliability circular connectors
- Terminal blocks
- Filter plates
- Shrouded latch filter plates

Custom Connector Solutions

Despite the breadth of our EMI/RFI filter and connector product line, certain applications demand custom EMC solutions. Our engineering staff will work with your production team to design an EMI/RFI connector which meets your individual requirements for filtering and packaging. And we ensure a timely and dependable delivery schedule.

For more information on our EMI filter products, see our catalog under Filters, RF & Signal.

ISO 9001 CERTIFIED

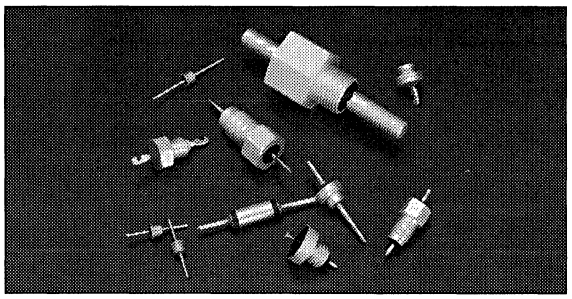
SPECTRUM CONTROL INC.
A Control Products and Systems Company

6000 West Ridge Road, Erie, PA 16506 ■ Phone: 814-835-1510 ■ Fax: 814-835-9000 ■ http://www.spectrumcontrol.com

EMI/RFI Filters and Connectors

SPECTRUM CONTROL INC.

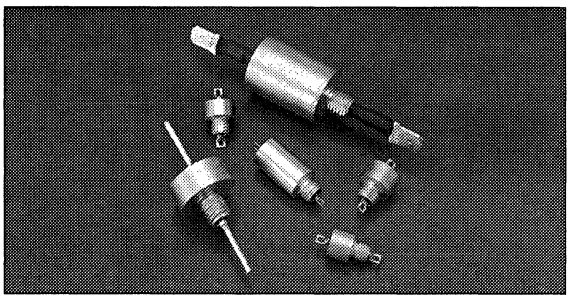
Resin Sealed/Solder-in Filters and Capacitors



Cost effective filtering is available in a wide range of threaded and solder-in bushings, capacitance values, temperature characteristics and circuit types. A high temperature series (300°C) facilitates a variety of soldering techniques. All parts are built in accordance with MIL-F-15733 and MIL-F-28861.

Applications: Transceivers, microwave filters, telecommunications equipment, industrial control systems, and multi-circuit filter assemblies.

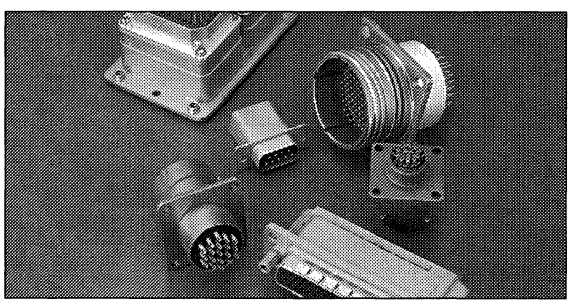
Hermetically Sealed Filters and Capacitors



These filters and capacitors are ideal for EMI/RFI filtering in hostile environments. Design flexibility is enhanced through a wide range of bushing sizes and circuit types. These filters are built in accordance with MIL-F-15733 or MIL-F-28861, with Q.P.L. listings to both. MIL-F-28861 class "S" for space applications available.

Applications: Power supplies, aerospace products and multisection filters.

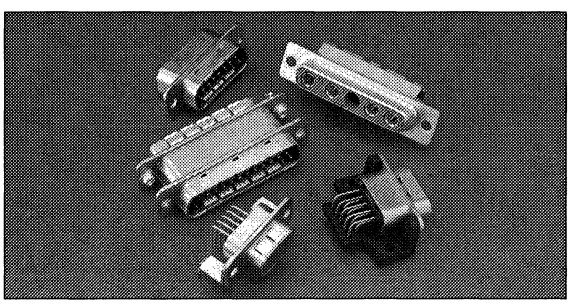
Custom Filtered Connectors



This line of filtered connectors employs multi-layer ceramic capacitors for effective filtering and to allow customization for specific applications. This connector series is available in shell sizes 8 through 25, insert arrangements of up to 128 pins, a wide range of capacitance values and mounting configurations.

Applications: These connectors are intermateable and, in most cases, completely interchangeable with the standard unfiltered connectors found in MIL-C-38999, 26482 and 83723.

Filtered Subminiature D Connectors



These filters provide a space saving solution to EMI/RFI problems, placing filters in the existing connector space, freeing on-board filter area for other uses. They are available in 9 through 50 position in standard density and to 78 position in the high density configuration, with 0.318" and 0.590" footprints and a variety of termination types. Filtering methods include top performing Pi, feed-thru capacitors and ferrites.

Applications: Telecommunications, medical equipment, industrial process equipment, graphics workstations, and personal computers.

ISO 9001 CERTIFIED

SPECTRUM CONTROL INC.

A Control Products and Systems Company

6000 West Ridge Road, Erie, PA 16506 ■ Phone: 814-835-1510 ■ Fax: 814-835-9000 ■ http://www.spectrumcontrol.com

TOKO Saw Filters-Narrow Band

1-800-PIK-TOKO
http://www.tokoam.com

SF

The SF type SAW filter is a multimode resonator filter, designed primarily as the IF filter for radio communications equipment. These devices feature very low insertion loss and very narrow bandwidths (Q's up to 15,000 are possible).

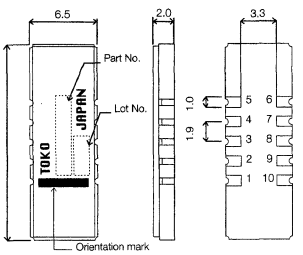
The SA type SAW devices manufactured by TOKO are transversal type filters. Manufactured using new low loss techniques, these filters have lower loss than traditional transversal filters, at the same time maintaining low in-band and group delay ripple.

STANDARD PART NUMBERS

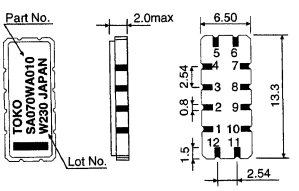
■ Electrical Characteristics TA = 25°C. Detailed specifications for each p/n are available from Toko.

DIMENSIONS

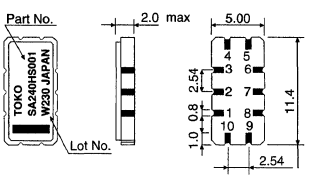
Style L



Style W



Style H



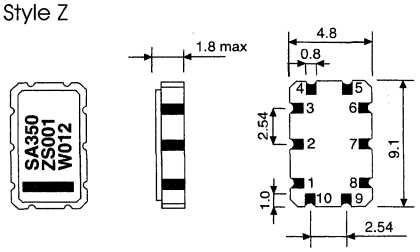
Type SF (Narrow Band IF Filters)

Typical Applications	TOKO Part Number	Center Frequency (MHz)	Bandwidth 3dB (kHz min)	Attenuation (dBmin) @fo±MHz	Attenuation (dBmin) @fo-910kHz	Insertion Loss (dB max)	Operating Temp. Range (°C)	Package Style
AMPS/	SF082HS-004	82.20	±15	9@fo±60	65	6	-30~+80	H
IS-136	SF082WA-001	82.20	±20	15@fo±60	70	5.0	-30~+80	W
	SF083HS-020	83.16	±15	12@fo+60	65	5.0	-30~+80	H
	SF083TS-011	83.16	±15	25@fo±60	70	5.0	-30~+80	T
	SF083WA-001	83.16	±15	20@fo±60	70	5.0	-30~+75	W
	SF083WA-002 (Balanced I/O)	83.16	±15	15@fo±60	32(±3.6MHz)	5.0	-30~+80	W
	SF085HS-009	85.38	±15	25@fo±60	45	5.0	-30~+80	H
	SF085WD-001	85.38	±15	14@fo±60	65	5.0	-30~+80	W
	SF086HS-005	86.46	±15	15@fo±60	40@fo±400	5.0	-20~+70	H
	SF086HS-008	86.85	±15	15@fo±60	65	6.0	-30~+80	H
	SF086WA-001	86.85	±15	10@fo±60	70	4.0	-30~+80	W
	SF109WS-007	109.65	±30	15@fo±100	55	5.0	-20~+70	W
	SF148XB-002	148.05	±12.5	30@fo±120	60	5.0	0~+70	X
GSM/PCS	SF225ZA-001	225.00	±85	20@fo±500	40	9.0	-10~+60	Z
	SF246ZA-019	246.00	±80	25@fo±500	40	8.5	-10~+60	Z
PDC	SF128YD-001	128.90	±19	25@fo±100	72	5.0	-20~+85	Y
	SF130YD-015	130.05	±19	25@fo±100	72	5.0	-20~+75	Y
	SF130YD-016	130.00	±19	30@fo±100	72	5.0	-20~+75	Y
	SF130ZA-001	130.00	±19	20@fo±100	72	5.0	-20~+75	Z
	SF147YD-003	147.55	±19	23@fo±100	72	5.0	-20~+75	Y
PHS/MCS	SF243ZA-003	243.95	±110	30@fo±600	40(±1.2MHz)	9.0	-10~+60	Z
	SF248ZA-003	248.45	±110	30@fo±600	40(±1.2MHz)	9.0	-10~+60	Z
RF Data	SF390ZA-001	390.00	±220	20@fo±800	38@fo-1500 40@fo+1500	9.0	-10~+60	Z
General	SF090HS-004	90.00	±15	15@fo+60	65	6.0	-30~+80	H
	SF090TS-002	90.00	±15	15@fo±60	65	6.0	-30~+80	T

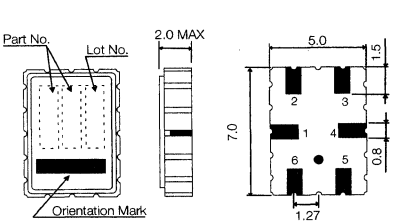
Type SA (Wide Band IF Filters)

Typical Applications	TOKO Part Number	Center Frequency (MHz)	Bandwidth 3dB (kHz min)	Attenuation (Bmin) @fo±MHz	Attenuation (dBmin) @fo ±MHz	Insertion Loss (dB max)	Operating Temp. Range (°C)	Package Style
CDMA	SA085LS-011	85.38	±630(6dB)	30@fo±0.90	—	17.0	-30~+80	L
	SA210WA-001	210.38	±630 (5dB)	33@fo±1.25	—	10.5	-30~+80	W
	SA130ZA-004[1]	130.38	±630	25@fo+1.98	40@fo±250	12.0	-30~+80	Z
GSM	SA153WA-004	153.00	±75	20@fo±0.80	30@fo±1.5	7.0	-20~+70	W
RF Data	SA070WA-010	70.00	±575	40@fo±1.75	45@fo±4.0	17.0	-20~+70	W
	SA240WA-001	240.192	±650	15@fo±1.728	40@fo±2.88	9.0	-10~+60	W
DAB	SA038WA-008	38.91	±610	38@fo±1.6	—	25.0	+25	W
General	SA200HS-004	200.00	±2500	40@fo±5	50@fo±20	20.0	-20~+70	H

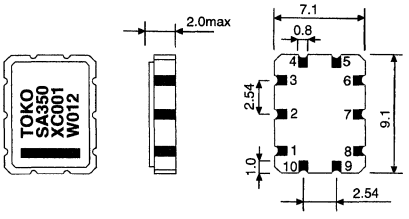
Style Z



Style Y



Style X

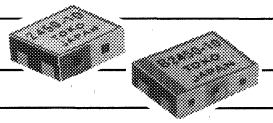


1-800-PIK-TOKO
http://www.tokoam.com

Band and Low Pass Filters

TOKO RF

TDF SERIES CHIP DIELECTRIC FILTERS



Toko's TDF Series is a broad line of miniature chip dielectric filters. They are dielectric resonator coupled bandpass filters made of a unique monolithic construction. The filters are ultra compact and exist in several; low profile versions, some less than 2.0mm, making them ideal for PCMCIA applications. Standard parts are available for most common worldwide communications systems including: cellular, 900 MHz cordless, RF LANs, GPS, PCN, PHS, DECT and PCS.

FEATURES

- 800 -2500 MHz
- Excellent out of band attenuation
- Reflow solderable
- Low profile package
- 50Ω Input/Output
- Packaged on tape/reel

STANDARD PART NUMBERS

TOKO Part Number	Poles	Fo (MHz)	BW (fo±MHz Min)	I.L. (dB Max)	VSWR	Length (L mm)	Pin Pitch (P mm)	Selectivity (dB min @ MHz)	Application
TDF2A-836E-10	2	836.5	12.5	2.7	2.0	9.9	4.5	6 (Fo ±32.5)	AMPS
TDF2A-881E-10	2	881.5	12.5	2.7	2.0	9.4	4.5	6 (Fo±32.5)	AMPS
TDF3A-1280H-10	2	1280.0	20.0	2.0	2.0	6.1	3.0	26 (Fo - 100)	RADIO
TDF2A-1575B-11	2	1575.4	5.0	5.5	2.3	5.4	2.5	22 (Fo±50)	GPS
TDF2A-1575B-12	2	1575.4	5.0	2.7	2.0	5.2	2.5	30, 28 (Fo-140, +140)	GPS
TDF2A-1575B-13	2	1575.4	5.0	1.0	2.0	5.2	2.0	7 (Fo±140)	GPS
TDF3A-1575B-10	2	1575.4	5.0	3.0	2.2	5.4	2.5	28, 26 (Fo-140, +140)	GPS
TDF3A-1907E-18	2	1907.0	12.5	0.75	1.5	6.1	3.0	45, 9 (Fo -485, +235)	PHS
TDF3A-1907E-19	2	1907.0	12.5	0.7	1.5	5.9	2.5	35, 5 (Fo-485, +235)	PHS
TDF2A-2442A-11	2	2442.0	2.0	4.3	2.0	5.2	2.5	15 (Fo±60)	RF LAN
TDF2A-2450T-10	2	2450.0	50.0	2.0	2.0	5.1	2.5	20, 16 (Fo -280, +280)	RF LAN
TDF2A-2484A-10	2	2484.0	2.0	4.3	2.0	5.2	2.5	15, 20 (Fo±60, ±90)	RF LAN
TDF2A-2484E-11	2	2484.0	13.0	3.0	1.6	5.1	3.0	35, 30 (Fo±350, ±700)	RF LAN
TDF2A-2484E-12	2	2484.0	13.0	2.0	1.6	5.1	3.0	25, 30 (Fo ±350, ±700)	RF LAN
TDF2A-2500A-12	2	2500.0	2.0	5.0	2.0	5.2	3.0	20, 25 (Fo±60, ±90)	VICS
TDFMA-915E-10	2	915.0	13.0	3.0	2.0	4.0	4.0	12 (Fo ±50)	900 ISM
TDF2B-915E-10	3	915.0	13.0	3.5	2.0	7.9	4.0	18 (Fo±50)	900 ISM
TDFM1A-930A-12	2	930.5	1.5	3.5	2.0	7.5	—	40 (Fo-90)	PAGER
TDFM2A-1575A-10	2	1575.4	1.0	3.2	2.0	5.25	2.5	30, 28 (Fo-140, +140)	GPS
TDFM2A-1575A-11	2	1575.4	1.0	5.5	2.3	5.2	2.0	22(Fo-50)	GPS
TDFM1B-147O-11	3	1747.5	37.5	3.2	2.0	4.75	2.0	25, 25 (Fo—160, ±240)	PCN
TDFM1B-1842O-11	3	1842.5	37.5	3.2	2.0	4.5	2.0	8, 25 (Fo±80, ±160)	PCN
TDFM1B-1880L-11	3	1880.0	30.0	3.2	2.0	4.4	2.0	34, 39 (Fo±190, ±240)	PCS
TDFM3A-1890D-16	2	1890.0	10.0	1.8	2.0	6.2	4.0	30, 5 (Fo-216, -48)	DECT
TDFM3A-1890D-17	2	1890.0	10.0	2.5	2.0	6.1	4.0	37, 7.5 (Fo-216, -48)	DECT
TDFM3A-1890D-18	2	1890.0	10.0	3.0	2.0	6.3	4.0	24, 20 (Fo-104, +113)	DECT
TDFM3A-1907E-10	2	1907.0	12.5	1.0	1.5	3.8	2.0	40, 10 (Fo-485, +235)	PHS
TDFM3A-1907E-11	2	1907.0	12.0	1.6	1.5	3.8	2.0	35, 20 (Fo -485, +235)	PHS
TDFM1B-1920V-10	3	1920.0	70.0	2.0	2.0	4.1	2.0	25(Fo -350, +780)	PCS
TDFM2A-1920D-10	2	1920.0	10.0	3.0	2.0	4.3	2.5	33, 27 (Fo -170, +170)	PCS
TDFM1B-1960L-11	3	1960.0	30.0	3.2	2.0	4.2	2.0	34, 39 (Fo±190, ±240)	PCS
TDFM3C-1960L-10	4	1960.0	30.0	4.0	2.0	6.4	4.5	10 (Fo±50)	PCS
TDFM1A-2450T-10	2	2450.0	50.0	2.0	2.0	5.2	3.0	20, 16 (Fo-280, +280)	RF LAN
TDFM1B-2450T-10	3	2450.0	50.0	2.3	2.0	5.1	2.5	24, 30 (Fo -190, +350)	RF LAN
TDFM1C-2450T-10	4	2450.0	50.0	3.0	2.0	9.0	—	26, 37 (Fo±150, ±200)	RF LAN
TDFM1A-2484E-10	2	2484.0	13.0	2.0	2.0	5.1	3.0	25, 30 (Fo ±350, ±700)	RF LAN
TDFM1A-2484E-11	2	2484.0	13.0	3.0	2.0	5.2	3.0	35, 30 (Fo±350, ±700)	RF LAN
TDF8A-904A-11	2	904.0	1.0	3.0	2.0	8.5	3.5	40 (Fo±140)	900 CT
TDFS8A-926A-11	2	926.0	1.0	3.0	2.0	8.3	3.5	40 (Fo±140)	900CT
TDFS8A-930A-10	2	930.5	1.5	3.5	2.0	7.8	—	40 (Fo±90)	PAGER

LTF SERIES MULTILAYER LOW PASS FILTER

Toko's LTF Series is a chip multilayer low pass filter. It is an ultra compact solution, ideal for keeping unwanted harmonics of the PA and LO out of the system. Toko's proprietary ceramic multilayer material is utilized for excellent performance and exceptional reliability. Specific parts have been designed for most common systems, such as cellular, ISM-900, PDC-1.5, PCS-1900, DCS-1800, DECT, PHS, and ISM-2.4.

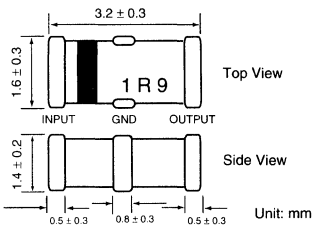
FEATURES

- Miniature footprint: 3.2 x 1.6mm (1206)
- Low profile (1.4mm)
- Carrier frequency range: 800MHz~2.6GHz
- Suitable for flow and reflow soldering
- Operating temperature range: -25°C to +80°C
- Storage temperature range: -40°C to +85°C
- Packaged on Tape and Reel

TOKO Part Number	Nominal Fo MHz	Bandwidth MHz	Insertion Loss	Bandwidth VSWR	Attenuation @ 2 x (fo ± BW)	Attenuation @ 3 x (fo ± BW)	Power Capacity	Impedance
LTF3216L-FR80G_*	836.5	25	0.6dBmax (0.35dB typ)	1.5max (1.15 typ)	30dB min (37dB typ)	18dB min (27dB typ)	2 W (max)	50Ω
LTF3216L-FR90G_*	902.5	25						
LTF3216L-FR90C_*	968.0	25						
LTF3216L-FR90A_*	915	26						
LTF3216L-F1R3G_*	1311	24					3W (max)	
LTF3216L-F1R4G_*	1441	24						
LTF3216L-F1R4A_*	1489	24						
LTF3216L-F1R6G_*	1660	25						
LTF3216L-F1R7G_*	1747.5	75						
LTF3216L-F1R8G_*	1880	60						
LTF3216L-F1R9A_*	1890	20						
LTF3216L-F1R9G_*	1907.5	25						
LTF3216L-F2R4G_*	2450	100						

* Add L to end of part number to order low cost version with 2nd harmonic attenuation 25dB min.

DIMENSIONS



TOKO America, Inc. ■ 1250 Feehanville Drive ■ Mount Prospect, IL 60056 ■ Tel: (847) 297-0070 ■ Fax: (847) 699-7864

TTE® America's Filter Specialist since 1956

Company Profile

Established in 1956, TTE continues its pioneering leadership role in the design, development and manufacture of high quality products. A unique interaction between design and quality control engineers enables us to continuously provide the high reliability necessary in this ever-changing area of high technology.

Initially TTE manufactured LC Filters in the frequency range of 5Hz to 100kHz. As our company expanded, so has our product line. Today, TTE filters are available for any cut-off or center frequency from 0.1Hz to 18GHz. Also available are precision inductors, attenuators, terminations, baluns as well as matching and isolation transformers for most of the same frequency range. We employ state-of-the-art instrumentation, such as the HP model 8720D network analyzer.

TTE supplies a wide range of critical markets including communications, aerospace, radar, sonar, wireless, data acquisition, telemetry, PCS and many more. In addition, we provide and maintain a quality assurance program that is based on MIL-Q-9858 and MIL-I-45208.

TTE is a leader in customer service, too. Ever-aware of your critical need for fast, dependable shipments, we maintain a large inventory of standard materials which affords us the ability to deliver most products within two weeks.

Please call with any questions that may arise. Our staff is always available and pleased to assist you with part number selection, as well as providing you with filter simulations at no charge.

Thank you for considering TTE products for your application.

TTE, Incorporated
11652 Olympic Blvd., Los Angeles, CA 90064
Fax.: 800.473.2791 / 310.445.2791
email: sls@tte.com
Tel.: 800.776.7614 / 310.478.8224
website: http://www.tte.com

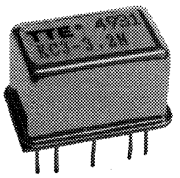
America's Filter Specialist since 1956 TTE®

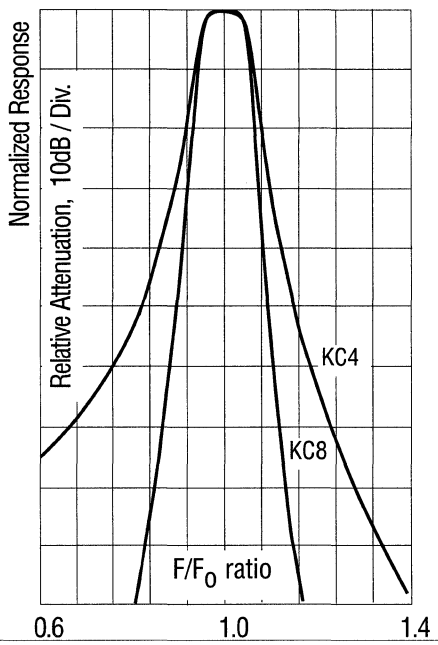
General Specifications

Chebyshev Bandpass Filters

F_0 - Center Frequency	: 500Hz to 1000MHz
†% Bandwidth range at 3dB	: from 3% to 25% F_0
Number of poles available	: from 2 to 11
Impedance (selection) range	: from 50Ω's to 10kΩ's
Insertion Loss at F_0	: <-12dB typically
VSWR at F_0	: 1.5:1 typically
Operating temperature	: 0° to +70°C
Case sizes range from	: 0.6" x 1.2" x 0.4"
Connect via	: Surface mount, PCB pins, BNC or SMA connectors

†Bandwidths from 2% to 70% F_0 are available. Please phone, fax or e-mail your specifications to us.





Stopband to Passband Bandwidth Ratios

Series Number	BWR	*Stopband Attenuation
KC2	10.0:1	-30dBc
KC3	12.0:1	-50dBc
KC4	6.0:1	-50dBc
KC5	4.3:1	-50dBc
KC6	4.0:1	-50dBc
KC7	3.5:1	-55dBc
KC8	3.0:1	-55dBc
KC9	2.5:1	-55dBc

The bandwidth ratios may vary at bandwidth and frequency extremes.
Guaranteed **minimum stopband attenuation.*

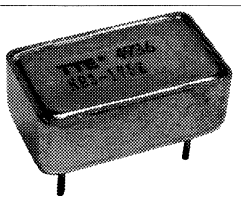
These and many more filters are covered in TTE's 100 page Filter Catalog. Request one today!

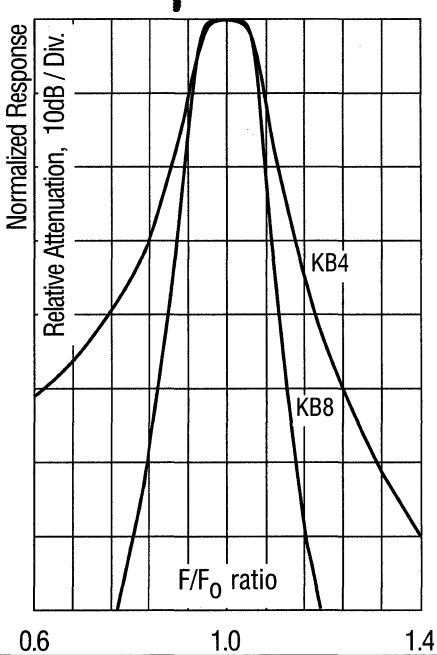
General Specifications

Butterworth Bandpass Filters

F_0 - Center Frequency	: 500Hz to 1000MHz
†% Bandwidth range at 3dB	: from 3% to 25% F_0
Number of poles available	: from 2 to 11
Impedance (selection) range	: from 50Ω's to 10kΩ's
Insertion Loss at F_0	: <-12dB typically
VSWR at F_0	: 1.5:1 typically
Operating temperature	: 0° to +70°C
Case sizes range from	: 0.6" x 1.2" x 0.4"
Connect via	: Surface mount, PCB pins, BNC or SMA connectors

†Bandwidths from 2% to 70% F_0 are available. Please phone, fax or e-mail your specifications to us.





Stopband to Passband Bandwidth Ratios

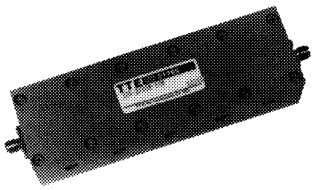
Series Number	BWR	*Stopband Attenuation
KB2	7.0:1	-20dBc
KB3	8.0:1	-35dBc
KB4	8.0:1	-45dBc
KB5	6.0:1	-50dBc
KB6	5.0:1	-50dBc
KB7	4.0:1	-50dBc
KB8	3.5:1	-50dBc
KB9	3.0:1	-50dBc

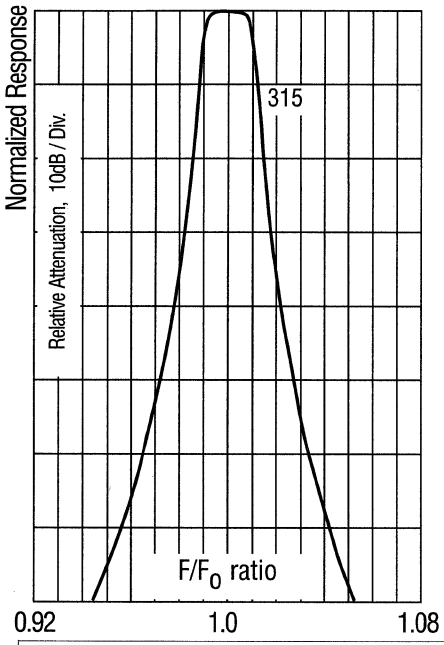
The bandwidth ratios may vary at bandwidth and frequency extremes.
Guaranteed **minimum stopband attenuation.*

TTE, Incorporated
11652 Olympic Blvd., Los Angeles, CA 90064
Fax.: 800.473.2791 / 310.445.2791
email: sls@tte.com
Tel.: 800.776.7614 / 310.478.8224
website: http://www.tte.com

TTE®

America's Filter Specialist since 1956





General Specifications

Standard Combline Bandpass Filters

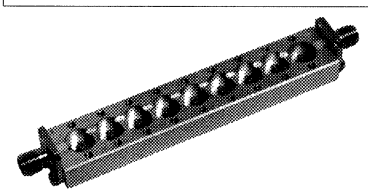
F_0 - Center Frequency	: 700MHz to 3500MHz
Passband Bandwidth	: 1.5% F_0
Passband Attenuation	: -1dBc maximum
Passband VSWR	: 1.5:1 maximum
Number of poles	: 5
Impedance	: 50Ω's
Insertion Loss at F_0	: <-2dB
Operating temperature	: 0° to +70°C
Case sizes range from	: 1.25" x 1.25" x 5.5" +conn.
Connect via	: SMA female connectors std : N connectors optional.

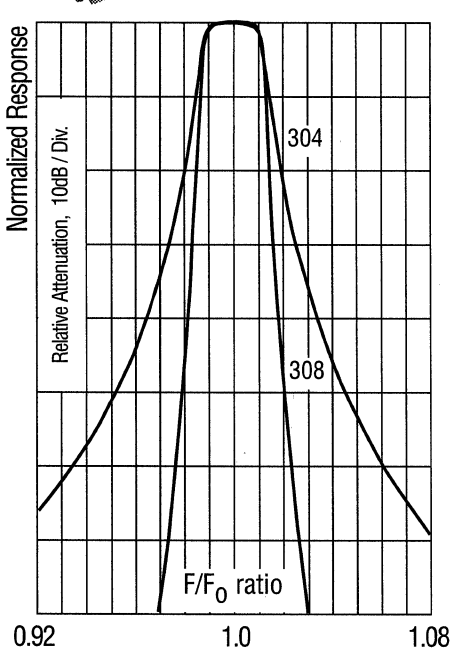
Stopband to Passband Bandwidth Ratios

Series Number	BWR	*Stopband Attenuation
315	4.3:1	-50dBc

The bandwidth ratios may vary at bandwidth and frequency extremes.
Guaranteed **minimum stopband attenuation.*

2 week shipment is standard, for series 315.





General Specifications

Combline Bandpass Filters

F_0 - Center Frequency	: 250MHz to 18GHz
Passband Bandwidth	: 1.5% to 25%F_0
Passband Attenuation	: -1dBc maximum
Passband VSWR	: 1.5:1
Number of poles	: 2 to 11
Impedance	: 50Ω's
Insertion Loss at F_0	: <-2dB
Operating temperature	: 0° to +70°C
Case sizes range from	: 1.25" x 1.25" x 5.5" +conn.
Connect via	: SMA female connectors std : N connectors optional.

Stopband to Passband Bandwidth Ratios

Series Number	BWR	*Stopband Attenuation
302	10.0:1	-25dBc
303	12.0:1	-50dBc
304	6.0:1	-50dBc
305	4.3:1	-50dBc
306	4.0:1	-50dBc
307	3.5:1	-55dBc
308	3.0:1	-55dBc
309	2.5:1	-55dBc

The bandwidth ratios may vary at bandwidth and frequency extremes.
Guaranteed **minimum stopband attenuation.*

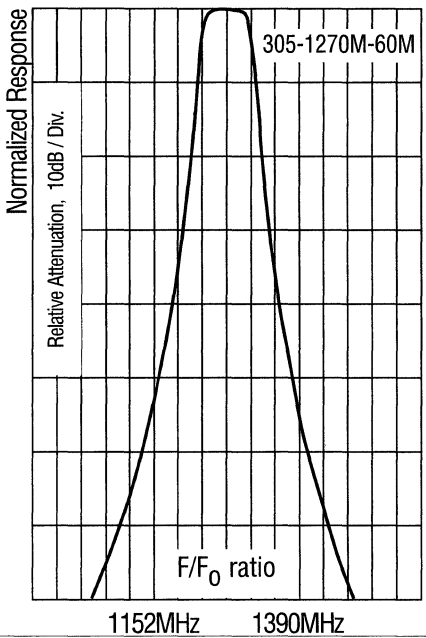
TTE, Incorporated
11652 Olympic Blvd., Los Angeles, CA 90064
Fax.: 800.473.2791 / 310.445.2791
email: sls@tte.com
Tel.: 800.776.7614 / 310.478.8224
website: http://www.tte.com

America's Filter Specialist since 1956 **TTE**®

General Specifications

Stock Combline Bandpass Filter

Passband	: 1240 to 1300MHz
Passband Insertion Loss	: 1dB maximum
Passband VSWR	: 1.25:1 typically 1.35:1 maximum
Stopband	: from 0 to 1152MHz and from 1390 to 5000MHz
Stopband Attenuation	: -50dBc minimum
Impedance	: 50Ω's
Case dimensions	: 1.1" x 1.75" x 4.1" +conn.
Connect via	: SMA female connectors std
Price	: $200.00 each



Stopband to Passband Bandwidth Ratios

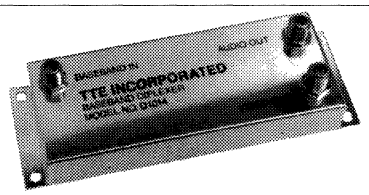
Model Number	BWR	*Stopband Attenuation
305-1270M-60M	3.2:1	-50dBc

Guaranteed **minimum stopband attenuation.*

Model number 305-1270M-60M, is available from limited factory stock.

General Specifications

Baseband Splitter : D1014



Low Frequency Specifications

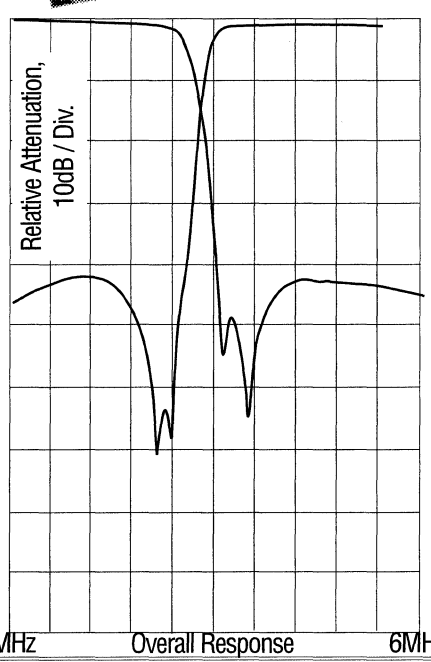
Passband (minimum)	: from 0 to 4.2MHz
Passband Insertion Loss	: <-3dB
Passband VSWR	: 1.5:1 typically
Chroma delay	: 25nS typically 35nS maximum
Stopband	: from 4.5 to 500MHz

High Frequency Specifications

Passband (minimum)	: from 4.5 to 75MHz
Passband Insertion Loss	: <-3dB
Passband VSWR	: 1.5:1 typically
Stopband	: from 0 to 4.2MHz

Common Specifications

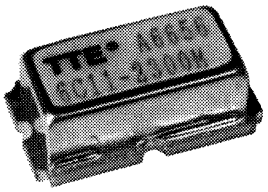
In / Output impedance	: 75Ω's
Connect via	: 3 female F connectors
Approximate dimensions	: 2" x 6" x 0.75" +connectors.
Price	: $220 each
Delivery	: Factory stock (limited)

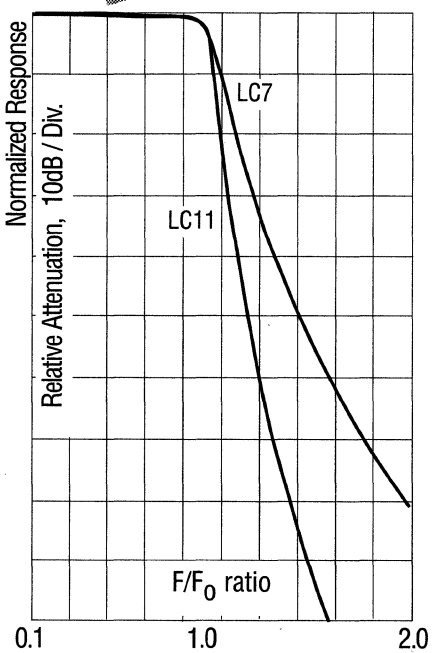


TTE, Incorporated
11652 Olympic Blvd., Los Angeles, CA 90064
Fax.: 800.473.2791 / 310.445.2791
email: sls@tte.com
Tel.: 800.776.7614 / 310.478.8224
website: http://www.tte.com

TTE®

America's Filter Specialist since 1956





General Specifications

Chebyshev Lowpass Filters

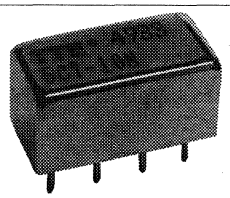
(F_C) -3dB Frequency	: 100Hz to 3000MHz
Number of poles available	: from 2 to 11
Impedance (selection) range	: from 50Ω's to 10kΩ's
Insertion Loss at 0.1F_C	: <-0.2dB typically
VSWR for 80%F_C	: 1.5:1 typically
Operating temperature	: 0° to +70°C
Case sizes range from	: 0.4" x 0.8" x 0.4"
Connect via	: Surface mount, PCB pins, BNC or SMA connectors

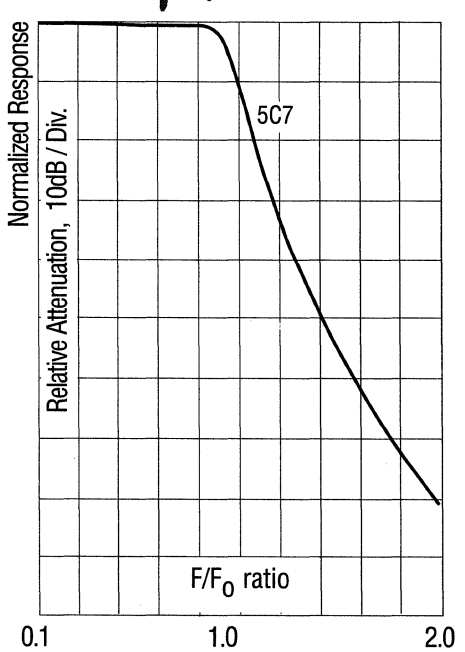
Stopband to Passband Transition Ratios

Series Number	F/F_C	*Stopband Attenuation
LC2	10.0:1	-40dBc
LC3	4.20:1	-40dBc
LC4	2.70:1	-40dBc
LC5	2.50:1	-50dBc
LC6	2.001	-50dBc
LC7	2.00:1	-60dBc
LC8	1.85:1	-60dBc
LC9	1.60:1	-60dBc
LC10	1.50:1	-60dBc
LC11	1.40:1	-60dBc

*Guaranteed ***minimum*** stopband attenuation.

TTE designs and manufactures all its products in the USA.





General Specifications

Chebyshev Lowpass Filters

(F_C) -3dB Frequency	: 5MHZ to 3000MHz
Number of poles available	: from 3 to 7
Impedance	: 50Ω's
Insertion Loss at 0.1F_C	: <-0.2dB typically
VSWR for 80%F_C	: 1.5:1 typically
Operating temperature	: 0° to +70°C
Case sizes range from	: 0.4" x 0.8" x 0.4"
Connect via	: Surface mount or PCB pins

Stopband to Passband Transition Ratios

Series Number	F/F_C	*Stopband Attenuation
5C2	4.20:1	-40dBc
5C3	2.70:1	-40dBc
5C4	2.50:1	-50dBc
5C5	2.00:1	-50dBc
5C6	2.001	-60dBc

*Guaranteed ***minimum*** stopband attenuation.

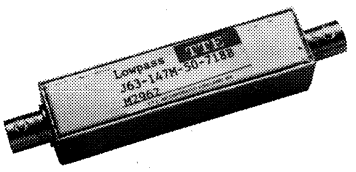
TTE, Incorporated
11652 Olympic Blvd., Los Angeles, CA 90064
Fax.: 800.473.2791 / 310.445.2791
email: sls@tte.com
Tel.: 800.776.7614 / 310.478.8224
website: http://www.tte.com

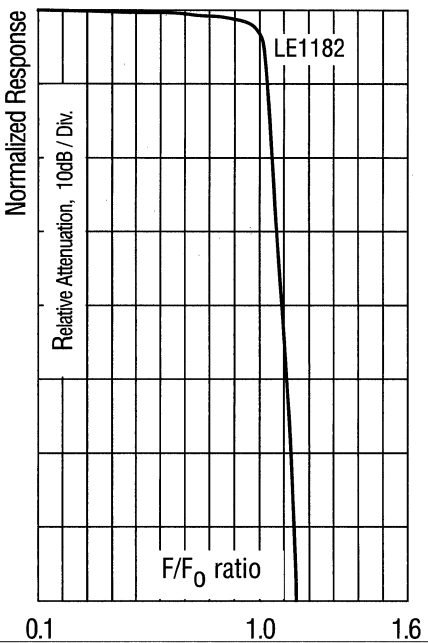
America's Filter Specialist since 1956 **TTE**®

General Specifications

Anti-Aliasing Lowpass Filters

(F_C) -3dB Frequency	: 1kHz to 200MHz
Impedance (selection) range	: from 50Ω's to 10kΩ's
Insertion Loss at 0.1F_C	: <-0.2dB typically
VSWR for 80%F_C	: 1.5:1 typically
Operating temperature	: 0° to +70°C
Case sizes range from	: 0.8" x 1.6" x 0.4"
Connect via	: Surface mount, PCB pins, BNC or SMA connectors





Stopband to Passband Transition Ratios

Series Number	F/F_C	*Stopband Attenuation
7 pole elliptical		
LE7415	1.15:1	-40dBc
LE7640	1.40:1	-60dBc
LE7890	1.90:1	-80dBc
9 pole elliptical		
LE9410	1.10:1	-40dBc
LE9615	1.15:1	-60dBc
LE9840	1.40:1	-80dBc
11 pole elliptical		
LE1141	1.06:1	-40dBc
LE1161	1.101	-60dBc
LE1182	1.20:1	-80dBc

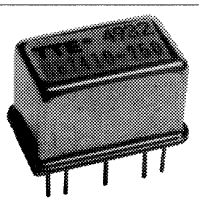
*Guaranteed **minimum** stopband attenuation.*

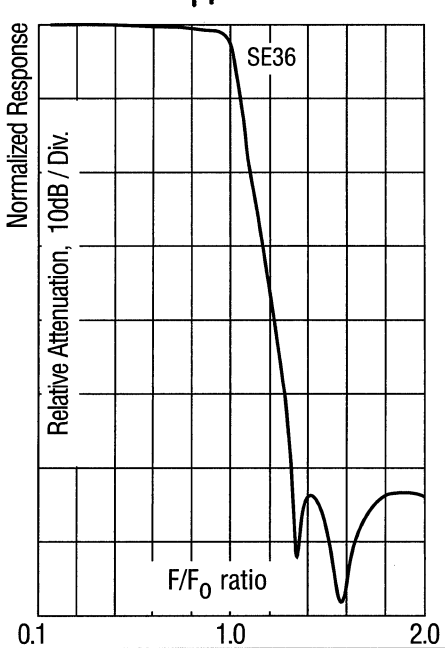
TTE offers Phase and Amplitude matched filters.

General Specifications

Sub-miniature Anti-Aliasing Lowpass Filters

(F_C) -3dB Frequency	: 5MHz to 100MHz
Impedance (selection) range	: from 50Ω's or 75Ω'S
Insertion Loss at 0.1F_C	: <-0.2dB typically
VSWR for 80%F_C	: 1.5:1 typically
Operating temperature	: 0° to +70°C
Case sizes range from	: 0.5" x 0.8" x 0.5"
Connect via	: PCB pins





Stopband to Passband Transition Ratios

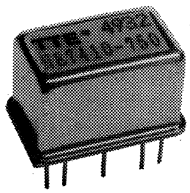
Series Number	F/F_C	*Stopband Attenuation
SE24	1.50:1	-40dBc
SE26	2.20:1	-60dBc
SE34	1.15:1	-40dBc
SE36	1.35:1	-60dBc

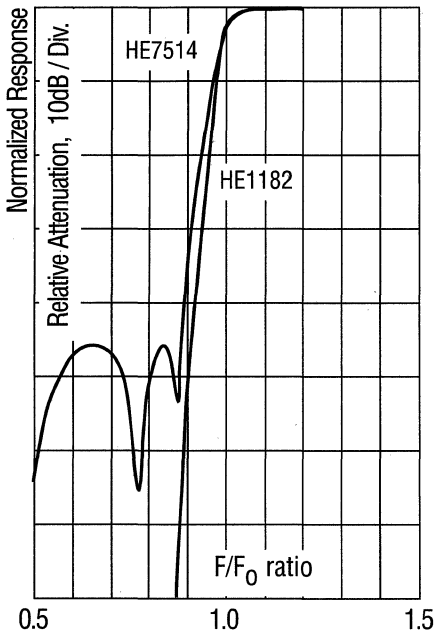
*Guaranteed **minimum** stopband attenuation.

TTE, Incorporated
11652 Olympic Blvd., Los Angeles, CA 90064
Fax.: 800.473.2791 / 310.445.2791
email: sls@tte.com
Tel.: 800.776.7614 / 310.478.8224
website: http://www.tte.com

TTE®

America's Filter Specialist since 1956





General Specifications

Elliptical Function Highpass Filters

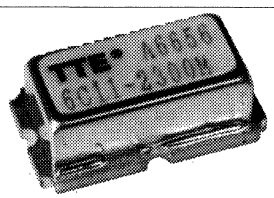
(F_C) -3dB Frequency	: 1kHz to 200MHz
Impedance (selection) range	: from 50Ω's to 39kΩ's
Insertion Loss at 5 F_C	: <-0.2dB typically
VSWR for 80%F_C	: 1.5:1 typically
Operating temperature	: 0° to +70°C
Case sizes range from	: 0.8" x 1.6" x 0.4"
Connect via	: Surface mount, PCB pins, BNC or SMA connectors

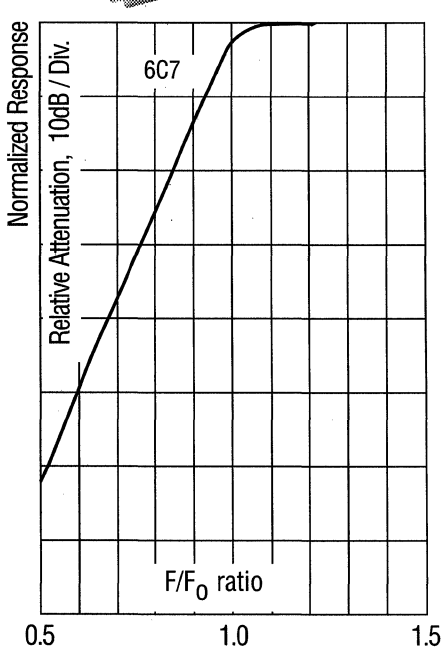
Stopband to Passband Transition Ratios

Series Number	F/F_C	*Stopband Attenuation
7 pole elliptical		
HE7415	0.86:1	-40dBc
HE7610	0.71:1	-60dBc
HE7890	0.52:1	-80dBc
9 pole elliptical		
HE9410	0.90:1	-40dBc
HE9615	0.86:1	-60dBc
HE9840	0.71:1	-80dBc
11 pole elliptical		
HE1141	0.94:1	-40dBc
HE1161	0.901	-60dBc
HE1182	0.83:1	-80dBc

*Guaranteed **minimum** stopband attenuation.*

TTE can supply you with 1000 units per week, allow an 8 week ramp-up time.





General Specifications

Chebyshev Highpass Filters

(F_C) -3dB Frequency	: 5MHz to 500MHz
Number of poles available	: from 3 to 7
Impedance (selection) range	: 50Ω's or 75Ω's
Insertion Loss at 5 F_C	: <-0.2dB typically
VSWR for 80%F_C	: 1.5:1 typically
Operating temperature	: 0° to +70°C
Case sizes range from	: 0.4" x 0.8" x 0.4"
Connect via	: Surface mount, PCB pins

Stopband to Passband Transition Ratios

Series Number	F/F_C	*Stopband Attenuation
6C3	0.25:1	-40dBc
6C4	0.37:1	-40dBc
6C5	0.40:1	-50dBc
6C6	0.50:1	-50dBc
6C7	0.50:1	-60dBc

*Guaranteed **minimum** stopband attenuation.*

TTE, Incorporated
11652 Olympic Blvd., Los Angeles, CA 90064
Fax.: 800.473.2791 / 310.445.2791
email: sls@tte.com
Tel.: 800.776.7614 / 310.478.8224
website: http://www.tte.com

America's Filter Specialist since 1956 **TTE®**

Product Summary Page

Bandpass Filters

LC Filters from 100Hz to 1000MHz
Active RC Filters from 1Hz to 200kHz
Combline and Interdigital Filters from 250MHz to 18GHz
Surface mount, PCB and connectorized packages available

Lowpass Filters

LC Filters from 100Hz to 3000MHz
Active RC Filters from 0.1Hz to 500kHz
Surface mount, PCB and connectorized packages available

Highpass Filters

LC Filters from 100Hz to 500MHz
Active RC Filters from 0.1Hz to 500kHz
Surface mount, PCB and connectorized packages available

Band Rejection Filters

LC Filters from 1kHz to 200MHz
Active RC Notch Filters from 1Hz to 10kHz
Surface mount, PCB and connectorized packages available

Diplexers and Multiplexers

from 10kHz to 18GHz

Transformers

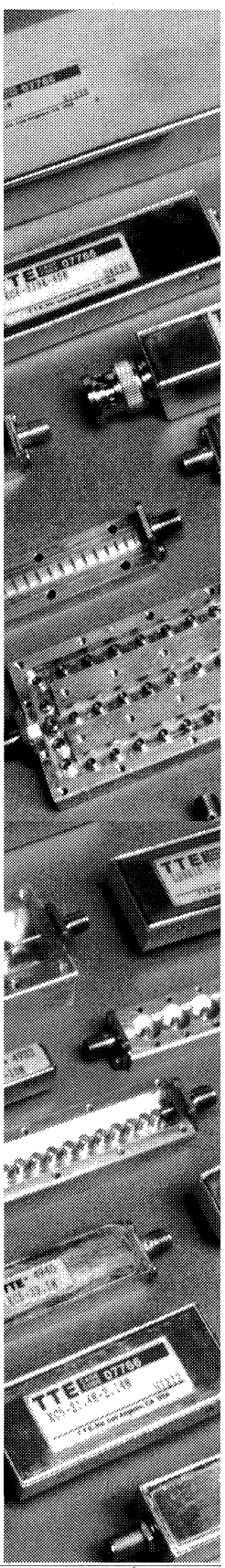
Frequency range : 10Hz to 100MHz
Matches : 1:1 to 16:1
Surface mount, PCB and connectorized packages available

Inductors

High Q precision inductors from 10nH to 100H; Q=100
Lowpass filter kits
Constant impedance Bandpass filter kits
Surface mount, PCB and connectorized packages available

Attenuators

-1dB steps to -10dB and -10dB steps to -60dB
-6dB terminations, ideal for terminating filters



TTE, Incorporated
11652 Olympic Blvd., Los Angeles, CA 90064
Fax.: 800.473.2791 / 310.445.2791
email: sls@tte.com
Tel.: 800.776.7614 / 310.478.8224
website: http://www.tte.com

TUSONIX

A World Leader in Ceramic EMI/RFI Components

...and a broad range of fixed and variable ceramic capacitors

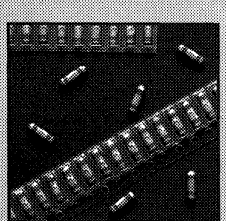
- **Technology**...EMI/RFI Components based on extensive Ceramic Dielectric Technology.
- **Innovation**...Surface Mount Filters reduce board count by replacing multiple components.
- **Delivery**...We meet customer needs with proven on-time performance.
- **Quality**...Quality Management System registered by UL to ISO 9001.
- **Value**...Cost Effective Solutions.

www.tusonix.com

TUSONIX

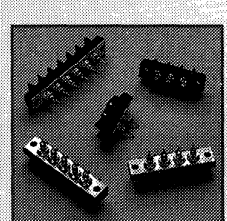
- 7741 N. Business Park Drive
  Tucson, Arizona 85743
- 520-744-0400 FAX: 520-744-6155
- email: sales@tusonix.com

New Products Showcase



Surface Mount EMI Filters

- Square Design For Easy Handling
- Small Size (8X2.1mm)
- Reduces Component Count
- Capacitance Up To 8200pF
- Insertion Loss Of 70dB At 1GHz
- Attractively Priced



Filtered Terminal Blocks

- Industry Standard Terminal Blocks
- Capacitance Up To 5000pF
- Eliminates EMI Using An Existing Design Element
- Custom Design Options

A5924 UL REGISTERED FIRM ISO9001

TUSONIX, INC.

Authorized Stocking Distributors:

- PALtronics 1-800-387-7969
- **Penstock 1-800-736-7862**
- Resco 1-800-638-1242
- RS Electronics 1-313-525-1155
- **TTI 1-800-225-5884**

THE #1 SOURCE FOR INTEGRATED CIRCUITS

Specialists in Alternative Source Solutions

In Business for 30 years with over 75 years experience selling integrated circuits

• Supplying obsolete and cutting edge technology • Can't find what you want?
Visit our website where solutions abound • American Microsemiconductor makes it easy

DIGITAL CIRCUIT SERIES

TTL SERIES

7400	74L00	74LS00	74HCT00	74ACT00	74S00
74C00	74ALS00	74LV00	74HC00	74H00	74F00
74AC00					

SUHL SERIES

SF50	SF100	SF200	SG50	SG200	SG300
SM10	SM200	SM300	MC400	MC500	MC2000
MC2100 Series					

CMOS SERIES 4000/4500

INTERFACE 1488, 1489

DISCONTINUED LOGIC MC830, MC846

MICROPROCESSORS

Z80 Series	6500 Series	6800 Series	8080A Series	8085 Series	8086 Series

REGULATORS

78XX Series	78MXX Series	78LXX Series	Adjustable
79XX Series	79MXX Series	79LXX Series	

MISCELLANEOUS

LINEAR

LM101	LM311	LM324	LM317	LM337	LM555
LM556	LM565	LM566	LM703	LM747	LM748
LM709	LM710	LM711			

MEMORY

4027	4116	4416	4164	2102	2114
2616	4464	6116	4164	6264	62256

OTHERS

8212	8214	8224	8226	8228	8282
8283	8286	8287	74C925	74C926	74C927
74C928					

EPROMS

2716	2732	2764

FIELD PROGRAMMABLE ARRAYS (PALS, GALS, PEELS)

18P8	20V10	20X8	20R8	22V10	22CV10

DIODE ARRAY

FSA2501	FSA2510	MAD1103	MAD1108

NOW SUPPLYING MICROPROCESSORS, MEMORIES, TTL, & CMOS by MICROELECTRONICA.

AMERICAN EXPRESS · MasterCard · VISA

AMS

973-377-9566
Fax 973-377-3078

E-Mail:sales@americanmicrosemi.com • http://www.americanmicrosemi.com

AMERICAN MICROSEMICONDUCTOR, INC.
133 KINGS RD., MADISON, NEW JERSEY 07940

AMITRON

85 Flagship Drive
North Andover, MA 01845
Email: sales@amitron.com

Tel: (978) 686-1882 x37
Fax: (978) 686-0622
http://www.amitron.com

See our pages in Sections A3450 & A4700

Custom Thick Film Substrates

CAPABILITIES
- Thick/Thin Film Integration on 99.6% Alumina
- Metalized Edge Wraps
- Printed Resistors, Capacitors & Thermistors
- Etched Conductor Lines to 2mils
- Multilayer Printing Exceeding 10 Conductor Layers
- Gold or Silver Filled Via Holes
- Leadless Chip Carriers for SMT & MCM Applications

STANDARD SUBSTRATE MATERIAL
- Alumina, BeO, Ferrite, Kapton, Quartz, Sapphire, Titanate

TOTAL PROCESSING TECHNOLOGY
- CAD Design & Layout
- CO2 Laser Machining
- Automatic & Semi-Automatic Printing
- Laser & Abrasive Trimming
- Automatic Diamond Sawing
- Tape & Reel Packaging Available

INDUSTRIES SERVICED
- Aerospace & Military, Telecommunications, Medical & Industrial, RF & Microwave, Consumer & Computer Electronics

For more information regarding our product lines, or to request our Substrate Design Guide, please contact us or visit our Web Site!

defining a degree of excellence

bel

HYBRID/VALUE-ADDED PRODUCTS

THICK FILM TECHNOLOGY & PROCESS CAPABILITIES

Bel is a recognized leader in the volume production of Thick Film Technology. All equipment, printers, dryers, furnaces and continuity testing is state-of-the-art. Our key manufacturing capabilities include:

- Utilization of 5" X 5" 96% AL203 substrates
- Over 30 passes per side (5 conductor layers and 4 resistor decade prints per side, not including dielectric and vias)
- Utilization of PdAg, PtAu and Fritless Au conductor traces
- Resistor tolerance of ± .5% using laser trimming, absolute TCR's of <50 PPM
- Inductors up to 100nH- size dependant
- Capacitors up to 500pf, ± 2%, laser trimmed, size restricted
- Up to 100 vias, top to bottom, size restricted
- PD of up to 100 W/square inch
- Frequency ranges for designs >3gHZ

CHIP & WIRE (C&W) CAPABILITIES

Chip attach (Bare Die)

- Ultrasonic Au-Au "scrubbing"
- Eutectic attach, AuGe, AuSi, Indium alloys & solder
- Ag & Au conductive epoxy attach
- Nonconductive epoxy, organic material

Wire bonding (Ball & Wedge)

- Thermosonic Au, .0007" to .003" diameter
- Ultrasonic Al, .0007" to .020" diameter

MIXED TECHNOLOGY USING C&W AND SMD DEVICES ON THICK FILM CERAMIC SUBSTRATES

Bel offers total vertical integration by utilizing C&W and SMD components on AL203. This allows for dense circuit design of both analog and digital circuitry which cannot be achieved on silicon. Complete solutions can be realized by using Bel magnetics and fuse technology. A complex circuit design may have over 60 active/passive chip components and >40 PFT resistors using both sides of the substrate.

CHIP ON BOARD (COB) AND SURFACE MOUNT DEVICES (SMD) MIXED TECHNOLOGY USING PCB MATERIALS

In addition to Bel's Thick Film ceramic capability for mixed technologies, we offer the ability to provide both C&W and SMD technology on PCB materials such as FR-4, BT Resin, Polyimide and Epsilom 3.

PACKAGING CAPABILITIES

- Single In Line (SIP)
- Dual In Line (DIP)
- Monolithic Dual In Line with connectors for stackable designs
- Plastic Leadless Chip Carriers (PLCC), standard & custom
- Pin Grid Array (PGA), standard & custom
- Chip on flex cable
- Surface Mount Device (SMD) with various pin types (gull wing, J lead, bump pads, etc.)
- Multichip Module (MCM, A-E) both AL203 & plastic, standard & custom
- Custom molded or potting shell, conformal or epoxy coated, etc.
- Clam shell & overmolded, standard or EMI shielded
- A variety of both custom ceramic and plastic solutions to meet mechanical considerations

Specifications subject to change without notice.

HEI has provided creative Hybrid Microelectronic packaging solutions for more than 25 years!

Ultra-miniature Packaging Solutions For Computer, Medical, Communications And Industrial Applications

Advanced Microelectronic Packaging Technology To Reduce Size:

- Thick Film printing .006/.006
- Diffusion patterning .004/.004
- Fodel imaging .002/.002
- Multilayer laminate and ceramic
- Die bond pitch to .006
- Blind vias and thru vias to .002
- Flip chip and chip & wire interconnects
- Single and multiple IC packages
- ISO-9001

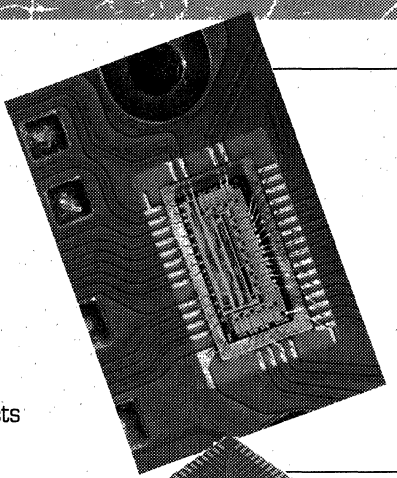
Rapid Prototyping and Cost Effective Production:

- Low NRE Costs
- Quick prototyping from your schematics
- CAD and Full 3D Modeling

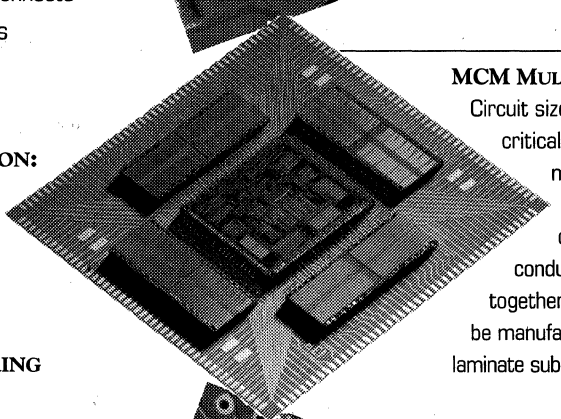
Automated Manufacturing Facility:

- 49,000 square feet
- Two Class 10,000 clean rooms
- Computer automated equipment and processes
- Full test and X-ray inspection capabilities

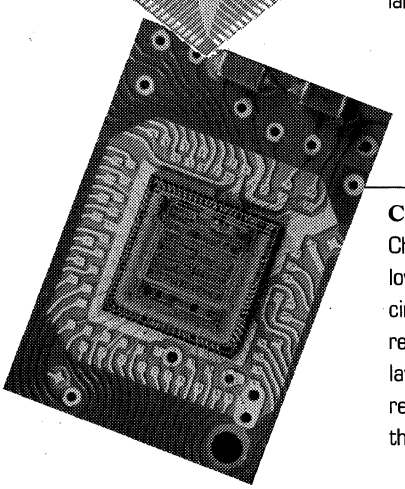
Call (612) 443-2500
Internet http://www.heii.com
or write to discuss your microelectronic packaging needs.



COF Chip-On-Flex
Direct semiconductor attach and interconnect on flex circuity can reduce overall circuit size as well as provide flexible packaging to the most adaptable product assembly applications.



MCM Multichip Modules
Circuit size can be reduced in size-critical applications with multichip module technology. These high density modules contain several semiconductors interconnected together in one package. They can be manufactured on both ceramic and laminate substrates.



COB Chip-On-Board
Chip-on-board in most cases is the lowest cost packaging solution for circuit size reduction. Most circuitry requiring less than 3 conductive layers with minimal power dissipation requirements are ideal applications for this technology.

HEI INC

1495 Steiger Lake Lane • Victoria, MN 55386 • (612) 443-2500 • Fax: (612) 443-2668

HMC

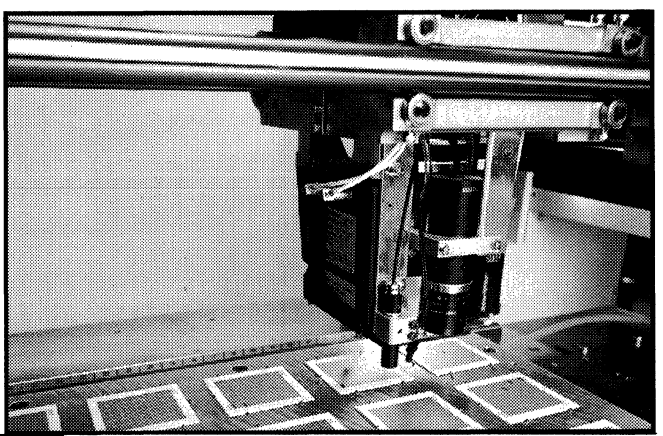
Hybrid MicroCircuits, Inc.

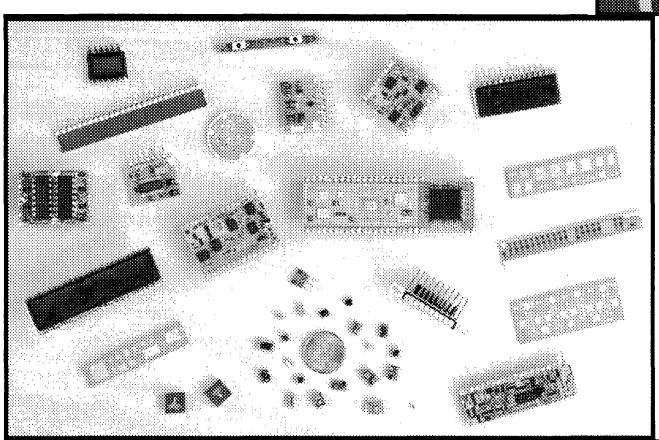
425 So. Grove Street Blue Earth, MN 56013
Phone (507) 526-7300 Fax (507) 526-5747

QUALITY HYBRID THICK FILM CIRCUIT DESIGN, DEVELOPMENT AND MANUFACTURING

HMC'S TECHNICAL CAPABILITIES

- CAD/CAM Design and Layout
- Double Sided Screen Printing
- Multi-layer & Thru-hole Printing
- Precious Base & Precious Metal Printing
- Printed Resistors
- Laser Trimming
- Automatic Pick and Place
- Wire Bonding - manual / automatic

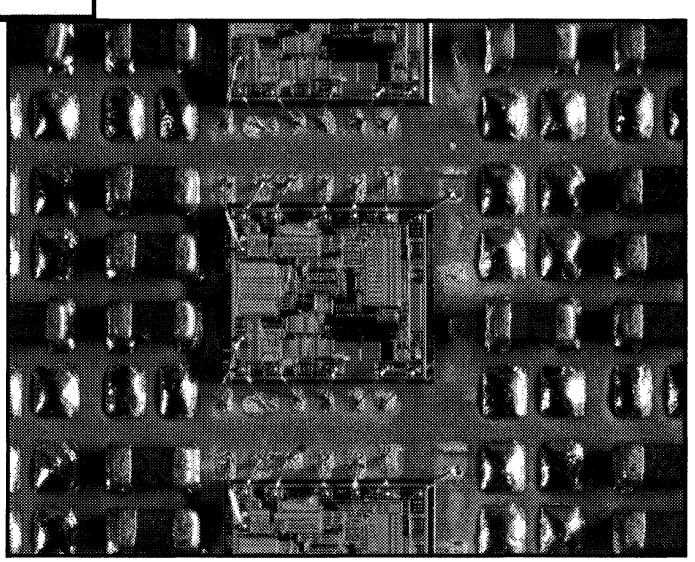




HMC'S TECHNICAL CAPABILITIES

- Flip Chip
- Flex Circuits
- PC Board - Component Placement and Wire Bonding
- Chip on Chip Placement & Wire Bonding
- Automatic Encapsulent Dispensing
- Substrate Sawing and Dicing
- Electrical Testing
- CFC Solvent Free

VISIT OUR WEB SITE
www.hmci.com
YOU MAY ALSO E-MAIL US AT
hmci1@bevcomm.net



INTERNATIONAL SENSOR SYSTEMS, INC.

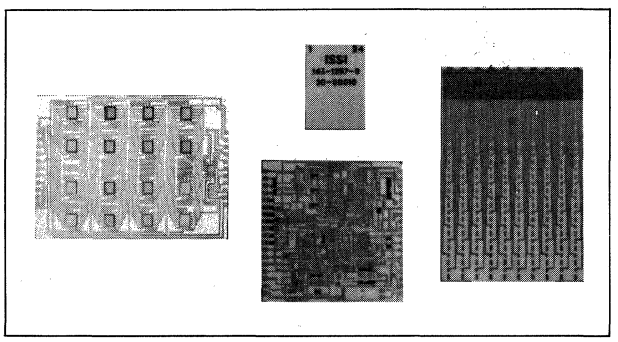
P.O. Box 345
Industrial Park
AURORA, NEBRASKA 68818

Telephone (402) 694-6111
(800) 260-6287
FAX (402) 694-6180
e-mail: issi@hamilton.net

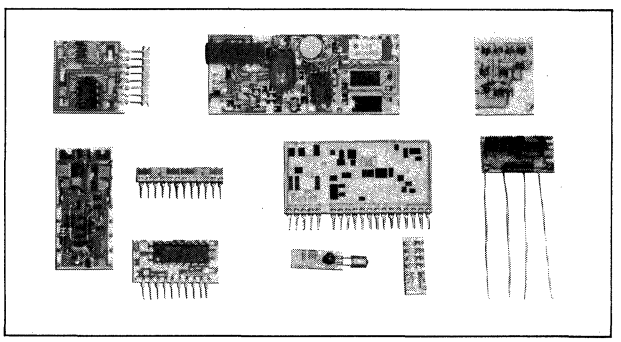
HYBRID THICK FILM TECHNOLOGY

FEATURES

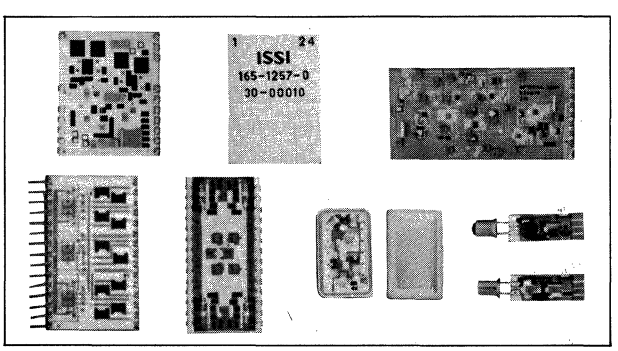
- one time insertion costs
- functional modularity
- high quality components
- compact
- low profile
- low mass
- high performance
- small
- extreme temperature operating range
- military specification capabilities



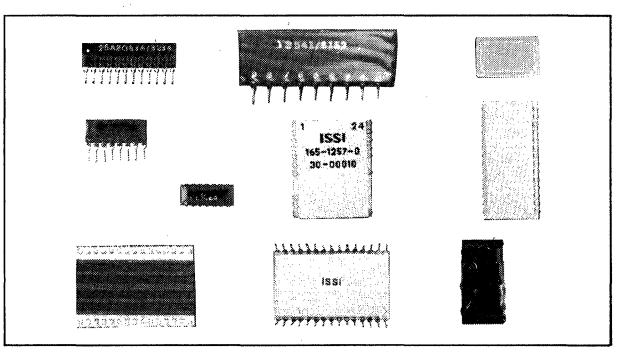
METALIZED SUBSTRATES — Simple or complex, single or multi-layer conductor patterns with Pd. Ag (Palladium Silver), Pt. Ag. (Platinum Silver), Au, (Gold), Pt. Au. (Platinum Gold) inks. Insulation with high temperature glass dielectric or low temperature glaze. Film Resistors from 1 ohm to 150 megohm, tolerances to ±0.1%, T.C.R. to 50 ppm, 1/10 w to 10 watt power dissipation, laser or abrasive trimming.



SOLDER REFLOW TECHNOLOGY — Compact networks with thick film resistors, IC packages, chip capacitors, inductors, discrete components, SOT package, diode bridge assembly, high and low temperature solder, standard or custom pin-outs. Special devices with photo-transistors, LED's and functional sub-assemblies.



CHIP AND WIRE TECHNOLOGY — Microcircuit assembly of functional thin film integrated circuit or component chips into operational devices. All available IC & component chips assembled to a thick film circuit by solder or epoxy bonding. Chips wired into circuit with either gold or aluminum wire. (Thermocompression or thermosonic wire bonding). Special handling for static control. Components actively or passively trimmed to guarantee functional specifications.



CUSTOM PACKAGES — Single-in-line or Dual-in-line pinout packages, conformally coated, metal can, plastic or ceramic covered and sealed. Customer markings as well as manufacturer's identification for traceability. Leak tested, temperature cycling and burn-in before final test to insure reliability. Heat sink attached to either alumina or beryllium oxide to obtain maximum power dissipation.

TECHNICAL SERVICES

• Circuit design • layout (including conversion of existing circuitry to thick film technology) • material selection • rubylith production • screen fabrication • product tooling • product testing • and building to print. Testing includes functional electrical and mechanical parameters • burn-in • leak testing • and temperature cycling.

APPLICATIONS

• Memory • logic • linear circuits • A-D • D-A • timing • filters • isolation • pulse shaping • impedance matching • signal generation • switching • sequencing • and many other medium range energy dissipation functions or a combination thereof.

ISSI MILITARY SPECIFICATION CAPABILITIES

MIL-I-45208 Inspection System Requirements
MIL-STD-45662 Calibration System Requirements
MIL-STD-883 Test Methods & Procedures for Microelectronics
Certificate of Compliance furnished upon request.

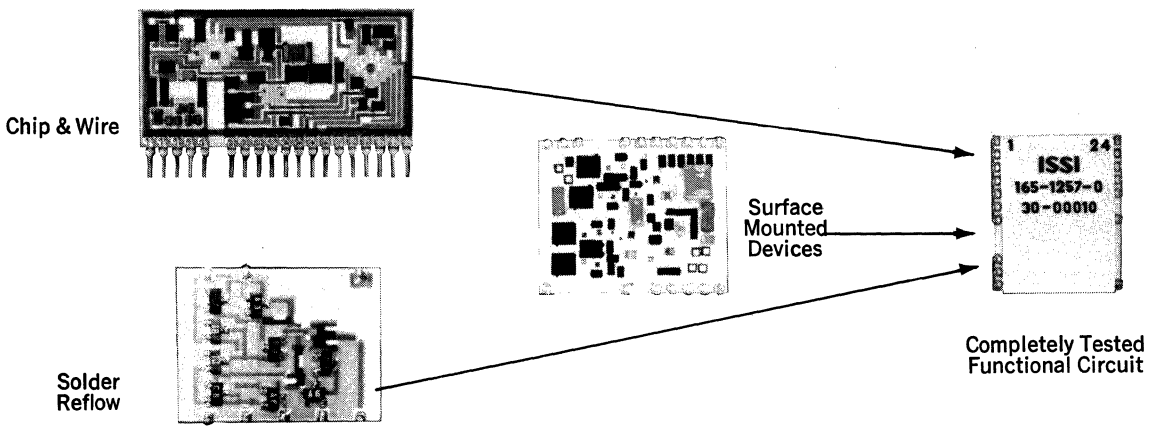
INTERNATIONAL SENSOR SYSTEMS, INC.

P.O. Box 345
Industrial Park
AURORA, NEBRASKA 68818

Telephone (402) 694-6111
(800) 260-6287
FAX (402) 694-6180
e-mail: issi@hamilton.net

HYBRID THICK FILM PRODUCTS AND SERVICES

Custom and Surface Mount Packages



CUSTOM PACKAGES

- Single In-line (SIP)
  - High Temp Solder
  - Low Temp Solder
- Hybrid
  - Flat Packs
- Dual In Line (DIP)
- Surface Mount
  - PCB Base
  - Ceramic Base
  - (See opposite page for details)
- Multi-layer Circuit
- Encapsulated
- X-tal Can Covers
- Ceramic Cover
  - High Temperature Sealant
  - Low Temperature Sealant
- Plastic Covers

CUSTOM COMPONENTS

- Custom Thick Film Metallized Substrates, Pd Ag, Pt Ag, Au, Pt Au, Dielectric, Glaze
- Networks, Specialized Resistor
  - Resistor-Capacitor
  - Resistor-Capacitor-Inductor
  - EMI/RFI Shielded
- Special Devices
- Amplifiers
- Oscillators
- Time Base Modules
- A-D, D-A Converters
- Fiber Optic
  - (Transceivers, Bar Code Readers)
- Solid State Relays
- Microwave
- Control Circuit
- Display Panels

TECHNICAL SERVICES

- Circuit Design
- Circuit Layout (Includes conversion to Thick Film)
- Material Selection
- Create Rubyliths
- Component Specification
- Tooling
- Product Testing
- Build to Print

TECHNICAL CAPABILITIES

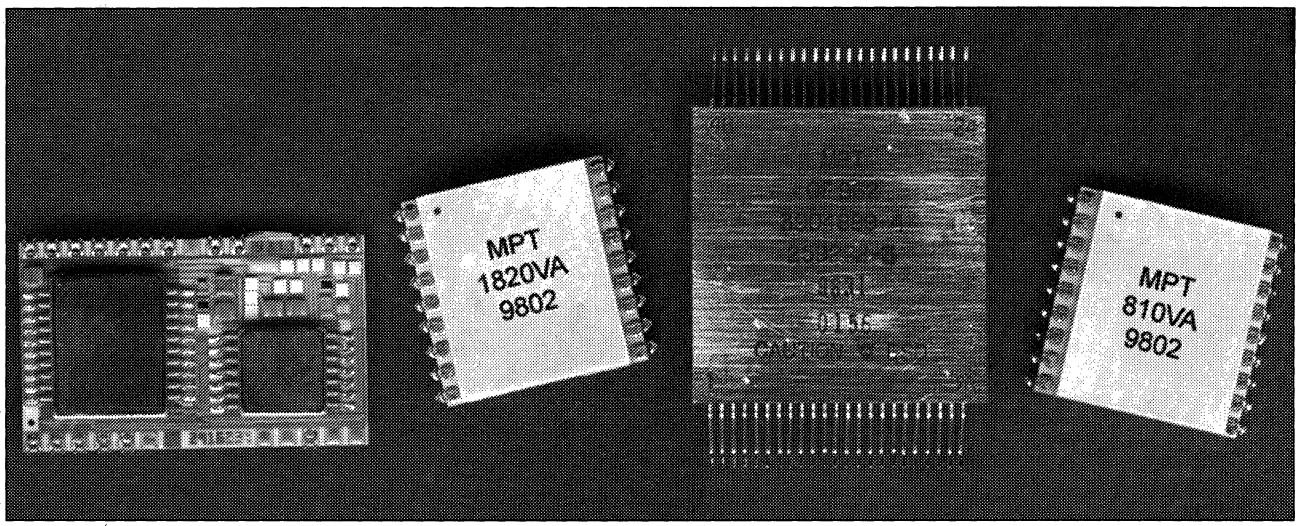
- Solder Reflow
  - IC Packages, Discrete Components (Capacitors, Bridges, L E.D.'s etc.)
- Chip and Wire
  - All Component Chips
  - All Available Integrated Circuits
  - Thermo-Compression Bonding (Au Wire)
  - Thermo Sonic Bonding (Au Wire)
  - Ultrasonic Bonding (Al Wire)
- Special Static Handling
- Resistance & Capacitance Trimmed (Active and Passive)

MILITARY SPECIFICATION CAPABILITIES

- MIL-I-45208 Inspection Systems Requirements
- MIL-STD-45662 Calibration System Requirements
- MIL-STD-883 Test Methods and Procedures for Microelectronics
- Certificate of Compliance furnished upon Request

MICRO-PRECISION TECHNOLOGIES INC.

12-B Manor Parkway • Salem, NH 03079 • Tel: (603) 893-7600 • Fax: (603) 893-9110
Website: www.micropt.com E-mail: sales@micropt.com



HYBRID MICROCIRCUITS

- Digital-to-Syncro Convertor
- Digital-to-Resolver Convertor
- Syncro-to-Digital Convertor
- Resolver-to-Digital Convertor
- Vector Attenuator
- RF Attenuators
- RF Phase Shifters
- RF Amplifiers
- Power Op Amps
- Pin Diode Drivers
- Fiber Optic Hybrids
- Custom Microcircuits

THICK FILM METALIZED SUBSTRATES

SUBSTRATES	CONDUCTORS	RESISTORS	LINE/SPACE RESOLUTION	LASER TRIMMING CAPABILITIES
Alumina, BeO, AIN. Thickness .005" to .080". Size up to 4.5 square inches.	Au Ag Pt/Au Pd/Au	1-160M Ohms	Standard line spacing .010". Fine line spacing .002".	Kerf width .001-.003" Tolerances 0.1%. Typical measuring accuracy; 50ppm. Ratio: up to 4ppm.

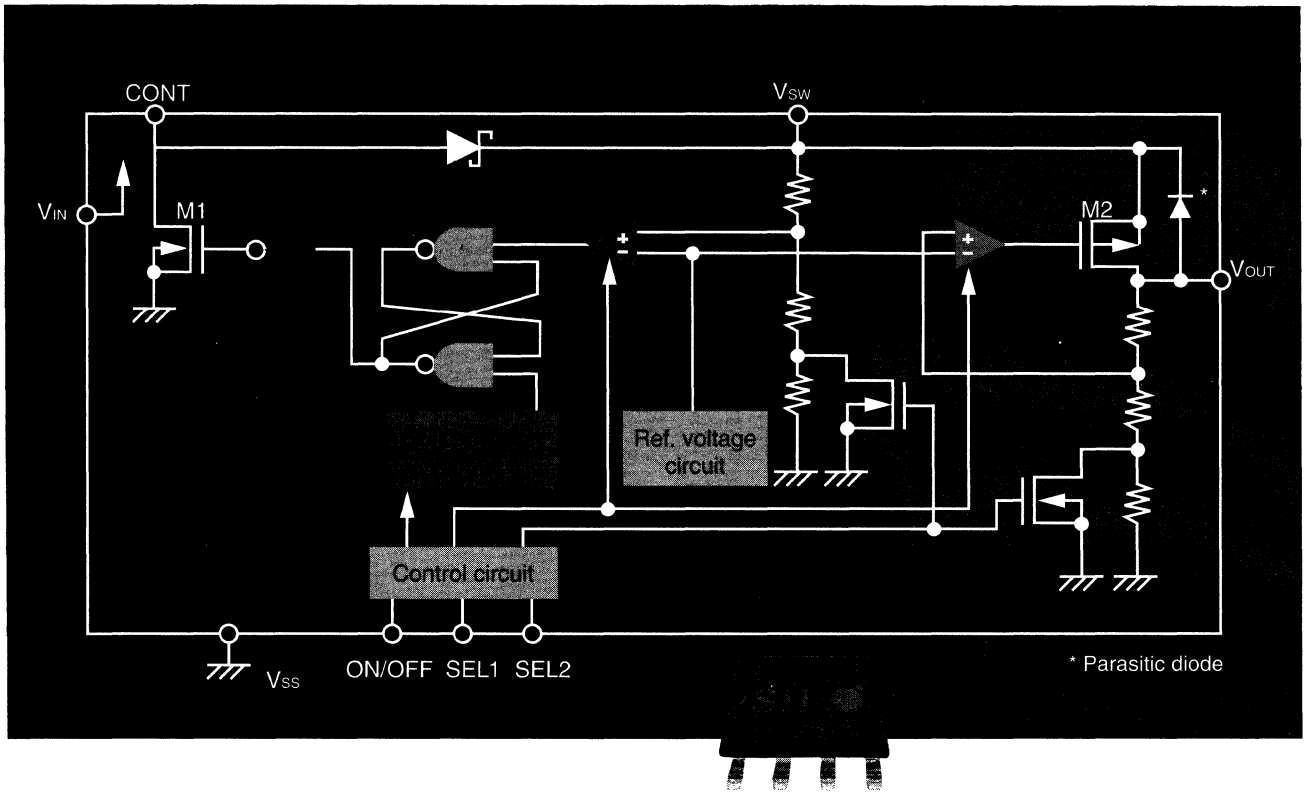
SPECIALIZING IN AEROSPACE, MEDICAL, MILITARY, AND HI-REL APPLICATIONS

- Microcircuit Assembly
- RF/Microwave Circuit Assembly
- Laser Trimming/Active/Passive
- Automatic Wafer/Substrate Assembly
- Prototyping
- Chip on Board Assembly
- SMD Assembly
- Automatic Au/Al Wirebonding
- Conformal Coating Assembly

Micro-Precision Technologies Inc. quality organization maintains a system at a high level of screening test based on MIL-PRF-38584

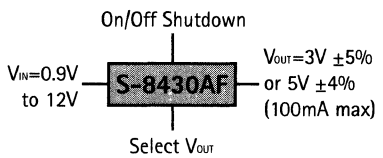
- In Process Inspection
- Internal Visual
- Stabilization Bake
- Temperature Cycling
- Constant Acceleration
- Burn in
- Fine Leak
- Gross Leak
- Final Electrical
- External Visual

Conformance tests per MIL-PRF-38534, Appendix C, Option 1 (in-line inspection)



Now! Step-Up Switching Regulator And Step Down Series Regulator

(On a single chip...Immediate delivery from stock!)



World's lowest current consumption:
Operation = 11 microamps (no load)
Shutdown = 200 nanoamps

Wide input voltage range: 0.9V to 12V

For $V_{IN}>V_{OUT}$, the S-8430AF operates as a series regulator. For $V_{IN}<V_{OUT}$, it operates as both a step-up switching regulator and a series regulator. During switching regulator operation, the series regulator attenuates the ripple voltage.

The S-8430AF is ideal for designers who want to maximize battery life:

- Cell phones and pagers
- Glucose monitor
- GPS terminals
- Hand held terminals
- Notebook computer
- PDA
- Portable voltmeter

And just compare these features:

- Output voltage = 3V or 5V
- Low input voltage down to 0.9V
- Operating current = 11µA
- Output current to 100mA
- Shutdown function
- Built-in RC oscillator (40kHz)
- Built-in Schottky diode
- 8 pin SOP = 5.2 x 4.4 x 1.5mm

Only $1.18 @ 1K

For complete technical information on all of our ultra-low current ICs:

- Switching and LDO regulators
- Voltage detectors
- Lithium-Ion battery protection
- EEPROM
- Real time clocks and timers
- 4-bit and 8-bit microprocessors
- Temperature sensors

Visit: www.seiko-usa-ecd.com

Immediate delivery from stock

Order your S-8430AF today:

All American	800-573-ASAP
Schuster	800-877-6875
Sterling	800-745-5500
Reptron	800-800-5441

Seiko Instruments Is #1 In Low Current Consumption.

SII
Seiko Instruments

Seiko Instruments USA Inc.
Electronic Components Division
2990 West Lomita Blvd., Torrance, CA 90505
Phone: (310) 517-7771 FAX: (310) 517-7792

semitronics

64 Commercial Street
Freeport, NY 11520

For complete specifications, samples
& technical assistance: Tel: (516) 623-9400
Fax: (516) 623-6954 • Toll Free: 800-926-SEMI

e-mail: semitron@aol.com
www.semitronics.thomasregister.com

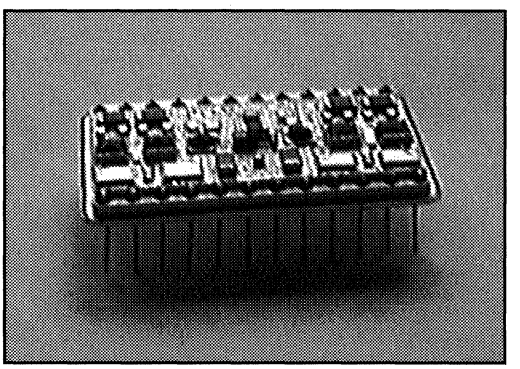
OPTO ELECTRONICS
- Mosfet Drivers
- Opto-Couplers
- Zero Crossing Triacs

SOLID STATE RELAYS
- Optically Isolated
- Bi-Directional
- Current & Thermal Shut-Off
- DESC Approved

HYBRIDS
- Multichip Modules
- Chip & Wire
- Custom Military, Medical & Commercial Applications

High Reliability screening available. Consult factory for details.

Hybrid Thick Film Products And Services



Custom Packages
Single In-line (SIP)
Hybrid Flat packs
Dual In Line (DIP)
Surface Mount
Multi-layer Circuit
Special Devices
TO's(Metal Can)
Encapsulated
Conformally Coated
Hermetically Sealed

Custom Capabilities
Solder Reflow
Discrete Components (Capacitors, L.E.D.s, etc.)
Chip and Wire Thermo Sonic Bonding (Au Wire)
Ultrasonic Bonding (Al Wire)
Tesec & Lorlin Test Systems
MIL-I-45208 Inspection System Requirements
MIL-STD-45662A Calibration System Requirements
MIL-STD-883 Test Methods & Procedures for Microelectronics

Custom Services
CAD Circuit Design
CAD Circuit Layout
Build to Print
Screen Printing
Component Specification
Tooling
Bonding Substrate
Metalization Multilayer
Mount Assembly
Product Testing
Package Sealing
Leak Testing
Environmental Testing
Electrical Testing
Mechanical Testing
Die and Wire Bonding

semitronics HI-REL AND BEYOND

NEW ENGLAND/INTERNATIONAL
400 West Cummings Park
Woburn, MA 01801
(781) 935-2150 • Fax: (781) 935-6637

EAST
64 Commercial Street
Freeport, NY 11520
(516) 623-9400 • Fax: (516) 623-6954

MID WEST
496 Windsor Park Drive
Dayton, OH 45459
(937) 435-6600 • Fax: (937) 435-1074

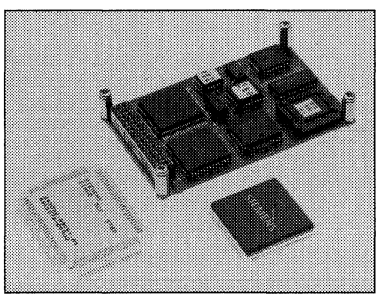
WEST
2659 Townsgate Road - Suite 101
Westlake Village, CA 91361
(805) 373-6850 • Fax: (805) 379-3801

SIEMENS

Siemens Electromechanical Components Inc.
200 South Richland Creek Drive, Princeton, Indiana 47671-0001
Tel: 812.386.1000 • Fax: 812.386.2072 • e-mail: info@sec.siemens.com

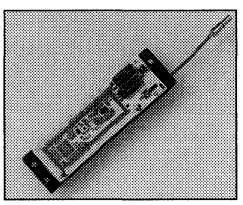
Hybrids and Micro Modules

Surface Mount Multichip Components



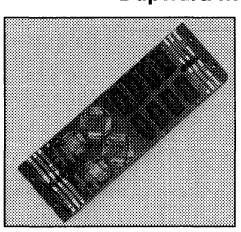
- Assembled in standard SMT packages
- Electronic subsystem integrated in a single component
- Combines latest technology trends and standardization

Intelligent IC Testers



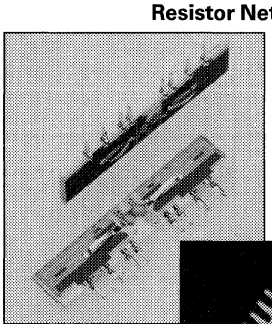
- IC Pins simulated by digital data
- Thick-film hybrid or Chip-On-Board technology

Dupward Multichip Module



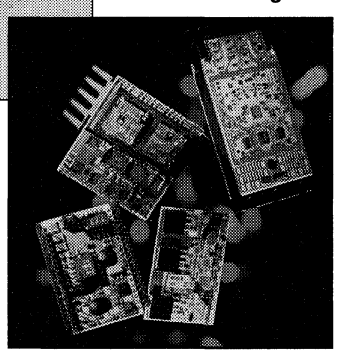
- MCM-L for IC tester (COB)
- Bare ICs (Bipolar and CMOS)
- Aluminium heat sink
- Thermal Cut-out
- Elastomer Contacts
- 6-layer fine conductor laminate (FR 4)

Resistor Networks



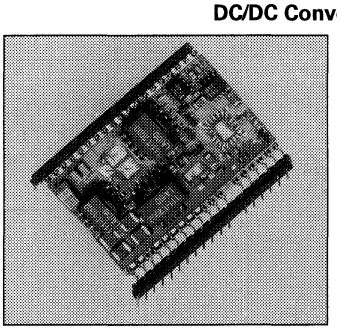
- Meets exacting pulse and voltage load requirements
- Thermal cutout
- PTC resistor
- SMD available

Intelligent Power Module (IPM)



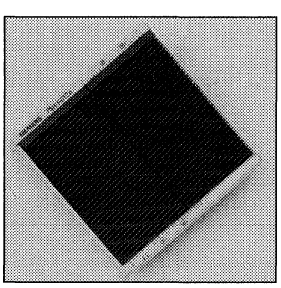
- Increased power density and complex logic functions
- Standardized pins, housing and heat sinks
- 3 phase full-bridge
- Fast free-wheeling diodes
- IGBT and diode for braking
- Custom chip mounting

DC/DC Converters



- Thick-film technology
- Optimized EMC behavior
- Integrated overload protection
- Input voltages 37.5V – 80V

Thick-film hybrid

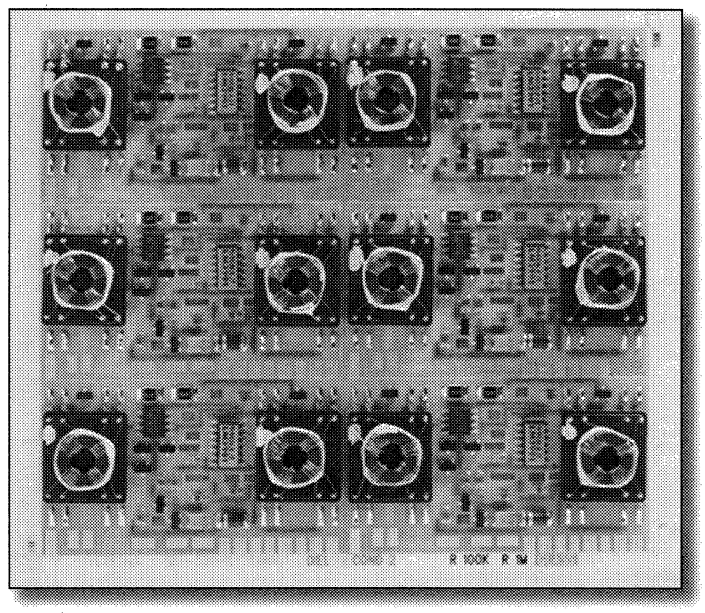


- Logic & power on one substrate
- Intregrated resistors and shunts
- Active Trimming
- Layered construction of logic part
- Standardized assembly
- Low resistance conductors

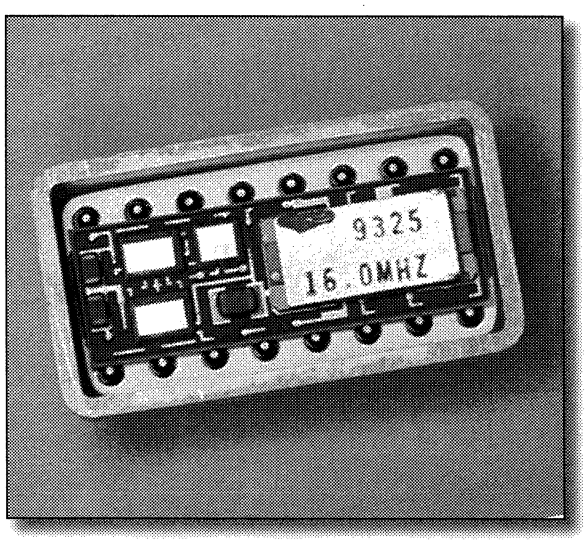
Visit our website at **www.sec.siemens.com** for more product information and details about our firm.

Vetronix Research
Custom Thick Film Hybrid Design & Fabrication

- **Ceramic Substrates**
- **Chip-and-Wire Hybrids**
- **Multichip Modules**
- **Surface Mount Hybrids**



Specializing in manufacturing needs for the Military, Industrial, and High-Reliability Industries.



Our Services Include:

- Circuit Design (Schematic Entry and Circuit Layout)
- Thick Film Substrate Fabrication
- Surface Mount Assembly
- Die and Element Attach
- Wire Bonding
- Test and Burn-In
- Quality Conformance Inspection when required

Vetronix Research Corporation

Microelectronics Design, Fabrication, and Integration

1700 Harmon Road
Auburn Hills, Michigan 48326

Phone: 248-393-2759
Fax: 248-393-2761

MICROWAVE COMPONENTS

Manufacturer	Starting EEM Page No.	Transformers	Terminations	Phase Modulators	Switches	Impedance ing Pad	Combiners/ Splitters	Phase Shifters	Frequency Mixers	Oscillators	Bias Tees	Phase Detectors	Isolators	Amplifiers	Circulators	Freq. Multiplier	Freq. Synthesizer
Amitron, Inc.	A•1672		√														
Electro-Films, Inc.	A•1673		√*		√			√*	√§			√§*		√§		√*	
Mini-Circuits	A•1675	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*		√§*		√§*	√§*

* MIL Spec. § Surface Mount.

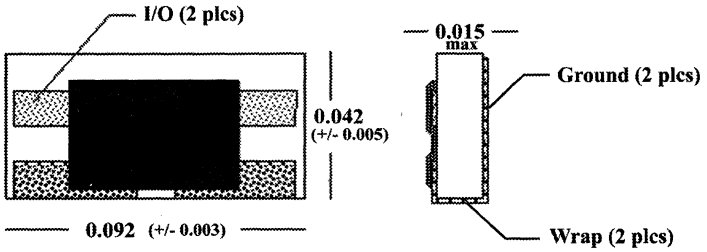
Manufacturer	Starting EEM Page No.	Attenuators	Directional Couplers	Filters	Capacitors
Amitron, Inc.	A•1672	√§			
Electro-Films, Inc.	A•1673	√§			
Kay Elemetrics Corp.	A•1674	√§			
Mini-Circuits	A•1675	√§*	√§*	√§*	√§*
NTK Technical Ceramics	A•1855		√§	√§	√§

* MIL Spec. § Surface Mount.

AMITRON
85 Flagship Drive
North Andover, MA 01845
Email: sales@amitron.com
Tel: (978) 686-1882 x37
Fax: (978) 686-0622
http://www.amitron.com

See our pages in Sections A3130 & A4700

Thick Film Microwave Attenuators



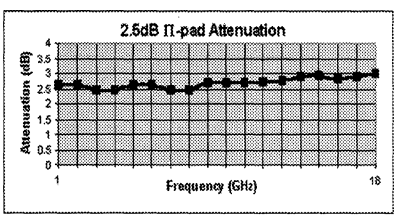
ELECTRICAL SPECIFICATIONS

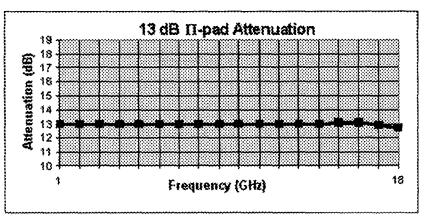
CHARACTERISTIC	TYPICAL
Working Voltage	25Vdc
Power Rating	125mW @70°C
Storage Temp	-65°C to +150°C
Operating Temp	-55°C to +125°C
Attenuation	0.5dB to 16.0dB
Tolerance (DC)	±0.1dB typical
Tolerance (to 12GHz)	±0.25dB typical
Tolerance (12-18GHz)	±0.5dB typical
TCR	±300ppm/°C

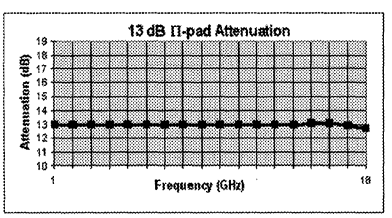
OTHER MECHANICAL CONFIGURATIONS ARE AVAILABLE OR CAN BE CUSTOM MANUFACTURED TO MEET YOUR REQUIREMENTS.

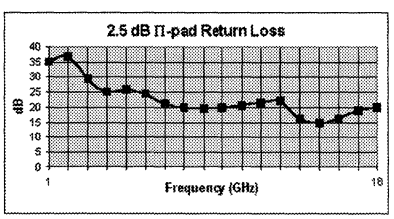
CONSULT OUR SALES REPRESENTATIVE TO DISCUSS YOUR APPLICATION.

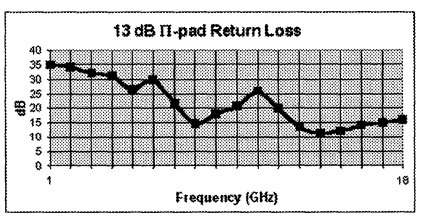
ATTENUATOR PERFORMANCE RATINGS

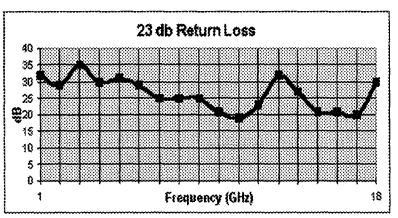












PART NUMBERING SYSTEM

R P A 2311- eeee F 5 h i

INSPECTION/SCREENING
R-Standard (100% Visual & Sample Electrical)
H-High Rel (100% Visual & Electrical)
C-Custom (Per Supplied Specification)

P-Pi Attenuator

BASE MATERIAL* (ALUMINA) THICKNESS
A-0.010
B-0.015
C-0.020
D-0.025
*BeO AVAILABLE

SIZE CODE
2311-Standard (0.092x0.042)
See Table in Section A4700

ATTENUATION VALUE
3 Digits plus decimal
ex: 06R0=6.0dB

TOLERANCE
F-±1% ±.1dB

TCR
5-300PPM

TERMINATION MATERIAL
E-Au I/O, Pt-Au Ground
F-Au I/O, Pt-Ag Ground
H-Pt-Au I/O & Ground
J-Sn/Pb over Ni I/O & Ground
K-Au over Ni I/O & Ground
L-Pg-Ag I/O & Ground

OPTIONS
O-None
T-Pre-tinned

Also available from AMITRON is our line of Substrates (Section A3130) & Chip Resistors (Section A4700)

THIN-FILM MICROWAVE COMPONENTS

Metalized Plates

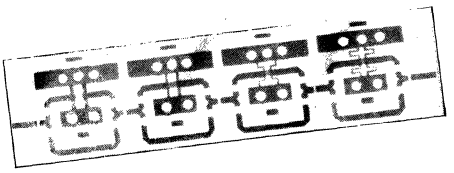
Electro-Films, Inc. offers a wide variety of metalized substrates suitable for Microwave Hybrid and Microwave Integrated Circuit applications. E.F.I.'s unique, economical fabrication process provides an exceptional range of dimensions, metalization and circuitry. Typical applications include: amplifiers, oscillators, UCO's, limiters, couplers, filters, attenuators, with frequency response thru 18 GHz and into the millimeter wave length range.

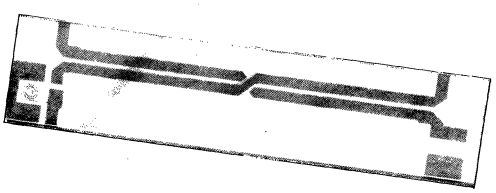
SUBSTRATE MATERIALS

- Alumina (as fired or polished) standard thicknesses of .010", .015", and .025", Dielectric Constant 9.8 typ. @ 25°C—10 GHz
- Quartz—BeO, Various thicknesses
- Sizes— Up to 4.1" x 3.3"

METALIZATION

- Sputtered in various combinations of NiCr, Cr, Ni, Au, Cu, TaN, TiW, Ti, Mo, Pd, TaW
- Electroplated — Cu, Ni, Au, up to 300 micro-inches
- Excellent adhesion (typically 7-10,000 lbs./in^2)
- One, Two or Six Surfaces
- Through Holes — metalized or non-metalized

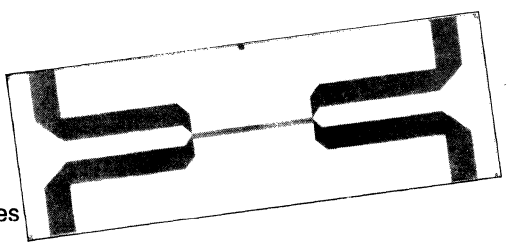




Patterned & Etched Substrates

Electro-Films, Inc. can handle the transition from a circuit requirement to a finished thin-film micro-component with in-house artwork and photo mask generation. E.F.I.'s processing techniques and quality control guarantee optimum quality in prototype or production quantities. E.F.I. is a thin-film specialist with unequalled productivity.

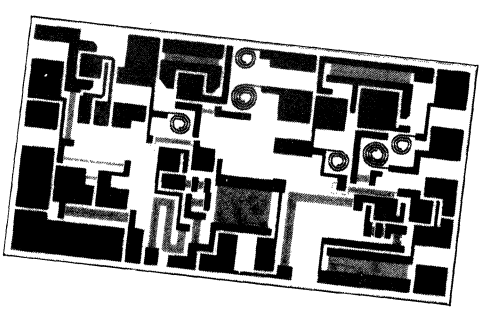
- Conductor only or resistor conductor patterns
- Resistive films — high stability NiCr or self passivating TaN
- In house laser machining for round or odd shaped substrates
- Metalized through holes
- Patterned edges
- Planar Inductors
- Lange couplers with fine line patterns, line and space tolerances as tight as ±.000050"
- Attenuator chips



Precision Chip Resistors

These precision Chip resistors are edge trimmed to tolerance providing excellent high frequency response. Edge trimming leaves a solid symmetrical block resistor void of any laser cuts eliminating the capacitive effects from a plunge or "L" cut trim.

- Resistance range 20ohm to 1 Kohm edge trimmed, 1 Kohm to 1 meg ohm non-edge trimmed
- Automatic laser trimming to ±.05% absolute
- Edge trim for high frequency applications
- Gold or solder coated terminations over a nickel barrier
- TCR ±50, 25 or 10 PPM °C — NiCr ±200, or100 PPM °C — TaN
- Single side or wrap around terminations
- Sizes — .020" x .040" to .100" x .100".



For other components, see our ad under "Resistor Products"

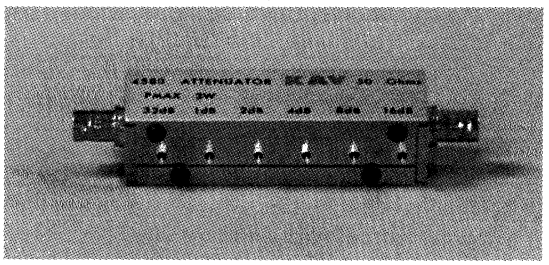
ELECTRO-FILMS INCORPORATED

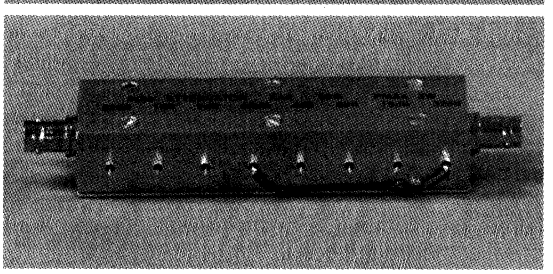
111 GILBANE STREET, WARWICK CENTRAL INDUSTRIAL PARK, WARWICK, RI 02886
Tel. (401) 738-9150 • FAX (401) 738-4389
Website: www.electro-films.com • E-mail: efichips@aol.com

ISO 9001 CERTIFIED

• ATTENUATORS • ATTENUATORS • ATTENUATORS • ATTENUATORS •

Looking for attenuators?





Depend on Kay Elemetrics high performance **Manual Step** and **Programmable Attenuators** to stand up to your requirements on the job. We can supply you with the right model to fit your specific application. We have both 50Ω and 75Ω models from DC-2000 MHz.

- ✔ **Impressive Accuracy**
- ✔ **Durable**
- ✔ ***New* Low Cost**
- ✔ **Quick Delivery**
- ✔ **Microstrip Line/SMD Construction**
- ✔ **Custom Models Available**

Manual Step Attenuators

837	50Ω	DC-1500MHz	0-102.5dB	.5dB Steps
839	50Ω	DC-2000MHz	0-101dB	1dB Steps
1/839	50Ω	DC-1000MHz	0-22.1dB	.1dB Steps
847	75Ω	DC-1000MHz	0-102.5dB	.5dB Steps
849	75Ω	DC-1500MHz	0-101dB	1dB Steps
1/849	75Ω	DC-500MHz	0-22.1dB	.1dB Steps
860	50Ω	DC-1500MHz	0-132dB	1dB Steps
865	600Ω	DC-1MHz	0-132dB	1dB Steps

Programmable Attenuators

4540	50Ω	DC-500MHz	0-130dB	10dB Steps
4550	50Ω	DC-500MHz	0-127dB	1dB Steps
1/4550	50Ω	DC-500MHz	0-16.5dB	.1dB Steps
4560	50Ω	DC-500MHz	0-31dB	1dB Steps
4580	50Ω	DC-500MHz	0-63dB	1dB Steps

For a FREE catalog and price list, call (973) 628-6200 today!

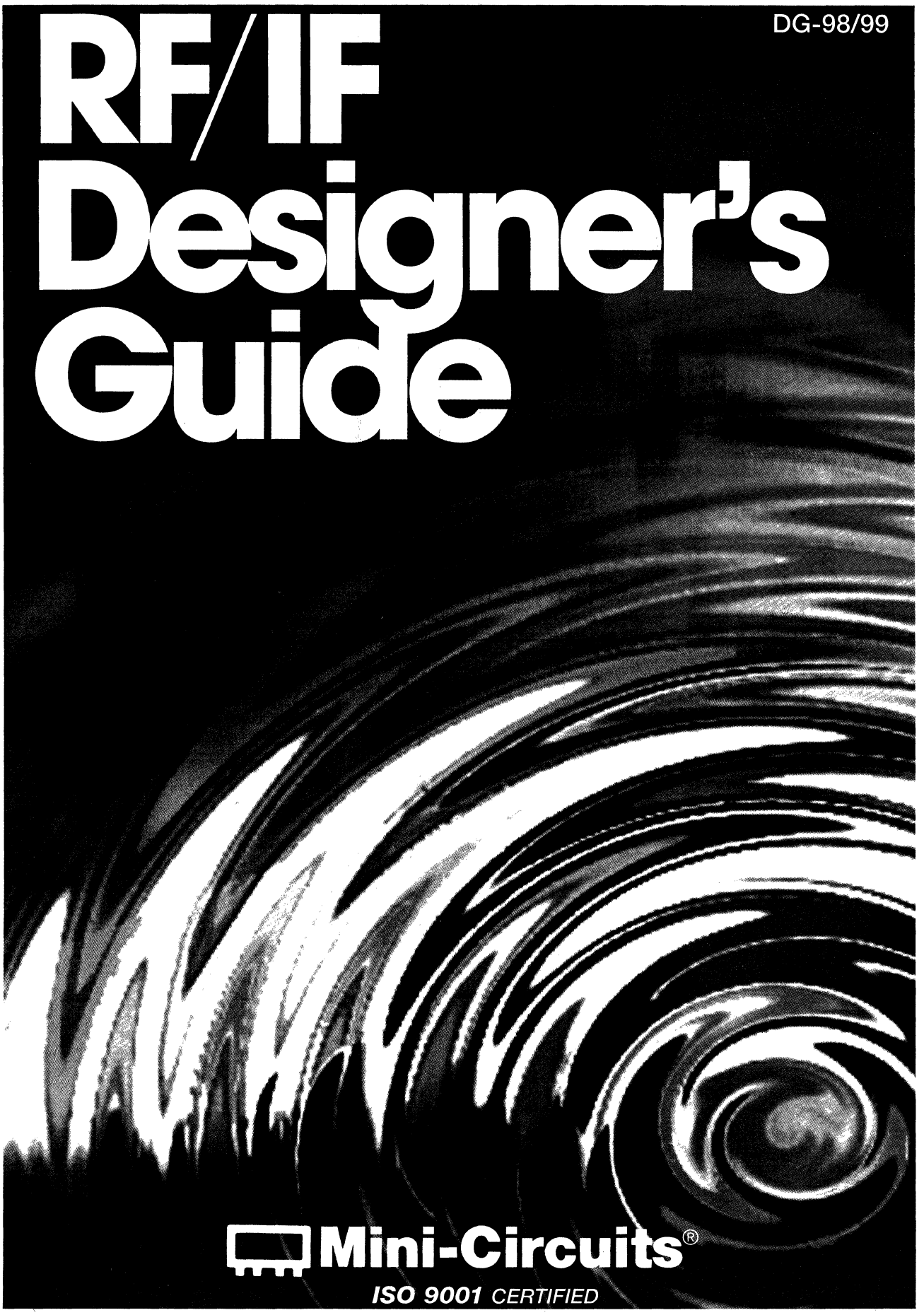
KAY **Kay Elemetrics Corp.**

2 Bridgewater Lane • Lincoln Park, NJ 07035-1488 USA
Tel: (973) 628-6200 • Fax: (973) 628-6363
E-mail: jnewell@kayelemetrics.com
Web: www.kayelemetrics.com

• ATTENUATORS • ATTENUATORS • ATTENUATORS • ATTENUATORS •

DG-98/99

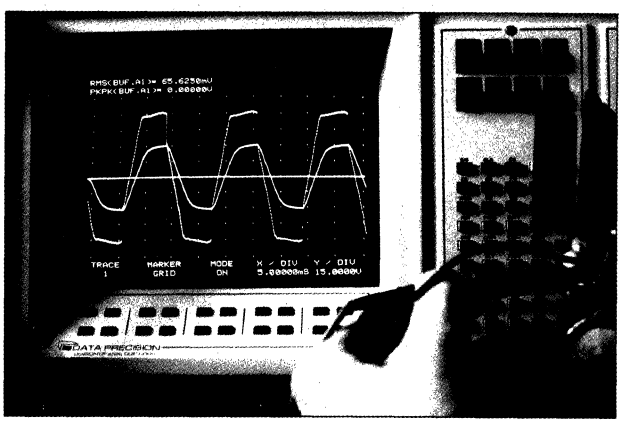
RF/IF Designer's Guide

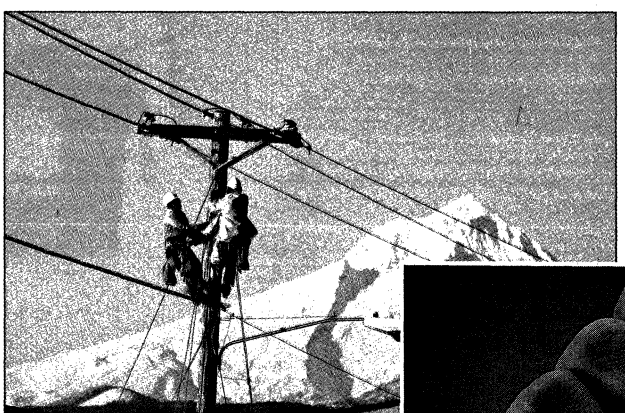


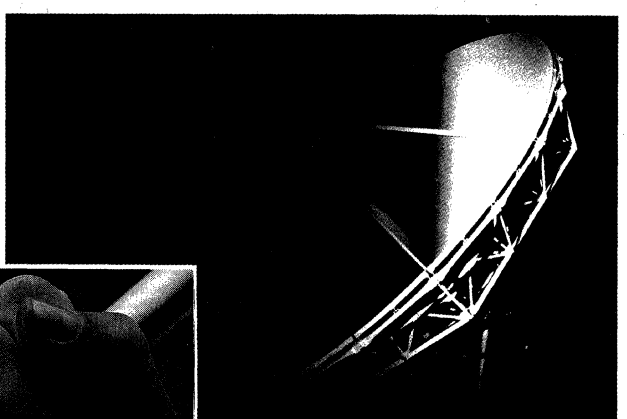
Mini-Circuits®

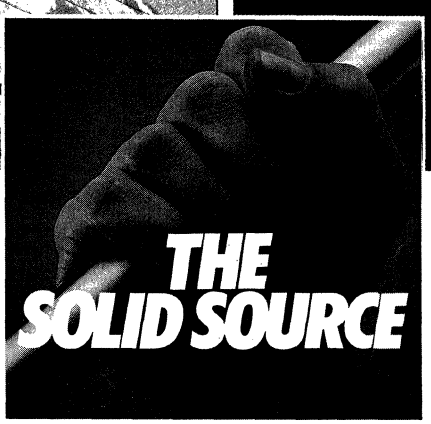
ISO 9001 CERTIFIED

MINI-CIRCUITS...
THE SOLID SOURCE FOR RF/IF MICROWAVE COMPONENTS









Signal Processing Solutions For:

COMMUNICATIONS • WIRELESS & CELLULAR PRODUCTS • MEDICAL

TEST INSTRUMENTATION • RADAR • SATELLITE LINKS • RECEIVERS • PC ASSEMBLIES • COMPUTER

CABLE/TV BROADCASTING • AIRCRAFT & AEROSPACE • MILITARY

DIGITAL & ANALOG • DATA ACQUISITION • UHF/VHF TRANSMITTERS • TELEPHONY

A•1676 **See us on the World Wide Web at http://eemonline.com** **EEM 1999**

QUALITY POLICY

Mini-Circuits quality policy is to provide products and services to our internal and external customers that will:

- ***Meet stated requirements***
- ***Exceed expectations***
- ***Continuously be improved***

CORPORATE VISION

To continue to be a world preferred company for RF, IF and microwave products.

MISSION STATEMENT

Our mission is to provide our customers with products of superior value while promoting growth and prosperity for our members, suppliers, community and company.

Harvey Kaylie

HARVEY KAYLIE
President
Mini-Circuits Laboratory
Brooklyn, New York

Mini-Circuits®

INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 *CERTIFIED*

Table of Contents

general information (section 0)

Corporate profile & Quality Policy 2,3
How to use this guide 6,7
Ordering and delivery information 8,9
Partner program 10
Partner program (terms & conditions) 11
Model index 12-15
Designers Kits 16,17
Surface mount devices (actual size) 18
Statistical process control 28,29
Tape & reel packaging 30
Device orientation 31
Case style dimensions and outline drawings 32-51
Conversion table dBm-volts-watts 74
VSWR table 75
Amplifier Selection Guide 112-114

Surface mount
- environmental specifications 19
- understanding surface mount 19
- questions and answers 20,21
- glossary of terms 21
- attaching surface mount components and reflow soldering 22-24

Mini-Circuits Guarantees Quality
- environmental specifications
- quality control procedures
- high reliability & MIL 25-27

Applications support 179
Worldwide Sales Offices / Distribution Centers 180

specifications and performance data*

frequency mixers

surface mount

- image reject 54
- level 3 55
- level 7 56,57,58,59
- level 10 65
- level 13 67
- level 17 70,71

plug-in & coaxial

- active 52,53
- level 7 60,61,62,63
- level 10 64
- level 13 66
- level 17 68,69
- level 23 72
- level 27 73

high power combiners/splitters

coaxial 2, 3, 4, 6 and 8 way 76,77

power splitters/combiners

surface mount

- 2 way - 0° 79
- 2 way - 90° 85-87
- 2 way - 180° 88
- 3 way - 0° 90
- 4 way - 0° 93
- 5 way - 0° 96
- 8 way - 0° 98

plug-in & coaxial

- 2 way - 0° 78,80,81
- 2 way - 0° resistive 82
- 2 way - 90° 83,84
- 2 way - 180° 88
- 2 way - 0° / 180° 89
- 3 way - 0° 90,91
- 4 way - 0° 92,94,95
- 5 way - 0° 96
- 6 way - 0° 97
- 8 way - 0° 98,99
- 9 way - 0° 100
- 10 way - 0° 101
- 12 way - 0° 102
- 16 way - 0° 103
- 24 way - 0°, 48 way - 0° 104

impedance matching pad

coaxial models 173

terminations

coaxial models 173

attenuators

plug-in & coaxial

- fixed 106,108,109
- fixed, precision 110,111
- attenuators/switches 130,132
- digital step 133

surface mount

- fixed 105,107
- attenuator/switches 131

Mini-Circuits®
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

Mini-Circuits®

amplifiers

amplifier selection guide 112-114
surface mount
monolithic, microwave 115
monolithic 116,117
monolithic, high IP3 119
flat pack/drop-in
monolithic 115,118
plug-in & coaxial
low noise 120,121
variable gain, high isolation 122
low power, medium power 123
medium higher power 124
high power 125
RF instrument amps 126
very high power 127
pulse amplifiers + data 128,129

directional couplers

surface mount
10 to 25.5 coupling 134,135
plug-in & coaxial
high power 137
6 to 30 dB coupling 136,138,139

filters

plug-in & coaxial
low pass 140,142,143
bandpass 144
low pass, flat time delay 145
high pass 146,147
surface mount
low pass 141
high pass 146

frequency doublers

plug-in & coaxial 148,149
surface mount 148

limiters

plug-in & coaxial, +3 to 20 dBm input 172

phase shifters

plug-in 151
surface mount 151

phase detectors

plug-in & coaxial 150
surface mount 150

phase modulators

plug-in & coaxial
QPSK 153
I&Q modulator 154
I&Q demodulator 156
surface mount
BPSK modulator 152
I&Q modulator 155
I&Q demodulator 157

switches

plug-in & coaxial
Pin diode with TTL drivers 158
Pin diode SPST, SPDT 159
GaAs, SPST, SPDT 161
surface mount
GaAs, SP4T 160
GaAs, SPST, SPDT & Transfer 162,163

bias tees

surface mount 164
plug-in & coaxial 165

voltage controlled oscillators

plug-in & coaxial
linear tuning 166
dual output 168
low noise 169
5V tuning for PLL 170
surface mount
linear tuning 167
low noise 169
5V tuning for PLL 171

transformers

surface mount & plug-in 174-178
coaxial models 177

*Performance curves and detailed data for Mini-Circuits newest products are contained on the Internet. See our Internet address on the opposite page. Our 760 page RF/IF Designer Handbook is also available. Write or call for your free, personal copies.

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

Using This Guide

Over 1000 Mini-Circuits IF/RF/Microwave Signal-Processing components are completely specified and described in this Guide. These Products are all available with guaranteed shipment of one week.

The large number of available models is offered so that the design engineer may select a model that closely fits the application requirement. In situations where there is a need for special electrical performance, mechanical configurations, environmental screening, or very low cost units, please contact our Applications Department. See page 179. In many cases, we produce special components in less than two weeks.

table of contents

The table of contents on pages 4, 5 lists product sub groups with corresponding specification pages and product group technical information including articles.

model number index

In each product group, model numbers are listed in alphanumeric order with page references to electrical specifications. All surface-mount models are highlighted with an indicator. See pages 12-15.

SMD

Surface-mount devices are included in almost every product group. See model number index page 12-15. Product group specification sections indicate non-hermetic and tape and reel package availability. Technical articles are listed on pages 18 through 29.

tape and reel packaging

Designers applying automated assembly procedures for surface-mount components will find a listing for tape width, reel size, package number, and number of devices on a reel; "footprints" for the various packages are shown on pages 30, 31.

specifications

The specification pages in each section include, for every model, a photo, complete electrical specifications, price, page number for CAPD, schematic diagram, pin connections (for pc board models) or connector markings, and reference designations for the case style and outline drawing. Each model within a series has a case style and outline drawing reference. Comments applicable to the specifications are listed under Notes which appear for each page spread.

Using the latest industry criteria for specifying mixer and I and Q modulator performance, "typical" conversion loss has been deleted and replaced with $\bar{x}$ and σ (sigma) average value and standard deviation of values for conversion loss. A discussion of these new parameter listings is given. See pages 28, 29.

SURFACE MOUNT

Available Tape & Reel

This "quick reference" headline and footer can be found on various product specification pages. It denotes that all the models featured on that page, or spread are surface mount and conveniently packaged on tape & reel.

PARTNER PROGRAM®

A revolutionary new concept that lets you lower the cost of doing business in the 90's. A true partnership is described where your savings keep growing year in and year out. Details of the program and the easy procedure to join are simply explained. See pages 10, 11.

Mini-Circuits®

case style outline drawings

Case Style and Outline Drawings include information on case dimensions, tolerances, case material and finish, bracket options and "footprint" sketches for pc board design using surface-mount units. See pages 32 through 51.

The information is arranged in tabular form with alphanumeric reference designations. Each alpha designation refers to a particular outline drawing. A photo of each case style is shown and designated on the model specification page.

computer-automated performance data (CAPD)

This symbol signifies that computer-automated performance data, CAPD, is available. A significant number of pages in our Handbook are devoted to Mini-Circuits' exclusive computer-automated performance data. These pages describe the most complete detailed data and performance curves ever available on characteristics of over 1000 catalogue products. Page numbers referencing this data appear on each product specifications page and refer to Thomas Register catalog volume or our RF/IF Designer's Guide Handbook.

ULTRA-REL® MIXERS
*5-YR. GUARANTEE**

This symbol identifies products that are manufactured with extra reliability. See page 26 for a complete explanation.

prices

The prices shown are the U.S. unit list prices for the quantity indicated. For unit prices in higher quantities, and for a formal quote, contact our nearest distribution center, authorized local distributor, sales office or the factory. See back cover.

ordering information and warranty

For warranty, terms of payment, shipping instructions, and one-week guaranteed shipping conditions. See pages 8 and 9.

applications support/ technical assistance

For literature requests, assistance in selecting models, understanding model specifications, requesting additional model performance data, contact our Applications Engineering Department. See page 179.

sales assistance

For assistance in purchasing products, obtaining quotes, opening up an account, requesting order status information, assistance in obtaining same or next day delivery, contact our Sales Department.

NSN numbers

Specification pages contain a listing of Mini-Circuits' models that have been assigned a National Stock Number (NSN).

listing of reps, authorized distributors distribution centers

A complete list of Mini-Circuits' sales representatives, local distributors, and major Distribution Centers puts you in immediate contact with our Sales Support team to answer questions, assist in component selection, and expedite orders. See back cover.

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

Ordering And Delivery Information

Refer to the rep listing in this handbook for Mini-Circuits worldwide network of sales representatives and distributors ready to serve your needs, supply your orders, and answer your questions promptly and courteously.

Federal supply code: 15542

how to order

Your local representative or distributor is the contact for both sales and service assistance for products listed in this catalog. These local offices have the latest price and delivery information on all models. They can also provide details on ordering procedures, service information and application engineering data. Your order may be sent directly to Mini-Circuits or to any of the local sales offices listed.

Prices listed in this catalog are domestic F.O.B. Brooklyn, New York. Mini-Circuits reserves the right to change specifications, models, prices, or designs without prior notice and without liability for such changes. Minimum order $50.00.

shipping instructions

Shipments can be made by either air or surface carriers. If specific shipping instructions do not accompany the order, Mini-Circuits will supply the carrier to be used. For air shipments, Mini-Circuits has arranged for substantial discounts with carriers.

terms

Net 30 days from date of invoice. If credit is not established with Mini-Circuits, shipments will be made C.O.D. (cash on delivery) or prepaid. We also accept most major credit cards. If prepaying, please include freight.

warranty

Limited Warranty and Exclusive Remedy. Each product manufactured by Mini-Circuits is warranted to conform to Mini-Circuits' applicable specifications on the date of shipment, subject to permissible variations and defects defined by The Institute for Interconnecting and Packaging Electronic Circuits, provided that these products are used with compatible components in appropriate environments, within the applications and ranges for which they were manufactured, and in accordance with applicable instructions, and provided further that they have not been subject to improper installation, improper maintenance, abuse, accident, negligence, alteration, misuse or the like. The warranty period is twelve (12) months after shipment, unless another period is specified. The sole and exclusive remedy available under this limited warranty is the repair or replacement of any products which Mini-Circuits determines to be defective or, if Mini-Circuits determines that this exclusive remedy fails its essential purpose, the purchaser will, at its option, be entitled to a refund of the purchase price for the products in question or a credit therefor.

LIMITATION OF WARRANTY. THERE ARE NO OTHER WARRANTIES HEREUNDER, WHETHER EXPRESSED OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND ANY WARRANTIES ARISING UNDER COURSE OF PERFORMANCE, COURSE OF DEALING OR USAGE OF TRADE. UNLESS A STATEMENT IS SPECIFICALLY IDENTIFIED IN THIS BROCHURE AS A WARRANTY, THE STATEMENTS MADE HEREIN RELATING TO ANY PRODUCTS ARE NOT EXPRESS WARRANTIES BUT ARE MERELY MINI-CIRCUITS' OPINION OR COMMENDATION OF SUCH PRODUCTS. ANY DESCRIPTION OF PRODUCTS SPECIFIED HEREIN IS NOT INTENDED TO BE A WARRANTY, BUT IS FOR THE SOLE PURPOSE OF IDENTIFYING SUCH PRODUCTS AND IT DOES NOT CONSTITUTE A WARRANTY THAT PRODUCTS WILL CONFORM TO THAT DESCRIPTION. SIMILARLY, THE USE OF ANY SAMPLES, MODELS OR DRAWINGS IS ONLY FOR ILLUSTRATIVE PURPOSES AND DOES NOT CONSTITUTE A WARRANTY THAT PRODUCTS WILL CONFORM WITH SUCH SAMPLES, MODELS OR DRAWINGS.

WAIVER OF CONSEQUENTIAL DAMAGES. UNDER NO CIRCUMSTANCES WILL MINI-CIRCUITS BE LIABLE FOR ANY CONSEQUENTIAL, EXEMPLARY, INCIDENTAL, INDIRECT OR SPECIAL DAMAGES, OR LOST PROFITS, EXPENSES OR LOSSES ARISING OUT OF OR RELATED TO THE SALE OR USE OF ANY OF ITS PRODUCTS REGARDLESS OF WHETHER THE LIABILITY RESULTED FROM ANY GENERAL OR PARTICULAR REQUIREMENT OR NEED WHICH MINI-CIRCUITS KNEW OR SHOULD HAVE KNOWN OF.

For a full statement of limited warranty offered by Mini-Circuits and the exclusive rights and remedies thereunder, together with Mini-Circuits limitations of warranties and limitation of liability, please refer to Mini-Circuits sales order form (3/25/98). If you do not have this form, please contact Mini-Circuits representative and one will be provided promptly.

Warning: Since each system utilizing components is unique with different component configurations and attributes and differing requirements and environments, all of which can, among other things, affect product performance, the selection and use of any product offered by Mini-Circuits must be determined by competent engineers and other appropriate professionals who are familiar with the specific system in question. Nothing contained in this brochure shall constitute any professional advice and should not be used as a substitute for competent professional determinations. Since Mini-Circuits has not given any professional advice, it is not responsible or liable for improper selection, use or installation of products offered by Mini-Circuits and, with respect to the systems in which such products are utilized, improper system design or the inadequacy of back-up systems.

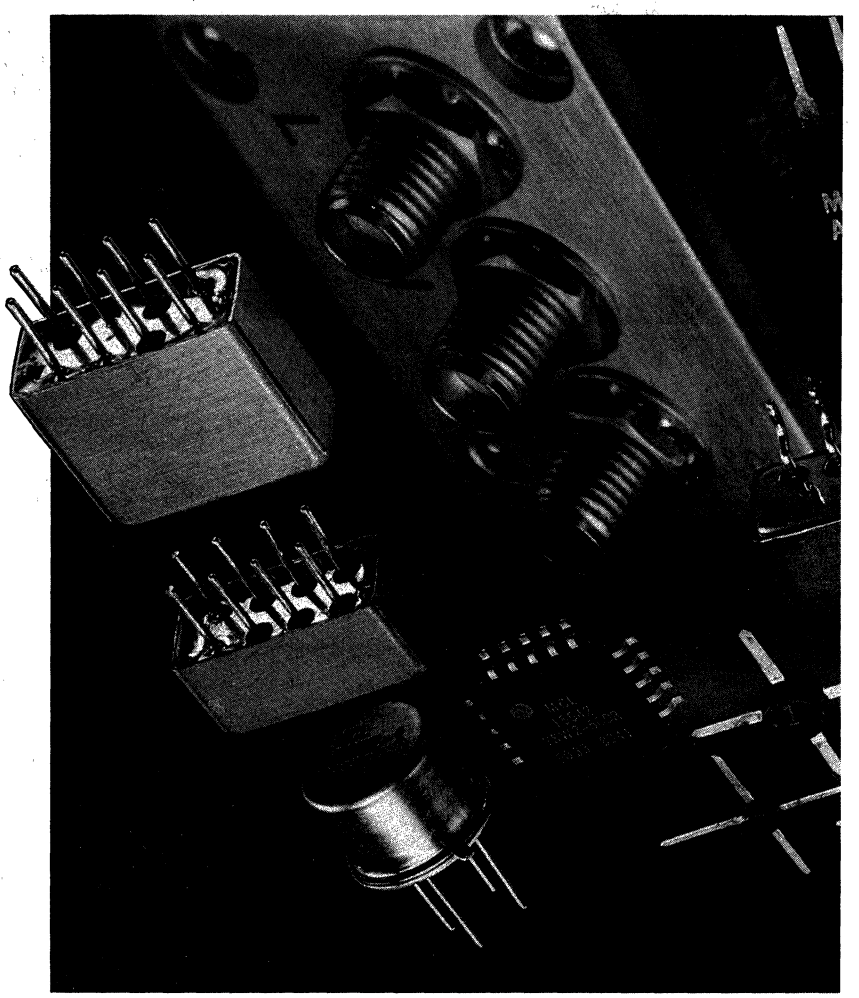
Warning: While products offered by Mini-Circuits have the potential to be used as components in (i) devices or systems utilized in air or space flight; (ii) medical devices; or (iii) life support devices or systems, such uses are not authorized, nor will such products be covered by Mini-Circuits' limited warranty, without the prior written consent of Mini-Circuits.

For U.S. Customers

To provide superior customer convenience and fast delivery, our Distribution Center is open 12 hours a day (8AM to 8PM for East Coast and 5AM to 5PM for West Coast customers). For West Coast orders, second day air service is offered at UPS ground rates. And, of course, all prices are the same as quoted from the factory.

For European Customers

To provide superior customer convenience, our Distribution Center in the UK (Wharf Rd., Frimley Green, Camberley, Surrey, GU16 6LF) is open from 8:30AM to 5:30PM. And, exclusive of duty and freight, all prices are the same as quoted from Mini-Circuits' factory.



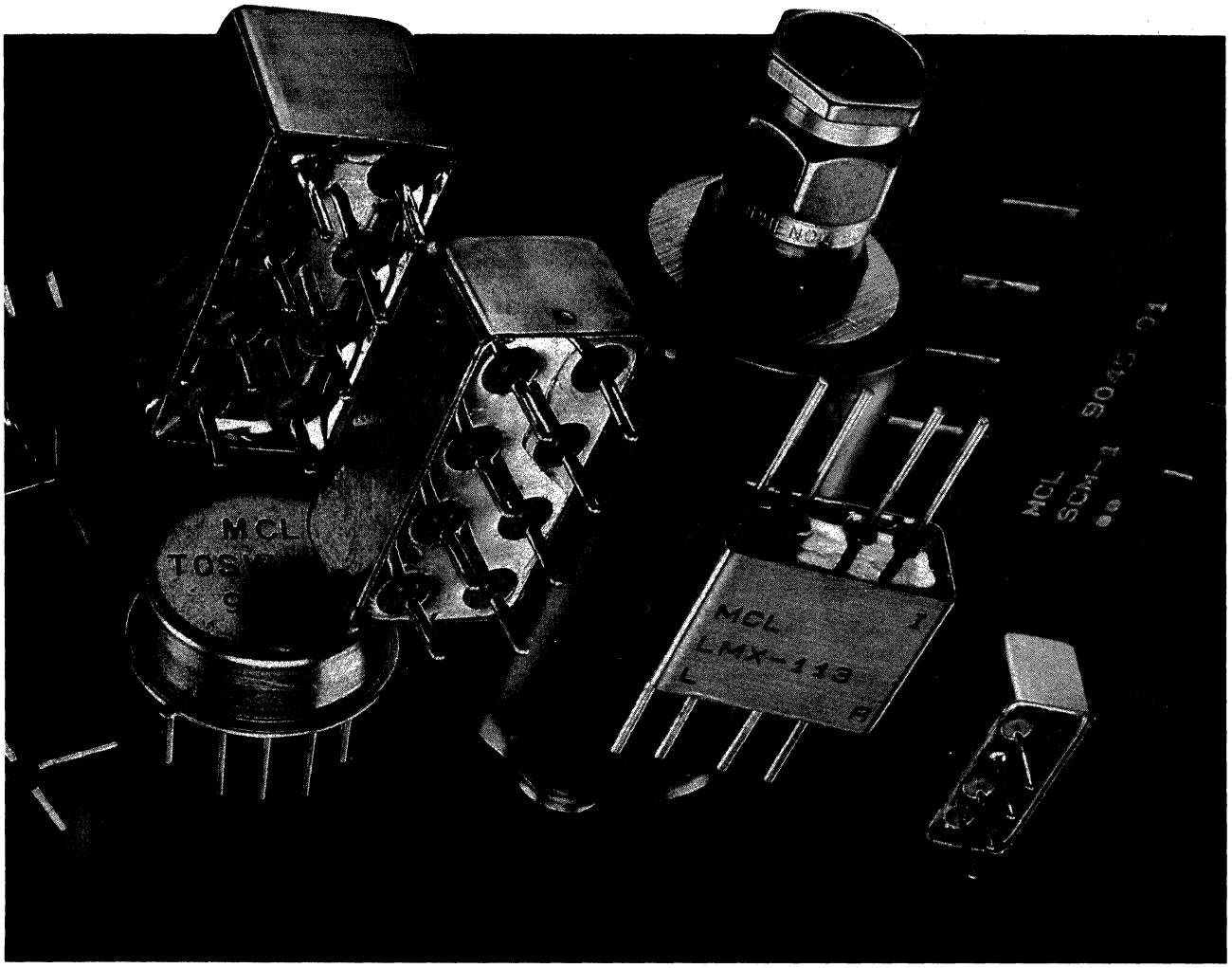
ALL MINI-CIRCUITS SHIPPED WITHIN

Eliminate weeks or even months of shipment delays for RF/IF signal-processing components...just one phone call to a Mini-Circuits' Distribution Center guarantees shipment within one week.

All Mini-Circuits' components listed in the latest published catalog, in all configurations, mounting options, and connector types will be processed and shipped within one week after an order is received, or if the order calls for scheduled assignments, we will ship on or before the due date. If we're late subject to the Conditions of Guarantee, we'll give a discount of 1% per day from your bill (maximum 25%, as allowed by law); but don't count on this discount since we intend to meet each and every scheduled shipment. Although we guarantee one-week turnaround, two days is our target and for rush orders only one day.

What makes this rapid turnaround possible? First, fast manufacturing throughput achieved through powerful statistical process-control techniques coupled with the latest computer-automated production and test equipment. Second, a worldwide distribution network with major Distribution Centers in the U.S. and England.

Guaranteed order processing is another expression of Mini-Circuits' dedicated effort for world-class quality...meeting and exceeding customers' expectations. Write, phone, or fax your order and be confident that it will be shipped on time, every time by Mini-Circuits.



RF/IF CATALOG PRODUCTS ONE-WEEK... GUARANTEED!

DISTRIBUTION CENTERS

NORTH AMERICA
Mini-Circuits
NEW YORK
8AM-5:30PM EST
(phone) 800 247-6343
(phone) 718 934-4500
(fax) 718 332-4661

MISSOURI
9AM-8PM EST
(phone) 800 654-7949
(phone) 417 335-5935
(fax) 417 335-5945

EUROPE
Mini-Circuits Europe
Registered in England No. 1419461,
Dale Electronics Ltd.
A Subsidiary of Mini-Circuits

Registered Office Dale House,
Wharf Road, Frimley Green Camberley,
Surrey GU16 6LF, England
(phone) 44-1252-835094
(fax) 44-1252-837010

CREDIT CARDS WELCOME

AMERICAN EXPRESS VISA ACCESS MASTER CARD EUROCARD

Conditions of Guarantee

- DISCOUNT: 1% per day will be discounted from the bill (maximum 25%, as allowed by law) if components listed in the latest catalog are not shipped within one week after an order is placed or if a scheduled order is shipped after the due date, subject to the Conditions of Guarantee.
- ORDER PLACEMENT—guarantee applies only to orders placed with Distribution Center.
- ORDER REQUIREMENT—guarantee starts after all details of the purchase order are received complete.
- SHIPMENT TIME—guarantee applies for work days Monday through Friday, holidays excluded.
- TRANSPORTATION—does not apply to situations where shipping is inhibited due to strikes, weather, or conditions beyond our control.
- GOVERNMENT REGULATIONS—does not apply to purchase orders inhibited by government rules, regulations, export licenses, and/or customs approval.
- QUANTITIES—guarantee applies to normal distribution quantities, which vary according to product line.
- CREDIT RATING—guarantee limited to companies with approved credit rating at time of shipment.
- LETTERS OF CREDIT—guarantee limited to meeting terms of LC.

Mini-Circuits®

P.O Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718)332-4661 *INTERNET* http://www.minicircuits.com
For detailed specs on all Mini-Circuits products refer to • 760-pg. HANDBOOK • MICROWAVE PRODUCT DATA DIRECTORY • EEM

ISO 9001 CERTIFIED

GUARANTEED SAVINGS... YEAR IN AND YEAR OUT!

How the program works

Wouldn't it be nice to plan next years budget based on costs that decrease instead of increase? When you're a member of Mini-Circuits Partner Program®, you can do just that! It's as easy as 2 + 2= 4... here's how it works.

As soon as you join the Partner Program®, the first time you purchase a Mini-Circuits model, the quantity price you pay is based on the sum of all your previous yearly purchases of that model. If you purchased 200 of a particular unit last year, and need another 200 units this year, the price you pay today would be based on a 400 unit quantity discount!

Yes, with the Partner Program®, your quantity discounts accumulate year after year as your total purchases jump from one quantity discount bracket to another.

Now that's guaranteed savings!

With Mini-Circuits Partner Program® you can enjoy a lifetime of volume quantity price reductions on all our catalog and most of our custom products.

The Partner Program® makes sense

Today, everybody is talking about the highly competitive business environment and the global challenges of the 90's. In typical Mini-Circuits tradition, we're not talking...we're taking action.

The Partner Program® is our way of sharing risks and earning the rewards of doing business with you.

Mini-Circuits is committed to a total partnership for improving quality and reducing manufacturing thru-put time. The end result is lower costs. As partners, we both share in these savings.

That's what true partnership is all about.

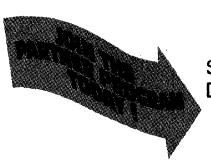
Joining the Partner Program®

The program is limited to qualified customers at no cost or obligation. Simply request a Partner Program® kit to receive information on this revolutionary program.

We'll take care of all the details and manage the statistics for your account.

You can place your orders in the usual manner with Mini-Circuits or any Mini-Circuits Distribution Centers. Your purchases will be tallied and tracked in the Mini-Circuits computer. In 1998 you will be eligible to receive automatic discounts based on your purchases starting from 1990.

Contact Mini-Circuits and start benefiting from the Partner Program® today!



Mini-Circuits®

P.O Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718)332-4661 ***INTERNET*** http://www.minicircuits.com

For quick access to product information see MINI-CIRCUITS CATALOG & WEB SITE • EEM • MICROWAVE PRODUCT DATA DIRECTORY • WWW.RFGLOBALNET.COM

ISO 9001 *CERTIFIED*

10

Mini-Circuits

PARTNER PROGRAM®

TERMS & CONDITIONS

This program is offered to qualified customers for the purpose of maintaining a mutually beneficial long term relationship.

As a participant of this program, you will share in the results of Mini-Circuits' commitment to quality by earning cumulative annual quantity price break reductions on all of your Mini-Circuits purchases.[1]

As the cumulative total enters into a higher quantity price break, the unit price of your present purchase is lowered, and it never stops. You can enjoy a lifetime of volume quantity price reductions on all of our catalog, and most of our custom products.

For a particular purchase of quantity C in the present year, the price shall correspond to quantity A according to the following formula.

$$QTY\ A = QTY\ B + QTY\ C$$

where QTY B = cumulative annual quantity purchased in preceding years as of January 1, 1990.

joining the program

Qualified customers automatically join the Partner Program by making a purchase of a Mini-Circuits model[2] from a Mini-Circuits distribution center, authorized local distributor, or from the factory direct.

qualified customers

The program is limited to original users. Companies reselling Mini-Circuits products do not qualify. Original users shall mean approved companies, universities, schools, organizations, a division or subsidiary of a corporation, and a department or location of a government agency. For corporations issuing a corporate contract to Mini-Circuits, a division of the corporation may combine quantities purchased by other divisions for cumulative total quantity calculations. In absence of a corporate contract, each division must join the Partner Program® individually.

maintaining qualification

A good credit standing with Mini-Circuits is a criteria to remain a participant of the program.

purchase location eligibility

Purchases from Mini-Circuits or a Mini-Circuits distribution center qualify for the program. Purchases from an authorized participating distributor qualify for the program when documentation of purchase is supplied to Mini-Circuits.

product eligibility

All catalog models and most special models are included in the program.

product ineligibility

Purchases made for the following do not qualify for the program: special testing, lot testing, serializing, source inspections, and qualification testing. Furthermore, purchases during special promotions or for multi-year or special contracts do not qualify. Highly specialized custom designed models may not be included in the program. Please consult with the Partner Program manager.

purchase quantities

Quantities credited to the program include only the net quantity of each model shipped to the customer in a specific calendar year. Different models may not be combined.

minimum purchase quantities

The base year quantity equals the total cumulative consecutive annual quantity purchased in preceding years as of January 1, 1990. However, if the quantity purchased for a model in a year is less than 2% of the quantity purchased in the previous year, then the cumulative total for the previous years shall revert to zero, i.e., base year quantity equals zero.

partner program changes

Mini-Circuits reserves the right to make changes to the program without prior notice.

partner program validity

The partner program is void where prohibited by law.

[1]Subject to the provisions of the terms and conditions given herein.
[2]All catalogs and most special products are eligible.

Model Index

● Dot indicates surface mount models.

mixers

model	pages
● ADE-1ASK	58
● ADE-10H	70
● ADE-12	58
● ADE-12H	71
● ADE-13	58
● ADE-14	58
● ADE-18	58
● ADE-18W	58
● ADE-2ASK	58
● ADE-20	58
● ADE-20H	70
● ADE-3G	58
● ADE-3GL	58
● ADE-35	58
● ADE-901	58
● ADM-10DH	70
● ALY-3	56
● ALY-4	56
● ALY-44MH	67
● ALY-44MHW	67
ASK-1	60
● ASK-1-KK81	56
ASK-2	60
● ASK-2-KK81	56
● JCIR-4MH	54
● JCIR-25	54
● JMS-1	56
● JMS-1LH	65
● JMS-1MH	67
● JMS-1H	71
● JMS-2	56
● JMS-2H	71
● JMS-2L	55
● JMS-2LH	65
● JMS-2MH	67
● JMS-2W	56
● JMS-5	56
● JMS-5LH	65
● JMS-5MH	67
● JMS-5H	71
● JMS-11X	56
● JYM-20H	70
● JYM-28H	70
● JYM-30H	70
● LRMS-1	56
● LRMS-1H	71
● LRMS-1LH	65
● LRMS-1MH	67
● LRMS-1W	56
● LRMS-1WH	71
● LRMS-2	56
● LRMS-2D	56
● LRMS-2H	71
● LRMS-2L	55
● LRMS-2LH	65
● LRMS-2MH	67
● LRMS-2U	56
● LRMS-2UH	71
● LRMS-5	56
● LRMS-5H	71
● LRMS-5L	55
● LRMS-5LH	65
● LRMS-5MH	67
● LRMS-11A	56
● LRMS-20J	65
● LRMS-25J	65
● LRMS-30J	56
● LRMS-860	56
RAY-1	72
RAY-2	72
RAY-3	72
RAY-6	72
RAY-6U	72
RAY-11	72
● RMS-1	56
● RMS-1BM	56
● RMS-1H	71
● RMS-1LH	65
● RMS-1MH	67
● RMS-1W	56
● RMS-1WH	71
● RMS-2	56
● RMS-2D	56
● RMS-2H	71
● RMS-2L	55
● RMS-2LH	65
● RMS-2MH	67
● RMS-2U	56
● RMS-2UH	71
● RMS-2UMH	67
● RMS-5	56
● RMS-5H	71
● RMS-5L	55
● RMS-5LH	65
● RMS-5MH	67
● RMS-11A	56
● RMS-11F	56
● RMS-11X	56
● RMS-25MH	67
● RMS-30	56
● RMS-42MH	67
● RMS-860	56
ROK-186MH	66
ROK-2500LH	64
ROSE-1	60
ROSE-2	60
SAM-1	60
SAM-2	60
SAM-3	60
SAY-1	72
SAY-2	72
SAY-11	72
SBL-1	60
SBL-1-1	60
SBL-1-1LH	64
SBL-1LH	64
SBL-1MH	66
SBL-1X	60
SBL-1XLH	64
SBL-1Z	60
SBL-1ZMH	66
SBL-2LH	64
SBL-3	60
SBL-3LH	64
SBL-11	60
SBL-11LH	64
SBL-173H	68
SBL-173SH	68
SBL-2500H	68
● SCM-1	57
● SCM-1LH	65
● SCM-2	57
● SCM-2LH	65
● SCM-5	57
● SCM-5LH	65
● SCM-2500	57
● SCM-2500LH	65
SIMA-5	60
SIMA-5H	68
SIMA-5MH	66
● SKY-5G	57
● SKY-7G	57
● SKY-42	57
● SKY-53R	57
● SKY-53HR	71
● SKY-53LHR	65
● SKY-53MHR	67
● SKY-60	57
● SKY-60H	71
● SKY-60LH	65
● SKY-60MH	67
SRA-1	60
SRA-1-1	60
SRA-1H	68
SRA-1MH	66
SRA-1W	60
SRA-1WH	68
SRA-11	60
SRA-11H	68
SRA-12	60
SRA-149	60
SRA-173H	68
SRA-173SH	68
SRA-2	60
SRA-2CM	60
SRA-2CR	64
SRA-2H	68
SRA-215	64
SRA-220	64
SRA-2000	60
SRA-2010MH	66
SRA-2400	60
SRA-2500SH	68
SRA-3	60
SRA-3H	68
SRA-3MH	66
SRA-3500	60
SRA-4	60
SRA-5	60
SRA-6	60
SRA-6H	68
SRA-8	60
● SYM-2	57
● SYM-10DH	70
● SYM-10DHW	70
● SYM-10HJ	70
● SYM-11	57
● SYM-11H	70
● SYM-11J	57
● SYM-11LH	65
● SYM-11MH	67
● SYM-12	57
● SYM-14H	71
● SYM-20DH	71
● SYM-20DHW	71
● SYM-22H	70
● SYM-860	57
● SYM-2500	57
TAK-1H	68
TAK-1WH	68
TAK-3H	68
TAK-5	61
TAK-5R	61
TAK-6	61
TAK-6R	61
TAK-7	61
TFM-1H	68
TFM-1MH	66
TFM-2	61
TFM-2H	68
TFM-2LH	64
TFM-2P	61
TFM-3	61
TFM-3H	68
TFM-3MH	66
TFM-4	61
TFM-4H	68
TFM-5	61
TFM-11	61
TFM-12	61
TFM-12MH	66
TFM-15	64
TFM-42MH	66
TFM-150	64
TFM-2400	61
TFM-4300	61
TSM-3	61
TUF-1	61
TUF-1H	68
● TUF-1HSM	71
TUF-1LH	64
● TUF-1LHSM	65
TUF-1MH	66
● TUF-1MHSM	67
● TUF-1SM	57
TUF-2	61
TUF-2H	68
● TUF-2HSM	71
TUF-2LH	64
● TUF-2LHSM	65
TUF-2MH	66
● TUF-2MHSM	67
● TUF-2SM	57
TUF-3	61
TUF-3H	68
● TUF-3HSM	71
TUF-3LH	64
● TUF-3LHSM	65
TUF-3MH	66
● TUF-3MHSM	67
● TUF-3SM	57
TUF-5	61
TUF-5H	68
● TUF-5HSM	71
TUF-5LH	64
● TUF-5LHSM	65
TUF-5MH	66
● TUF-5MHSM	67
● TUF-5SM	57
TUF-5X	61
● TUF-5XSM	57
TUF-11A	61
TUF-11AH	68
● TUF-11AHSM	71
TUF-11ALH	64
● TUF-11ALHSM	65
TUF-11AMH	66
● TUF-11AMHSM	67
● TUF-11ASM	57
TUF-18DH	68
● TUF-18DHSM	70
TUF-860	61
TUF-860H	68
● TUF-860HSM	71
TUF-860LH	64
● TUF-860LHSM	65
TUF-860MH	66
● TUF-860MHSM	67
● TUF-860SM	57
TUF-2500MH	66
● TUF-2500MHSM	67
UNCL-L1	53
UNCL-L1H	53
UNCL-R1	52
UNCL-R1H	52
UNCL-X1	52
UNCL-X1MH	52
VAY-1	73
ZAD-1	62
ZAD-1-1	62
ZAD-1H	69
ZAD-1SH	69
ZAD-1W	62
ZAD-1WH	69
ZAD-1WSH	69
ZAD-2	62
ZAD-2H	69
ZAD-3	62
ZAD-3H	69
ZAD-3SH	69
ZAD-4	62
ZAD-6	62
ZAD-8	62
ZAD-11	62
ZAD-11H	69
ZAD-12	62
ZAM-42	63
ZAY-1	72
ZAY-2	72
ZAY-3	72
ZEM-M2TMH	66
ZEM-2B	63
ZEM-4300	63
ZEM-4300MH	66
ZFM-1H	69
ZFM-1W	63
ZFM-2	63
ZFM-2H	69
ZFM-3	63
ZFM-3H	69
ZFM-4	63
ZFM-4H	69
ZFM-5X	63
ZFM-11	63
ZFM-12	63
ZFM-15	64
ZFM-150	64
ZFM-2000	63
ZFM-4212	63
ZFY-1	72
ZFY-2	72
ZFY-11	72
ZLW-1	62
ZLW-1W	62
ZLW-1-1	62
ZLW-1H	69
ZLW-1SH	69
ZLW-1WH	69
ZLW-1WSH	69
ZLW-2	62
ZLW-2H	69
ZLW-3	62
ZLW-3H	69
ZLW-3SH	69
ZLW-5	62
ZLW-6	62
ZLW-8	62
ZLW-11	62
ZLW-11H	69
ZLW-12	62
ZLW-186MH	66
ZMX-7GHR	69
ZMX-7GLHR	64
ZMX-7GMH	66
ZMX-7GMHR	66
ZMX-7GR	62
ZMX-8GH	69
ZMX-8GLH	64
ZMX-10G	62
ZMY-1	72
ZMY-2	72
ZMY-3	72
ZP-1	62
ZP-1H	69
ZP-1LH	64
ZP-1MH	66
ZP-2	62
ZP-2H	69
ZP-2LH	64
ZP-2MH	69
ZP-3	62
ZP-3H	69
ZP-3LH	64
ZP-3MH	66
ZP-5	62
ZP-5H	69
ZP-5LH	64
ZP-5MH	66
ZP-5X	62
ZP-11A	62
ZP-11AH	69
ZP-11ALH	64
ZP-11AMH	66
ZP-860	62
ZP-860H	69
ZP-860LH	64
ZP-860MH	66
ZP-10514	62

high power combiners/ splitters

model	pages
ZA2CS-2G-20W	76
ZA2CS-10-20W	76
ZA2CS-500-15W	76
ZA2CS-600-10W	76
ZA3CS-400-3W	76
ZA3CS-450-9W	76
ZB3CS-920-15W	76
ZB4CS-440-12W	76
ZB4CS-960-12W	76
ZB5PD-894-50W	77
ZB6CS-150-12W	77
ZB8CS-950-32W	77

Mini-Circuits®

INTERNET http://www.minicircuits.com

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

ISO 9001 CERTIFIED

Mini-Circuits®

power splitters / combiners

model	pages
● ADP-2-10-75	79
● BP2C	79
● BP2G	79
● BP2P	79
● BP4C	93
● BP4P	93
● HPQ-05	86
● HPQ-05W	86
● HPQ-06	86
● HPQ-06W	86
● HPQ-07	86
● HPQ-08	86
● HPQ-09	86
● HPQ-09W	86
● HPQ-10	86
● HPQ-10W	86
● HPQ-11	86
● HPQ-12	86
● HPQ-12W	86
● HPQ-15	86
● HPQ-15W	86
IZY2PD-64	81
IZY2PD-86	81
● JCPS-8-850	98
● JCPS-8-850-75	98
● JEPS-16-1W-75	103
● JPS-2-1N	79
● JPS-2-1W	79
● JPS-2-4	79
● JPS-2-900	79
● JPS-3-1	90
● JPS-3-1W	90
● JSPQ-1875W	85
● JSPQW-100	85
● JS4PS-1	93
● JYPS-2-4-75	79
LPS-109	78
● LRPQ-70	85
● LRPQ-700	85
● LRPQ-980	85
● LRPS-2-1	79
● LRPS-2-1-75	79
● LRPS-2-1W-75	79
● LRPS-2-4	79
● LRPS-2-11	79
● LRPS-2-25	79
● LRPS-2-980	79
● LRPS-3-1	90
● LRPS-3-850	90
MSC-2-1	78
MSC-2-1W	78
MSC-2-5	78
MSC-2-11	78
MSC-3-1W	90
PMT-1	89
PMT-1-75	89
PQW-2-90	84
PQW-2-270	84
PRSC-2050	82
PSC-2-1	78
PSC-2-1-75	78
PSC-2-1-75A	78
PSC-2-1V-75	78
PSC-2-1W	78
PSC-2-1W-75	78
PSC-2-2	78
PSC-2-2-75	78
PSC-2-4	78
PSC-2-4-752	78
PSC-2-5	78
PSC-2-11	78
PSC-2-45	78
PSC-2-500-1W	78
PSC-2-960-1W	78
PSC-2-1000	78
PSC-2375	78
PSC-3-1	90
PSC-3-1A	90
PSC-3-1-75	90
PSC-3-1-75-2	90
PSC-3-1W	90
PSC-3-2	90
PSC-3-13	90
PSC-3-13-39	90
PSC-4-1	92
PSC-4-1-75	92
PSC-4-1W	92
PSC-4-1W-75	92
PSC-4-3	92
PSC-4A-1W-75	92
PSC-4A-4	92
PSC-4A-475	92
PSC-4-5	92
PSC-4-6	92
PSC-5-1	96
PSC-5-1-75	96
PSC-5-2	96
PSC-6-1	97
PSC-6-1-75	97
PSC-8-1	98
PSC-8-1W	98
PSC-8-1-75	98
PSC-8-6	98
PSC-8A-4	98
PSC-8A4-75	98
PSC-9-1	100
PSC-10-1	101
PSC-12-1	102
PSCJ-2-1	88
PSCJ-2-1-75	88
PSCJ-2-1W	88
PSCJ-2-2	88
PSCQ-2-0.455	84
PSCQ-2-1.25	84
PSCQ-2-1.5	84
PSCQ-2-3.4	84
PSCQ-2-4	84
PSCQ-2-6.4	84
PSCQ-2-7.5	84
PSCQ-2-8	84
PSCQ-2-10.5	84
PSCQ-2-13	84
PSCQ-2-14	84
PSCQ-2-17.5	84
PSCQ-2-21.4	84
PSCQ-2-32	84
PSCQ-2-26	84
PSCQ-2-40	84
PSCQ-2-50	84
PSCQ-2-60	84
PSCQ-2-70	84
PSCQ-2-70N	84
PSCQ-2-85A	84
PSCQ-2-90	84
PSCQ-2-120	84
PSCQ-2-160	84
PSCQ-2-180	84
PSCQ-2-250	84
PSCQ-2-300	84
PSCQ-2-400	84
PSCQ-2-450	84
PSCQ-2-550	84
PSCQ-2-1000	84
● RPQ-820	85
● RPQ-1495	85
● SCP-2-1	79
● SCP-2-1A	79
● SCP-3-1	90
● SCP-4-1	93
● SCP-4-1W	93
● SCP-4-1W-75	93
● SCP-4-4	93
● SCP-4-4-75	93
● SCP-5-1	96
● SCPJ-2-1W-75	88
● SCPJ-2-750-75	88
● SCPQ-10.5	85
● SCPQ-21.4	85
● SCPQ-50	85
● SCPQ-60	85
● SCPQ-85C	85
● SCPQ-90	85
● SCPQ-150	85
● SCPQ-180	85
● SCPQ-400	85
● SYPQ-21.4	85
● SYPQ-70	85
● SYPQ-113-1	85
● SYPS-2-1	79
T05SC-2-1	78
T05SC-110	78
TSC-2-1	78
TSC-2-1W	78
ZAPD-1	81
ZAPD-2	81
ZAPD-2-22-75	81
ZAPD-4	81
ZAPD-21	81
ZAPD-50	81
ZAPD-50W	81
ZAPD-900-5W	81
ZAPD-1750	81
ZAPDJ-2	88
ZAPDQ-2	83
ZAPDQ-4	83
ZA3PD-1	91
ZA3PD-1.5	91
ZA3PD-2	91
ZA3PD-4	91
ZA4PD-2	95
ZA4PD-4	95
ZBSC-5-1	96
ZBSC-413	94
ZBSC-611	97
ZBSC-615	97
ZB4PD-4	95
ZB4PD-6.4	95
ZB4PD-42	95
ZB4PD-1750-75	95
ZB4PD1-5.8	95
ZB4PD1-8.4	95
ZB4PD1-500	95
ZB4PD1-500-75	95
ZB4PD1-930	95
ZB4PD1-930W	95
ZB4PD1-2000	95
ZB6PD-1700	97
ZB6PD-2	97
ZB6PD-17	97
ZB6PD1-900	97
ZB6PD1-960	97
ZB6PD1-1900	97
ZB8PD-1	99
ZB8PD-2	99
ZB8PD-4	99
ZB8PD-6.4	99
ZB8PD-8.4	99
ZB8PD-22-75	99
ZB8PD-2000	99
ZCSC-3-R3	91
ZCSC-8-1	99
ZC2PD-900	81
ZC4PD-18	95
ZC4PD-900	95
ZC6PD-960	97
ZC6PD-960W	97
ZC6PD-1900	97
ZC6PD-1900W	97
ZC8PD-900	99
ZC9PD-1000	100
ZC10PD-26	101
ZC10PD-900	101
ZC10PD-900W	101
ZC16PD-900	103
ZC16PD-960	103
ZC16PD-960W	103
ZC16PD-1900	103
ZC16PD-1900W	103
ZC16PD-2185	103
ZESC-2-11	80
ZFRSC-42	82
ZFRSC-2050	82
ZFRSC-2075	82
ZFSC-2-1	80
ZFSC-2-1-75	80
ZFSC-2-1W	80
ZFSC-2-1W-75	80
ZFSC-2-2	80
ZFSC-2-4	80
ZFSC-2-5	80
ZFSC-2-6	80
ZFSC-2-6-75	80
ZFSC-2-9G	80
ZFSC-2-10G	80
ZFSC-2-11	80
ZFSC-2-2500	80
ZFSC-3-1	91
ZFSC-3-1W	91
ZFSC-3-4	91
ZFSC-3-4-75	91
ZFSC-3-13	91
ZFSC-4-1	94
ZFSC-4-1W	94
ZFSC-4-2-75-1	94
ZFSC-4-3	94
ZFSC-4375	94
ZFSC-4-175	94
ZFSC-5-1	96
ZFSC-6-1	97
ZFSC-6-1-75	97
ZFSC-6-110	97
ZFSC-8-1	99
ZFSC-8-1-75	99
ZFSC-82-75	99
ZFSC-8375	99
ZFSC-8-4	99
ZFSC-84-75	99
ZFSC-8-6	99
ZFSC-8-43	99
ZFSC-10-1	101
ZFSC-12-1	102
ZFSC-12-1-75	102
ZFSC-12-11	102
ZFSC-12-175	103
ZFSC-16-1	103
ZFSC-16-1-75	103
ZFSC-16-3	103
ZFSC-16-12	103
ZFSC-16-675	103
ZFSC-24-1	104
ZFSC-24-6	104
ZFSC-24-11	104
ZFSC-24-11-75	104
ZFSC-48-1	104
ZFSC-48-1-75	104
ZFSCJ-2-1	88
ZFSCJ-2-2	88
ZFSCJ-2-3	88
ZFSCJ-2-4	88
ZMSC-2-1	80
ZMSC-2-1W	80
ZMSC-2-2	80
ZMSC-3-1	91
ZMSC-3-2	91
ZMSC-4-1	94
ZMSC-4-2	94
ZMSC-4-3	94
ZMSCJ-2-1	88
ZMSCJ-2-2	88
ZMSCQ-2-21.4	83
ZMSCQ-2-50	83
ZMSCQ-2-90	83
ZMSCQ-2-120	83
ZMSCQ-2-180	83
ZN2PD-20	81
ZN2PD-9G	81
ZN2PD-920	81
ZN2PD-920W	81
ZN2PD-1900	81
ZN2PD-1900W	81
ZN3PD-900	90
ZN3PD-900W	90
ZN4PD-20	95
ZN4PD-920	95
ZN4PD-920W	95
ZN12PD-17	102
ZSC-2-1	80
ZSC-2-1-75	80
ZSC-2-1W	80
ZSC-2-2	80
ZSC-2-2-75	80
ZSC-2375	80
ZSC-2-4	80
ZSC-3-1	91
ZSC-3-1-75	91
ZSC-3-2	91
ZSC-3-2-75	91
ZSC-4-1	94
ZSC-4-1-75	94
ZSC-4-2	94
ZSC-4-3	94
ZSC-4-3-75	94
ZSCJ-2-1	88
ZSCJ-2-2	88
ZSCQ-2-50	83
ZSCQ-2-90	83
ZSCQ-2-180	83

impedance pad

model	pages
BMP-5075	173
BMP-5075R	173

fixed attenuators terminations

model	pages
ANNE-50	173
AT-1	106
AT-2	106
AT-3	106
AT-3-75	106
AT-4	106
AT-5	106
AT-6	106
AT-6-75	106
AT-7	106
AT-8	106
AT-9	106
AT-10	106
AT-10-75	106
AT-12	106
AT-15	106
AT-15-75	106
AT-20	106
AT-20-75	106
AT-25	106
AT-30	106
AT-40	106
BTRM-50	173
BTRM-75	173
BW-S1-2W	110
BW-S2-2W	110
BW-S3-2W	110
BW-S4-2W	110
BW-S5-2W	110
BW-S6-2W	110
BW-S7-2W	110
BW-S8-2W	110
BW-S9-2W	110
BW-S10-2W	110
BW-S12-2W	110
BW-S15-2W	110
BW-S20-2W	110
BW-S30-2W	110
BW-S40-2W	110
CAT-1	108
CAT-2	108
CAT-3	108
CAT-3-75	108
CAT-4	108
CAT-5	108
CAT-6	108
CAT-6-75	108
CAT-7	108
CAT-8	108
CAT-9	108
CAT-10	108
CAT-10-75	108
CAT-12	108
CAT-15	108
CAT-15-75	108
CAT-20	108
CAT-20-75	108
CAT-25	108
CAT-30	108
CAT-40	108
● LAT-1	105
● LAT-2	105
● LAT-3	105
● LAT-4	105
● LAT-5	105
● LAT-6	105
● LAT-7	105
● LAT-8	105
● LAT-9	105
● LAT-10	105
● LAT-12	105
● LAT-15	105
● LAT-20	105
MAT-1	106
MAT-2	106
MAT-3	106
MAT-4	106
MAT-5	106
MAT-6	106
MAT-7	106
MAT-8	106
MAT-9	106
MAT-10	106
MAT-12	106
MAT-15	106
MAT-20	106
MAT-25	106
MAT-30	106
MAT-40	106
NAT-1	109
NAT-1-2W	109
NAT-1-60	109
NAT-2	109
NAT-2-2W	109
NAT-2-60	109
NAT-3	109
NAT-3-2W	109
NAT-3-60	109
NAT-4	109
NAT-4-2W	109
NAT-4-60	109
NAT-5	109
NAT-5-2W	109
NAT-5-60	109
NAT-6	109
NAT-6-2W	109
NAT-6-60	109
NAT-7	109
NAT-7-60	109
NAT-8	109
NAT-8-60	109
NAT-9	109
NAT-9-60	109
NAT-10	109
NAT-10-60	109
NAT-12	109
NAT-12-42	109
NAT-15	109
NAT-15-30	109
NAT-20	109
NAT-20-21	109
NAT-25	109
NAT-25-21	109
NAT-30	109
NAT-30-15	109
NAT-40	109
NTRM-50	173
NTRM-50G	173
● PAT-1	107
● PAT-2	107
● PAT-3	107
● PAT-4	107
● PAT-5	107
● PAT-6	107
● PAT-7	107
● PAT-8	107
● PAT-9	107
● PAT-10	107
● PAT-12	107
● PAT-15	107
● PAT-20	107
● PAT-30	107
ROSE-50	173
SAT-0.5	109
SAT-1	109
SAT-2	109
SAT-2.5	109
SAT-3	109
SAT-4	109
SAT-5	109
SAT-6	109
SAT-7	109
SAT-8	109
SAT-9	109
SAT-10	109
SAT-12	109
SAT-15	109
SAT-20	109
SAT-30	109
SAT-40	109
STRM-50	173

In Stock... Immediate Delivery

Available Tape & Reel

For Custom Versions Of Standard Models Consult Our Applications Dept.

Model Index

● Dot indicates surface mount models.

bi-phase attenuators

model	pages
GAS-1	130
GAS-2	130
GAS-3	130
● LRAS-2-75	131
PAS-1	130
PAS-2	130
PAS-3	130
PAS-2000	130
● RAS-1	131
● RAS-2-75	131
● SYAS-1	131
● SYAS-2	131
● SYAS-860	131
TFAS-1	130
● TFAS-1SM	131
TFAS-2	130
● TFAS-2SM	131
TFAS-860	130
● TFAS-860SM	131
ZAS-1	132
ZAS-3	132
ZFAS-2000	132
ZMAS-1	132
ZMAS-3	132

digital step attenuators

model	pages
TOAT-R512	133
TOAT-124	133
TOAT-3610	133
TOAT-4816	133
TOAT-51020	133
ZFAT-R512	133
ZFAT-124	133
ZFAT-3610	133
ZFAT-4816	133
ZFAT-51020	133
ZSAT-31R5	133

amplifiers

model	pages
AMP-3G	123
AMP-11-2	120
AMP-15	120
AMP-74	123
AMP-75	120
AMP-76	120
AMP-77	120
AMP-2000	123
ERA-1	115
● ERA-1SM	115
ERA-2	115
● ERA-2SM	115
ERA-3	115
● ERA-3SM	115
ERA-4	115
● ERA-4SM	115
ERA-5	115
● ERA-5SM	115
ERA-6	115
● ERA-6SM	115
● HELA-10	119
LZY-1	127
LXY-1X	127
LZY-2	127
LZY-2X	127
MAN-1	123
MAN-1AD	122
MAN-11AD	122
MAN-1HLN	120
MAN-1LN	120
MAN-2	123
MAN-2AD	122
MAR-1	118
● MAR-1SM	116
MAR-2	118
● MAR-2SM	116
MAR-3	118
● MAR-3SM	116
MAR-4	118
● MAR-4SM	116
MAR-6	118
● MAR-6SM	116
MAR-7	118
● MAR-7SM	116
MAR-8	118
● MAR-8SM	116
MAV-11	118
● MAV-11SM	116
● RAM-1	117
● RAM-2	117
● RAM-3	117
● RAM-4	117
● RAM-6	117
● RAM-7	117
● RAM-8	117
TO-0812LN	121
TO-1217LN	121
TO-1724LN	121
● VAM-3	117
● VAM-6	117
● VAM-7	117
● VNA-25	117
ZEL-0812LN	121
ZEL-1217LN	121
ZEL-1724LN	121
ZFL-1HAD	122
ZFL-2AD	122
ZFL-2HAD	122
ZFL-11AD	122
ZFL-500	123
ZFL-500HLN	120
ZFL-500LN	120
ZFL-750	123
ZFL-1000	123
ZFL-1000G	122
ZFL-1000GH	122
ZFL-1000H	123
ZFL-1000LN	120
ZFL-1000VH	123
ZFL-1000VH2	123
ZFL-2000	123
ZFL-2500	123
ZFL-2500VH	123
ZHL-03-5WF	125
ZHL-0812HLN	121
ZHL-0812MLN	121
ZHL-1000-3W	125
ZHL-1042J	123
ZHL-1217HLN	121
ZHL-1217MLN	121
ZHL-1724HLN	121
ZHL-1724MLN	121
ZHL-1A	124
ZHL-1HLD	122
ZHL-1-2W	125
ZHL-1-50P3	124
ZHL-1010-46P3	124
ZHL-2010-46P3	124
ZHL-3010-46P3	124
ZHL-2	124
ZHL-2-8	124
ZHL-2-12	124
ZHL-2-50P3	124
ZHL-3A	124
ZHL-32A	124
ZHL-42	124
ZHL-42W	124
ZHL-4240	124
ZHL-4240W	124
ZHL-5W-1	125
ZHL-6A	123
ZHL-7-2W	125
ZHL-900-10W	125
ZJL-3G	123
ZJL-4G	123
ZJL-4HG	123
ZJL-5G	123
ZJL-6G	123
ZJL-7G	123
ZKL-1R5	123
ZKL-2	123
ZKL-2R5	123
ZKL-2R7	123
ZRON-8G	123
ZVE-8G	124

instrumentation amplifiers

model	pages
T1A-900-10	126
T1A-1000-4	126
T1A-1000-1R8	126

pulse amplifiers

model	pages
ZPUL-21	128
ZPUL-30P	128

directional couplers

model	pages
● ADC-6-1R	134
● ADC-8-4-75	134
● ADC-10-1R	134
● ADC-10-4	134
● ADC-10-4-75	134
● ADC-15-4	134
● ADC-15-4-75	134
● ADC-18-4-75	134
● ADC-20-4	134
● ADC-20-4-75	134
● D17I	134
● D18P	134
● D19G	134
● D20C	134
● JDC-6-1	134
● JDC-10-2	134
● JDC-10-4	135
● JDC-10-4-75	135
● JDC20-1W-75	135
● JDC-20-1W	135
● JDC-20-3-75	135
● JDC-20-2	135
● LRDC-10-1	135
● LRDC-10-1-75	135
● LRDC-10-2-75	135
● LRDC-10-2W-75	135
● LRDC-12-1-75	135
● LRDC-20-2	135
PDC-10-1	136
PDC-10-1-75	136
PDC-10-1BD	136
PDC-10-2	136
PDC-10-5	136
PDC-10-6	136
PDC-10-6-75	136
PDC-10-21	136
PDC-10-22	136
PDC-10-54	136
PDC-15-6	136
PDC-15-6-75	136
PDC-15-21	136
PDC-20-1	136
PDC-20-1BD	136
PDC-20-1W	136
PDC-20-3	136
PDC-20-3-75	136
PDC-20-3BD	136
PDC-20-6-75	136
PDC20-400HP	137
PDC-20A-5	136
PDC20-900HP	137
PDC20-970HP	137
P4DC-30A-2	136
● SCDC-11-2	135
● SCDC-25-2	135
TDC-6-1	136
TDC-10-1	136
TDC-10-2	136
TODC-10-1	136
ZABDC20-2400	137
ZADC-10-4-75	138
ZADC-10-10	138
ZADC-20-10	138
ZADC-30-10	138
ZDC-10-1	138
ZDC-10-1-75	138
ZDC-10-2	138
ZDC-15-2	138
ZDC-15-6	138
ZDC-15-6-75	138
ZDC-20-1	138
ZDC-20-3	138
ZDC-20-3-75	138
ZDC-20-3-75-1	138
ZDC-2375	138
ZEDC-10-2B	138
ZEDC-15-2B	138
ZFBDC20-900HP	137
ZFBDC20-970HP	137
ZFDC-10-1	139
ZFDC-10-1-75	139
ZFDC-10-2	139
ZFDC-10-21	139
ZFDC-10-21-75	139
ZFDC-10-22	139
ZFDC-10-5	139
ZFDC-10-6	139
ZFDC-15-5	139
ZFDC-15-6	139
ZFDC-15-6-75	139
ZFDC-15-10	139
ZFDC-20-1H	137
ZFDC-20-3	139
ZFDC-20-3-75	139
ZFDC-20-4	139
ZFDC-20-4L	139
ZFDC-20-5	139
ZFDC-20-5-75	139
ZFDC-20-50	139
ZFDC-3375	139
ZMDC-10-1	139
ZMDC-10-2	139
ZMDC-15-6	139
ZMDC-20-1	139
ZMDC-20-3	139
ZMDC-30-1	139

filters

model	pages
BBLP-39	145
BBLP-117	145
BBLP-156	145
BBLP-200	145
BBLP-300	145
BBLP-467	145
BBP-10.7	144
BBP-21.4	144
BBP-30	144
BBP-60	144
BBP-70	144
BHP-25	147
BHP-50	147
BHP-100	147
BHP-150	147
BHP-175	147
BHP-200	147
BHP-250	147
BHP-300	147
BHP-400	147
BHP-500	147
BHP-600	147
BHP-700	147
BHP-800	147
BHP-900	147
BHP-1000	147
BIF-21.4	144
BIF-30	144
BIF-40	144
BIF-50	144
BIF-60	144
BIF-70	144
BLP-1.9	142
BLP-2.5	142
BLP-5	142
BLP-7-75	142
BLP-10.7	142
BLP-10.7-75	142
BLP-15	142
BLP-15-75	142
BLP-21.4	142
BLP-21.4-75	142
BLP-30	142
BLP-30-75	142
BLP-50	142
BLP-50-75	142
BLP-70	142
BLP-90	142
BLP-100	142
BLP-100-75	142
BLP-150	142
BLP-200	142
BLP-250	142
BLP-300	142
BLP-450	142
BLP-550	142
BLP-600	142
BLP-600-75	142
BLP-750	142
BLP-800	142
BLP-850	142
BLP-850-75	142
BLP-1000	142
BLP-1200	142
NBLP-39	145
NBLP-117	145
NBLP-156	145
NBLP-200	145
NBLP-300	145
NBLP-467	145
NBLP-933	145
NBLP-1870	145
NBP-10.7	144
NBP-21.4	144
NBP-30	144
NBP-60	144
NBP-70	144
NHP-25	147
NHP-50	147
NHP-100	147
NHP-150	147
NHP-175	147
NHP-200	147
NHP-250	147
NHP-300	147
NHP-400	147
NHP-500	147
NHP-600	147
NHP-700	147
NHP-800	147
NHP-900	147
NHP-1000	147
NIF-21.4	144
NIF-30	144
NIF-40	144
NIF-50	144
NIF-60	144
NIF-70	144
NLP-1.9	143
NLP-2.5	143
NLP-5	143
NLP-10.7	143
NLP-15	143
NLP-21.4	143
NLP-30	143
NLP-50	143
NLP-70	143
NLP-90	143
NLP-100	143
NLP-150	143
NLP-200	143
NLP-250	143
NLP-300	143
NLP-450	143
NLP-550	143
NLP-600	143
NLP-750	143
NLP-800	143
NLP-850	143
NLP-1000	143
NLP-1200	143
NLP-1750	143
NLP-2400	143
NLP-2950	143
PBLP-39	145
PBLP-117	145
PBLP-156	145
PBLP-200	145
PBLP-300	145
PBLP-467	145
PBP-10.7	144
PBP-21.4	144
PBP-30	144
PBP-60	144
PBP-70	144
PHP-25	146
PHP-50	146
PHP-100	146
PHP-150	146
PHP-175	146
PHP-200	146
PHP-250	146
PHP-300	146
PHP-400	146
PHP-500	146
PHP-600	146
PHP-700	146
PHP-800	146
PHP-900	146
PHP-1000	146
PIF-21.4	144
PIF-30	144
PIF-40	144
PIF-50	144
PIF-60	144
PIF-70	144
PLP-1.9	140
PLP-2.5	140
PLP-5	140
PLP-7-75	140
PLP-10.7	140
PLP-10.7-75	140
PLP-15	140
PLP-15-75	140
PLP-21.4	140
PLP-21.4-75	140
PLP-30	140
PLP-30-75	140
PLP-50	140
PLP-50-75	140
PLP-70	140
PLP-90	140
PLP-100	140
PLP-100-75	140
PLP-150	140
PLP-200	140
PLP-250	140
PLP-300	140
PLP-450	140
PLP-550	140
PLP-600	140
PLP-600-75	140
PLP-750	140
PLP-800	140
PLP-850	140
PLP-850-75	140
PLP-1000	140
PLP-1200	140
SBLP-39	145
SBLP-117	145
SBLP-156	145
SBLP-200	145
SBLP-300	145
SBLP-467	145
SBLP-933	145
SBLP-1870	145
SBP-10.7	144
SBP-21.4	144
SBP-30	144
SBP-60	144
SBP-70	144

Mini-Circuits®

INTERNET http://www.minicircuits.com

P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661

Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

ISO 9001 CERTIFIED

Mini-Circuits®

filters (con't)

model	pages
● SCHF-17	146
● SCHF-25	146
● SCHF-300	146
● SCLF-5	141
● SCLF-8	141
● SCLF-10.7	141
● SCLF-21.4	141
● SCLF-25	141
● SCLF-30	141
● SCLF-45	141
● SCLF-95	141
● SCLF-135	141
● SCLF-190	141
● SCLF-225	141
● SCLF-380	141
● SCLF-420	141
● SCLF-550	141
● SCLF-700	141
● SCLF-1000	141
SHP-25	147
SHP-50	147
SHP-100	147
SHP-150	147
SHP-175	147
SHP-200	147
SHP-250	147
SHP-300	147
SHP-400	147
SHP-500	147
SHP-600	147
SHP-700	147
SHP-800	147
SHP-900	147
SHP-1000	147
SIF-21.4	144
SIF-30	144
SIF-40	144
SIF-50	144
SIF-60	144
SIF-70	144
SLP-1.9	143
SLP-2.5	143
SLP-5	143
SLP-10.7	143
SLP-15	143
SLP-21.4	143
SLP-30	143
SLP-50	143
SLP-70	143
SLP-90	143
SLP-100	143
SLP-150	143
SLP-200	143
SLP-250	143
SLP-300	143
SLP-450	143
SLP-550	143
SLP-600	143
SLP-750	143
SLP-800	143
SLP-850	143
SLP-1000	143
SLP-1200	143
SLP-1650	143
SLP-2400	143
SLP-2950	143

frequency doublers

model	pages
AK-2	148
AK-3000	148
FD-2	148
FK-5	148
FK-3000	148
GK-2	149
GK-3	149
GK-5	149
LK-3000	149
MK-2	149
MK-3	149
MK-5	149
RK-2	148
RK-3	148
RK-5	148
RK-6	148
RK-3000	148
SK-2	148
● SYK-2R	148

limiters

model	pages
PLS-1	172
PLS-2	172
PLS-6	172

phase shifters

model	pages
● JSPHS-446	151
SPH-16	151

phase detectors

LPD-1	150
MPD-1	150
MPD-2	150
MPD-21	150
RPD-1	150
RPD-2	150
● SYPD-1	150
● SYPD-2	150
ZRPD-1	150

modulators/ demodulators

BPSK, I/Q & QPSK

model	pages
● JCBM-1000DR	152
● JCIQ-88M	155
● JCIQ-176M	155
● JCIQ-176D	157
● JCIQ-895D	157
● JCIQ-1785D	157
● JCIQ-1880D	157
MIQA-10D	156
MIQA-10M	154
MIQA-21D	156
MIQA-21M	154
MIQA-70D	156
MIQA-70M	154
MIQA-70ML	154
MIQA-91M	154
MIQA-100M	154
MIQA-108M	154
MIQA-195M	154
MIQC-38D	156
MIQC-38M	154
MIQC-60WD	156
MIQC-88M	154
MIQC-176M	154
MIQC-895D	156
MIQC-895M	154
MIQC-1785M	154
MIQC-1880M	154
MIQY-1.25D	156
MIQY-70D	156
MIQY-70M	154
MIQY-140D	156
MIQY-140M	154
PMQ-94	153
PMQ-330	153
PMQ-440	153
PMQPW-150	153
PMQPW-250	153
QMC-100	153
QMC-170	153
QMC-1050	153
ZAMIQ-895D	156
ZAMIQ-895M	154
ZFMIQ-10D	156
ZFMIQ-10M	154
ZFMIQ-70D	156
ZFMIQ-70ML	154
ZFMIQ-91M	154
ZFMIQ-100M	154
ZFMIQ-108M	154
ZMQ-1050	153

switches

model	pages
● GSWA-4-30DR	160
● KSW-2-46	162
● KSWA-2-46	162
● KSWHA-1-20	162
● MSW-2-20	163
● MSWA-2-20	163
● MSWT-4-20	163
PSW-1211	159
● RSW-2-25P	163
TOSW-230	158
TOSW-425	158
ZFSW-2-46	161
ZFSWA-2-46	161
ZFSWHA-1-20	161
ZMSW-1111	159
ZMSW-1211	159
ZSDR-230	158
ZSDR-425	158
ZYSW-2-50DR	161
ZYSWA-2-50DR	161

bias-tees

model	pages
● JEBT-4R2G	164
● JEBT-4R2GW	164
● JEBT-6G	164
● JEBT-6GW	164
PBTC-1G	165
PBTC-1GW	165
PBTC-3G	165
PBTC-3GW	165
ZFBT-4R2G	165
ZFBT-4R2G-FT	165
ZFBT-4R2GW	165
ZFBT-4R2GW-FT	165
ZFBT-6G	165
ZFBT-6G-FT	165
ZFBT-6GW	165

oscillators

model	page
● JCOS-820BLN	169
● JCOS-820WLN	169
● JCOS-1100LN	169
● JTOS-25	167
● JTOS-50	167
● JTOS-50P	171
● JTOS-75	167
● JTOS-75P	171
● JTOS-100	167
● JTOS-100P	171
● JTOS-150	167
● JTOS-150P	171
● JTOS-200	167
● JTOS-200P	171
● JTOS-300	167
● JTOS-300P	171
● JTOS-400	167
● JTOS-400P	171
● JTOS-535	167
● JTOS-535P	171
● JTOS-765	167
● JTOS-765P	171
● JTOS-1000W	167
● JTOS-1025	167
● JTOS-1025P	171
● JTOS-1300	167
● JTOS-1650	167
● JTOS-1910	167
● JTOS-2000	167
● JTOS-2200P	171
● JTOS-3000	167
● JTOS-3000P	171
POS-25	166
POS-50	166
POS-50P	170
POS-75	166
POS-75P	170
POS-100	166
POS-100P	170
POS-150	166
POS-150P	170
POS-200	166
POS-200P	170
POS-300	166
POS-300P	170
POS-400	166
POS-400P	170
POS-535	166
POS-535P	170
POS-765	166
POS-765P	170
POS-900W	166
POS-1000W	166
POS-1025	166
POS-1025P	170
POS-1060	166
POS-1400	166
POS-2000	166
POS-2120W	166
POSA-138	169
POSA-158	169
● ROS-285PV	171
● ROS-900PV	171
● ROS-960PV	171
● ROS-1410V	167
● ROS-1600PV	171
ZOS-50	168
ZOS-75	168
ZOS-100	168
ZOS-150	168
ZOS-200	168
ZOS-300	168
ZOS-400	168
ZOS-535	168
ZOS-765	168
ZOS-1025	168

transformers

model	pages
● ADT1-1	176
● ADT2-1T	174
● ADT3-1T	174
● ADT4-1WT	174
● ADT9-1T	174
● ADT16-1T	174
● ADTL1-12	178
● ADTL1-18-75	178
● ADTT1-1	175
FT1.22-1	177
FT1.5-1	177
FTB1-1	177
FTB1-1-75	177
FTB1-6	177
● JTX-2-10T	174
● JTX-4-10T	174
T1-1	176
● T1-1-KK81	176
T1-1H	176
● T1-1H-KK81	176
T1-1T	174
● T1-1T-KK81	174
T1-6	176
● T1-6-KK81	176
T1-6T	174
● T1-6T-KK81	174
T1.18-3	176
● T1.18-3-KK81	176
T1.5-1	176
● T1.5-1-KK81	176
T1.5-6	176
● T1.5-6-KK81	176
T2-1	176
● T2-1-KK81	176
T2-1-2W	176
● T2-1-2W-KK81	176
T2-1T	174
● T2-1T-KK81	174
T2-613-1	178
● T2-613-1-KK81	178
T2.5-6	176
● T2.5-6-KK81	176
T2.5-6T	174
● T2.5-6T-KK81	174
T3-1	177
● T3-1-KK81	177
T3-1T	174
● T3-1T-KK81	174
T4-1	174
● T4-1-KK81	174
T4-1-2W	176
● T4-1-2W-KK81	176
T4-1H	174
● T4-1H-KK81	174
T4-2	177
● T4-2-KK81	177
T4-6	176
● T4-6-KK81	176
T4-6T	174
● T4-6T-KK81	174
T5-1T	174
● T5-1T-KK81	174
T8-1	177
● T8-1-KK81	177
T8-1T	174
● T8-1T-KK81	174
T9-1	174
● T9-1-KK81	174
T9-1H	176
● T9-1H-KK81	176
T13-1T	174
● T13-1T-KK81	174
T14-1	177
● T14-1-KK81	177
T16-1	176
● T16-1-KK81	176
T16-1H	176
● T16-1H-KK81	176
T16-6T	174
● T16-6T-KK81	174
T36-1	176
● T36-1-KK81	176
T-622	178
● T-622-KK81	178
T-626	178
● T-626-KK81	178
● TC1-1	178
● TC1-15	178
● TCI.5-1	177
● TC2-1T	174
● TC3-1T	174
● TC4-1T	174
● TC4-1W	174
● TC4-11	177
● TC4-14	174
● TC8-1	174
● TC9-1	174
TMO1-02	176
TMO1-1	176
TMO1-1T	174
TMO1.5-1	176
TMO2-1	177
TMO2-1T	174
TMO2.5-6	176
TMO2.5-6T	174
TMO3-1	177
TMO3-1T	174
TMO4-1	174
TMO4-2	177
TMO4-6	176
TMO5-1T	174
TMO6-1	176
TMO8-1	177
TMO9-1	176
TMO13-1T	174
TMO14-1	177
TMO16-1	176
TO-75	176
TT1-6	175
● TT1-6-KK81	175
TT1.5-1	175
● TT1.5-1-KK81	175
TT2.5-6	175
● TT2.5-6-KK81	175
TT4-1	175
● TT4-1-KK81	175
TT4-1A	175
● TT4-1A-KK81	175
TT16-1	175
● TT16-1-KK81	175
TT25-1	175
● TT25-1-KK81	175
TTMO1-1	175
TTMO4-1A	175
TTMO25-1	175
● TX1-1	176
● TX1-R5	176
● TX1.5-1	176
● TX9-1	176
● TX16-R3T	174
● TX16-1	176

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

designers kits

Mini-Circuits offers a wide range of plug-in and surface-mount component kits to aid the engineer during the evaluation, design, and prototype stages; in addition, there are kits offered to provide components for use in the testing laboratory. These kits contain a carefully-selected group of models that will enable the largest versatility of usage by the engineer.

As an example of Mini-Circuits quest to exceed our customer's expectations, these kits are priced up to 40 percent lower than the cost of individual units and are available from stock.

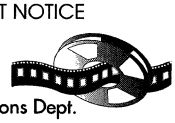
TYPE	KIT NO.	QTY. EACH MODEL	MODEL NUMBERS	TOTAL QUANTITY UNITS	PRICE
FREQUENCY MIXERS	K-SYM*	1	SYM-2, -11, -860, -11LH, 11MH, 11H	6	59.95
	K-TUF*	1	TUF-1, 1SM, -2, -2SM, -3, -3SM, -5, -5SM, -11A, -11ASM, -860, -860SM	12	79.95
	K1-RMS*	1	RMS-1, -1W, -2, -2D, -2U, -5, -11A, -860	8	59.95
	K1-LRMS*	1	LRMS-1, -1W, -2, -2D, -2U, -5, -11A, -860	8	59.95
	K2-LRMS*	1	LRMS-1LH, -2LH, 5LH, -1MH, -2MH, 5MH, -1H, -2UH, -5H	9	89.95
	K-SM*	2	SYM-2, RMS-2, LRMS-2, SCM-2, TUF-2SM	10	59.95
	K-860*	2	SYM-860, RMS-860, LRMS-860, TUF-860SM	8	82.60
POWER SPLITTERS	K1-PS*	1	SCP-2-1A, SCP-3-1, SCPQ-21.4, SCPQ-90, SCPQ-180,		
			SCPQ-400	6	59.95
	K2-PS	1	PSCQ-2-21.4, -2-50, -2-90, -2-180, -2-250, -2-400	6	99.95
	K3-PS	2	PSC-2-1-75, -3-1-75, -4-1-75	6	99.95
	K4-PS	2	PSC-2-1, PSCJ-2-1, AND 1 EACH PSC-3-1A, PSC-4-3	6	99.95
AMPLIFIERS	DAK-2	5	MAR-1, -2, -3, -4, -6, -7, -8	35	59.95
	DAK-2SM*	5	MAR-1SM, -2SM, -3SM -4SM, -6SM, -7SM, -8SM	35	61.95
	DAK-3*	3	MAR-1, -1SM, -2 -2SM, -3, -3SM, -4, -4SM MAR-6, -6SM, -7, -7SM, -8, -8SM, MAR-11, -11SM	48	59.95
	K1-MAN	1	MAN-1LN, 1HLN, -1, -2	4	59.95
	K2-MAN	1	MAN-1AD, 11AD, 2AD	3	59.95
	K-ZFL	1	ZHL-6A, ZFL-1000, ZFL-2000	3	395.00
	KZHL-318	1	ZHL-6A, ZHL-1042J, ZRON-8G	3	1095.00
CHIP CAPACITORS	KCAP-1	50	10PF, 22PF, 47PF, 68PF, 100PF, 220PF, 470PF, 680PF, 1000PF, 2200PF, 4700PF, 6800PF, .010UF, .022UF, .047UF, .068UF, .100UF	850	99.95
DIGITAL STEP ATTENUATORS	K-TOAT	1	TOAT-124, -3610, -51020	3	149.95
	K-ZFAT	1	ZFAT-R512, -124, -3610, -51020	4	299.95
ELECTRONIC ATTENUATORS	K-PAS	1	PAS-1, -3, -2000	3	99.95

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

Mini-Circuits®

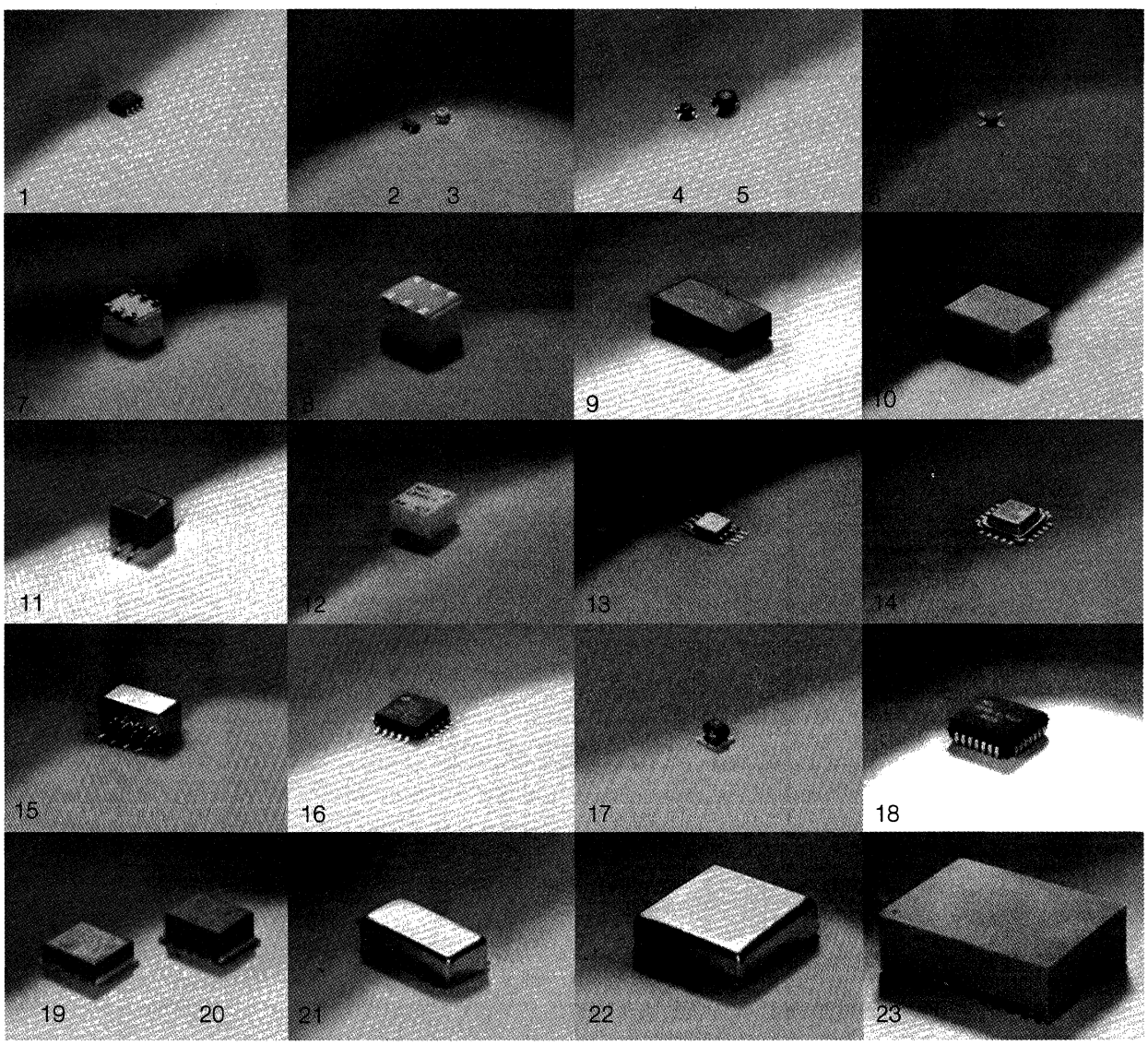
TYPE	KIT NO.	QTY. EACH MODEL	MODEL NUMBERS	TOTAL QUANTITY UNITS	PRICE
FIXED ATTENUATORS/ TERMINATIONS	K1-AT	4	AT-3, -6, -10, -20	16	49.95
	K2-AT	1	AT-1, -2, -3, -4, -5, -6, -7, -8, -9, -10, AT-12, -15, -20, -30, -40, -3-75, -6-75, AT-10-75, -15-75, -20-75	20	49.95
	K1-MAT	2	MAT-3, 6, 9, 10, 12, 15, 20, 40	16	49.95
	K2-MAT	1	MAT-1, -2, -3, -4, -5, -6, -7, -8, -9 MAT-10, -12, -15, -20, -25, -30, -40	16	49.95
	K1-CAT	2	CAT-3, -6, -10, -20	8	89.95
	K2-CAT	1	CAT-1, -2, -3, -4, -5, -6, -7, -8, -9, CAT-10, -12, -15, -20, -30, -40	15	199.95
	K-CAT-75	1	CAT-3-75, -6-75, -10-75, -15-75, -20-75	5	74.95
	K1-SAT	2	SAT-3, -6, -10, -20	8	109.95
	K2-SAT	1	SAT-1, -2, -3, -4, -5, -6, -7, -8, -9, -9, SAT-10, -12, -15, -20, -30, -40	15	219.95
	K-NAT	2	NAT-3, -6, -10, -20	8	149.95
	K-TRM	2	BTRM-50, STRM-50, NTRM-50	6	49.95
DIRECTIONAL COUPLERS	K1-DC	1	ZFDC-10-5, -15-5, -20-5 (BNC CONNECTORS)	3	199.95
	K2-DC	1	ZFDC-10-1, -20-4 (BNC CONNECTORS)	2	89.95
	K3-DC	1	PDC-10-6, -15-21, -20A-5	3	79.95
	K4-DC	1	PDC-10-1-75, -15-6-75, 20-3-75, 20-6-75	4	59.95
	K5-DC	1	PDC-10-1, -10-54, -10-6	3	53.95
	K6-DC	1	ZFDC-10-21-75, -20-3-75, -3375 (BNC CONNECTORS)	3	119.95
	K7-DC	1	ZEDC-10-2B, -15-2B, ZFDC-20-4 (SMA CONNECTORS)	3	149.95
FILTERS	K-SCF*	1	SCLF-21.4, -30, -45, -135, -190, -380, -420	7	59.95
	K-PHP	1	PHP-50, -100, -150, -175, -200, -250, -300, PHP-400, -500, -600, -700, -800, -900, -1000	14	149.95
	K-LHP	1	SLP-50, -100, -300, -550, -1000, SHP-200, -400, -700	8	249.00
	K-PLP	1	PLP-5, -10.7, -21.4, -30, -50, -70, -90, PLP-100, -150, -200, -250, -300, -450, -550, PLP-600, -750, -800, -850, -1000, -1200	20	159.95
PHASE DETECTORS	K-PD*	1	MPD-1, MPD-2, MPD-21, SYPD-1, SYPD-2	5	79.95
SWITCHES	K1-KSW*	1	KSW-2-46, KSWA-2-46, KSWHA-1-20	3	99.95
	K-ZFSW	1	ZFSW-2-46, ZFSWA-2-46	2	139.95
RF TRANSFORMERS	TTK-1	2	TT1-6, 1.5-1, 2.5-6, 4-1, 4-1A, 16-1, 25-1	14	79.95
	TK-5	2	T1-1T, T1-6T, T2-1T, T2.5-6T, T3-1T, T4-1T, T4-6T, T5--1T, T8-1T, T13-1T, T16-6T	22	79.95
	TK-6	2	T1-1, 1.18-3, 1-6, 1.5-1, 1.5-6, 2.5-6, 4-6, 9-1, 16-1, 36-1	20	79.95
	THK-1	3	T1-1H, T4-1H AND 2 EACH T9-1H, T16-1H	10	59.95
	TMK-2	2	TMO-1-1, -2-1, -4-1, -9-1, -16-1	10	59.95

NOTES: *KITS CONTAINING SURFACE-MOUNT UNITS.
(1) AVAILABLE FROM MINI-CIRCUITS DISTRIBUTOR CENTERS.
(2) SORRY, NO SUBSTITUTIONS ALLOWED
(3) PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

In Stock... Immediate Delivery  Available Tape & Reel
For Custom Versions Of Standard Models Consult Our Applications Dept.

Mini-Circuits®

surface mount devices actual size



Case Style	Series Name	Case Style	Series Name
1 XX211	VNA,MSWT, MSW, MSWA, BP	14 AG191	VSW, VSWA
2 MMM168	VAM	15 NNN150	TUF-SM
3 AF190	RAM	16 KKK155	YSW, YSWA
4 WW107	MAR-SM, ERA-SM	17 AT224	TC
5 RRR137	MAV-SM	18 AN213	GSWA
6 AF320	PAT	19 TTT166	SYM, SYAS
7 BH292	JMS, JPS, JDC	TTT167	SYM, SYPD, SYAS, SYPS
8 TT100	RMS, RPQ, RAS, TX	20 AH202	SYPQ
9 YY101	SCM, SCPQ, SCP	21 BK276	JSIQ, JSPQW, JSPHS
YY161	SCPJ, SCPQ, SCDC, SCLF	BK343	JSPQ
10 BJ293	JYM, JYPS	BK377	JTOS
11 KK81	ASK, T, TT	22 BG291	JCIQ, JCPS
12 QQQ130	LRMS, LRPQ, LRPS, LRAS, LRDC	BG419	JCOS
13 XX112	KSW, KSWA, KSWHA	23 BL301	JEBT

ALL CATALOG ITEMS GUARANTEED TO BE ***SHIPPED WORLDWIDE WITHIN 1 WEEK!***

FOR CUSTOM PRODUCTS AT CATALOG PRICES CONTACT OUR APPLICATIONS DEPT.

AVAILABLE ON TAPE & REEL

surface mount environmental specifications

All MCL products are manufactured under exacting quality assurance and control standards. As a minimum they will meet published specifications after being subjected to any or all of the following physical and environmental tests of MIL-STD-202, unless otherwise noted.

Rating or Test	MIL-STD-202 Method		Package Type Hermetic	Non-Hermetic[4]
Temperature Operating, °C[1]	--	--	-55° to 100°	-20° to 85°
Temperature Storage, °C[1]	--	--	-55° to 100°	-55° to 100°
Altitude: 150,000 feet	105	E	Yes	--
Humidity: 90%RH, 65°C	106	--	Yes[2]	--
Thermal Shock	107	B	-65° to 125°	-55° to 100°
Fine & Gross Leak	112	C&D	$1x10^{-7}$	Not Appl.
Solderability: 95% coverage	208	--	Yes	Yes
Solder Heat[3]	--	--	Yes	Yes
Solvent Resistance	215	--	Yes	Yes

Notes:
1. Extended temperature ranges are available for some models; consult factory. Operating Temperature for RAM models, -55°C to 125°C and VNA, -40°C to 70°C, or as noted on spec. page.
2. Humidity not guaranteed for VSW, VSWA models.
3. Peak temperature during reflow soldering 230°C, see typical profiles page 22. Technical Section.
4. Including aqueous washable models.

understanding surface mount

The main reason for the utilization of surface mount technology today is PWB area efficiency and the corresponding reduction of the system volume. Small surface mount components are used to manufacture electronic assemblies that are significantly smaller than the similar function assemblies using thru-hole components. Usually, the board area for most systems can be reduced by a factor of two for a single sided board. When components are mounted on both sides of the board, size reduction by another factor of two can be achieved. Conversely, the functional density can be doubled in the same area with the use of surface mount components. Since the height of surface mount components are generally smaller, significant reduction in system volume can also be achieved. Fewer, denser assemblies and correspondingly fewer connectors, less mechanical hardware and shorter lead lengths can yield another reduction factor of 2 to 4. Add to that the use of Application Specific IC's (ASIC's), and a total volume amounting to approximately 20 percent of the original system can result.

Size reduction however, is not the only SMT benefit. As a secondary benefit, the ever increasing demand for higher speed circuitry causes time delay reductions of even nanoseconds to be beneficial. Typically, an SMT package will have significantly lower values of inductance, capacitance and resistance compared to dual in-line packages (DIP). This is shown in the table below. Surface mount assembly essential is a four step manufacturing process:

1 Print the solder paste
2 Place components
3 Reflow the paste to form the solder interconnection between the component an the land area on the PWB
4 Clean-up

The use of a pick-and-place machined can perform the equivalent function handled by 3 to 4 machines in a standard thru-hole assembly area. Additionally, an automated SMT manufacturing line conserves space, used fewer people, has a shorter cycle time and reduces work in progress inventory. This helps achieve higher yields through more rapid feedback and use of statistical process control data. In all, the savings from automated SMT manufacturing can be as great as 50% compared to a thru-hole manufacturing area designed to build a similar electronic function.

SURFACE MOUNT VS. DUAL IN-LINE PACKAGES INDUCTANCE AND CAPACITANCE VALUE COMPARISONS

	DUAL IN-LINE PKG. (DIP)		SMALL OUTLINE (SO)		PLASTIC LEADED CHIP CARRIER (PLCC)	
LEADS	L (nH)	C (pF)	L (nH)	C (pF)	L (nH)	C (pF)
8	3.2-9.3	0.35-1.0	2.3-3.8	0.22-0.48	--	--
14	3.2-10.2	0.38-1.1	2.6-3.8	0.22-0.54	--	--
16	3.3-10.5	0.44-1.1	2.4-4.3	0.22-0.50	--	--
20	3.4-13.7	0.53-1.5	4.9-8.5	0.45-0.85	4.2-5.0	0.60-0.65
24	3.8-18.1	0.53-1.6	4.9-9.5	0.43-1.86	--	--
28	3.8-14.4	0.58-1.7			5.3-6.9	0.70-0.75
40/44	3.8-15.3	0.60-1.9			5.3-6.6	0.75-0.80
64/68	7.1-28.1	0.63-2.4			5.1-6.4	0.78-0.83

Values given are Min. and Max.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED
19

most often asked questions about surface mount

Q. *What is the recommended temperature profile to be used for Mini-Circuits surface mount units?*

A. Use as low a temperature as will melt your solder paste and form properly wetting fillets. The solder-melt temperature should be maintained at the surface mount units for the minimum practical time to minimize thermal shock however, preheat at 2°C/second maximum rate and allow at least 2 minutes cool-down time.

Q. *What are some of the defects related to the soldering process that can occur and what is the possible causes?*

A. At a glance...here are some of the cause and effect relationships for common defects that can occur.

DEFECTS	Co-Planarity	Solderability	Metallurgy	Solder-Quality	Solder-Volume	Reflow Profile	Placement Accuracy	Land Design
Open Joints	X	X			X		X	
Tombstoning			X	X	X	X		X
Voids		X	X	X		X		
Solder Wicking	X		X			X		
Non-Wetting		X	X	X				
Incomplete Fillets	X				X		X	X
Poor Strength		X	X	X	X	X		
Solder Shorts					X		X	X
Solder Balls		X		X	X	X		
Intermetallics			X	X		X		
Appearance			X			X	X	
Component Cracking			X		X	X	X	X

Q. *Will Mini-Circuits units be capable of meeting performance specs after being subjected to my reflow process?*

A. Yes. As a guide, units built with a ceramic or epoxy-glass PC board base will withstand a reflow temperature profile which peaks for 6 seconds at 225°C, spends 90 seconds maximum above 200°C, 2.5 minutes above 175°C and 5 minutes above 150°C. This includes such units as RMS, JMS and SYM, for example. Unencapsulated models such as TC transformers will take more. They can be reflowed with 230°C peak, 5 minutes above 175°C and 7 minutes above 150°C.

Plastic molded amplifiers in the MAR-SM, MAV-SM and VAM series can be reflowed with 230°C peak, 8 seconds above 220°C, 25 seconds above 200°C and 20 minutes above 150°C. The corresponding maximum times for the ceramic-metal RAM amplifiers are several times longer, as shown on the specification pages.

Plastic GaAs switches with drivers such as YSW can withstand 240°C peak and 200°C for 4 minutes. The ceramic-metal VSW version will take 275°C peak.

Q. *How are Mini-Circuits mixers designed to resist internal solder melting during reflow process ?*

A. Mini-Circuits Ultra-Rel mixers are built tough! All internal connections are welded. Therefore, no solder joints can reflow because there are none.

Q. *With regard to cleaning methods which are being used in accordance with new environmental laws, will Mini-Circuits components stand-up after being subjected to aqueous wash?*

A. External surfaces will not be adversely affected. Many surface mount components are hermetically sealed or moisture proofed, and are not subject to any restrictions on cleaning fluids generally used on customers' assemblies. Moldid plastic units and some units which have polymeric seals may allow seepage, however. After a water rinse, bake-out of such units is usually necessary to remove moisture and ensure restoration of full electrical performance.

Use of defluxing agents which have non-volatile constituents is not recommended for units subject to seepage, because rinsing will not extract them effectively. Mini-Circuits offers low-cost open assembly and wash-through designs for applications using those defluxing agents.

Q. *What is the coplanarity of the leads on Mini-Circuits components?*

A. Mini-Circuits surface mount components meet the applicable coplanarity deviation limit in Appendix C of MIL- M- 38510, which is .004 inch (0.102 mm). This includes the KK81 case style. Some of the other gull-wing case styles may have slightly greater deviation. In any event, customers' stated requirements should be achievable.

Q. *What effect does the land size have on the strength of the solder joints?*

A. The strength of the solder joint is a function of the volume of solder paste, the area of land and the type of component lead. Smaller than optimum land sizes reduce the solder joint strength. Larger sizes provide more tolerance for the screen printer and the pick-and-place machine, but result in little additional joint strength.

Q. *What is the recommended spacing between lands?*

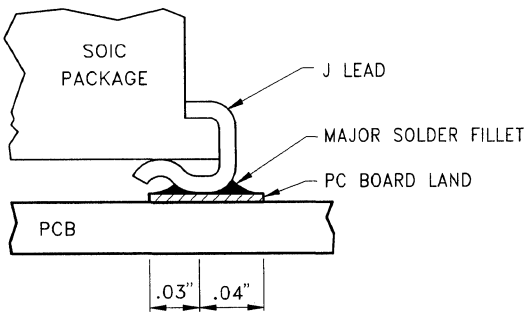
A. Maintaining 25 mil spacing between lands helps to minimize shorting due to solder bridging.

Q. *What are the advantages of JMS models compared with the RMS mixer?*

A. The leads raise the base of the unit above the user's printed wiring board. This higher profile facilitates removal of solder flux after mounting and allows visual inspection of solder connection. The shape of the J lead also allows the device to occupy the minimum area on the board and provides strain relief due to thermal stress. Additionally, the leads allow for easier removal from the printed wiring board for repair or replacement.

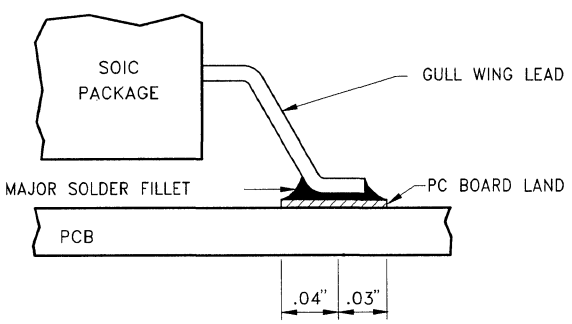
Q. *When using J leads, what is the position of the lands with respect to the package so the major fillet formation is optimized?*

A. The major fillet of the solder joint for the J lead is on the outside (the "heel") lead; therefore the contact point on the land should be slightly to the inside of the center of the land. A 0.07 inch land size is shown for illustration purposes.



Q. *...and what should the position of the land be for gull-wing leads?*

A. The heel of the gull-wing lead is on the inside, next to the package body. The major fillet is at the heel. Therefore, the land should be placed so that the greater portion of the land extends under the lead toward the body of the package.



Q. *Why is there more than one grounding lead on some Mini-Circuits surface mount components?*

A. Many components perform over wide frequency bands with high isolation between specific signal ports and low VSWR. To achieve this performance, reactances of ground-return paths of the units have to be controlled. Therefore, all ground leads should find a short electrical path to the ground plane, preferably via plated-through holes in the PC board. The holes should be located under or near the unit.

Q. *How much latitude does one have in bending the leads on a surface mount component?*

A. Leads can be bent at angles up to 90 degrees. Hold each lead near the body of the unit while bending, so as not to cause stress where it exits the body. Avoid repeated bends which might fatigue the material.

Q. *When soldered to PC board, are crimp leads mechanically strong enough to hold the unit down,or is additional anchoring needed?*

A. All Mini-Circuits surface mount components are designed so that normal soldering procedures are sufficient to hold them without additional anchoring.

Q. *Does Mini-Circuits 4.5σ repeatability apply to surface mount units?*

A. The 4.5σ repeatability specification applies to the same performance characteristics as for functionally equivalent Mini-Circuits models in other packages.

Q. *My application dictates a rugged surface mount mixer, but price is critical. What would you recommend?*

A. Consider Mini-Circuits TUF series. With all-welded internal and external construction, TUF models are the most rugged surface mount mixers in the world. These 0.5x0.2x0.25 inch metal cased units employ only four gull wings to simplify lead placement on PC boards. TUF mixers are priced low... from $3.95 each (qty. 10).

glossary of terms

COPLANARITY: The relationship between the leads of a component and the lands on a printed wiring board.

INTERMETALLICS: (Intermetallic Compound-IMC) Metallic compounds that form at the surfaces between different metals. IMC's typically have significantly different properties than the original metals, such as tensile strength.

LAND: The metal conductor surface on the substrate or PWB on to which the component lead is attached with solder.

METALLURGY: The art of working metals.

NON-WETTING: The characteristic of a metal surface where the solder comes in contact but does not form an intermetallic or metallurgical bond.

PRINTED WIRING BOARD: (PWB) Also called printed circuit board (PCB). The substrate, generally epoxy glass, used to provide component attachment lands and interconnections to form a functioning electronic circuit.

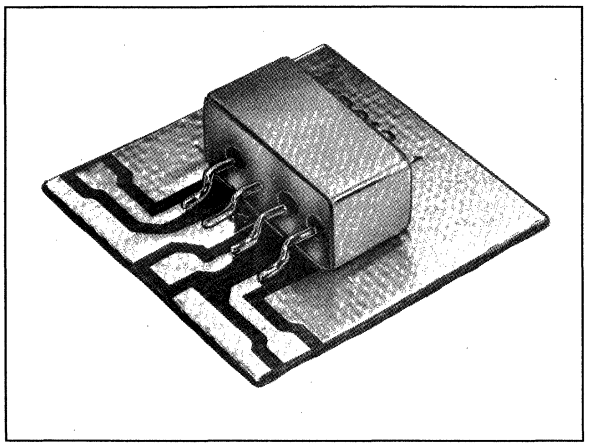
TOMBSTONING: Refers to a chip capacitor or resistor that is standing on one solder termination (also "drawbridging").

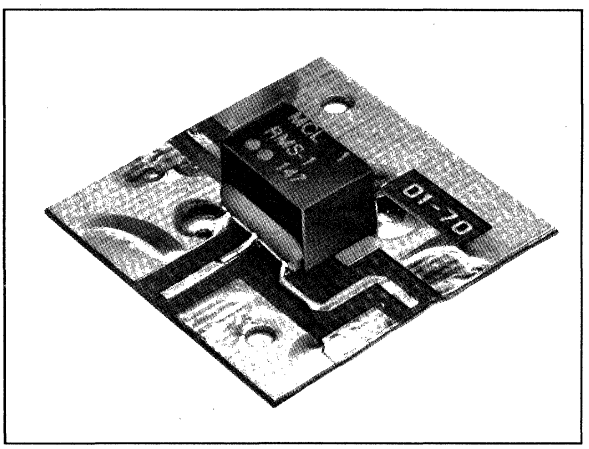
VOIDS: A cavity inside the solder, generally formed by gases trapped during cool down of the soldering step.

WICKING: The action that causes the solder to move from one area to another by wetting the surface of solderable metal.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

practical considerations for attaching surface-mount components





The photos included illustrate some of these components soldered to circuit boards.

What automated soldering methods can be considered for Mini-Circuits surface-mount components? There are two basic methods: reflow and wave soldering. Generally, reflow soldering can be done when (1) there are only surface-mount components, or (2) these are present together with through-hole components and the latter will be soldered in a separate (wave-soldering) step. The surface-mount components can be located on both the upper and lower sides of the board, when reflow is used. Wave soldering is suitable for through-hole components mounted on top of the board as well as for surface-mount components on the bottom of the board. Both ceramic and polymer-based boards can be accommodated.

reflow

Reflow requires applying a controlled amount of solder and flux to the areas where connections are to be made. A common technique is to print a pattern of solder paste on the board, and then put the components onto their places. They tend to stay in position because of the stickiness of the paste. Optionally, components can be held with chip-bonding epoxy. When heat is applied, it must produce a time-temperature profile suitable for accomplishing several process steps as illustrated in Figure 1.

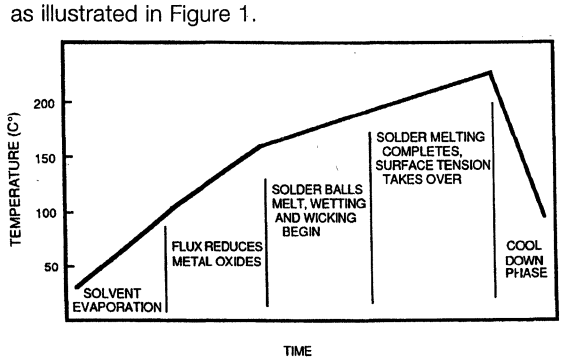


Fig. 1 Solder Reflow Phases

First, solvent evaporation is done at temperatures up to about 100°C. Second, flux reduces metal oxides as temperature rises to the solder melting point, typically 183°C. Third, as temperature continues to rise, the solder particles in the paste melt and wetting and wicking in the joint area begin. In the next step when temperature reaches a peak around 215°, surface tension shapes the fillet of fully molten solder. It takes only a few seconds for proper solder wetting at that temperature. The length of time that the work is actually above 200° is usually limited to one or two minutes to avoid damage. Many plastic-encapsulated components can withstand several minutes of solder-melt temperature when reflowed. Even at the higher temperature experienced in wave soldering (see below), such components tend to withstand several seconds immersion in molten solder.

There are several techniques for applying the heat needed for reflow. Two of the most common are infrared and vapor-phase. Infrared heat sources operate at very high temperature and are placed at the inner walls of the chamber, not in contact with the work. The actual temperature of the work is strongly affected by its mass, geometry and composition, as well as belt speed. Organic materials such as epoxy-based boards tend to absorb the IR radiation and conduct the heat to metal parts which, by themselves, would tend to reflect the IR away. On the other hand, in the vapor-phase soldering process the vapor surrounding the work is maintained at the optimum solder-wetting temperature. This is accomplished by boiling an inert liquid in a tank. The boiling point is approximately 215°C. When the work is held in the vapor just above the liquid, the heat at that temperature is transferred to all surfaces quite uniformly.

Figures 2 and 3 illustrate profiles obtained with both reflow processes. Separately controlled heating zones in an IR oven provide an opportunity to shape the profile more optimally than is typical of the vapor phase process. However, the infrared method may require more careful setup to avoid undesired nonumiformity of heating.

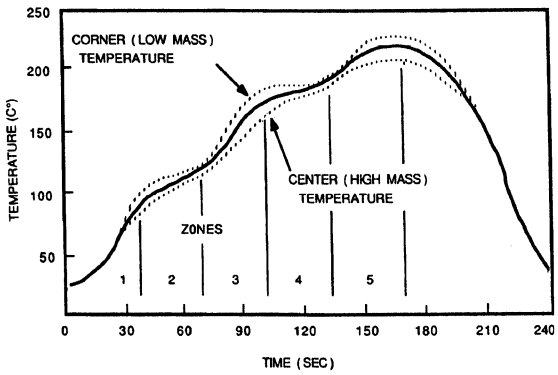


Fig. 2 Typical Five-Zone Infrared Profile.

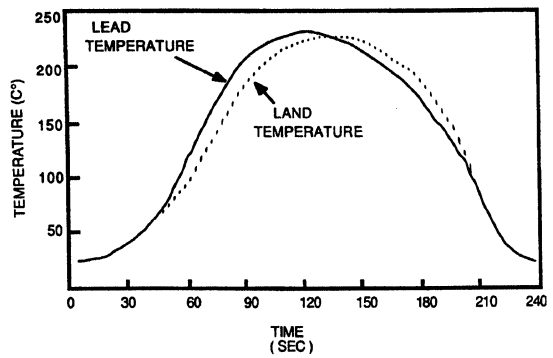


Fig. 3 Typical Vapor Phase Profile

wave soldering

This method applied molten solder to the bottom side of a circuit board after a preheating sequence, with cool-down following the soldering. There are variations to the method, mainly characterized by the shape of the solder wave; the choice among them is influenced by the type of assembly and the components being mounted. Solder temperature, typically 260°C , is higher then the peak temperatures used in the reflow method. The temperature profile experienced by the board and components increases during preheat to about 150° at a rate similar to reflow, but then rises rapidly when the solder wave impinges.

Components housed in molded plastic cases may be better suited to reflow soldering because of the possibility of microcracks developing at the leads if they are wave soldered. Resistance to this defect is enhanced when moisture is baked out of the plastic material before soldering by either method; 24 hours at 125°C is usually effective.

some pointers

Among the considerations for successful attachment of surface-mount components are:

- Lead coplanarity,and wettability by the solder.
- Compatibility of solder composition with finish on components and circuit boards.
- Amount of solder deposited.
- Internal heating of components.
- Component placement and orientation accuracy.

Leads on a component should all be in the same plane. More departure from coplanarity can be tolerated in the reflow method than in wave soldering because in reflow the surface tension in the molten solder tends to bridge small gaps and ensure an acceptable fillet. In wave soldering, special techniques are used to counteract the tendency of surface tension to deposit excess solder and cause undesired bridging between metallization areas. Even so, better coplanarity may be required when wave soldering to ensure good joints.

Wetting, or the ability of solder to adhere to the entire joint surfaces uniformly, is enhanced when clean surfaces on the component leads and circuit board are provided. If the quality of initially suitable surface finishes is preserved by proper handling and storage, the flux applied in the soldering operation should suffice to remove any metallic oxides. Compatibility of the solder includes closeness of its melting point with that of the metallization finishes, and the minimization of materials such as gold which promote the formation of brittle intermetallic compounds with tin-lead solder. The amount of solder to be deposited depends upon joint geometry, but once determined the deposition can be controlled to a few thousandths of an inch by using preforms or printing the solder pattern.

Concern about internal heating of components during soldering becomes greater when the size or complexity of individual components increases, or where assembly contains a mix of large and small components. In the latter case the heating rates can be disparate, or a large component may mask a small one from the source of heat. Careful study and experimentation may be needed to optimize the process. Measurement of air temperature in the processing chamber, even at several points, may not be sufficient with infrared heating. Monitoring with a surface temperature profiler can ensure that small components are not being overheated.

While high accuracy is needed for component placement on a circuit board, this requirement is eased somewhat in the case of reflow because surface tension in the molten solder has a self-centering action. This assumes that a proper metallized footprint has been provided.Correct orientation of components requires assurance that when they are supplied in tape-and-reel, all have been inserted into the tape in a constant and known orientation. Also, the tape

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED
23

cavity dimensions must ensure that the orientation is maintained. Especially when component placement is done manually, a clear orientation index is necessary on each component. The following considerations tend to keep the components, once placed, from becoming dislodged before the solder solidifies: When all surface-mount components are on top of the board, the stickiness of solder paste and then the surface tension of molten solder usually suffice. Components on the bottom of the board may need pre-attachment with an adhesive such as epoxy. Caution is then necessary to prevent low -viscosity constituents of the adhesive from spreading onto the metallization areas ("creep"), which could inhibit solder wetting.

automated soldering of Mini-Circuits surface-mount components

Of course, the surface-mount models listed at the beginning of the article can also be mounted by hand-soldering techniques. But, pertinent to the advantage afforded by automated assembly is that most can be soldered in their standard configurations, or require simple modification to their internal connection method or omission of a plastic enclosure, depending upon the particular temperature profile specified for a customer's application.

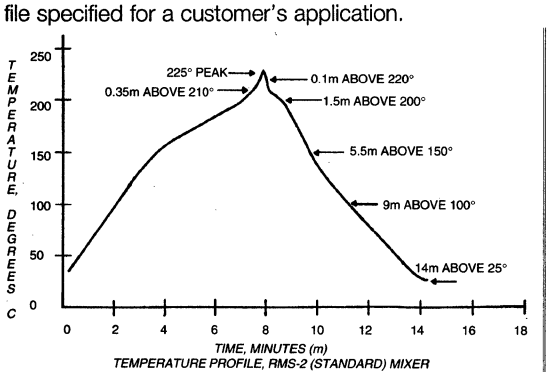


Fig. 4 Temperature Profile, RMS-2 Mixer

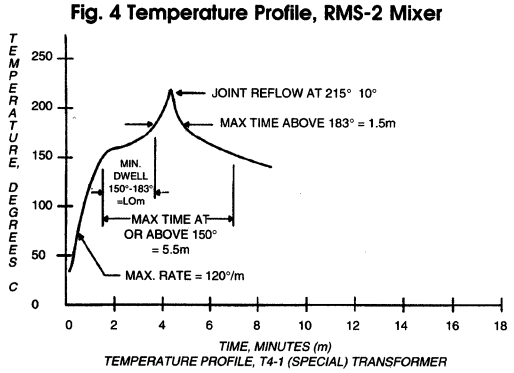


Fig. 5 Temperature Profile, T4-1 Transformer

examples of soldering temperature profiles for Mini-Circuits Components

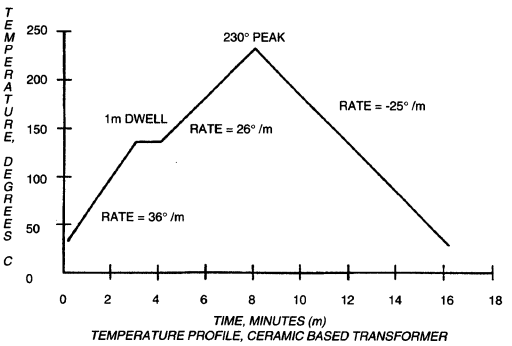


Fig. 6 Temperature Profile, Ceramic-Base Transformer

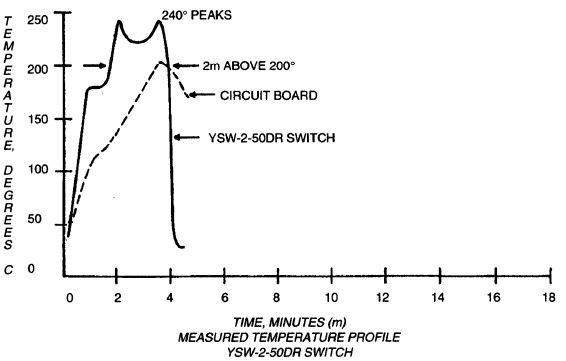


Fig. 7 Temperature Profile, YSW-2-50DR Switch

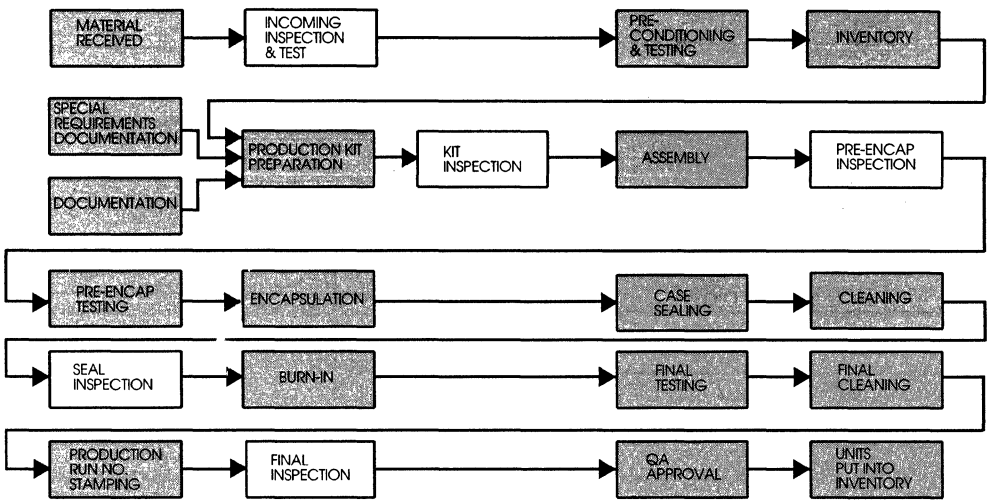
Mixer model RMS-2 meets the temperature profile shown in Figure 4 in its standard configuration. Transformer model T4-1 meets the profile in Figure 5 when a solder having 260°C solidus is used for its internal connections. A special transformer model designated TC, having a smaller version of case style TT100, has a ceramic base and no lid. It accepts the temperature profile shown in Figure 6. All three of these profiles were set by customer's specifications. As a final example, GaAs switches with drivers, in plastic case style KKK155 are designed to withstand a reflow heating and cooling cycle lasting 4 minutes, in which the component itself exceeds 200°C for 2 minutes. Figure 7 shows actual temperatures measured on a switch and on the circuit board to which it is being mounted, using an infrared reflow machine having four zones and seven source panels in a 72-inch overall length. The same GaAs switches in metal-ceramic case style AG191 will withstand a peak case temperature up to 275°C.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

Mini-Circuits Guarantees Quality

Although we have gone beyond our past objective of exceeding 0.1% AQL- no rejects, not even one per 1000 units-this is not satisfactory anymore. Our present commitments are to achieve a Cpk of 1.5, or 4.5 sigma: not even 4 rejects per million units. Mini-Circuits' process controls using SPC, pre-control and design of experiments reduce variability of performance. "Skinny Sigma" is our way of life and it can be yours. Specify Mini-Circuits RF signal processing components to reduce your inspection costs and improve your production yields.

How Mini-Circuits achieves high reliability



Environmental Specifications

All MCL products are manufactured under exacting quality assurance and control standards. As a minimum they will meet published specifications after being subjected to any or all of the following physical and environmental tests of MIL-STD-202, unless otherwise noted. For amplifiers, see the table of environmental specifications at the beginning of the amplifier section of the Handbook.

Rating or Test	MIL-STD-202		Package Type			
	Method	Condition	Hermetic	Nonhermetic		
				Metal	Plastic	Connectored
Temperature Operating, °C (1)	—	—	-55 to 100	-55 to 100	-22 to 85	-55 to 100
Temperature Storage, °C (1)	—	—	-55 to 100	-55 to 100	-55 to 100	-55 to 100
Altitude: 150,000 feet	105	E	Yes	Yes	Yes	Yes
Humidity: 90% RH, 65°C	106	—	Yes	Yes(2)	(3)	Yes (2)
Thermal Shock: -65 to 125°C	107	B	Yes	Yes	-55 to 100	-55 to 100
Fine Leak, atm-cc/s	112	C	$1x10^{-7}$	Not Appl.	Not Appl.	Not Appl.
Gross Leak, atm-cc/s	112	D	$1x10^{-5}$	Not Appl.	Not Appl.	Not Appl.
Drop: random, 45 minutes	203	—	Yes	Yes	Yes	Yes
Vibration: 2 to 2000 Hz, 20 G's, 12 hours	204	D	Yes	Yes	Yes	Yes
Solderability: 95% coverage	208	—	Yes	Yes	Yes	Not Appl.
Solder heat: 260°C 10 seconds	210	B	Yes	Yes	Yes	Not Appl.
Terminal tensile strength: 4-1/2 lbs, 10 seconds	211	A	Yes	Yes	Yes	Not Appl.
Terminal fatigue: 2 lbs 3 cycles	211	C	Yes	Yes	Yes	Not Appl.
Mechanical shock: 100 G's, 6ms	213	I	Yes	Yes	Yes	Yes
Solvent resistance	215	—	Yes	Yes	Yes	Not Appl.

For surface mount models, see surface mount environmental specifications in General Information (section 0).

Notes:
1. Extended temperature ranges are available for some models; consult factory.
2. Nonhermetic metal-cased units may require bake-out after test to restore full performance.
3. Humidity capabilities of plastic-cased units available on special request.

In Stock...Immediate Delivery

For custom versions of standard models consult our applications dept.

Product Testing For High Reliability

Ultra-Rel®

Mini-Circuit's mixers, phase detectors, frequency doublers and limiters are "Ultra-Rel®": They carry a five-year guarantee, a reliability breakthrough attributed mainly to unique Ultra-Rel® diodes that easily meet and exceed MIL-STD-883 tests. Each type of diode must pass the following grueling tests:

LIFE	1000 hrs. TA + 125°C, 50 mA ac
THERMAL SHOCK	-65° to +125°C, 200 cycles, 5 min. dwell
MECHANICAL SHOCK	1.5k G's, 0.5 msec pulse
VIBRATION	variable frequency 20 to 2,000 Hz.
TEMPERATURE CYCLE	-65°C to +125°C, 200 cycles, 10 min. dwell
MOISTURE RESISTANCE	85°C/@85%humidity 1000 hrs., no bias
HI-TEMPERATURE STORAGE	125°C, 160 hrs.

/MIL and Hi-Rel Products

All hermetically sealed MCL models can be subjected to screening and to environmental testing. These tests are designed to eliminate early failures and to ensure performance in hostile environments. Many models having such testing performed are available from stock parts, designated by a /MIL, or Hi-Rel suffix to the model number. For your convenience, the table below summarizes availability and applicable MIL Spec by product line. A brief description of the test procedures follows the table.

Of course, if you have a specific screening requirement for any model, which is not available from a stock item, or for a non-hermetic model, contact our Applications Engineering staff and they will suggest the most cost-effective means of satisfying your reliability needs.

/MIL Models

Mixers, Frequency Doublers and Phase Detectors are tested in accordance with MIL-M-28837. Pre-conditioning, Group A (screened) and Group B are performed on each inspection lot.

Power Splitters are tested in accordance with MIL-P-23971. Group A and Group B are performed on each inspection lot.

These models may be ordered by adding the suffix /MIL to the model number.

Product Line	Applicable Suffix		Applicable Std. or Specification for reference
	*Hi-Rel	*/MIL	
Amplifiers	No	No	MIL-STD-883
Digital Step Attenuators	No	No	MIL-STD-883
Directional Couplers	Yes	No	MIL-C-15370
Electronic Attenuators/			
Switches	Yes	Yes	MIL-M-28837
Filters	Yes	No	MIL-F-18327
Fixed Attenuators	Yes	No	MIL-A-3933
Frequency Doublers	Yes	Yes	MIL-M-28837
I & Q Modulators and Demodulators	No	No	MIL-M-28837
Limiters	No	No	MIL-M-28837
Mixers	Yes	Yes	MIL-M-28837
Phase Detectors	Yes	Yes	MIL-M-28837
Phase Modulators	No	No	MIL-M-28837
Power Splitter/ Combiners	Yes	Yes	MIL-P-23971
Switches	Yes	No	MIL-STD-883
Terminations	No	No	MIL-D-39030
Transformers	Yes	No	MIL-T-55631

*Check with our Sales Department for specific models available as Hi-Rel. or MIL.

Mini-Circuits®

Hi-Rel Models

Mixers, Phase Detectors, Frequency Doublers and Electronic Attenuators/Switches are tested to the following per MIL-STD-202:

1) THERMAL SHOCK	Method 107, Cond. A (100°C)
2) BURN-IN	Method 108, Cond. A (100°C, 8mA ac)
3) FINE AND GROSS LEAK	Method 112, Cond. C and D

Power splitter/combiners, Directional Couplers, Transformers, Fixed Attenuators, Filters and Limiters are tested to the following per MIL-STD-202:

1) BAKE-IN	Method 108, Cond. A (100°C, no excitation)
2) THERMAL SHOCK	Method 107, Cond. A (100°C)
3) FINE & GROSS LEAK	Method 112, Cond. C and D

Switches incorporating PIN diodes are tested to the following per MIL-STD-202, as a minimum:

1) THERMAL SHOCK	Method 107, Cond. A (100°C)
2) BURN-IN	Method 108, Cond. A (100°C, diode current applied)

For additional tests applicable to specific switch models, please consult our Sales Department.

These models may be ordered by adding the suffix Hi-Rel to the model number.

Aqueous Wash Compatibility

Mini-Circuits products in hermetic packages will withstand all cleaning methods commonly applied by users when soldering onto PC boards. Similarly, many non-hermetic models are guaranteed to be aqueous washable. These include the plastic and ceramic case styles CG581 and QQQ569, for example, as well as wash-through and monolithic devices.

Care should be taken regarding aqueous wash for other non-hermetic models, by noting the technical guidance given in this article, and requesting assistance as needed from our Sales or Applications departments. Often, selection or simple adaptation of our product will enhance its washability.

"Aqueous wash", as generally understood, means the use of high pH (caustic) saponifiers, and such chemicals can affect internal materials. These may attack copper, and/or may dissolve magnet wire insulation and soften epoxy-based bonding material if they remain in contact for an extended time.

"Water wash" generally means the use of DI (deionized) water only, without a saponifier. The only consequence of using water wash on a design which does not guarantee complete sealing is the possible need for a dry-out step after cleaning.

Connector Specifications

All coaxial connectors used in MCL products meet applicable requirements of MIL-C-39012 including mating compatibility, coupling proof torque, contact retention, materials and finish durability.

Meeting Customer Needs

The following table outlines generic types of tests we do to satisfy customer's needs per specific contractual requirements. Each entry encompasses one or more QCPs (Quality Control Procedures) which are particularized as to test conditions. The principal MIL standards referenced in the QCPs are listed as a guide.

MINI-CIRCUITS QCP GROUP	TEST	METHODS OF MIL-STD -202	-810	-883
02-00	THERMAL SHOCK	107	503	1010
03-00	RANDOM VIBRATION	214		
04-00	MECHANICAL SHOCK	207,213	516	
05-00	CONSTANT ACCELERATION	212		2001
06-00	BAKE-IN/BURN-IN	108		1015
07-00	SEAL TESTS	112		
08-00	MOISTURE RESISTANCE	106	507	
09-00	RADIOGRAPHIC	209		2012
10-00	SINE VIBRATION	201	514	
11-00	HIGH FREQUENCY VIBRATION	204		
12-00	HUMIDITY	103		
13-00	ALTITUDE (BAROMETRIC PRESSURE)	105	500	
14-00	SALT-SPRAY	101	509	
15-00	TERMINAL STRENGTH	211		
16-00	RESISTANCE TO SOLVENTS	215		
17-00	SOLDERABILITY	208		
18-00	RESISTANCE TO SOLDERING HEAT	210		
19-00	IMMERSION	104		
20-00	EXPLOSION	109	511	
21-00	SAND AND DUST	110	510	
22-00	FUNGUS TEST		508	
25-00	PARTICLE IMPACT NOISE DETECTION (PIND)			2020

In Stock... Immediate Delivery

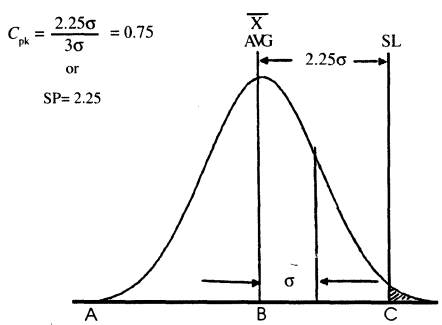
For Custom Versions Of Standard Models Consult Our Applications Dept.

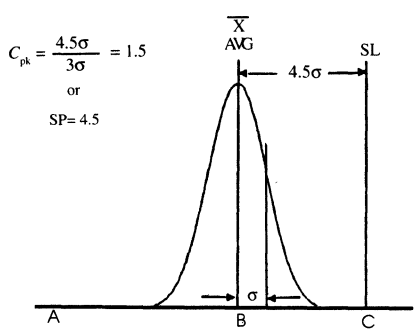
statistical process control... key to competitive manufacturing

In today's tough world market environment, the need to be better is more demanding, and the need to be more competitive is a necessity to survive. A company cannot rest on the success of past performance and expect to continue to remain successful. There are many well known examples of companies both large and small that were once leaders in their field and now are skeletons of themselves or just plain dead and buried.

How does one get more competitive? The answer is simple. Exceed your customers' needs and expectations ...provide, in the manner required by the customer, a quality product at low cost, on time, every time. In most manufacturing organizations a significant cost factor is attributed to the cost of purchased materials and they may range from 25% to 80% of the cost of the entire product. Because of the significance of purchased material to total cost, the quality of the purchased material is important and essential to the competitiveness of the manufacturing organization.

This paper will discuss the effects of quality on the direct and indirect causes that contribute to the *real cost* of the purchased material. A measure of the quality of the material will be described by a quality factor, Cpk. The higher the value of Cpk, the better the quality of the product. Cpk is a measure of the repeatability of material performance. The higher the number, the better is the consistency of performance or the less is the variation in performance. Therefore, once designed in, the material should be consistent enough so that its variations are not transparent to the final product.





In manufacturing, variation is evil! If the value of Cpk for a purchased part is low, and Cpk varies from production lot-to-lot, then it can be projected the process for manufacturing the part is not in control, performance will be inconsistent, rejects can be expected, and the true cost of the purchased part will be significantly higher than the price shown on the purchase order.

With the abundance of low cost computers and hand held scientific calculators, the ability to calculate Cpk is easily attainable. Cpk is a quality factor that is based on the statistical calculation of mean value, $\bar{x}$ and standard deviation, sigma. Cpk is the difference in value between the mean value and the closest spec limit divided by 3 sigma.

$$\text{Cpk} = \frac{\text{(spec limit - mean value)}}{\text{3 sigma}}$$

At Mini-Circuits we use SP (Sigma Performance) = 3 times Cpk. We must *measure* variation to control it. If we can measure it we can tell when it gets better or worse. We need to know what works and what doesn't work. How much a manufacturing process varies is measured by Sigma (σ). In the figures shown, the average (AVG) tells us where the process is centered. The spread or width is measured by sigma. The figures show how the product is distributed. The height of the graph measures how often values occur. The spread measures how far the values are from the AVG. If the product is well controlled, there will be little variation, more values of units will occur nearer the target, $\bar{x}$, and sigma will be small.

Manufactured products are either good or bad depending on whether they do what the customer wants them to do. Specification limits *were* the measure of success, where product within spec was good and out of spec bad. It is not enough in today's market place to *just* meet spec! In the figures shown, a spec limit (SL) is compared to the product distribution. Product built outside, or to the right of the spec limit, is very bad; even product built just to the left of the spec limit is not good. Small (skinny) Sigma means the product will be far from the spec limit and close to the AVG value (very good product, what today's customers demand).

We can compare different processes by measuring variation and the distance from the average to the spec limit. But only if we measure the distance in terms if sigma, as shown in the figures. The real distance is the same for both figures (C-B), meaning both processes are centered and the AVG values are equal. But, in terms of product quality, the figure on the bottom is far superior (4.5>2.25) because the variation between units is much less as given by the skinnier value of sigma.

For convenience, we normalize by dividing the distance (C-B) by sigma (considered a relative ideal), and get the capability index, Cpk, a figure of merit. The skinnier the σ is, the higher the Cpk, and the less variation, unit-to-unit.

Mini-Circuits® P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
INTERNET http://www.minicircuits.com
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

The "goodness" of the purchased parts, Cpk, will affect the actual *real cost* of the purchased material. This real cost can vary and will depend on the original design and the specifications describing the purchased material. The real cost depends on the sum of both direct and indirect costs. These are:

Costs additive to the cost of purchased parts:

A. Direct costs of poor quality parts:

1. Warranty
2. Scrap and repair
3. Inspection/test

B. Indirect costs of poor quality parts:

1. Lost sales-customers switching to competition
2. Field trips, retrofits, settlements
3. Downtime, line shut downs, delinquencies, rescheduling
4. Inventory build-up, obsolete material, MRB, material expediting, material shrinkage
5. Engineering changes and redesign, documentation changes, material selection and separation

C. Indirect costs, demands of the manufacturing system on company's resources

1. Space
2. Manpower, receiving, production control, manufacturing, sales, finance, engineering, QA, accounting, maintenance, house cleaning
3. Utilities (lighting, heating, air conditioning, telephone)
4. Capital equipment (testing, incoming inspection and production, data processing)
5. Finances, cost to maintain higher inventory of material
6. Data processing and data entry

Description of costs to the manufacturer of poor quality parts received.

When poor quality parts are received, the manufacturer must maintain an incoming inspection department to check parts for conformance to specifications. *If* all parts were received with a Sigma Performance = 4.5 or, Cpk =1.5, then the demands for incoming inspection would evaporate. However, this is not the case in the real world today. Therefore, the cost of the inspection department is visually spread out and amortized as a percentage of the total cost of all material received. However, when poor quality parts are received, there are direct additional costs that are incurred by the manufacturing organization. These costs include additional testing and inspection so that additional manpower and capital equipment are required. In addition, there are added costs associated with documents DMR, RTV etc.; MRB meetings; purchasing costs such as expediting, search for alternatives, rescheduling and issuing of p.o. change orders; and engineering costs for evaluation and test.

In addition to incoming inspection costs, the delays of incoming material to the production floor will generate additional manufacturing costs. These include rescheduling and smaller production runs (less parts available); inefficiency of resources, such as manpower and machines, increased space requirements and WIP; increased material shrinkage and increased manufacturing throughput time.

The results of these manufacturing delays and costs will cause shipment delays and increased manufacturing costs that may be passed on to customers. Both factors contributing to a less competitive position!

To pursue Mini-Circuits' goal to exceed our customer's expectations, Mini-Circuits is striving to achieve an SP of 4.5 or, Cpk = 1.5. All mixer and I&Q modulator conversion loss is specified in statistical terms. We are vigorously pursuing statistical process control and statistical specifications on all our products to enable our customers to receive the highest quality and value, at the lowest cost... the key to competitive manufacturing.

CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

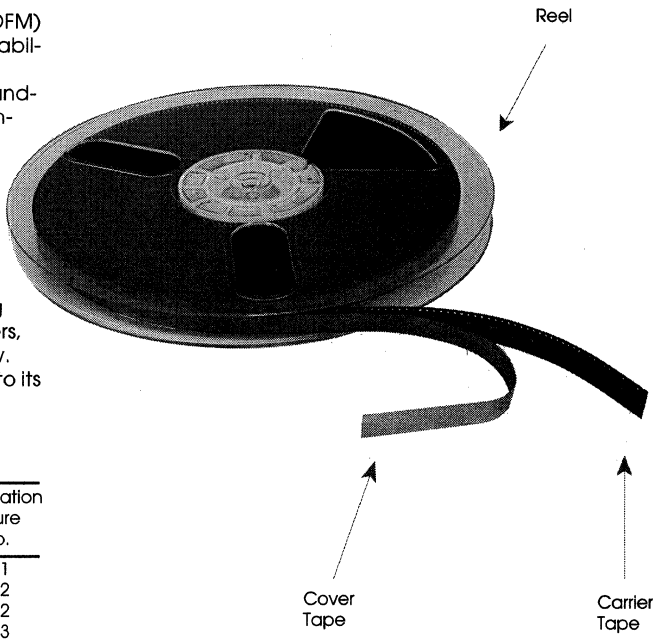
tape and reel packaging for surface mount devices

Design-For-Assembly (DFA) and Design-For-Manufacture (DFM) stand tall alongside CAD/CAM in the quest to optimize profitability, production efficiency and equipment operating usage.

Automation of surface-mount assembly by the use of pick-and-place equipment to handle tiny components has been enhanced by evolutionary improvements in tape-and-reel systems which can accommodate as many as 4000 parts on a 13-inch reel. This results in less frequent component reloading and less downtime of the assembly equipment. Other advantages of tape feeders include versatility or the ability to handle a variety of parts.

Mini-Circuits has kept pace with the trend towards automated assembly and offers RF/Microwave signal-processing components (mixers, amplifiers, transformers, power splitters, switches and others) in tape-and-reel format as shown below.

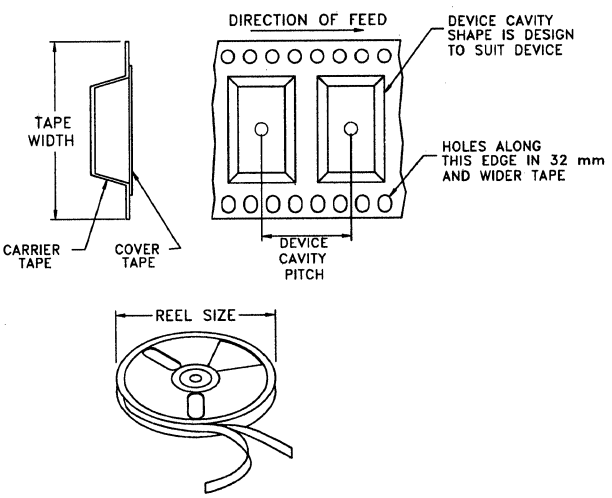
To order a tape-and-reel packaged product, add suffix -TR to its model number.



packaging information[1]

Packaging Part No.	Case Style	Tape Width (mm)	Reel Size (inches)	Device Cavity Pitch (mm)	Devices per Reel	Orientation Figure No.
F1	KK81	24	13	12	500	T-001
F2	TT100	16	13	12	500	T-002
F3	TT240	16	13	12	500	T-002
F4	WW107	12	7	8	1000	T-003
F5	YY101	32	13	16	500	T-004
F6	YY161	32	13	16	500	T-004
F7	KKK155	24	13	16	500	T-005
F8	MMM168	8	7	8	3000	T-006
F9	NNN150	24	13	16	500	T-007
F10	QQQ130	32	13	16	500	T-008
F11	RRR137	12	7	8	500	T-009
F12	TTT166	24	13	12	500	T-010
F13	TTT167	24	13	12	500	T-010
F14	AF190	12	7	8	500,1000	T-011
F15	AG191	16	13	12	500	T-005
F16	XX211[2]	12	7	8	500,1000	T-004
F17	AT224/577	12	7	8	500	T-012
F18	AN213	24	13	16	500	T-013
F19	XX112	16	7	8	500	T-014
F20	CTT248	16	13	12	500	T-002
F21	BG291	32	13	32	200	T-015
F22	BK276	32	13	16	500	T-015
F23	BJ293	24	13	16	500	T-015
F24	BH292	16	13	12	500	T-015
F25	BL301	44	13	32	125	T-015
F26	AF320	12	7	8	1000	T-011
F27	BK343	32	13	16	500	T-015
F28	BK377	32	13	20	500	T-015
F29	BJ398	24	13	12	500	T-015
F30	QQQ569	32	13	16	500	T-008
F31	CA531	8	7	4	1000	T-001
F32	CB518	16	13	12	500	T-015
F33	CB539	16	13	12	500	T-015
F34	CD541	16	13	12	1000	T-015
F35	CD542	16	13	12	1000	T-015
F36	CG581	24	13	12	500	T-010
F37	CK605	24	13	16	500	T-010
F38	BJ360	32	13	16	500	T-015
F42	CJ608	24	13	16	500	T-015
F43	CL620	16	7	8	500	T-015
F44	CM624	16	13	12	1000	T-015

tape illustration



NOTE: 1. For device marking & outline, see case style/outline drawings.
2. For BP models, 1000 devices per reel.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

device orientation Mini-Circuits / *TECHNICAL SECTION*

Fig. T-001

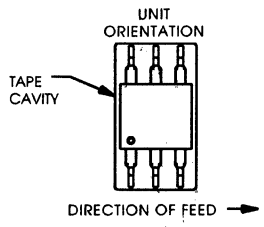


Fig. T-002

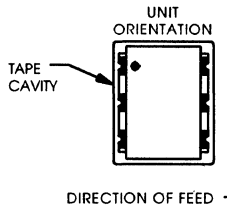


Fig. T-003

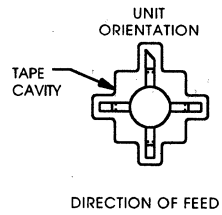


Fig. T-004

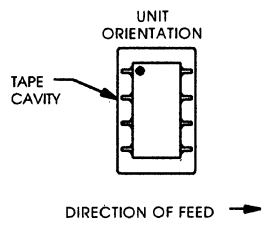


Fig. T-005

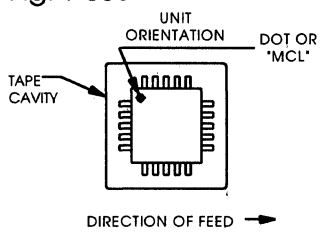


Fig. T-006

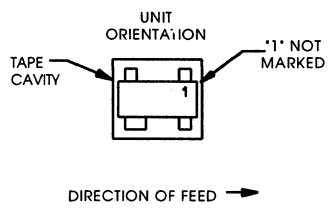


Fig. T-007

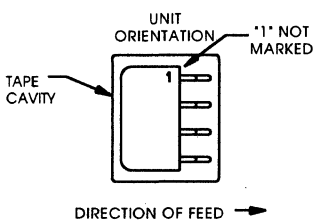


Fig. T-008

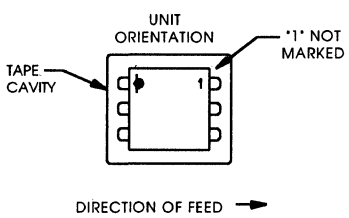


Fig. T-009

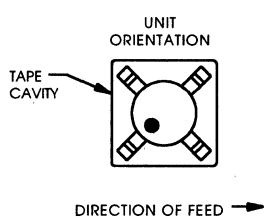


Fig. T-010

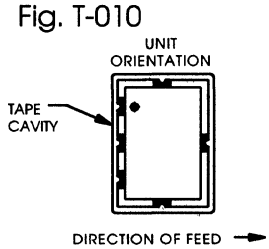


Fig. T-011

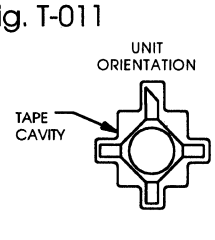


Fig. T-012

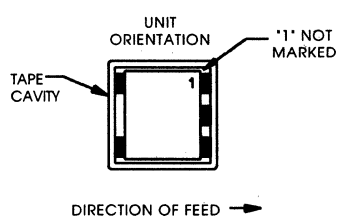


Fig. T-013

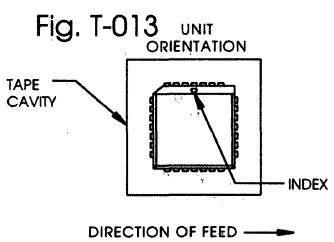


Fig. T-014

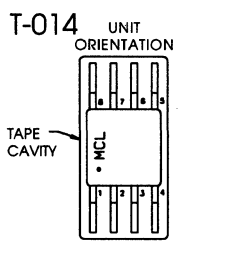
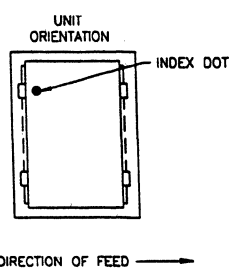


Fig. T-015



In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.
Available Tape & Reel

case styles

outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
A01	.770 19.56	.800 20.32	.385 9.78	.400 10.16	.370 9.40	.400 10.16	.200 5.08	.20 5.08	.14 3.56	.031 .79									5.2	A1,B3,E1,B7
A03	.480 12.19	.500 12.70	.390 9.91	.405 10.29	.210 5.33	.230 5.84	.100 2.54	.20 5.08	.14 3.56	.020 .51									2.3	A1,B4,E1,B7
A04	.770 19.56	.800 20.32	.200 5.08	.210 5.33	.370 9.40	.400 10.16	.200 5.08	.20 5.08	.14 3.56	.031 .79									3.7	A1,B3,E1,B7
A05	.770 19.56	.800 20.32	.240 6.10	.250 6.35	.370 9.40	.400 10.16	.200 5.08	.20 5.08	.14 3.56	.031 .79									3.7	A1,B3,E1,B7
A06	.770 19.56	.800 20.32	.285 7.24	.310 7.87	.370 9.40	.400 10.16	.200 5.08	.20 5.08	.14 3.56	.031 .79									5.2	A1,B3,E1,B7
A11	.480 12.19	.500 12.70	.240 6.10	.255 6.48	.210 5.33	.230 5.84	.100 2.54	.20 5.08	.14 3.56	.020 .51									1.9	A1,B4,E1,B7
B02	.480 12.19	.500 12.70	.240 6.10	.255 6.48	.210 5.33	.230 5.84	.16 4.06	.100 2.54	.14 3.56	.20 5.08	.020 .51								1.9	A1,B4,E1,B7
B13	.480 12.19	.500 12.70	.390 9.91	.405 10.29	.210 5.33	.230 5.84	.16 4.06	.100 2.54	.14 3.56	.20 5.08	.020 .51								2.3	A1,B4,E1,B7
C07	.770 19.56	.810 20.57	.380 9.65	.410 10.41	.030 .76	.200 5.08	.20 5.08	.14 3.56											11.0	A1,E1,B7
C145	.770 19.56	.810 20.57	.380 9.65	.410 10.41	.030 .76	.200 5.08	.20 5.08	.14 3.56											11.0	A1,E1,B7
D08	1.000 25.40	1.025 26.04	.390 9.91	.430 10.92	.500 12.70	.525 13.34	.025 .64	.300 7.62	.200 5.08	.09 2.29	.13 3.30	.150 3.81	.20 5.08	.14 3.56					8.5	A1,E1,B7
D09	1.000 25.40	1.025 26.04	.240 6.10	.280 7.11	.500 12.70	.525 13.34	.025 .64	.300 7.62	.200 5.08	.09 2.29	.13 3.30	.150 3.81	.20 5.08	.14 3.56					7.5	A1,E1,B7
E10	1.580 40.13	1.620 41.15	.380 9.65	.410 10.41	.770 19.56	.810 20.57	.030 .76	.200 5.08	.10 2.54	.20 5.08	.14 3.56								23.0	A1,E1,B7
F14	2.00 50.80	2.00 50.80	.75 19.05	1.00 25.40	.25 6.35	1.500 38.10	.125 3.18	.39 9.91	1.00 25.40	.50 12.70	1.00 25.40								170.0	A10, C1,D2
F53	2.00 50.80	2.0 50.80	.75 19.05	1.00 25.40	.13 3.30	1.750 44.45	.125 3.18	.39 9.91	1.00 25.40	.50 12.70	1.00 25.40								170.0	A10 C1,D2
F183	1.26 32.00	1.00 25.40	.70 17.78	.200 5.08	.200 5.08	.860 21.84	.125 3.18	.35 8.89	.63 16.00	.38 9.65	.50 12.70								24	A4,B1,D17
G15	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.38 9.65	.61 15.49	— —	.80 20.32	.80 20.32	.76 19.30	.125 3.18	1.688 42.88	2.18 55.37	.75 19.05	.07 1.78				85.0	A10,A18,B1, D1,D7
G144	1.25 31.75	1.25 31.75	— —	.63 16.00	.38 9.65	.61 15.49	— —	— —	— —	.76 19.30	.125 3.18	1.688 42.88	2.18 55.37	.75 19.05	.07 1.78				85.0	A10,A18, B6,D6
H16	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.38 9.65	1.000 25.40	.125 3.18	1.000 25.40	— —	— —	.125 3.18	1.688 42.88	2.18 55.37	.75 19.05	.07 1.78				70.00	A10,A18,B1, D2,D3,D4
J17	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.38 9.65	1.000 25.40	.125 3.18	1.000 25.40	— —	— —	.125 3.18	1.688 42.88	2.18 55.37	.75 19.05	.07 1.78				75.0	A10,A18, B1,D2,D3
K18	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.38 9.65	1.000 25.40	.125 3.18	1.000 25.40	— —	— —	.125 3.18	1.688 42.88	2.18 55.37	.75 19.05	.07 1.78				70.0	A10,A18,B1, C1,D2,D3
L19	1.50 38.10	1.13 28.70	1.00 25.40	.50 12.70	.155 3.94	2.345 59.56	.138 3.51	.987 25.07	2.50 63.50	.10 2.54	.31 7.87	1.19 30.23	— —	.66 16.76	— —	— —	.150 3.81		37.0	A6,A11,A18, B2,D6
L20	2.25 57.15	1.38 35.05	1.24 31.50	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.10 2.54	.40 10.16	1.86 47.24	— —	.64 16.26	— —	— —	.150 3.81		74.0	A6,A11,A18, B2,D5
M21	1.50 38.10	1.13 28.70	1.00 25.40	.50 12.70	.155 3.94	2.345 59.56	.138 3.51	.987 25.07	2.50 63.50	.10 2.54	.31 7.87	.75 19.05	1.19 30.23	.66 16.76	— —	— —	.150 3.81		40.0	A6,A11,A18, B2,C1,D6
M22	2.25 57.15	1.38 35.05	1.24 31.50	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.10 2.54	.40 10.16	1.15 29.21	1.86 47.24	.64 16.26	— —	— —	.150 3.81		74.0	A6,A11,A18, B2,C1,D5
M23	2.25 57.15	1.38 35.05	1.24 31.50	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.10 2.54	.63 16.00	1.06 26.92	1.63 41.40	.69 17.53	— —	— —	.150 3.81		70.0	A6,A11,A18, B2,C1,D6

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

* NOTES:

A. MATERIAL AND FINISH
- A1. Header material: C.R.S. Pin material: #52 alloy. Finish: electro tin, hot-oil flowed. Cover material: cupro-nickel.
- A4. Case material: aluminum alloy. Finish: iridite per MIL-C-5541
- A6. Case material: aluminum alloy. Finish: blue paint over iridite.
- A10. Case material: aluminum alloy. Finish: grey paint or yellow iridite.
- A11. Case material: aluminum alloy. Finish: blue anodized.
- A18. Mounting bracket finish: iridite or clear anodize.

B. MOUNTING
- B1. Mounting bracket available on request. Add suffix B to part number.
- B2. Mounting bracket available on request. For bracket mounted on connector end add suffix B to part number and $5.00 to unit cost. For bracket mounted on the rear, add suffix BR to part number and add $1.50 to unit cost.
- B3. Insulated spacer available. Request P/N B14-045-01.
- B4. Insulated spacer available. Request P/N B-14-047-01.
- B6. Bracket version only.
- B7. Pin's meniscus (of header): 0.015" max.

C. MARKING
- C1. For port markings 1, 2, and 3 see specification data sheet.

D. CONNECTORS
- D1. Connectors: SMA Standard. BNC on request (no charge). Male SMA on request, consult factory.
- D2. Connectors: please specify, unless otherwise noted; BNC is standard, TNC, SMA and Type N, consult factory. (ZAPD -4 units not available with BNC).
- D3. For Bracket Version, Option B, this dimension, "C**", changes from 0.75 to 0.94 inches.
- D4. FTB Models available:
  - *A15 female BNC/isolated female BNC.
  - *C15 male BNC/isolated female BNC.

  FT Models available:
  - *A16 female BNC/female BNC 75 ohms.
  - *B16 female BNC/male BNC 75 ohms.
  - *C16 male BNC/female BNC 75 ohms.
- D5. Connectors: BNC standard, TNC consult factory.
- D6. Connectors: Female SMA only. Male SMA available on request, consult factory.
- D7. For ZFSC-5 a fifth connector is offered as Port 5 in-line and opposite of sum(s) port.
- D17. Connectors: Female SMA only.

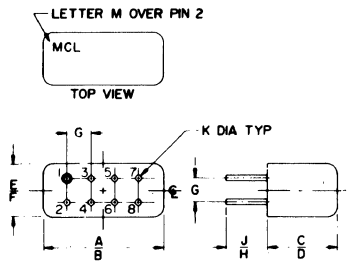
E. SPECIAL TOLERANCES
- E1. Pin diameter ±.005 inch.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

outline drawings

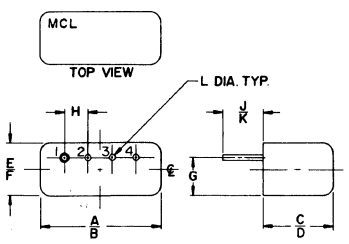
Mini-Circuits®

A



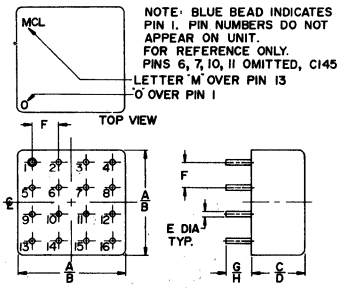
NOTE: Blue Bead indicates pin 1.
Pin numbers do not appear on unit.
For reference only.

B

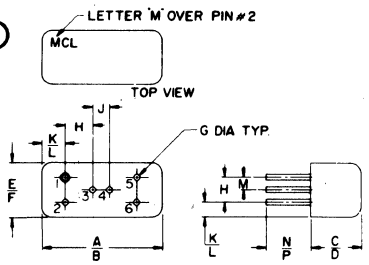


NOTE: Blue Bead indicates pin 1.
Pin numbers do not appear on unit.
For reference only.

C

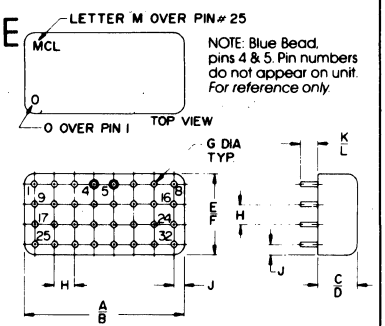


D

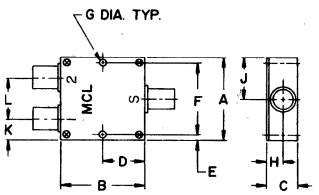


NOTE: Blue Bead indicates pin 1.
Pin numbers do not appear on unit.
For reference only.

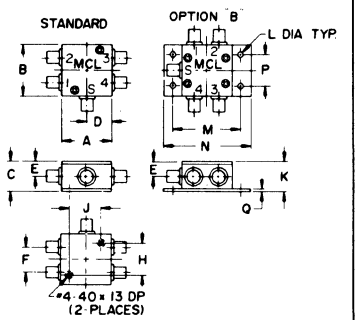
E



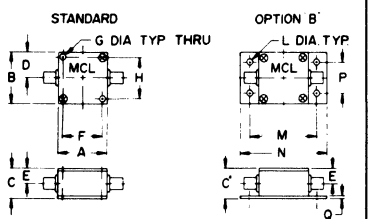
F



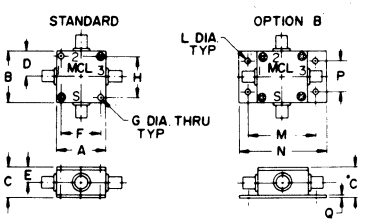
G



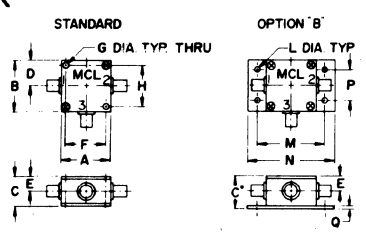
H



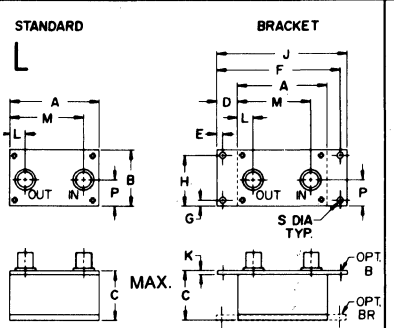
J



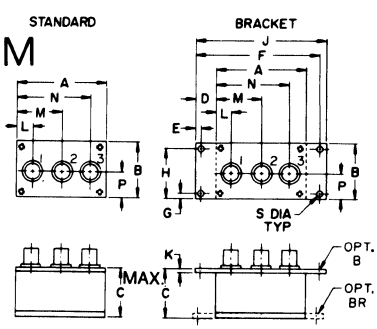
K



L



M



CAPD now available! computer-automated performance data

In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

case styles

outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
N24	1.50 38.10	1.13 28.70	1.00 25.40	.50 12.70	.155 3.94	2.345 59.56	.138 3.51	.987 25.07	2.50 63.50	.10 2.54	.32 8.13	.75 19.05	1.18 29.97	.31 7.87	.56 14.22	.81 20.57	.150 3.81		45.0	A6, A11, A18, B2, D6
N27	2.25 57.15	1.38 35.05	1.24 31.50	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.10 2.54	.48 12.19	1.13 28.70	1.78 45.21	.36 9.14	.69 17.53	1.01 25.65	.150 3.81		92.0	A6, A11, A18, B2, D8
P25	2.25 57.15	1.38 35.05	1.24 31.50	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.10 2.54	.78 19.81	1.47 37.34	— —	.38 9.65	1.00 25.40	— —	.150 3.81		86.0	A6, A11, A18, B2, D8
P26	1.50 38.10	1.13 28.70	1.00 25.40	.50 12.70	.155 3.94	2.345 59.56	.138 3.51	.987 25.07	2.50 63.50	.10 2.54	.50 12.70	1.00 25.40	— —	.31 7.87	.81 20.57	— —	.150 3.81		42.5	A6, A11, A18, B2, D6
Q28	4.06 103.12	1.60 40.64	1.50 38.10	3.56 90.42	.24 6.10	.88 22.35	.36 9.14	.160 4.06	.4 10.16	.69 17.53	.58 14.73	.66 16.76	3.13 79.50	.8 20.32	.06 1.53				300.0	A10, A18, D9
R29	4.06 103.12	1.60 40.64	1.50 38.10	3.56 90.42	.24 6.10	.88 22.35	.36 9.14	.160 4.06	.4 10.16	.69 17.53	.58 14.73	.66 16.76	3.13 79.50	.8 20.32	.06 1.53				300.0	A10, A18, C2, D9
R30	6.69 169.93	1.60 40.64	1.50 38.10	6.22 157.99	.24 6.10	.88 22.35	.36 9.14	.160 4.06	.40 10.16	.69 17.53	.55 13.97	.66 16.76	5.72 145.29	.81 20.57	.06 1.53				500.0	A10, A18, C2, D9
R31	9.31 236.47	1.60 40.64	1.50 38.10	8.84 224.54	.24 6.10	.88 22.35	.36 9.14	.160 4.06	.40 10.16	.69 17.53	.54 13.72	.66 16.76	8.34 211.84	.81 20.57	.06 1.53				700.0	A10, A18, C2, D9
R67	6.69 169.93	1.60 40.64	1.50 38.10	6.22 157.99	.24 6.10	.88 22.35	.36 9.14	.160 4.06	.40 10.16	.69 17.53	1.22 30.99	.66 16.76	5.72 145.29	.81 20.57	.06 1.53				500.0	A10, A18, D9
S32	3.75 95.25	2.00 50.80	1.8 45.72	.19 4.83	3.375 85.72	.19 4.83	1.625 41.27	.156 3.96	.6 15.24	.4 10.16	.5 12.70	1.30 33.02	.09 2.29	.38 9.65	3.00 76.20	.30 7.62	2.60 66.04		220.0	A7, A18, D9
T34	4.75 120.65	2.00 50.80	2.21 56.13	.19 4.83	4.375 111.13	.23 5.84	1.540 39.12	.144 3.66	.58 14.73	.34 8.64	.50 12.70	1.50 38.10	1.00 25.40	.12 3.05	.38 9.65	4.00 101.60	.30 7.62	2.60 66.04	440.0	A7, A8, A18, D16
T35	4.75 120.65	2.00 50.80	2.40 60.96	.19 4.83	4.375 111.13	.23 5.84	1.540 39.12	.144 3.66	.58 14.73	.34 8.64	.50 12.70	1.50 38.10	1.00 25.40	.12 3.05	.38 9.65	4.00 101.60	1.50 38.10	5.00 127.00	700.0	A7, A8, A18, D16
U36	7.00 177.80	3.25 82.55	2.13 54.10	.25 6.35	6.500 165.10	.38 9.65	2.500 63.50	.156 3.96	.73 18.54	.88 22.35	.63 16.00	1.13 28.70	2.23 56.64	.125 3.17	.50 12.70	6.00 152.40			900.0	A7, A8, A18, D6
U111	7.00 177.80	3.25 82.55	3.13 79.50	.25 6.35	6.500 165.10	.38 9.65	2.500 63.50	.156 3.96	.43 10.92	.88 22.35	.63 16.00	1.00 25.40	2.63 66.80	.125 3.17	.50 12.70	6.00 152.40	2.23 56.64		1100.0	A8, A18, D6
U200	7.00 177.80	3.25 82.55	2.13 54.10	.25 6.35	6.500 165.10	.38 9.65	2.500 63.50	.156 3.96	.53 13.46	.73 18.54	.20 5.08	.70 17.78	1.25 31.75	.125 3.17	.50 12.70	6.00 152.40	2.15 54.61	.50 12.70	1000.0	A7, A18, D6
V37	.83 21.08	.83 21.08	.75 19.05	.37 9.40	.42 10.67	1.25 31.75	.100 2.54	1.150 29.21	.095 2.41	.735 18.67	.21 5.33	.106 2.69	.06 1.52						34.0	A10, A18, C1, D17
W38	.30 7.62	.27 6.86	.23 5.84	.010 0.25	.042 1.07	.020 0.51	.100 2.54	.05 1.27	.09 2.29	.37 9.40	.036 0.91								.50	A13, E2
X65	.30 7.62	.27 6.86	.23 5.84	.010 0.25	.042 1.07	.020 0.51	.100 2.54	.05 1.27	.04 1.02	.12 3.05	.300 7.62	.35 8.89							.50	A13, E2
Y39	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.36 9.15	1.000 25.4	1.000 25.4	.125 3.2	.125 3.2	.46 11.7	2.18 55.4	1.688 42.9	.07 1.8	.750 19.0	.50 12.7	.80 20.3	.45 11.4	.29 7.4	50.0	A4, A18, B1, D6, D22
Y460	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.36 9.15	1.000 25.4	1.000 25.4	.125 3.2	.125 3.2	.46 11.7	2.18 55.4	1.688 42.9	.07 1.8	.750 19.0	.50 12.7	.80 20.3	.45 11.4	.29 7.4	50.0	A4, A18, B1, D6
Z40/Z41	7.06 179.32	3.13 79.50	.88 22.35	.250 6.35	1.750 44.45	5.310 134.87	6.810 172.97	.250 6.35	2.875 73.03	.144 3.66	3.53 89.66	.44 11.18	.415 10.54	.89 22.61					800.0	A30, D11 A4 (Z41)
Z54	3.50 88.90	2.13 54.10	.88 22.35	.250 6.35	— —	— —	3.250 82.55	— —	— —	.125 3.17	1.750 44.45	.44 11.18	.415 10.54	.89 22.61	.250 6.35	1.813 46.05			250	A10, D11
Z184	2.26 57.40	2.00 50.80	.70 17.78	.200 5.08	— —	— —	2.060 52.32	— —	— —	.125 3.17	1.13 28.70	.35 8.89	.38 9.65	.500 12.70	.200 5.08	— —			59	A4, D17
Z259	7.06 179.32	3.13 79.50	.88 22.35	.250 6.35	1.750 44.45	5.310 134.87	6.810 172.97	.312 7.92	2.875 73.03	.144 3.66	3.53 89.66	.44 11.18	1.31 33.27	.89 22.61					800	A4, C2 D24

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

* NOTES:

A. MATERIAL AND FINISH
- A4. Case material: aluminum alloy. Finish: irridite per MIL-C-5541.
- A6. Case material: aluminum alloy. Finish: blue paint over irridite
- A7. Case material: aluminum alloy. Finish: case black paint. Heat sink: black anodize. Baseplate iridite per MIL-C-5541.
- A8. Case material: aluminum alloy. Finish: case irridite. Heat sink: black anodize.
- A10. Case material: aluminum alloy. Finish: grey paint, or yellow iridite.
- A11. Case material: aluminum alloy. Finish: blue anodized.
- A13. Case material: plastic. Lead Finish: tin-lead plate.
- A18. Mounting bracket finish: irridite or clear anodize.
- A30. Case material: aluminum alloy. Finish: gray paint.

B. MOUNTING
- B1. Mounting bracket available on request. Add suffix B to part number.
- B2. Mounting bracket available on request. For bracket mounted on connector end add suffix B to part number and $5.00 to unit cost. For bracket mounted on the rear, add suffix BR to part number and add $1.50 to unit cost.

C. MARKING
- C1. For port markings 1, 2, and 3 see specification data sheet.
- C2. Consecutive marking, n = no. of way power-splitter.

D. CONNECTORS
- D6. Connectors: Female SMA only. Male SMA available on request, consult factory.
- D8. Connectors: BNC only.
- D9. Connectors: BNC standard. TNC or Female SMA on request, consult factory.
- D11. Connectors: Please specify; Type N or SMA.
- D16. Connectors: Please specify, unless otherwise noted SMA is standard for model ZHL-2-12 for all other models BNC is standard. TNC, N, or SMA available on request. consult factory.
- D17. Connectors: Female SMA only.
- D22. Gain Control Terminal on Models ZFL-1000G and ZFL-1000GH only.
- D24. Connectors: Female BNC standard. Type N or SMA consult factory.

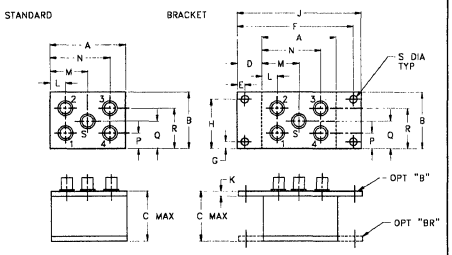
E. SPECIAL TOLERANCES
- E1. Pin diameter ±.005 inch.
- E2. Lead width ±.010; lead thickness ±.005 inch.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

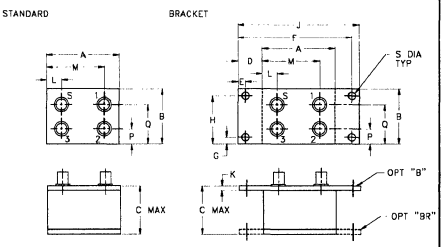
outline drawings

Mini-Circuits®

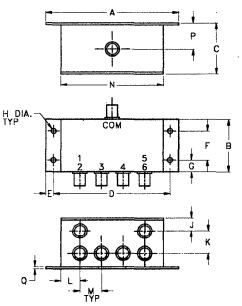
N



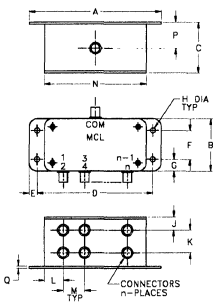
P



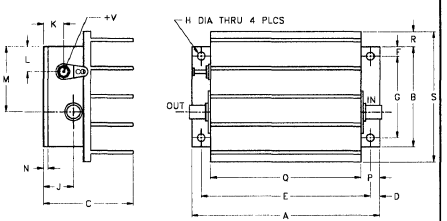
Q



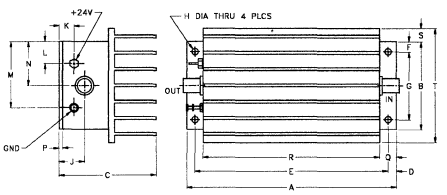
R



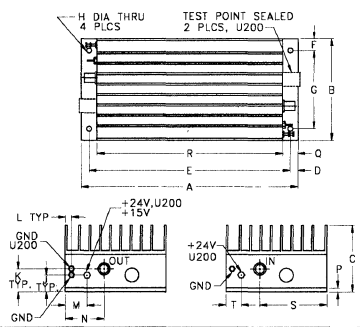
S



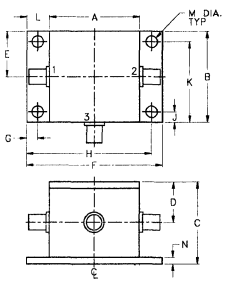
T



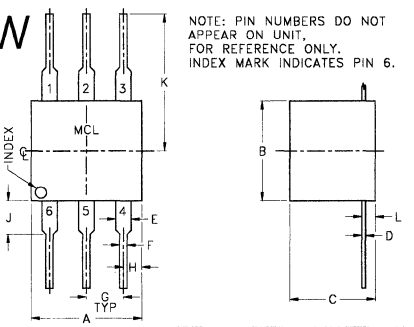
U



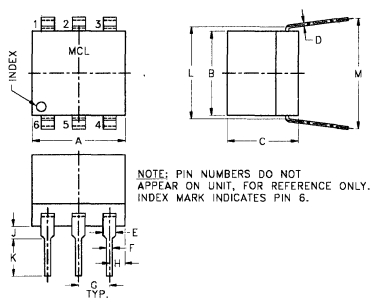
V



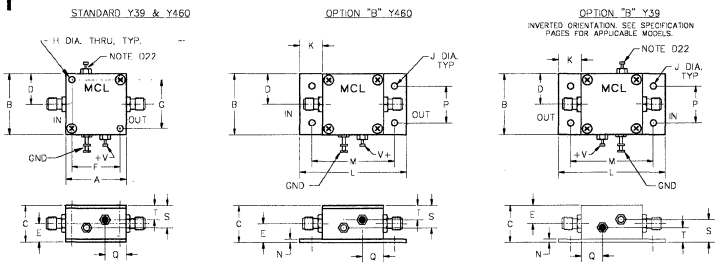
W



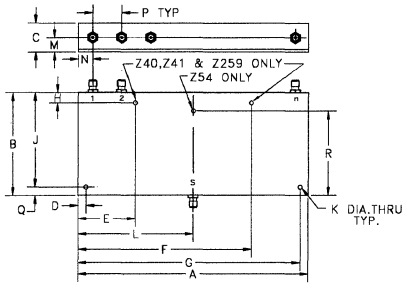
X



Y



Z



CAPO now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

case styles

outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
AB185	4.76 120.90	3.00 76.20	.53 13.46	.150 3.81	4.610 117.09	1.500 38.10	.125 3.18	.50 12.70	.25 6.35	1.13 28.70	.500 12.70								183	A4, D17
AB186	4.76 120.90	3.00 76.20	.53 13.46	.150 3.81	4.610 117.09	1.500 38.10	.125 3.18	.38 9.65	.25 6.35	.88 22.35	.500 12.70								153	A4, D17
AB204	6.13 155.70	3.00 76.20	.53 13.46	.162 4.11	5.962 151.43	1.500 38.10	.116 2.95	.50 12.70	.25 6.35	1.13 28.70	.50 12.70								215	A4, C2, D17
AF190	.180 4.57	.090 2.29	.020 .51	.100 2.54	.083 2.11	.076 1.93	.005 .13	.022 .56	.210 5.33	.060 1.52	.060 1.52	.060 1.52	.020 0.51						.04	A16, C6, E3, F14
AF320	.200 5.08	.100 2.54	.020 .51	.070 1.78	.068 1.73	.057 1.45	.005 .13	.020 .51	.230 5.84	.065 1.65	.060 1.52	.080 2.03	.040 1.02						.04	A28, C8, E3, F26
AG191	.310 7.87	.400 10.16	.095 2.41	.003 .08	.007 .18	.035 .89	.055 1.40	.020 .51	.050 1.27										.40	A17, C7, E4, F15
AH202	.375 9.53	.500 12.70	.25 6.35	.020 .51	.035 .89	.050 1.27	.140 3.56	.180 4.57	.320 8.13	.360 9.14	.450 11.43	.465 11.81	.095 2.41	.135 3.43	.240 6.10	.280 7.11			.80	A19
AN213	.456 11.58	.487 12.37	.170 4.32	.020 .51	.029 .74	.017 .43	.050 1.27	.035 .89											2.0	A23, E6, F18
AR214	2.25 57.15	1.38 35.05	1.25 31.75	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.12 3.05	.69 17.53	1.50 38.10	.30 7.62	.41 10.41	.71 18.03	.41 10.41	.150 3.81		74.0	A6, A18, D17
AT224	.150 3.81	.150 3.81	.150 3.81	.050 1.27	.030 .76	.025 .64	.028 .71	.050 1.27	.160 4.06	.030 0.76									.15	A21, F17
AT557	.200 5.08	.200 5.08	.200 5.08	.075 1.91	.050 1.27	.025 0.64	.026 0.66	.070 1.78	.220 5.59	.035 0.89									.15	A21, F17
AV243	1.01 25.65	1.63 41.40	1.59 40.39	.30 7.62	1.05 26.67	.14 3.56	.46 11.68	.12 3.05	.030 .76										18	A22, D17
AW254	3.00 76.20	2.06 52.32	1.90 48.26	.100 2.54	2.500 63.50	1.525 38.74	.125 3.18	1.000 25.40	.50 12.70	2.00 50.80									280	A8, C2, D24
AW256	4.50 114.30	2.25 57.15	1.69 42.93	.125 3.18	4.000 101.60	1.625 41.28	.125 3.18	.890 22.61	.44 11.18	3.50 88.90									500	A8, C2, D24
AW257	8.06 204.72	3.25 82.55	2.38 60.45	.125 3.18	7.560 192.02	2.625 66.68	.125 3.18	.890 22.61	.44 11.18	7.06 179.32									1240	A8, C2, D24
AX255	3.00 76.20	2.00 50.80	1.90 48.26	.100 2.54	2.500 63.50	1.525 38.74	.125 3.18	.125 31.75	.50 12.70	— —									300	A8, D24

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

*NOTES:

A. MATERIAL AND FINISH
- A4. Case material: aluminum alloy. Finish: irridite per MIL-C-5541.
- A6. Case material: aluminum alloy. Finish: blue paint over irridite.
- A8. Case material: aluminum alloy. Finish: case irridite, heat sink black anodize.
- A16. Case material: ceramic. Lead material: #42 alloy. Finish: tin-lead plate.
- A17. Case material: CRS. Lead material: kovar. Finish: gold plate 50 micro inches.
- A18. Mounting bracket finish: irridite or clear anodize.
- A19. Case material plastic, G-10 base. Termination finish: solder plate
- A21. Open-style, ceramic base. Termination finish: solder plate over nickel.
- A22. Case material: aluminum alloy. Finish: nickel plate; heat sink: black anodize.
- A23. Case material: plastic. Lead finish: solder plate.
- A28. Case material: ceramic. Lead material: Kovar. Finish: Solder plate over nickel.

C. MARKING
- C2. Consecutive marking n = no. of way power splitter.
- C6. RF input lead (1) identified by diagonally cut lead.
- C7. Lead #6 is identified by diagonally cut lead.
- C8. No diagonal cut at lead (1). Input and output interchangeable.

D. CONNECTORS
- D17. Connectors: Female SMA only.
- D24. Connectors: BNC female standard. Type N or SMA consult factory.

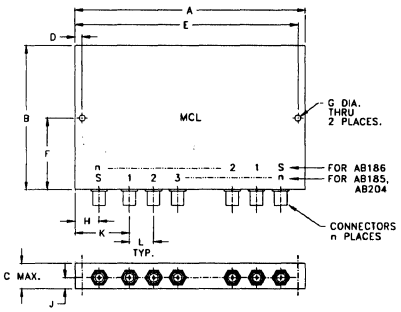
E. SPECIAL TOLERANCES
- E3. Lead width ±.005; lead thickness ±.002; cap diameter ±.005 inch.
- E4. All tolerances are ±.005 except where minimum or maximum limits are shown.
- E6. Lead width ±.005 inch.

F. PACKAGING
- F1-29. Tape and reel packaging available. See Tape & Reel packaging information for details. To order Tape & Reel version add -TR suffix to model.

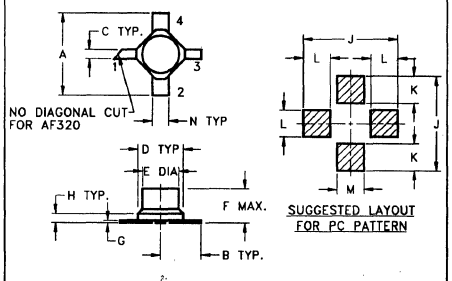
outline drawings

Mini-Circuits®

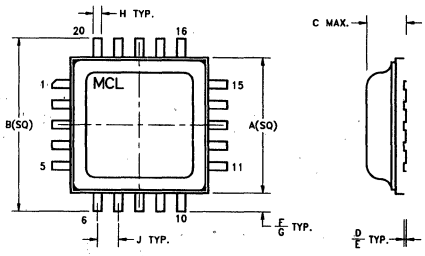
AB



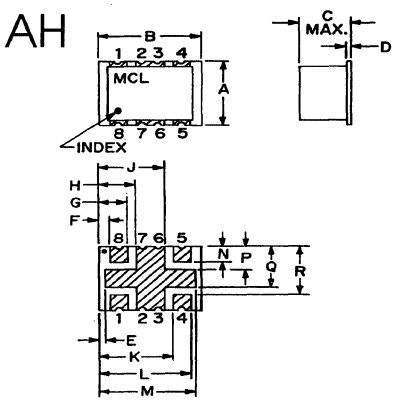
AF



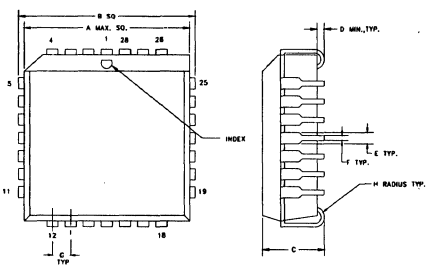
AG



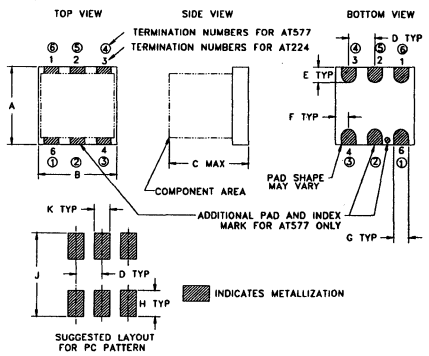
AH



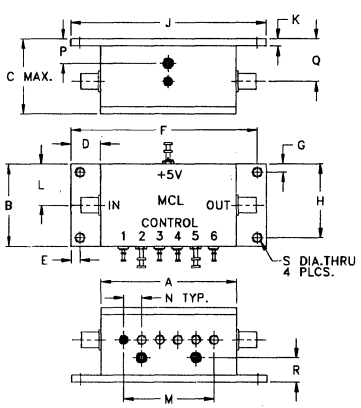
AN



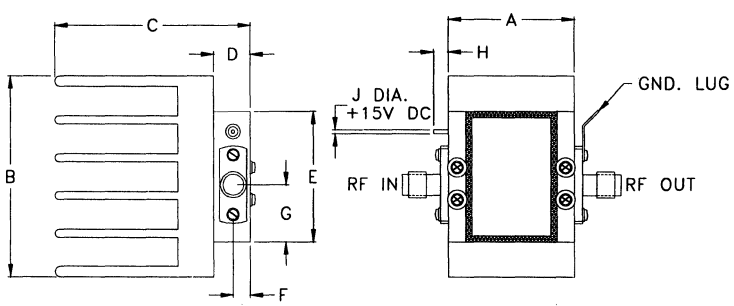
AT



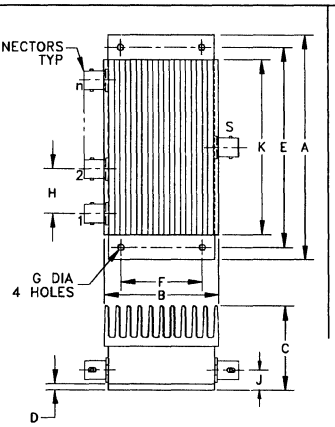
AR



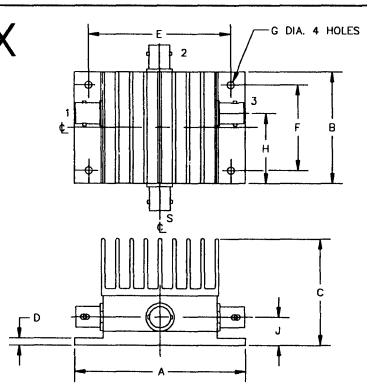
AV



AW



AX



CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

case styles

outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
BB48	.50 12.70	.39 9.91	.225 5.72	.025 0.63	.07 1.78	.100 2.54	.250 6.35	.350 8.89	.06 1.52	.31 7.87									3.0	A1, E1
BG291	.870 22.09	.800 20.32	— —	.100 2.54	.250 6.35	.100 2.54	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.890 22.60								4.0	A27, F21
BG419	.870 22.09	.800 20.32	— —	.100 2.54	.400 10.16	.100 2.54	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.890 22.60								6.4	A27
BH292	.280 7.11	.310 7.87	— —	.100 2.54	.225 5.72	.055 1.40	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.300 7.62								.45	A24, F24
BJ293	.395 10.03	.500 12.70	— —	.100 2.54	.230 5.84	.100 2.54	.100 2.54	.047 1.19	.065 1.65	.060 1.52	.425 10.80								.80	A19, F23
BJ360	.450 11.43	.800 20.32	— —	.100 2.54	.250 6.35	.100 2.54	.200 5.08	.047 1.19	.065 1.65	.065 1.65	.480 12.19								1.7	A31, F38
BJ398	.305 7.75	.390 9.91	— —	.100 2.54	.100 2.54	.045 1.14	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.325 8.26								.20	A19, F29
BK276	.470 11.94	.803 20.40	— —	.100 2.54	.250 6.35	.102 2.59	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.490 12.45								3.0	A27, F22
BK343	.460 11.68	.768 19.51	—	.100 2.54	.155 3.94	.084 2.13	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.480 12.19								1.5	A27, F27
BK377	.505 12.83	.789 20.04	— —	.100 2.54	.250 6.35	.095 2.41	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.525 13.34								3.0	A27, F28
BL301	.940 23.88	1.260 32.00	— —	.100 2.54	.390 9.91	.080 2.03	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.970 24.64								7.2	A19, F25
BL372	.940 23.88	1.426 36.22	— —	.100 2.54	.250 6.35	.163 4.14	.100 2.54	.047 1.19	.065 1.65	.065 1.65	.970 24.64								6.4	A27, F39
BN333	1.680 42.67	2.130 54.10	3.6 91.44	7.5 190.50	.740 18.80	.42 10.67	1.32 33.53	.30 7.62	.55 13.97	.14 3.56									755	A22, D17
BR386	3.25 82.55	1.38 35.05	1.25 31.75	.71 18.03	1.13 28.70	.125 3.18	2.25 57.15	.71 18.03	.41 10.41	.98 24.89	1.28 32.51	2.950 74.93	.15 3.81	1.100 27.94	.14 3.56	.150 3.81			180	A4,A18,D17
BT412	9.50 241.30	7.3 185.42	6.3 160.02	6.00 152.40	1.00 25.40	3.75 95.25	.13 3.30	.75 19.05	.30 7.62	1.00 25.40	.48 12.18	1.91 48.51	1.3 33.02	2.50 63.50	.9 22.86	5.30 134.62	5.1 129.54	5.2 132.08	4000	A8, D17
BT451	9.50 241.30	7.3 185.42	6.3 160.02	6.00 152.40	1.00 25.40	3.75 95.25	.13 3.30	.78 19.81	.31 7.87	1.48 37.59	1.48 37.59	2.45 62.23	1.1 27.94	2.95 75.00	.5 12.7	6.00 152.40	5.1 129.54	5.2 132.08	4000	A8, D17
BU413	1.00 25.40	.75 19.05	.58 14.73	.50 12.70	.29 7.37	.38 9.65	1.40 3.56	— —	.687 17.45	— —	.32 8.13	.13 3.30	.10 2.54	.16 4.06	— —	— —			25	A4,C1,D6

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

*NOTES:

A. MATERIAL AND FINISH
- A1. Header material: C, R. S. Pin material: #52 alloy. Finish: electro tin, hot oil flowed. Cover material: cupro-nickel.
- A4. Case material: aluminum alloy. Finish: irridite per MIL-C-5541
- A8. Case material: aluminum alloy. Finish: case irridite. Heat sink black anodize.
- A18. Mounting bracket finish: irridite or clear anodize.
- A19. Case material: plastic, G-10 base. Termination finish: solder plate
- A22. Case material: aluminum alloy. finish: nickel plate. Heat sink: black anodize.
- A24. Case material: ceramic, Lead finish: solder plate
- A27. Header: Glass epoxy laminate. Cover: Cupro-nickel, bright-burnish Leads: Solder-plated iron-nickel alloy.
- A31. Case material: Brass alloy, tin plated. Header: G-10 base. Termination finish: solder plate.

C. MARKING:
- C1. For port markings 1,2, and 3 see specification data sheet.

D. CONNECTORS
- D6. Connectors: female SMA only. Male SMA available on request, consult factory.
- D16. Connectors: please specify. Unless otherwise noted SMA is standard for ZHL-2-12; for all other models BNC is standard. TNC, N, SMA available on request, consult factory.
- D17. Connectors: Female SMA only.

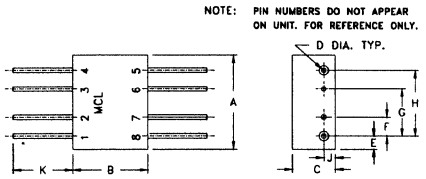
E. SPECIAL TOLERANCES
- E1. Pin diameter ±.005 inch.

F. PACKAGING
- F1-39. Tape and reel packaging available. See Tape & Reel packaging information for details. To order Tape & Reel version add -TR suffix to model.

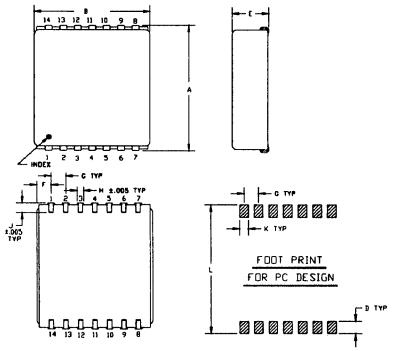
outline drawings

Mini-Circuits®

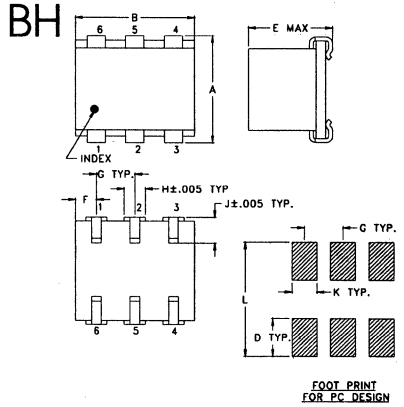
BB



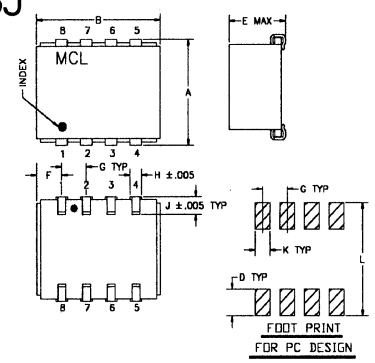
BG



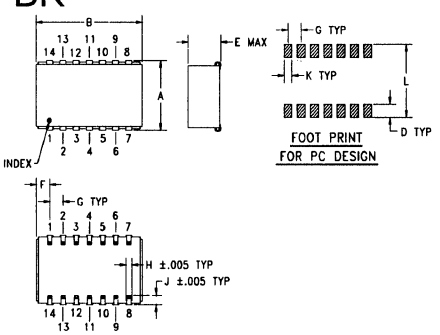
BH



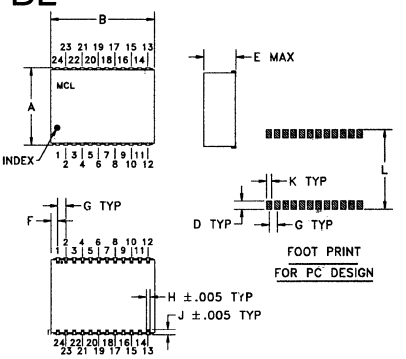
BJ



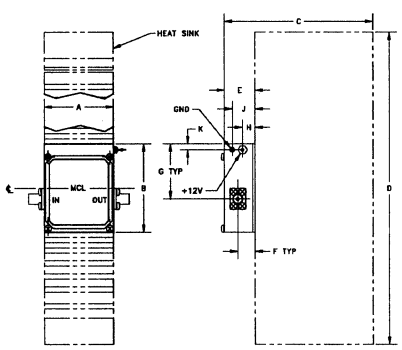
BK



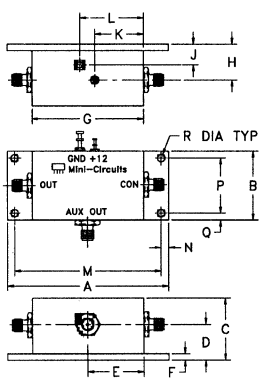
BL



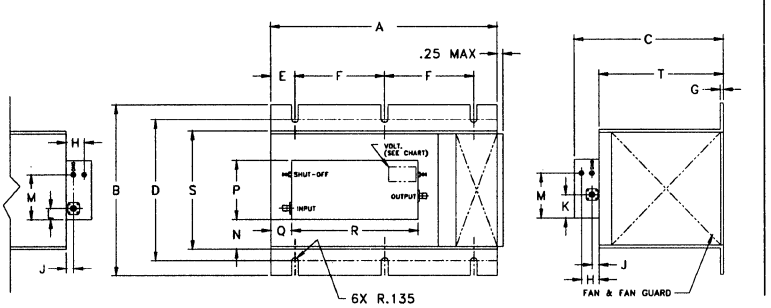
BN



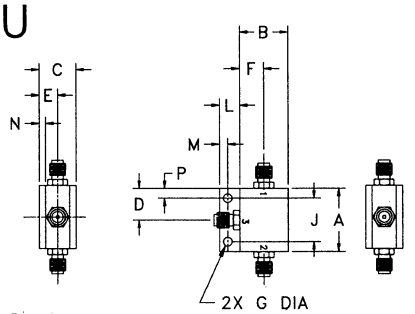
BR



BT



BU



CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

case styles

outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
BV278	.6.00 152.40	4.50 114.30	1.38 35.05	.15 3.81	5.700 144.78	.15 3.81	4.200 106.68	.38 9.65	2.25 57.15	.75 19.05	.75 19.05	.156 3.96							960	A8,D16
BW459	1.00 25.40	.75 19.05	.61 15.49	.38 9.65	.29 7.37	.25 6.35	.26 6.60	.35 8.89	.65 16.51	.688 17.48	.156 3.96	.13 3.30	1.07 27.18	.140 3.56					25	A4,A18,D17
BY493	1.38 35.05	1.00 25.40	.75 19.05	.125 3.18	.35 8.89	.52 13.21	.27 6.86	.78 19.81	.68 17.27	.125 3.18	1.50 38.10	1.281 32.54	1.000 25.40	.19 4.83	.11 2.79	.35 8.89			40	A4,D17
CA531	.052 1.32	.067 1.70	.106 2.69	.122 3.10	.040 1.02	.064 1.63	.087 2.21	.118 3.00	.067 1.70	.083 2.11	.033 .84	.042 1.07	.014 0.36	.020 0.51	.012 0.30	.007 0.18	.020 0.51	.012 0.30	.020	A13, F31
CB518	.270 6.86	.310 7.87	— —	.090 2.29	.080 2.03	.055 1.40	.050 1.27	.018 0.46	.074 1.88	.030 0.76	.290 7.37								.30	A21, F32
CB539	.293 7.44	.300 7.62	— —	.090 2.29	.085 2.16	.050 1.27	.050 1.27	.018 0.46	.067 1.70	.030 0.76	.315 8.00								.30	A21, F33
CC51	2.00 50.80	2.00 50.80	.75 19.05	.938 23.83	.13 3.30	1.750 44.45	.125 3.17	.38 9.65	1.00 25.40	1.25 31.75									120.0	A10, D11
CC258	2.00 50.80	2.00 50.80	.75 19.05	.938 23.83	.13 3.30	1.750 44.45	.125 3.17	.38 9.65	1.00 25.40	1.25 31.75									200.0	A4, D24
CD541	.280 7.11	.310 7.87	.220 5.58	.100 2.54	.080 2.03	.055 1.40	.100 2.54	.040 1.02	— —	.065 1.65	.300 7.62								.40	A23, F34
CD542	.280 7.11	.310 7.87	.220 5.58	.100 2.54	.108 2.74	.055 1.40	.100 2.54	.040 1.02	— —	.065 1.65	.300 7.62								.40	A23, F35
CG581	.375 9.53	.500 12.70	.230 5.84	.087 2.21	— —	.150 3.81	.100 2.54	.510 12.95	.155 3.94	.093 2.36	.385 9.78	.040 1.02	.080 2.03	.024 0.61	.060 1.52				.60	A24, F36

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

*NOTES:

A. MATERIAL AND FINISH
- A4. Case material: aluminum alloy. Finish: irridite per MIL-C-5541
- A8. Case material: aluminum alloy. Finish: case irridite. Heat sink black anodize.
- A10. Case material: aluminum alloy. Finish: grey paint or yellow irridite.
- A13. Case material: plastic, Lead finishe: tin-lead plate.
- A18. Mounting bracket finish: irridite or clear anodize.
- A21. Open-style, ceramic base. Termination finish: solder plate over nickel
- A23. Case materal: plastic. Lead finish: solder plate.
- A24. Case material: ceramic. Lead finish: solder plate.

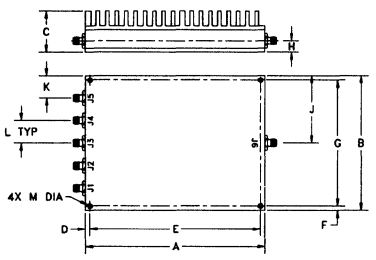
D. CONNECTORS
- D11. Connectors: Please specify; Type N or SMA
- D16. Connectors: please specify. Unless otherwise noted SMA is standard for ZHL-2-12; for all other models BNC is standard. TNC, N, SMA available on request, consult factory.
- D17. Connectors: Female SMA only.
- D24. Connectors: female BNC standard. Type N or SMA consult factory.

F. PACKAGING
- F1-36. Tape and reel packaging available. See Tape & Reel packaging information for details. To order Tape & Reel version add -TR suffix to model.

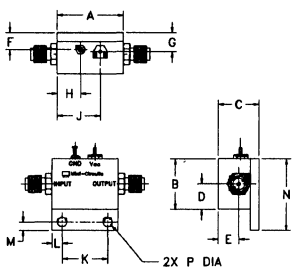
outline drawings

Mini-Circuits®

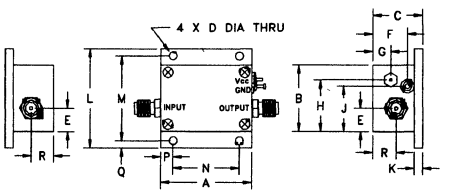
BV



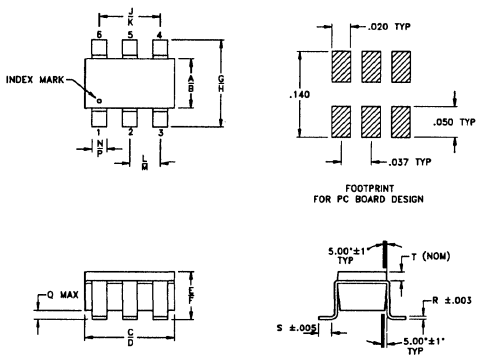
BW



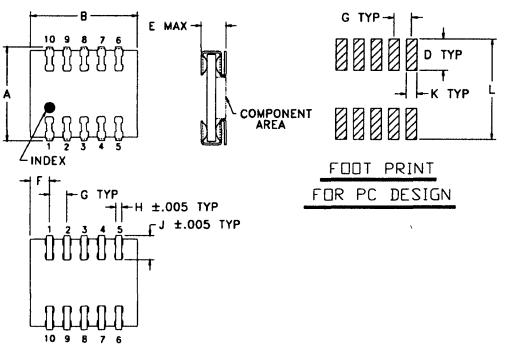
BY



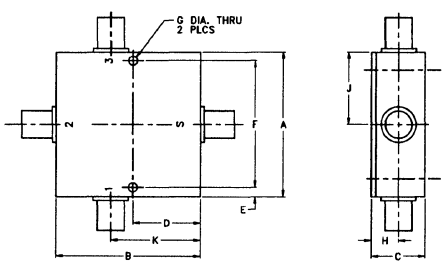
CA



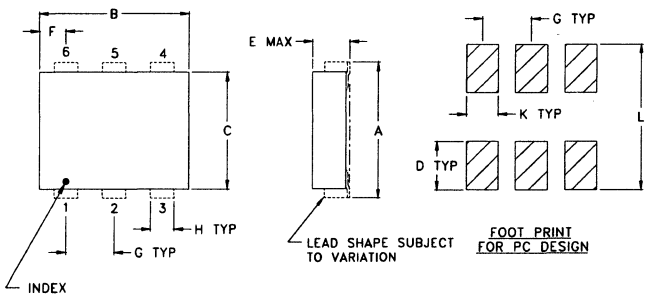
CB



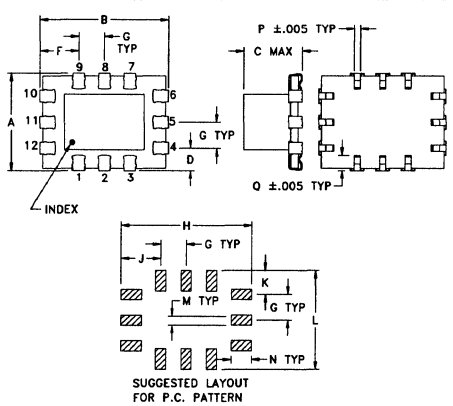
CC



CD



CG



CAPO now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

41

case styles
outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
CJ608	.360 9.14	4.00 10.16	.29 7.37	.120 3.04	.155 3.94	.050 1.27	.100 2.54	.040 1.02	-- --	.060 1.52	.420 10.67								.40	A23, F42
CK605	.500 12.70	.500 12.70	.180 4.57	.100 2.54	.080 2.03	.115 2.92	.060 1.52	.040 1.02	.540 13.72	.060 1.52	.100 2.54	.135 3.45	.135 3.45	.115 2.92	.140 3.56	.070 1.78	.150 3.81	.070 1.78	1.0	A31, F37
CL620	.154 3.91	.340 8.64	.068 1.73	.236 5.99	-- --	.050 1.27	.016 0.41	.008 0.20	.010 0.25	.032 0.81	.059 1.50	.095 2.41	.028 0.71	.287 7.29					.14	A13, F43
CM624	.295 7.49	.405 10.3	.095 2.41	.406 10.3	-- --	.050 1.27	.016 0.41	.008 0.20	.004 0.10	.032 3.23	.091 2.31	.102 2.59	.028 0.71	.460 11.68		.130 3.30	.340 8.64		0.67	A13, F44
CP641	4.75 120.65	4.375 111.13	4.11 104.39	1.540 39.12	2.00 50.80	3.36 85.34	.144 3.66	4.24 107.70	1.12 28.45	.58 14.73	.125 3.18	2.38 60.45	1.50 38.10	1.00 25.40	.50 12.70	.34 8.64	.19 4.83	.23 5.84	850	A7, D17
DD52	2.00 50.80	2.00 50.80	.75 19.05	.90 22.86	.156 3.96	1.688 42.88	.125 3.18	.392 9.96	1.00 25.40	.50 12.70	1.00 25.40	1.25 31.75							225.0	A10, D11
DD477	2.00 50.80	2.00 50.80	.75 19.05	.90 22.86	.156 3.96	1.688 42.88	.125 3.18	.392 9.96	-- --	.50 12.70	1.00 25.40	1.25 31.75							225.0	A10, D17

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

* NOTES:

A. MATERIAL AND FINISH
- A7. Case material: aluminum alloy. finish: case black paint; Heat sink: black anodize; base plate iridite per MIL-C-5541.
- A10. Case material: aluminum alloy. Finish: grey paint or yellow iridite.
- A13. Case material: plastic. Lead Finish: tin-lead plate.
- A23. Case material: plastic. Lead Finish: solder plate.
- A31. Case material: Brass alloy, tin plated. Header: G-10 base. Termination finish: solder plate.

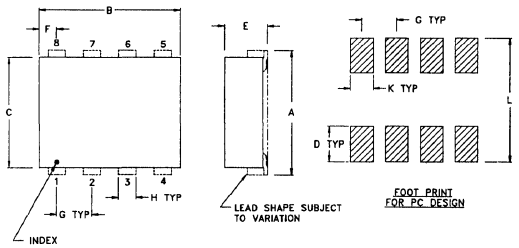
D. CONNECTORS
- D11. Connectors: Please specify; Type N or SMA.
- D17. Connectors. Female SMA only.

F. PACKAGING
- F1-44. Tape and reel packaging available. See Tape and Reel Packaging Information for details. To order Tape & Reel version add -TR suffix to model.

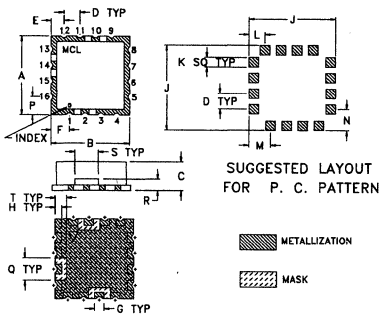
Mini-Circuits®

outline drawings

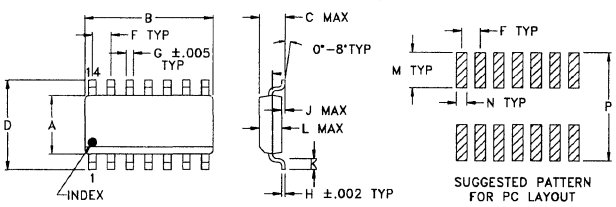
CJ



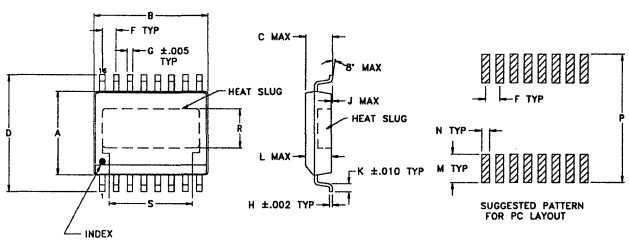
CK



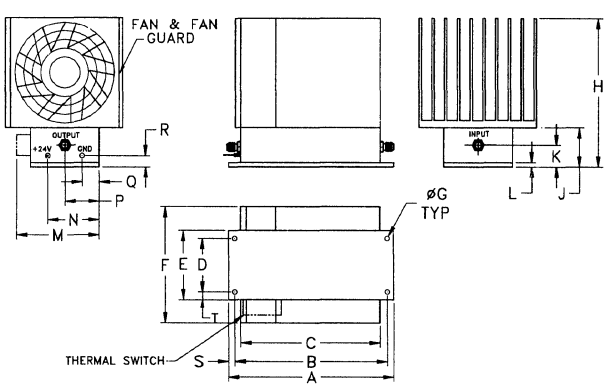
CL



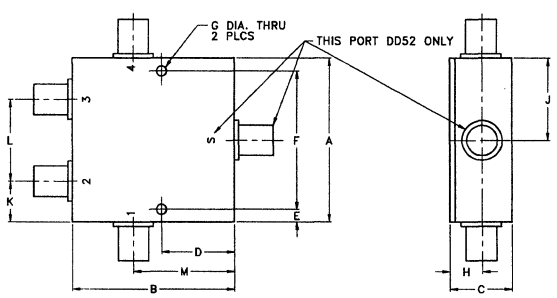
CM



CP



DD



CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

case styles

outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
FF55	1.40 35.56	.58 14.73	.73 18.54	2.59 65.79	— —														40.0	A9, D12
FF56	.98 24.89	.43 10.92	.47 11.94	1.70 43.18	— —														18.0	A9, D13
FF57	1.54 39.12	.72 18.29	.93 23.62	3.08 78.23	.82 20.83														90.0	A9, D14
FF99	1.27 32.26	.72 18.29	.47 11.94	1.98 50.29															42.0	A9, D13
FF626	— —	.28 7.11	— —	1.20 30.48	.31 7.88														3.9	A32, D13
FF627	— —	.28 7.11	— —	1.28 32.51	.31 7.88														4.3	A32, D13
FF628	— —	.28 7.11	— —	1.38 35.05	.31 7.88														4.9	A32, D13
FF629	— —	.28 7.11	— —	1.68 42.67	.31 7.88														6.5	A32, D13
GG60	2.31 58.67	1.20 30.48	.60 15.24	.125 3.18	2.062 52.37	.30 7.62	.53 13.46	.63 16.00											75.0	A10, D10
HH68	9.31 236.47	1.60 40.64	3.57 90.68	8.84 224.54	.25 6.35	.88 22.35	.36 9.14	.160 4.06	.34 8.64	.69 17.53	.54 13.72	.66 16.76	8.34 211.84	.33 8.38	.06 1.52				1090.0	A10, A18, D10
JJ77	1.50 38.10	1.13 28.70	.97 24.64	.50 12.70	.155 3.94	2.345 59.56	.14 3.56	.850 21.59	2.50 63.50	.10 2.54	.44 11.18	.75 19.05	.63 16.00	.54 13.72	.37 9.40	.43 10.92	.150 3.81	.73 18.54	50.0	A6, A11, A18, D17
KK81	.30 7.62	.27 6.86	.23 5.84	.010 .25	.042 1.07	.020 .51	.100 2.54	.05 1.27	.05 1.27	.035 .89	.036 .91	.26 6.60	.575 14.61						.50	A13, E2, F1
LL85	1.43 36.32	.58 14.73	.75 19.05																21.5	A9, D18
LL86	1.19 30.23	.58 14.73	.51 12.95																14.0	A9, D19
LL87	1.43 36.32	.82 20.83	.68 17.27																48.5	A9, D20
LL561	.58 14.73	.36 9.14	.36 9.14																4.0	A9, D19
LL604	.55 13.97	.36 9.14	.33 8.38																4.0	A34, D27
NN92	3.66 92.96	3.25 82.55	2.13 54.10	.25 6.35	3.16 80.26	.38 9.65	2.50 63.50	.156 3.96	.72 18.29	.64 16.26	.74 18.80	1.78 45.21	2.30 58.42	.125 3.18	.50 12.70	2.66 67.56			440.0	A7, A8, A18, D6
PP94	.360 9.14	.250 6.35	.25 6.35	.016 .41	.020 .51	.04 1.02	.200 5.08												1.5	A26, C3
PP120	.50 12.70	.21 5.33	.150 3.81	.016 .41	.020 .51	.04 1.02	.300 7.62												1.5	A12, C3
PP163	.360 9.14	.250 6.35	.350 8.89	.016 .41	.020 .51	.040 1.02	.200 5.08												2.9	A12, C3
PP230	.50 12.70	.250 6.35	.240 6.10	.016 .41	.020 .51	.04 1.02	.300 7.62												1.8	A12, C3
QQ95	.500 12.70	.250 6.35	.25 6.35	.016 .41	.020 .51	.04 1.02	.300 7.62	.150 3.81	.150 3.81	.075 1.91									3.5	A12, C3
QQ96	.600 15.24	.250 6.35	.25 6.35	.016 .41	.020 .51	.04 1.02	.400 10.16	.200 5.08	.200 5.08	.100 2.54									4.0	A12, C3
RR93	4.06 103.12	1.60 40.64	2.125 53.98	3.56 90.42	.25 6.35	.88 22.35	.36 9.14	.160 4.06	.4 10.16	.69 17.53	.58 14.73	.66 16.76	3.13 79.50	.8 20.32	.06 1.52	.33 8.38			350.0	A10, A18, D9

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

* NOTES:

A. MATERIAL AND FINISH
- A6. Case material: aluminum alloy. Finish: blue paint over iridite.
- A7. Case material: aluminum alloy. Finish: case black paint. Heat sink: black anodize. Baseplate iridite per MIL-C-5541.
- A8. Case material: aluminum alloy. Finish: case iridite. Heat sink: black anodize.
- A9. Case material: brass. Finish: nickel plate.
- A10. Case material: aluminum alloy. Finish: grey paint or yellow iridite.
- A11. Case material: aluminum alloy. Finish: blue anodized.
- A12. Header and lead finish: gold plate per MIL-G-45204. Case material: Nickel
- A13. Case material: plastic. Lead Finish: tin-lead plate.
- A18. Mounting bracket finish: irridite or clear anodize.
- A26. Header material: C.R.S., pin material: #52 alloy; finish: electro tin, hot-oil flowed. Cover material: nickel.
- A32. Case material: Stainless steel, passivated.
- A34. Case material: Brass, Finish: Gold plate.

C. MARKING
- C3. For Pin designations see specification data sheet.

D. CONNECTORS
- D6. Connectors: Female SMA only. Male SMA available on request, consult factory.
- D9. Connectors: BNC standard. TNC or Female SMA on request, consult factory.
- D10. Connectors: BNC standard. SMA on request, consult factory.
- D11. Connectors: Please specify; Type N or SMA.
- D12. Connectors: Male BNC, Female BNC standard. Other combinations with SMA, TNC available on request, consult factory.
- D13. Connectors: Male SMA. Female SMA only.
- D14. Connectors: Male N, Female N standard. Combinations with BNC, SMA, TNC available on request, consult factory.
- D17. Connectors. Female SMA only.
- D18. Connectors: Male BNC only.
- D19. Connectors: Male SMA only.
- D20. Connectors: Male Type N only.
- D24. Connectors: female BNC standard. Type N or SMA consult factory.
- D27. Connectors: female SMB only.

E. SPECIAL TOLERANCES
- E2. Lead width ±.010; lead thickness ±.005 inch.

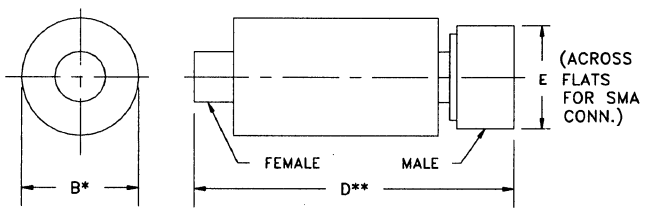
F. PACKAGING
- F1-29. Tape and reel packaging available. See Tape and Reel Packaging Information for details. To order Tape & Reel version add -TR suffix to model.

Mini-Circuits® *INTERNET* http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

outline drawings

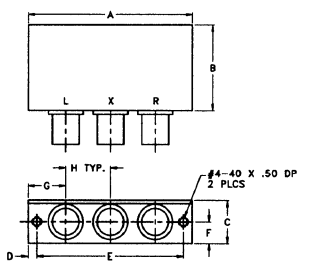
Mini-Circuits®

FF

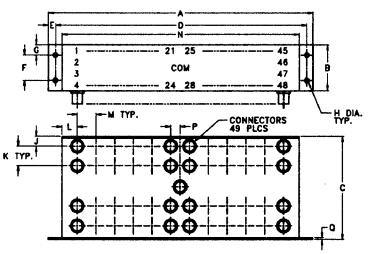


*MAX, FOR FF626-FF629
**MAX, FOR FF57

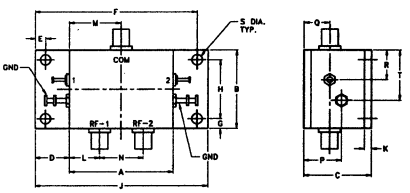
GG



HH

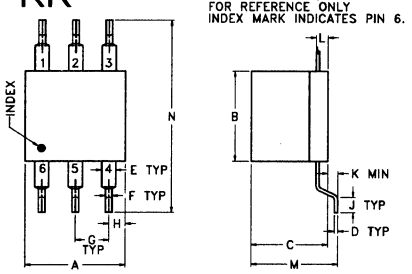


JJ

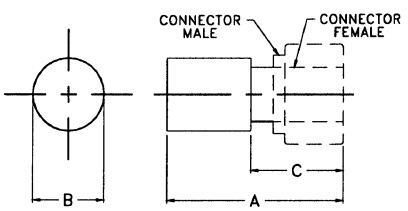


KK

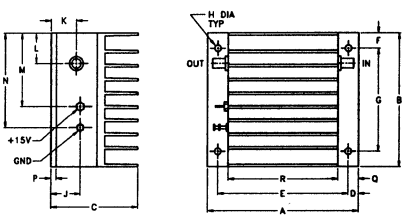
NOTE: PIN NUMBERS DO NOT APPEAR ON UNIT, FOR REFERENCE ONLY INDEX MARK INDICATES PIN 6.



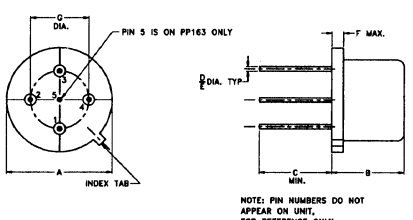
LL



NN

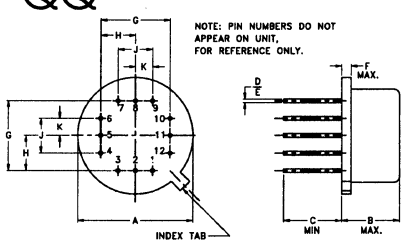


PP

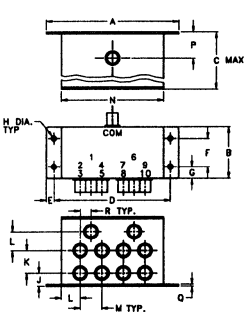


NOTE: PIN NUMBERS DO NOT APPEAR ON UNIT, FOR REFERENCE ONLY.

QQ



RR



In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

CAPD now available! computer-automated performance data

case styles

outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
SS98	1.25 31.75	1.56 39.62	.75 19.05	.63 16.00	.39 9.91	1.50 38.10	1.000 25.40	— —	.125 3.18	.46 11.68	2.18 55.37	1.688 42.88	.07 1.78	.750 19.05	.50 12.70	.80 20.32	.45 11.43	.29 7.37	85.0	A8, A18, B1, D6
TT100	.250 6.35	.310 7.87	.20 5.08	.100 2.54	.050 1.27	.055 1.40	.040 1.02	.070 1.78	.270 6.86	.050 1.27									.50	A14, F2
TT240	.250 6.35	.310 7.87	.20 5.08	.100 2.54	.050 1.27	.055 1.40	.040 1.02	.070 1.78	.270 6.86	.050 1.27									.50	A20, F3
TT241	.250 6.35	.310 7.87	.275 6.99	.100 2.54	.050 1.27	.055 1.40	.040 1.02	.070 1.78	.270 6.86	.050 1.27									.50	A20, F0
UU102	3.50 88.90	2.00 50.80	.50 12.70	.150 3.81	3.350 85.09	1.00 25.40	.125 3.18	1.75 44.45	.20 5.08	.55 13.97									120.0	A10, C2, D17
UU179	8.50 215.90	3.95 100.33	.75 19.05	.250 6.35	8.250 209.55	— —	.187 4.75	4.250 107.95	.38 9.65	.500 12.70	.475 12.07	3.475 88.27							282	A4, D17
UU181	2.25 57.15	2.30 58.42	.63 16.00	.125 3.18	2.125 53.98	— —	.125 3.18	1.13 28.70	.31 7.87	.500 12.70	.125 3.18	2.175 55.24							51	A4, D17
UU182	2.75 69.85	2.80 71.12	.63 16.00	.125 3.18	2.625 66.68	— —	.125 3.18	1.38 35.05	.31 7.87	.500 12.70	.125 3.18	2.675 67.95							67	A4, D17
UU187	6.00 152.40	1.62 41.15	.88 22.35	.250 6.35	5.750 146.05	.810 20.57	.144 3.66	3.00 76.20	.44 11.18	1.00 25.40	— —	— —							274	A4, D23
UU188	3.50 88.90	2.13 54.10	.88 22.35	.150 3.81	3.350 85.09	1.06 26.92	.125 3.18	1.75 44.45	.44 11.18	.89 22.61	— —	— —							184	A4, D23
UU215	4.00 101.60	1.25 31.75	.38 9.65	.125 3.18	3.875 98.43	.500 12.70	#2-56 —	2.00 50.80	.19 4.83	.500 12.70	— —	1.125 28.58							77	A4, D17
UU233	1.50 38.10	1.00 25.40	.38 9.65	.125 3.18	1.375 34.93	.500 12.70	#2-56 —	.75 19.05	.19 4.83	.50 12.70									28.0	A8, B8, C2, D17
UU586	3.50 88.90	3.00 76.20	.63 16.00	.130 3.30	3.380 85.85	1.50 38.10	.125 3.17	1.75 44.45	.32 8.13	.500 12.70									160.0	A4, D17
UU589	6.60 167.64	3.28 83.31	.75 19.05	.150 3.81	6.45 163.83	1.64 41.66	.144 3.66	3.30 83.82	.38 9.53	.500 12.70	— —	— —							520	A4, D17
VV105	.085 2.16	.060 1.52	.008 .20	.020 .51	.256 6.50	.012 .30	.025 .64												.015	A13, C4, E2
WW107	.020 .51	.10 2.54	.020 .51	.092 2.34	.085 2.16	.060 1.52	.008 .20	.026 .66											.015	A13, C4, E2, F4
XX112	.18 4.57	.18 4.57	.060 1.52	.40 10.16	.35 8.89	.050 1.27	.015 .38	.005 .13	.005 .13	.07 1.78	— —	.105 2.67	.025 0.63	.420 10.69	.19 4.83	.18 4.57			.15	A15, E2, F19
XX211	.163 4.14	.202 5.13	.077 1.96	.25 6.35	.22 5.59	.050 1.27	.017 .43	.009 .23	.025 .63	.03 .76	— —	.050 1.27	.03 0.76	.270 6.86	— —	— —			.10	A13, E2, F16
YY101	.75 19.05	.38 9.65	.20 5.08	.010 .25	.050 1.27	.020 .51	.200 5.08	.075 1.91	.600 15.24	.450 11.43	— —	.47 11.94	.100 2.54	.150 3.81					1.6	A13, E2, E5 F5
YY109	.75 19.05	.38 9.65	.20 5.08	.010 .25	.050 1.27	.020 .51	.200 5.08	.075 1.91	.600 15.24	.72 18.29	— —	.74 18.80	.100 2.54	.150 3.81					1.6	A13, E2, E5, F0
YY161	.75 19.05	.38 9.65	.28 7.11	.010 .25	.050 1.27	.020 .51	.200 5.08	.075 1.91	.600 15.24	.450 11.43	— —	.47 11.94	.100 2.54	.150 3.81					1.6	A13, E2, F6
ZZ121	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.38 9.65	.61 15.49	— —	.800 20.32	.800 20.32	.76 19.30	.125 3.18	1.688 42.88	2.18 55.37	.75 19.05	.07 1.78				85.0	A10, A18, B1, D6

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

* NOTES:

A. MATERIAL AND FINISH
- A4. Case material: aluminum alloy. Finish: iridite per MIL-C-5541.
- A8. Case material: aluminum alloy. Finish: case iridite Heat sink, black anodize.
- A10. Case material: aluminum alloy. Finish: grey paint or yellow iridite.
- A13. Case material: plastic. Lead Finish: tin-lead plate.
- A14. Case material: ceramic or plastic, ceramic base. Terminations: palladium platinum silver.
- A15. Case material: kovar. Lead material: kovar. Finish: gold plate per MIL-G-45204 .
- A18. Mounting bracket finish: iridite or clear anodize.
- A20. Case material: ceramic. Terminations: solder plate over nickel. Board edges straight.

B. MOUNTING
- B1. Mounting bracket available on request. Add suffix B to part number.
- B7. Pin's meniscus (of header) 0.015" max.
- B8. #2-56 UNC-2B mounting holes provided to .32" deep minimum.

C. MARKING
- C2. Consecutive marking n = no. of way power splitter.
- C4. RF input lead (1) identified by one or both of the following at factory option: (a) diagonally cut lead, which may be 45°(ref) in either direction; (b) orientation mark on the case. Model dash number identified by color dot or alphanumeric code on case. See specification data sheet.
- C5. RF output is identified by index mark, model dash number by alphanumeric code.

D. CONNECTORS
- D6. Connectors: Female SMA only. Male SMA available on request, consult factory.
- D17. Connectors: Female SMA only.
- D23. Connectors: Please specify female type N or SMA.

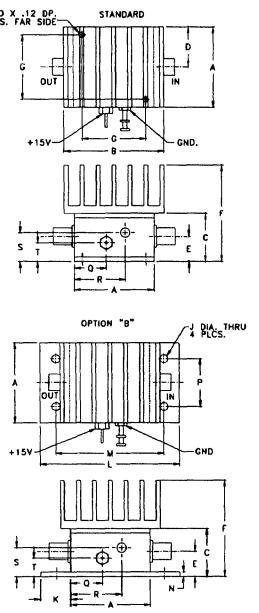
E. SPECIAL TOLERANCES
- E1. Pin diameter ±.005 inch.
- E2. Lead width ±.010; lead thickness ±.005 inch.
- E5. For SCM mixers, long lead version (YY109) is available upon request; consult factory. To order short lead version (case YY101) add -NL suffix.

F. PACKAGING
- F0. Not available in Tape & Reel.
- F1-29. Tape and reel packaging available. See Tape and Reel Packaging Information for details. To order Tape & Reel version add -TR suffix to model.

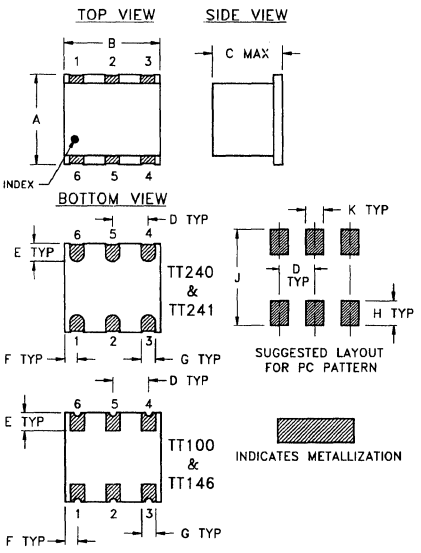
outline drawings

Mini-Circuits®

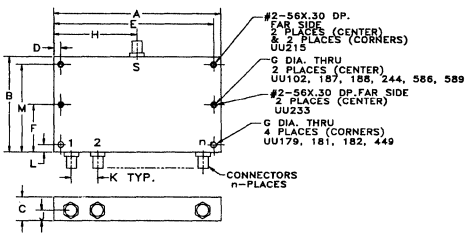
SS



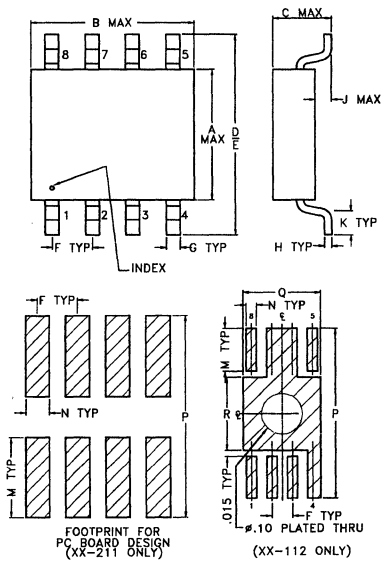
TT



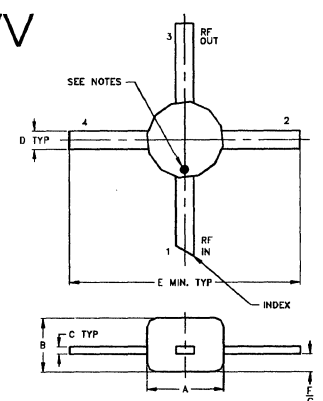
UU



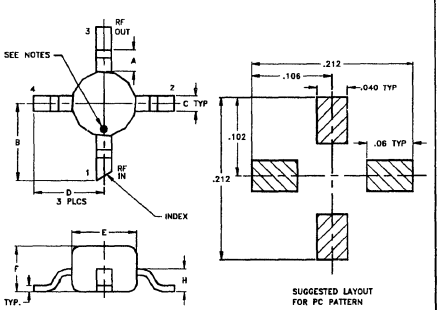
XX



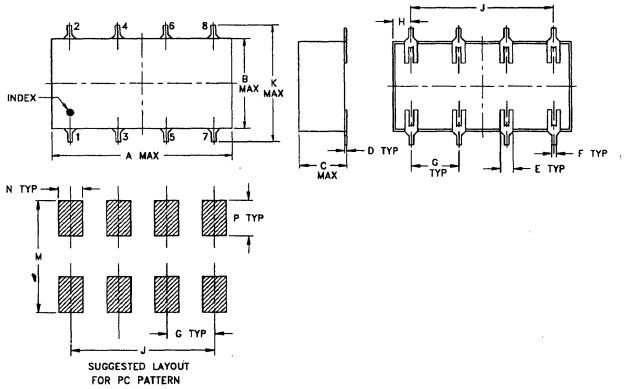
VV



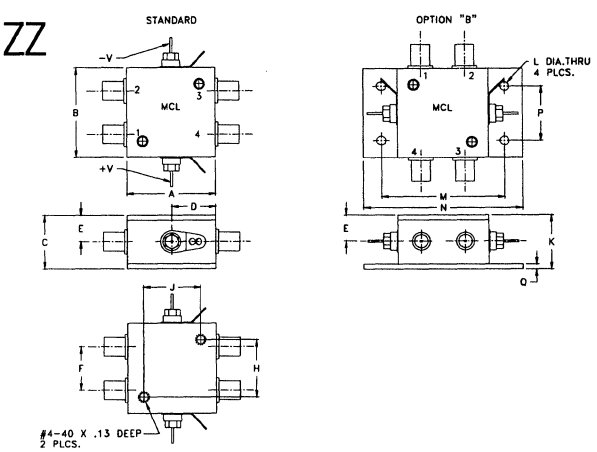
WW



YY



ZZ



CAPO now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

case styles

outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
AAA118	1.50 38.10	.50 12.70	.935 23.75	.040 1.02	1.100 27.94	.19 4.83	.400 10.16	.15 3.81	.600 15.24	.300 7.62	.20 5.08	.14 3.56							19	A1, E1, B7
BBB123	.145 3.69	.100 2.54	.04 1.02	.006 .15	.030 .76	.488 12.40													.015	A13, C5, E2
CCC127	2.25 57.15	1.38 35.05	1.24 31.50	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.12 3.05	.80 20.32	.69 17.53	1.60 40.64	.60 15.24	1.200 30.48	.52 13.21	.82 20.83	.150 3.81	80.0	A6, A11, A18, D17
DDD131	7.00 177.80	3.25 82.55	3.13 79.50	.25 6.35	6.500 165.10	.38 9.65	2.500 63.50	.156 3.96	.88 22.35	.43 10.92	.62 15.75	1.00 25.40	2.63 66.68	.125 3.18	.50 12.70	6.00 152.40	2.23 56.64	8.35 212.09	1884.0	A7, A18, D6
DDD338	7.00 177.80	3.25 82.55	3.13 79.50	.25 6.35	6.500 165.10	.38 9.65	2.500 63.50	.156 3.96	.88 22.35	.73 18.54	.62 15.75	1.13 28.70	2.23 56.64	.125 3.18	.50 12.70	6.00 152.40	2.23 56.64	8.35 212.09	1884.0	A7, A18, D6
EEE132	.90 22.86	.90 22.86	.675 17.15	.245 6.22	.45 11.43	1.34 34.04	.09 2.29	1.152 29.26	.09 2.29	.712 18.08	.22 5.59	.106 2.69	.05 1.27						50.0	A4, A18, D6
FFF122	.83 21.08	.83 21.08	.18 4.57	.10 2.54	.100 2.54	.600 15.24	.95 24.13	.017 .43	.15 3.81										5.0	A15, E1
GGG126	2.25 57.15	1.38 35.05	1.24 31.50	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.55	.12 3.05	.80 20.32	.69 17.53	— —	.60 15.24	1.200 30.48	.52 13.21	.82 20.83	.150 3.81	80.0	A6, A11, A18, D17
HHH141	2.00 50.80	2.00 50.80	.95 24.13	1.062 26.98	0.125 3.18	1.75 44.45	.125 3.18	0.575 14.60	1.00 25.40	1.35 34.29									200.0	A10, C1, D6
JJJ142	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.38 9.65	.32 8.13	— —	.80 20.32	.80 20.32										70.0	A10, D17
JJJ245	.75 19.05	1.00 25.40	.58 14.73	.38 9.65	.29 7.37	.35 8.89													22.0	A4, B9, D6
KKK155	.32 8.13	.445 11.30	.090 2.29	.006 .152	.012 .30	.070 1.78	.050 1.270	.010 .254	.015 .38	.030 .762	.050 1.270	.050 1.270							.40	A13, F7
MMM168	.045 1.14	.055 1.40	.105 2.67	.120 3.05	.047 1.19	.005 0.13	.083 2.11	.104 2.64	.070 1.78	.080 2.03	.018 0.46	.024 0.61	.030 0.76	.036 0.91	.015 0.38	.021 0.53	.023 0.58	.004 0.10	1.0	A13, F8

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

* NOTES:

A. MATERIAL AND FINISH
- A1. Header material C.R.S. Pin material: #52 alloy. Finish: electro tin, hot oil flowed. Cover material: cupro-nickel.
- A4. Case material: aluminum alloy. Finish: irridite per MIL-C-5541.
- A6. Case material: aluminum alloy. Finish: blue paint over irridite.
- A7. Case material: aluminum alloy. Finish: case black paint. Heat sink: black anodize. Baseplate irridite per MIL-C-5541.
- A10. Case material: aluminum alloy. Finish: grey paint or yellow iridite.
- A11. Case material: aluminum alloy. Finish: blue anodized.
- A13. Case material: plastic. Lead finish: tin-lead plate.
- A15. Case material: kovar. Lead material: kovar. Finish: gold plate per MIL-G-45204.
- A18. Mounting bracket finish: irridite or clear anodize.

B. MOUNTING
- B7. Pin's meniscus (of header) 0.015" max.
- B9. No mounting holes.

C. MARKING
- C1. For port markings 1, 2, and 3 see specification data sheet.
- C5. RF output is identified by index mark, model dash number by alphanumeric code.

D. CONNECTORS
- D6. Connectors: Female SMA only. Male SMA available on request, consult factory.
- D17. Connectors: Female SMA only.

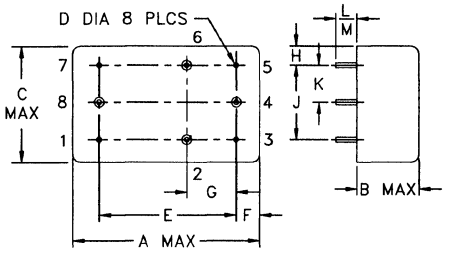
E. SPECIAL TOLERANCES
- E1. Pin diameter ±.005 inch.
- E2. Lead width ±.010; lead thickness ±.005 inch

F. PACKAGING
- F1-29. Tape and reel packaging available. See Tape and Reel Packaging Information for details. To order Tape & Reel version add -TR suffix to model.

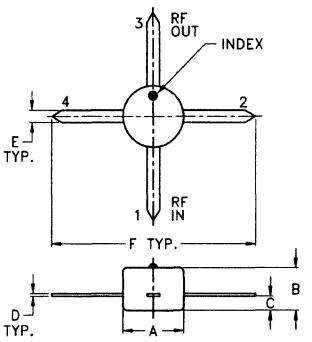
Mini-Circuits®

outline drawings

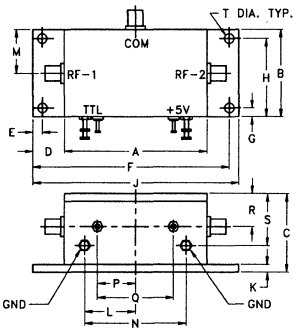
AAA



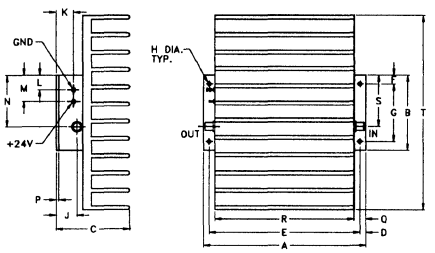
BBB



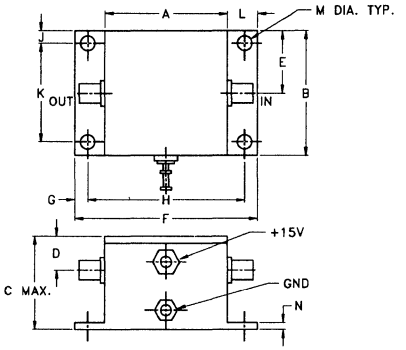
CCC



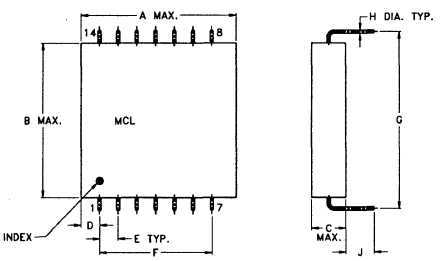
DDD



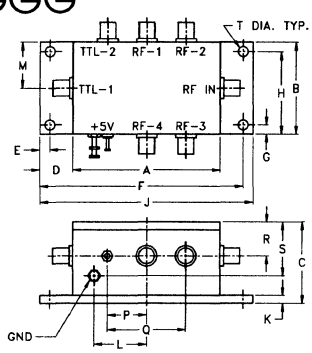
EEE



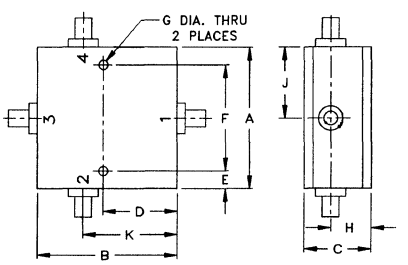
FFF



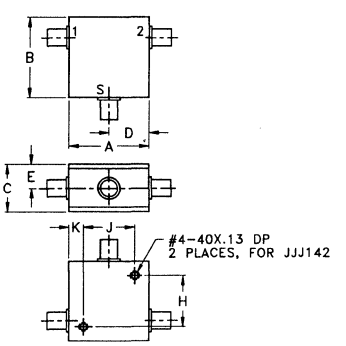
GGG



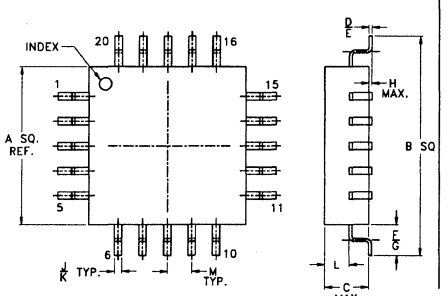
HHH



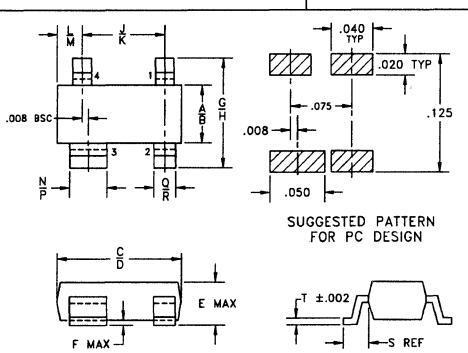
JJJ



KKK



MMM



In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

case styles

outline dimensions (inch / mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams.	NOTES*
NNN150	.50 12.70	.48 12.19	.255 6.48	.240 6.10	.23 5.84	.21 5.33	.06 1.52	.100 2.54	.09 2.29	.16 4.06	.020 .51	.09 2.29	.005 .13						1.9	A1, E1, F9, B7
PPP83	.75 19.05	.38 9.65	.20 5.08	.010 .25	.05 1.27	.020 .51	.200 5.08	.075 1.91	.200 5.08	.14 3.56	.060 1.52								1.6	A13, E2
QQQ130	— —	.31 7.87	.20 5.08	.10 2.54	.010 .25	.100 2.54	.050 1.27	.400 10.16	.420 10.67	.120 3.05	.060 1.52	.100 2.54	.020 .51						.55	A24, E2, F10
QQQ569	— —	.31 7.87	.225 5.72	— —	— —	.100 2.54	.045 1.14	.390 9.90	.420 10.67	.120 3.05	.060 1.52	.100 2.54	— —						.50	A24, F30
RRR137	.28 7.11	.14 3.56	.030 .76	.020 .51	.145 3.68	.110 2.79	.006 .15	.010 .25	.030 .76										.015	A13, C5, E2, F11
SSS173	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.38 9.65	1.000 25.40	.125 3.18	1.000 25.40	— —	— —	.125 3.18	1.688 42.88	2.18 55.38	.75 19.05	.07 1.78				75	A10, A18, D17
TTT166	.375 9.53	.500 12.70	.15 3.81	.020 .51	.075 1.91	.250 6.35	.425 10.80	.187 4.75	.050 1.27	.050 1.27	.070 1.78	.270 6.86	.540 13.72	.060 1.52	.095 2.41	.445 11.30	.208 5.28	.415 10.54	.8	A19, F12
TTT167	.375 9.53	.500 12.70	.23 5.84	.020 0.51	.075 1.91	.250 6.35	.425 10.80	.187 4.75	.050 1.27	.050 1.27	.070 1.78	.270 6.86	.540 13.72	.060 1.52	.095 2.41	.445 11.30	.208 5.28	.415 10.54	.8	A19, F13
VVV180	1.80 45.72	1.75 44.45	.66 16.76	.125 3.18	1.675 42.55	.125 3.18	.125 3.18	1.625 41.28	.31 7.87	.63 16.00	1.13 28.70	.88 22.35							34	A4, D17

tolerance .x±.1 .xx±.03 .xxx±.015 inch **oz. = grams x.0353**

*NOTES:

A. MATERIAL AND FINISH
- A1. Header material C.R.S Pin materal: #52 alloy. Finish: electro tin, hot oil flowed. Cover material: cupro-nickel.
- A4. Case material: aluminum alloy. Finish: irridite per MIL-C-5541.
- A10. Case material: aluminum alloy. Finish: grey paint or yellow iridite.
- A13. Case material: plastic. Lead finish: tin-lead plate.
- A18. Mounting bracket finish: irridite or clear anodize.
- A19. Case material plastic, G-10 base. Termination finish: solder plate
- A24. Case material ceramic. Lead finish: solder plate.

B. MOUNTING
- B7. Pin's meniscus (of header) 0.015" max.

C. MARKING
- C5. RF output is identified by index mark, model dash number by alphanumeric code.

D. CONNECTORS
- D17. Connectors; Female SMA only.

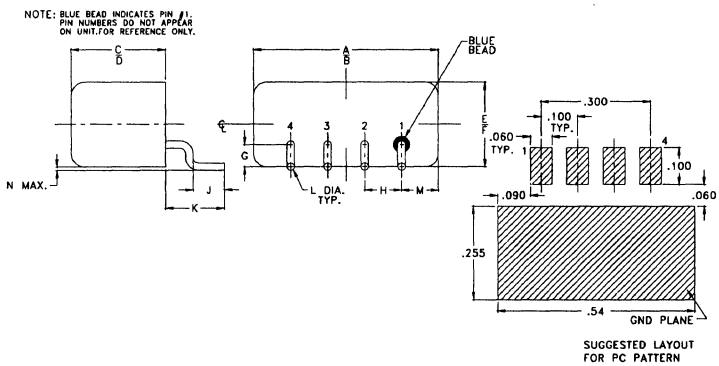
E. SPECIAL TOLERANCES
- E1. Pin diameter ±.005 inch.
- E2. Lead width ±.010; lead thickness ±.005 inch.

F. PACKAGING
- F1-30. Tape and reel packaging available. See Tape & Reel packaging information for details. To order Tape & Reel version add -TR suffix to model.

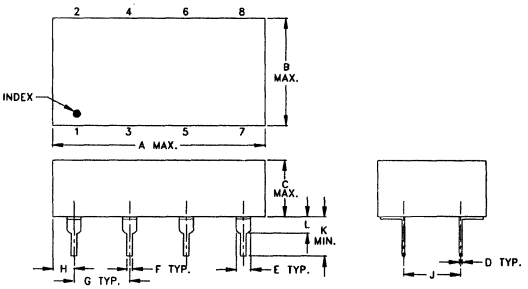
Mini-Circuits®

outline drawings

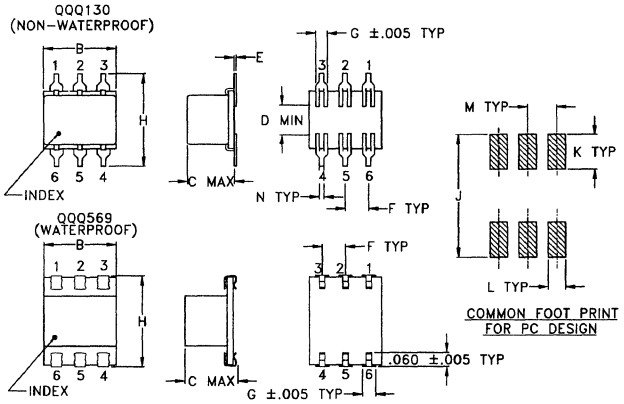
NNN



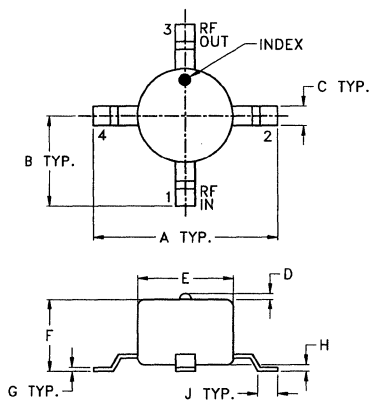
PPP



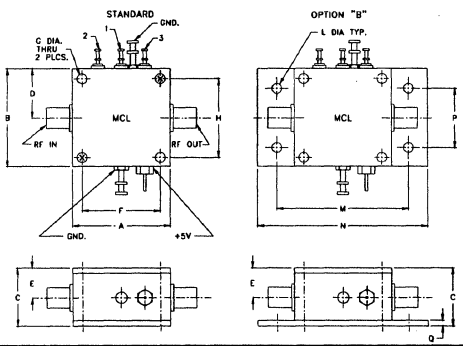
QQQ



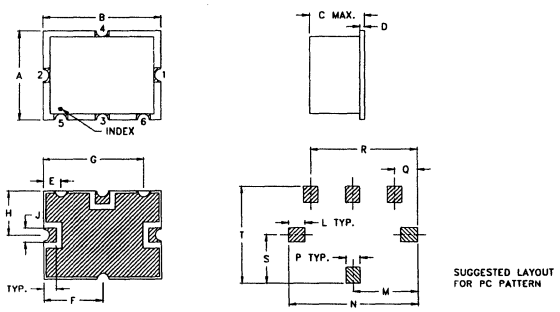
RRR



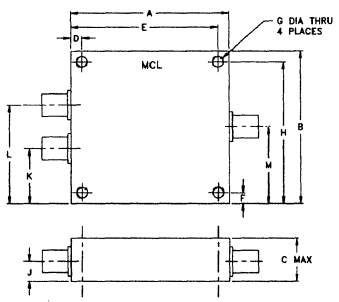
SSS



TTT



VVV



CAPD now available! computer-automated performance data

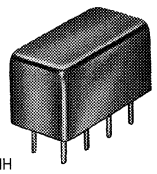
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

FREQUENCY MIXERS

Plug-In

ACTIVE, LOAD INSENSITIVE 10 to 500 MHz



UNCL-X
UNCL-X1MH

UNCL-X1 (+7 dBm LO, up to +1 dBm RF)
UNCL-X1MH (+13 dBm LO, up to +7 dBm RF)

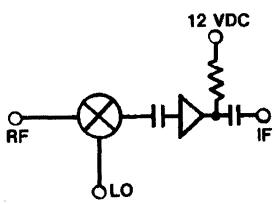
MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF f_L-f_U	CONVERSION GAIN, dB Mid-Band m $\bar{x}$	σ	Min.	Total Range Min.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	INPUT POWER (dBm) 1 dB Comp Typ.	DC POWER Volt	Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	CASE STYLE Note B	CONNECTION	Price $ Qty. (1-9)
UNCL-X1	1-500	10-500	1.57	.05	-1.0	-1.0	60	40	30	25	25	20	50	30	30	20	26	18	1	12	36	1-177	A01	a	23.95
UNCL-X1MH	1-500	10-500	2.41	.015	0.5	0	60	40	35	25	30	20	50	30	25	18	18	14	7	12	60	1-181	A01	a	27.95

L = low range (f_L to 10 f_L)

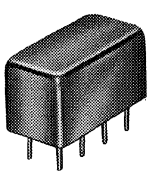
M = mid range (10 f_L to f_U/2)
m = mid band (2f_L to f_U/2)

U = upper range (f_U/2 to f_U)

features
- 2-tone 3rd-order IM
- insensitive to IF load
- VSWR 1.2:1, IF/RF ports



ACTIVE, LOW NOISE (4.3 dB typ.) 10 to 500 MHz



UNCL-R1
UNCL-R1H

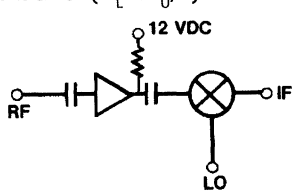
UNCL-R1 (+7 dBm LO, up to -10 dBm RF)
UNCL-R1H (+17 dBm LO, up to +1 dBm RF)

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF f_L-f_U	CONVERSION GAIN, dB Mid-Band m $\bar{x}$	σ	Min.	Total Range Typ.	Min.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	INPUT POWER (dBm) 1 dB Comp Typ.	DC POWER Volt	Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	CASE STYLE Note B	CONNECTION	Price $ Qty. (1-9)
UNCL-R1	10-500	DC-500	5.53	.11	2	5	2	65	45	55	40	47	35	40	30	30	20	25	17	-10	12	35	1-185	A01	b	23.95
UNCL-R1H	10-500	DC-500	6.32	.23	3	6	2	65	45	55	40	47	35	40	30	35	25	28	19	1	12	60	1-183	A01	b	27.95

L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)
m = mid band (2f_L to f_U/2)

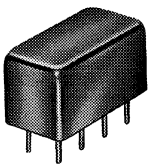
U = upper range (f_U/2 to f_U)



Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

Mini-Circuits®
ULTRA·REL® MIXERS
5 YEAR GUARANTEE

ACTIVE, LOW LO DRIVE 10 to 500 MHz



UNCL - L1
UNCL-L1H

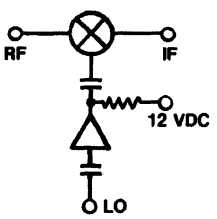
UNCL-L1 (-4 dBm LO, up to 1 dBm RF)
UNCL-L1H (+6 dBm LO, up to 14 dBm RF)

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS, dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	INPUT POWER (dBm) 1 dB Comp Typ.	DC POWER Volt	Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
UNCL-L1	10-500	DC-500	5.73	.08	8.0	8.5	45	30	35	20	25	17	32	20	23	15	18	12	1	12	35	1-179	A01	c	23.95
UNCL-L1H	10-500	DC-500	5.73	.07	8.0	8.5	45	25	36	20	24	17	32	18	25	15	18	10	14	12	60	1-187	A01	c	27.95

L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)
m = mid band (2f_L to f_U/2)

U = upper range (f_U/2 to f_U)



NSN GUIDE

MCL NO.	NSN
UNCL-X1MH	5895-01-391-0040

NOTES:

$\bar{X}$ Average of conversion loss at center of mid-band frequency(f_L + f_U/4)
σ Standard deviation
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.

pin connections

PORT	a	b	c
LO	7	7	1
RF	8	1	7
IF	1	8	8
DC	4	4	4
GND EXT.	3,5,6	3,5,6	3,5,6
CASE GND	3,5,6	3,5,6	3,5,6
NOT USED	2	2	2

In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

FREQUENCY MIXERS

Surface Mount

IMAGE REJECT 500 to 2550 MHz

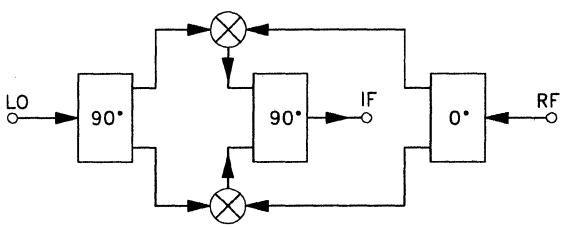
JCIR

JCIR-4MH (+15 dBm LO)
JCIR-25 (+13 dBm LO)

MODEL NO.	FREQUENCY MHz RF f_L-f_U	LO f_L-f_U	IF	CONVERSION LOSS dB $\bar{x}$	σ	Max.	IMAGE* REJECTION dBc Typ.	Min.	LO-RF ISOLATION dB M Typ.	Min.	LO-IF ISOLATION dB M Typ.	Min.	RF-IF ISOLATION dB M Typ.	Min.	IP3 @ center band Typ. (dBm)	CAPD DATA Page	CASE STYLE	ZO Ω	PRICE $ QTY.
NEW JCIR-4MH	430-930	500-1000	65-75	7.9	0.15	9.0	28	18	55	40	25	20	25	15	20	—	BG291	kj	54.95
NEW JCIR-25	2490-2550	2420-2480	57-83	7.0	—	8.5	27	17	35	25	26	18	25		16	—	BG291	kk	44.95

features

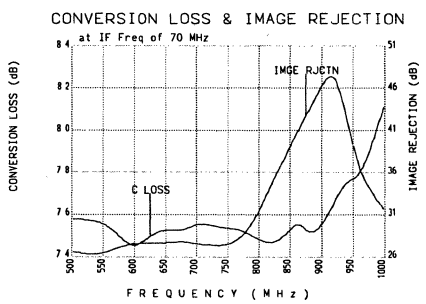
- excellent image rejection, 28 dB typ. (JCIR-4MH)
- low conversion loss, 7.9 dB typ. (JCIR-4MH)
  7.0 dB typ. (JCIR-25)
- solder plated J-leads for excellent solderability & strain relief



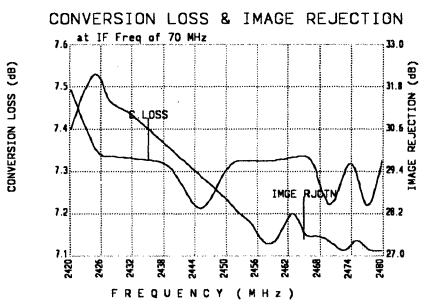
applications

- cellular
- ISM

JCIR-4MH



JCIR-25



NOTES:

* RF frequency higher than LO frequency, JCIR-25
LO frequency higher than RF frequency, JCIR-4MH
A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
1a. RF power 100mW (JCIR-4MH); 200mW (JCIR-25)
1b. IF current, 40mA

pin connections

see case style outline drawings

PORT	kj	kk
LO	2	9
RF	9	2
IF	11	11
GND	1,3,4,5,6,7,8 10,12,13,14	1,3,4,5,6,7,8 10, 12, 13, 14
50 OHM TERM	4	--

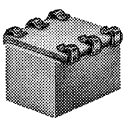
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

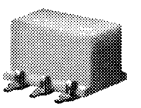
Mini-Circuits®

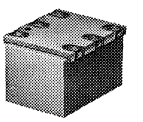
FREQUENCY MIXERS

Surface Mount

LEVEL 3 *400 to 1400 MHz*


JMS


LRMS


RMS

	MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF	CONVERSION LOSS (dB) $\bar{x}$	σ	Max.	ISOLATION LO-RF (dB) Typ.	Min.	ISOLATION LO-IF (dB) Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
	JMS-2L	800-1000	DC-200	7.0	0.2	8.4	24	17	20	14	1-210	BH292	ht	7.45
◆	LRMS-2L	800-1000	DC-200	7.0	0.2	8.4	24	16	20	12	1-210	QQQ130	w	6.95
◆	LRMS-5L	400-1400	DC-800	7.0	0.2	9.8	22	14	18	6	1-210	QQQ130	w	13.95
	RMS-2L	800-1000	DC-200	7.0	0.2	8.4	24	16	20	12	1-210	TT100	w	6.95
	RMS-5L	400-1400	DC-800	7.0	0.2	9.8	22	14	18	6	1-210	TT100	w	13.95

features

- low LO power: 3 dBm.
- JMS-2L, RMS-2L and LRMS-2L are usable at 0 dBm LO.
- wide band coverage: 400-1400 MHz.
- 1 dB compression, -3 dBm typical.
- miniature surface mount (0.25" x 0.31" x 0.2").
- conversion loss spec limit 4.5 s typical from mean.
- ideal for cellular applications.

pin connections

PORT	w	ht[1]
LO	1	6
RF	4	3
IF	5	2
GND EXT.	2,3,6	1,4,5
CASE GND	—	—
NOT USED	—	—

[1] pin connection physically same as w.

NOTES:

$\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)

σ Standard deviation

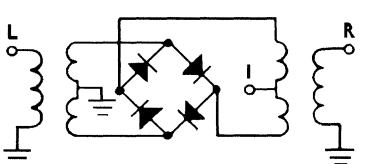
◆ For aqueous washable units add suffix J to L model number. See outline QQQ569. Footprint for L models and L models suffix J are the same.

A. Environmental specifications and re-flow soldering information available in General Information Section.

B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".

C. Prices and Specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:
   1a. RF power, 50mW
   1b. Peak IF current, 40mA



In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

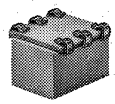
FREQUENCY MIXERS

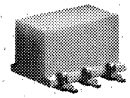
Surface Mount

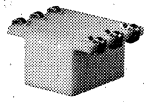
LEVEL 7 150 kHz to 4.3 GHz

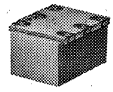
ALY

ASK-KK81


†JMS


† LRMS


† LRMS-J


†RMS

+7 dBm LO, up to +1 dBm RF

	MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTOR	Price $ Qty. (1-9)
	ALY-3	2300-2600	DC-400	5.5	.15	—	7.0			31 (typ.)		25 (min.)				15 (typ.)		12 (min.)		—	CB539	jx	5.95
	ALY-4	3300-4300	DC-600	5.7	.15	—	8.0			28 (typ.)		23 (min.)				15 (typ.)		12 (min.)		—	CB539	jx	5.95
	ASK-1-KK81	1-600	DC-600	5.58	.06	7.0	8.5	50	30	35	25	30	20	45	35	30	20	25	15	1-76	KK81	w	6.95
†	ASK-2-KK81	1-1000	DC-1000	6.79	.10	8.0	9.8	60	40	35	18	26	16	50	30	25	17	15	10	1-209	KK81	w	8.25
	JMS-1	2-500	DC-500	5.75	.10	7.0	8.0	55	50	45	30	40	25	55	45	45	25	32	20	1-218	BH292	ht	4.95
	JMS-2	20-1000	DC-1000	7.0	.15	8.4	9.5	63	40	50	28	35	20	56	30	47	22	37	20	1-244	BH292	ht	7.45
	JMS-2W	5-1200	DC-500	6.8	.10	8.0	9.0	60	40	60	30	37	20	60	40	48	20	31	15	1-47	BH292	ht	7.95
	JMS-5	5-1500	DC-1000	6.0	.10	8.0	9.5	63	40	50	25	35	20	60	40	30	18	15	8	1-225	BH292	ht	9.95
	JMS-11X	5-1900	5-1000	6.7	.15	8.2	9.8	58	45	35	20	27	18	56	45	37	20	27	20	1-49	BH292	hu	4.25***
◆	LRMS-1	0.5-500	DC-500	5.94	.05	7.0	8.5	55	50	33	25	27	20	55	45	30	23	24	19	1-218	QQQ130	w	6.25
◆	LRMS-1W	2-750	DC-750	5.83	.21	7.5	8.5	70	45	45	28	38	22	60	45	40	25	30	20	1-175	QQQ130	w	6.75
◆	LRMS-2	5-1000	DC-1000	6.67	.26	8.0	9.5	60	40	40	20	25	18	55	30	30	20	20	12	1-224	QQQ130	w	6.95
◆	LRMS-2D	5-1000	DC-1000	6.81	.06	8.0	10.0	59	40	40	30	33	22	55	30	40	22	30	20	1-173	QQQ130	w	7.25
◆	LRMS-2U	10-1000	10-750	6.79	.16	8.0	9.5	55	40	40	30	30	25	55	30	35	25	30	22	1-227	QQQ130	w	11.45
◆	LRMS-5	5-1500	DC-1000	5.92	.34	7.5	9.5	60	40	40	20	30	18	55	30	30	18	15	8	1-225	QQQ130	w	13.95
◆	LRMS-11A	1500-1900	40-400	7.44	.36	—	9.0			25 (typ.)		17 (min.)				23 (typ.)		15 (min.)		1-212	QQQ130	w	16.95
◆	LRMS-860	800-1050	DC-250	5.5	.23	7.5	7.5			36 (typ.)		25 (min.)				24 (typ.)		18 (min.)		1-171	QQQ130	w	11.45
	LRMS-30J	200-3000	DC-1000	6.8	.30	9.0	9.8			30 (typ.)		17 (min.)				27 (typ.)		7 (min.)		—	QQQ569	w	7.95***
	RMS-1	0.5-500	DC-500	5.94	.05	7.0	8.5	55	50	33	25	27	20	55	45	30	23	24	19	1-218	TT240	w	6.25
	RMS-1W	2-750	DC-750	5.83	.21	7.5	8.5	70	45	45	28	38	22	60	45	40	25	30	20	1-175	TT100	w	6.75
	RMS-1BM	5-600	DC-600	6.0	.05	7.0	7.5	65	45	50	32	35	23	55	40	40	25	35	22	1-175	TT100	w	6.25
	RMS-2	5-1000	DC-1000	6.67	.26	8.0	9.5	60	40	40	20	25	18	55	30	30	20	20	12	1-224	TT100	w	6.95
	RMS-2D	5-1000	DC-1000	6.81	.06	8.0	10.0	59	40	40	30	33	22	55	30	40	22	30	20	1-173	TT100	w	7.25
	RMS-2U	10-1000	10-750	6.79	.16	8.0	9.5	55	40	40	30	30	25	55	30	35	25	30	22	1-227	TT100	w	11.45
	RMS-5	5-1500	DC-1000	5.92	.34	7.5	9.5	60	40	40	20	30	18	55	30	30	18	15	8	1-225	TT100	w	13.95
	RMS-11A	1500-1900	40-400	7.44	.36	—	9.0			25 (typ.)		17 (min.)				23 (typ.)		15 (min.)		1-212	TT100	w	16.95
✪	RMS-11F	350-2000	DC-400	5.5	.20	7.0	9.2	37	26	36	20	32	20	22	14	29	20	28	20	1-61	TT240	w	4.95***
	RMS-11X	5-1900	5-1000	7.1	.10	8.2	9.8	58	45	35	20	27	18	56	45	37	20	27	20	1-49	TT240	gk	3.95***
	RMS-30	200-3000	DC-1000	6.5	.20	9.0	9.8			27 (typ.)		17 (min.)				20 (typ.)		7 (min.)		1-83	TT240	w	6.95***
	RMS-860	800-1050	DC-250	5.5	.23	7.5	7.5			36 (typ.)		25 (min.)				24 (typ.)		18 (min.)		1-171	TT100	w	11.45

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)

pin connections see case style outline drawings

PORT	d	k	r	w	x	z	gk	gm	ht[1]	hu[2]	hp	je	jx	ka
LO	8	8	1	1	2	4	1	4	6	6	5	1	5	11
RF	1	1	8	4	1	1	5	2	3	2	1	5	10	5
IF	3,4^	3	3	5	3	2	4	1	2	3	7	7	8	2
GND EXT.	2,5,6,7	2,5,6,7	2,4,5,6,7	2,3,6	4,5,6	3	2,3,6	3	1,4,5	1,4,5	2,3,4,6,8	2,3,4,6,8	all others	all others
CASE GND	—	—	—	—	—	3	—	3	—	—	—	—	—	—
NOT USED	—	4	—	—	—	—	—	—	—	—	—	—	—	—

^ pins must be connected together externally
[1] pin connection physically same as w
[2] pin connection physically same as gk

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

Mini-Circuits®

ULTRA·REL® MIXERS
5 YEAR GUARANTEE

SCM SKY SYM-J SYM TUF-SM

+7 dBm LO, up to +1 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band $\bar{x}$	m σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	LO-IF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
SCM-1	1-500	DC-500	5.72	.10	7.0	8.0	60	40	45	35	40	30	50	40	45	35	40	25	1-221	YY101	d	4.25
SCM-2	5-1000	DC-500	5.76	.03	8.3	9.8	50	40	40	25	35	20	55	30	40	25	30	18	1-219	YY101	k	5.45
SCM-5	1250-1800	DC-500	5.82	.19	—	8.0	28 (typ.)		17 (min.)				18 (typ.)		8 (min.)				1-196	YY101	r	11.95
SCM-2500	500-2500	DC-500	5.88	.08	6.9	10.0	35	22	35	22	35	22	18	12	18	12	18	12	1-191	YY101	r	11.95
SKY-5G	2000-5000	DC-1000	6.6	.10	—	9.5	28 (typ.)		20 (min.)				13 (typ.)		7 (min.)				1-59	BJ398	je	14.95
SKY-7G	2000-7000	DC-1000	7.0	.10	—	9.8	28 (typ.)		15 (min.)				20 (typ.)		7 (min.)				1-61	BJ398	je	16.95
NEW SKY-42	2000-4200	DC-1200	5.0	.30	—	8.5	31 (typ.)		20 (min.)				17 (typ.)		12 (min.)				—	BJ398	je	14.95
SKY-53R	2800-5300	DC-500	5.7	.20	—	9.5	28 (typ.)		15 (min.)				12 (typ.)		8 (min.)				1-63	BJ398	hp	14.95
SKY-60	2500-6000	DC-1500	6.2	.20	—	9.7	28 (typ.)		17 (min.)				14 (typ.)		8 (min.)				1-65	BJ398	je	14.95
SYM-2	2-1000	DC-1000	5.4	.10	7.2	9.5	70	45	50	30	40	25	63	40	48	24	37	20	1-66	TTT166	x	11.95
SYM-860	800-1050	DC-250	5.6	.10	7.0	7.0	39 (typ.)		25 (min.)				37 (typ.)		20 (min.)				1-165	TTT166	x	8.95
SYM-11	1-2500	10-600	7.0	.30	9.0	10.5	63	40	40	24	34	20	61	40	35	20	28	15	1-169	TTT167	x	9.95
SYM-11J	1-2500	10-500	7.4	.10	8.0	9.8	64	40	43	24	35	20	60	40	35	20	30	15	—	CG581	ka	10.95
SYM-12	5-1200	DC-1000	6.5	.30	8.0	9.0	68	45	50	30	37	25	56	40	46	25	29	18	1-55	TTT167	x	9.45
SYM-2500	1-2500	DC-500	6.5	.10	8.5	9.8	70	50	50	25	36	20	60	45	30	10	16	8	1-57	TTT167	x	11.95
TUF-1SM	2-600	DC-600	5.85	.04	7.0	8.0	60	50	42	30	37	25	60	45	47	30	36	22	1-192	NNN150	z	4.25
TUF-2SM	50-1000	DC-1000	5.85	.07	7.5	9.0	58	40	47	30	42	25	50	35	44	20	29	18	1-194	NNN150	z	5.20
† TUF-3SM	0.15-400	DC-400	4.7	.02	7.0	8.0	60	50	46	30	35	25	60	40	47	25	35	20	1-200	NNN150	z	6.10
TUF-5SM	20-1500	DC-1000	5.7	.04	9.0	9.0	54	40	42	30	39	25	40	25	32	18	23	8	1-206	NNN150	z	9.45
TUF-5XSM	1-1500	1-1000	5.9	.10	7.0	9.0	60	40	40	20	28	17	60	45	45	25	38	20	1-83	NNN150	gm	11.95
TUF-11ASM	1400-1900	40-500	6.8	.30	8.6	8.6	33 (typ.)		20 (min.)				29 (typ.)		15 (min.)				1-167	NNN150	z	16.95
TUF-860SM	800-1050	DC-250	5.6	.24	7.75	7.75	35 (typ.)		25 (min.)				27 (typ.)		20 (min.)				1-165	NNN150	z	9.45

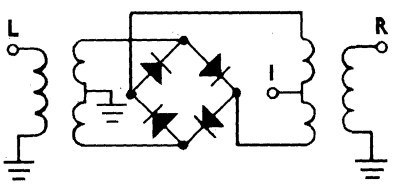
L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)

NOTES:

$\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
σ Standard deviation
◆ For aqueous washable units add suffix J to L model number. See outline QQQ569. Footprint for L models and L models suffix J are the same.
† Phase detection, positive polarity except RMS-860 and LRMS-860
✪ Frequency ranges specified: m = 350-1000 MHz, L = 350-750 MHz, M = 750-1000 MHz, U = 1000-2000 MHz
*** Price for quantities 10-49
A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
1a. RF power, 50mW
1b. Peak IF current, 40mA

NSN GUIDE

MCL NO.	NSN
RMS-1	5895-01-415-6798
RMS-2	5895-01-447-3489
RMS-2TR	5895-01-382-2092
SCM-1NL	5895-01-374-9561



In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

FREQUENCY MIXERS

Surface Mount

LEVEL 7 50 MHz to 3.5 GHz

ADE

+7 dBm LO, up to +1 dBm RF

	MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF	CONVERSION LOSS dB Mid-Band $\bar{x}$	CONVERSION LOSS dB Mid-Band m σ	CONVERSION LOSS dB Mid-Band Max.	CONVERSION LOSS dB Total Range Max.	LO-RF ISOLATION, dB L Typ.	LO-RF ISOLATION, dB L Min.	LO-RF ISOLATION, dB M Typ.	LO-RF ISOLATION, dB M Min.	LO-RF ISOLATION, dB U Typ.	LO-RF ISOLATION, dB U Min.	LO-IF ISOLATION, dB L Typ.	LO-IF ISOLATION, dB L Min.	LO-IF ISOLATION, dB M Typ.	LO-IF ISOLATION, dB M Min.	LO-IF ISOLATION, dB U Typ.	LO-IF ISOLATION, dB U Min.	IP3 @ center band Typ. (dBm)	CAPD DATA Page	Case Style	CONNECTION	Price $ Qty. (10-49)
NEW	ADE-1ASK	2-600	DC-600	5.3	.10	6.5	7.5	55	45	50	30	40	25	50	40	45	24	35	18	16		CD542	kh	3.95
NEW	ADE-2ASK	1-1000	DC-1000	5.4	.10	6.8	9.5	55	45	45	30	36	20	50	40	32	22	22	12	12		CD542	kh	4.25
NEW	ADE-3G	2300-2700	DC-400	5.6	.10	--	7.0			36 (typ.)	25 (min.)					26 (typ.)	17 (min.)			13		CD542	kh	3.45
NEW	ADE-3GL	2100-2600	DC-600	6.0	.25	--	8.8			34 (typ.)	25 (min.)					20 (typ.)	7 (min.)			17		CD541	jw	4.95
	ADE-12	50-1000	DC-1000	7.0	.15	8.0	9.0	40	25	--	--	33	22	44	26	--	--	37	20	17		CD541	jv	2.95
	ADE-13	50-1600	50-1000	8.1	.10	9.0	9.8	50	25	40	25	33	20	49	30	35	20	32	20	11	see	CD541	ju	3.10
	ADE-14	800-1000	DC-200	7.4	.20	--	8.9			32 (typ.)	22 (min.)					34 (typ.)	20 (min.)			17		CD541	jv	3.25
	ADE-18	1700-2500	DC-600	4.9	.20	--	7.3			27 (typ.)	22 (min.)					10 (typ.)	7 (min.)			10	facing	CD542	jw	3.45
	ADE-18W	1750-3500	DC-700	5.4	.30	8.9	8.9			33 (typ.)	20 (min.)					12 (typ.)	7 (min.)			11		CD542	jw	3.95
	ADE-20	1500-2000	DC-300	5.4	.10	--	7.8			31 (typ.)	22 (min.)					28 (typ.)	20 (min.)			14		CD542	jv	4.95
	ADE-35	1600-3500	DC-1500	6.3	.50	--	9.8			25 (typ.)	16 (min.)					22 (typ.)	12 (min.)			11	page	CD542	jv	4.95
	ADE-901	800-1000	DC-200	5.9	.10	--	7.3			32 (typ.)	22 (min.)					26 (typ.)	18 (min.)			13		CD542	jv	2.95

L = low range (f_L to 10 f_L) M = mid range (10f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)

features

- low conversion loss, 6.6 dB typ.
- excellent isolation, 40 dB typ.
- IP3, up to 17 dBm typ.
- ultra low profile package (patent pending)
- solder plated leads for excellent solderability
- waterwash compatibility
- low cost

applications

- cellular
- PCN
- ISM
- instrumentation
- wireless/VSAT systems
- PCMCIA cards

pin connections see case style outline drawings

PORT	ju	jv	jw	kh
LO	6	6	4	6
RF	3	4	6	3
IF	4	3	3	2
GND	1,2,5	1,2,5	1,2,5	1,4,5

NOTES:

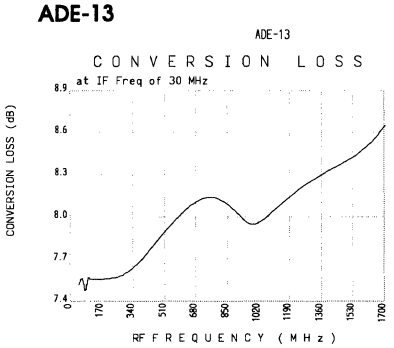
$\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
σ Standard deviation
A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
1a. RF power 50mW
1b. Peak IF current, 40mA

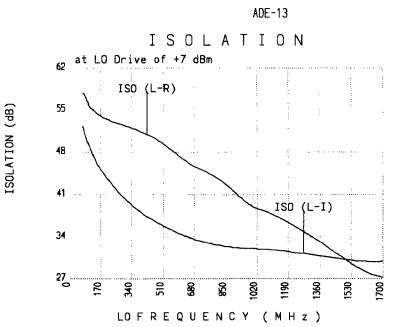
Mini-Circuits®

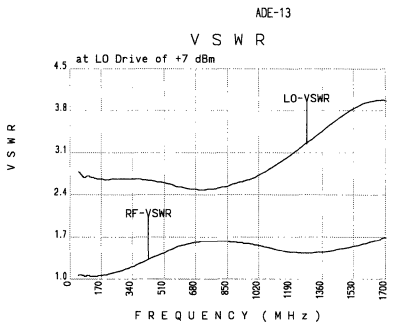
ULTRA·REL® MIXERS

5 YEAR GUARANTEE

ADE-13

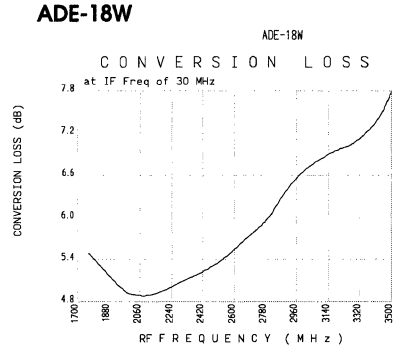


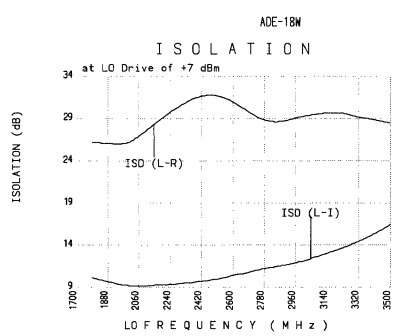


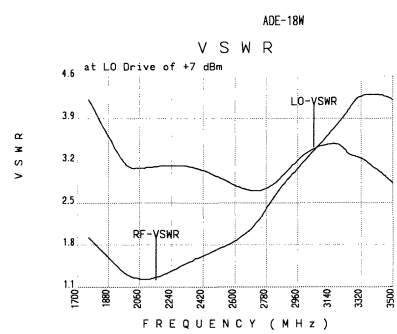


Frequency		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF port	VSWR LO port
RF MHz	LO MHz	LO + 7 dBm	LO + 7 dBm	LO + 7 dBm	LO + 7 dBm	LO + 7 dBm
45.00	75.00	7.52	58.10	52.50	1.07	2.80
66.00	96.00	7.60	57.30	50.30	1.08	2.72
79.00	109.00	7.42	55.60	49.40	1.05	2.68
91.00	121.00	7.59	55.60	48.50	1.06	2.72
100.00	130.00	7.55	55.20	47.70	1.06	2.72
157.98	187.98	7.56	53.70	44.30	1.04	2.65
315.87	345.87	7.57	52.30	39.00	1.17	2.68
473.76	503.76	7.85	50.20	36.10	1.40	2.65
631.65	661.65	8.09	45.80	33.90	1.62	2.49
789.54	819.54	8.19	44.30	32.70	1.65	2.49
947.43	977.43	7.97	39.20	32.10	1.60	2.65
1000.00	1030.00	7.91	39.10	32.30	1.58	2.68
1263.21	1293.21	8.26	35.30	31.50	1.38	3.21
1578.99	1608.99	8.43	27.60	29.80	1.57	4.03
1736.88	1766.88	8.71	27.30	30.40	1.74	3.95

ADE-18W







Frequency		Conversion Loss (dB)	Isolation L-R (dB)	Isolation L-I (dB)	VSWR RF port	VSWR LO port
RF MHz	LO MHz	LO + 7 dBm	LO + 7 dBm	LO + 7 dBm	LO + 7 dBm	LO + 7 dBm
1765.00	1795.00	5.49	26.40	10.30	1.92	4.22
1950.00	1980.00	4.99	26.10	9.40	1.38	3.21
2000.00	2030.00	4.90	26.60	9.40	1.27	3.06
2135.00	2165.00	4.87	28.70	9.40	1.19	3.11
2320.00	2350.00	5.13	31.60	9.70	1.51	3.16
2500.00	2530.00	5.31	32.50	10.20	1.73	2.96
2690.00	2720.00	5.76	29.40	11.10	1.99	2.65
2800.00	2830.00	5.98	28.70	11.60	2.52	2.76
2875.00	2905.00	6.33	28.90	11.80	2.84	2.96
3000.00	3030.00	6.71	29.70	12.40	3.21	3.38
3200.00	3230.00	6.99	29.90	13.80	3.86	3.57
3245.00	3275.00	7.00	29.60	14.20	4.03	3.26
3300.00	3330.00	7.08	29.30	14.70	4.32	3.32
3430.00	3460.00	7.37	28.90	16.00	4.32	3.01
3500.00	3530.00	7.79	28.50	17.00	4.22	2.84

In Stock... Immediate Delivery

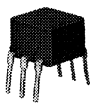
For Custom Versions Of Standard Models Consult Our Applications Dept.

Available Tape & Reel

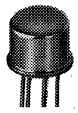
FREQUENCY MIXERS

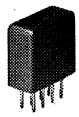
Plug-In & Flatpack

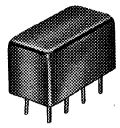
LEVEL 7 *500 Hz to 4.3 GHz*

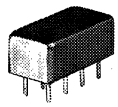

ASK-X65

ASK-W38


ROSE


SAM


SRA


SBL
SIMA

+7 dBm LO, up to +1 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTOR	Price $ Qty. (1-9)
❑ ASK-1•	1-600	DC-600	5.58	.06	7.0	8.5	50	30	35	25	30	20	45	35	30	20	25	15	1-76	W38	w	6.95
†❑ ASK-2•	1-1000	DC-1000	6.79	.10	8.0	9.8	60	40	35	18	26	16	50	30	25	17	15	10	1-209	W38	w	8.25
ROSE-1	1-600	DC-600	5.08	.03	6.5	7.5	40	30	35	25	30	20	55	40	40	20	25	18	1-100	PP94	ab	11.95
ROSE-2	1-1000	DC-1000	5.60	.23	7.0	8.0	61	45	37	22	25	18	55	40	26	17	16	12	—	PP94	ab	16.95
SAM-1	1-600	DC-600	5.67	.05	7.0	8.5	55	45	45	30	35	20	50	40	40	25	30	20	1-102	A03	e	16.95
SAM-2	1-1000	DC-1000	5.68	.08	7.5	9.5	55	45	40	25	35	20	50	40	40	25	30	25	1-66	A03	f	20.45
SAM-3	0.1-500	DC-500	5.04	.07	7.0	8.5	60	50	50	35	35	30	50	40	45	30	30	20	1-106	A03	e	19.95
SRA-1	.5-500	DC-500	5.11	.09	7.0	8.5	50	45	45	30	35	25	45	35	40	25	30	20	1-92	A01	e	13.45
SRA-1W	1-750	DC-750	5.80	.04	7.5	8.5	50	45	45	30	35	25	45	30	40	25	30	20	1-54	A01	f	15.95
SRA-1-1	.1-500	DC-500	4.81	.11	7.5	8.5	50	45	45	30	35	25	45	30	40	25	30	20	1-52	A01	e	14.95
SRA-2	1-1000	.5-500	5.66	.07	7.5	8.5	45	30	35	20	30	20	45	30	30	20	30	20	1-56	A01	j	15.95
SRA-2CM	5-1000	DC-1000	5.27	.04	7.0	8.5	60	50	35	30	30	25	50	45	30	25	25	20	1-96	A01	f	14.95
SRA-3	.025-200	DC-200	4.61	.06	7.5	8.5	60	50	45	35	35	25	45	35	40	30	30	20	1-46	A01	e	15.95
SRA-4	5-1250	.5-500	5.71	.08	7.5	8.5	50	40	40	20	30	20	50	40	40	20	30	20	1-122	A01	j	17.95
SRA-5	5-1500	10-600	6.69	.07	8.0	8.5	50	45	35	30	30	20	45	40	30	25	25	15	1-20	A06	m	24.95
SRA-6	.003-100	DC-100	4.58	.05	7.5	8.5	60	50	45	30	35	25	60	45	40	25	30	20	1-48	A01	d	24.95
SRA-8	.0005-10	DC-10	5.69	.11	7.5	8.5	60	50	50	40	45	35	60	50	50	40	45	35	1-50	A01	d	29.95
SRA-11	5-2000	10-600	6.72	.07	8.5	9.0	50	45	35	25	30	20	45	40	30	20	25	15	1-58	A06	m	20.95
SRA-12	800-1250	50-90	6.21	.13	7.5	7.5	32	25	35	25	35	25	30	20	30	20	30	20	1-74	A06	m	29.95
SRA-149***	5-500	DC-500	5.61	.07	6.5	8.0	60	50	55	45	53	40	50	40	35	25	30	24	1-217	A06	p	9.95
SRA-2000	100-2000	DC-600	8.60	.15	9.5	9.5			37 (Typ.)		20 (Min.)				30 (Typ.)		20 (Min.)		1-60	A06	m	21.95
SRA-2400	750-2400	DC-400	5.95	.26	9.0	9.0	30	20	30	20	30	20	30	8	30	8	30	8	1-191	A06	s	22.95
SRA-3500**	500-3500	DC-1000	7.28	.31	9.5	9.5	30	17	30	17	30	17	20	8	20	8	20	8	1-213	A06	s	28.95
❑ SBL-1	1-500	DC-500	5.60	.09	7.0	8.0	60	45	45	35	40	25	45	35	40	25	30	20	1-62	A06	d	4.75
❑ SBL-1X	10-1000	5-500	5.88	.10	7.5	8.0	50	40	40	30	30	20	50	45	40	35	35	25	1-64	A06	j	6.45
❑ SBL-1Z	10-1000	DC-500	6.27	.09	7.5	9.0	50	40	35	25	25	20	40	25	25	18	19	15	1-114	A06	s	7.45
❑ SBL-1-1	0.1-400	DC-400	4.84	.04	7.0	8.0	50	45	45	30	35	25	45	30	40	25	30	20	1-116	A06	d	7.45
❑ SBL-3	.025-200	DC-200	4.81	.05	7.5	8.5	55	50	45	30	35	25	45	35	40	30	30	20	1-118	A06	e	7.45
❑ SBL-11	5-2000	10-600	7.08	.11	8.5	9.0	50	45	35	25	30	20	45	40	30	20	25	15	1-58	A06	m	19.95
SIMA-5	2-1500	DC-1000	7.01	.08	8.0	9.0	65	44	44	23	31	22	54	38	30	18	25	11	1-198	A06	m	24.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

m = mid band (2f_L to f_U/2)

NOTES:

- $\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
- σ Standard deviation
- ❑ Non-hermetic
- † Phase detection, positive polarity
- • ASK plug-in mounting case X65
- •• Below 10°C, f_L is 0.2 MHz.
- * Conversion loss 9.5 dB maximum from 0.01 to 0.015 MHz
- ** Conversion loss 10dB maximum at IF=1000 MHz
- *** Blue bead pin 4
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
- C. Prices and Specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings:
  - 1a. RF power, 50 mW
  - 1b. Peak IF current, 40 mA

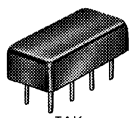
NSN GUIDE

MCL NO.	NSN MIL-M-28837/1*
ASK-1	5895-01-320-0366
SAM-1	5895-01-117-2926
SAM-2	5895-01-165-6621
SAM-3	5895-01-062-9973
SBL-1	5895-01-126-4913
SBL-1X	5895-01-179-8084
SRA-1	5895-00-008-8272 03
SRA-1-1	5962-01-113-5431
SRA-1W	5895-01-163-0433 09
SRA-3	5895-01-021-5914
SRA-4	5826-01-155-6545
SRA-6	5895-01-124-0117
SRA-8	5985-01-081-0977
SRA-11	5895-01-273-0883
SBL-3	5895-01-326-6030
TAK-5	5895-01-271-0842
TAK-6	5895-01-231-2372
TFM-2	5895-01-135-1852
TFM-3	5895-01-112-0031
TFM-4	5895-01-317-9388
TFM-11	5895-01-409-1158
TFM-12	5895-01-179-5686
TSM-4	5895-01-373-2444

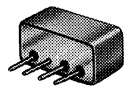
Mini-Circuits® *INTERNET* http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

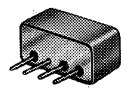
Mini-Circuits®

ULTRA·REL® MIXERS
5 YEAR GUARANTEE


TAK

TSM

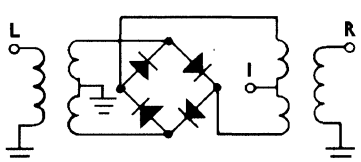

TFM


TUF

+7 dBm LO, up to +1 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	m σ	m Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	LO-IF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
TAK-5	.01-250	DC-250	4.65	.02	7.0	8.5	60	50	50	35	40	35	55	45	45	30	35	25	1-86	A04	e	20.95
TAK-5R	.05-200	DC-200	4.70	.05	6.5	8.0	55	50	45	35	45	35	50	45	40	30	40	30	1-88	A04	d	20.95
TAK-6	.5-600	DC-600	5.58	.04	7.5	8.5	60	50	50	30	40	25	55	45	45	30	30	20	1-90	A04	e	20.95
TAK-6R	.5-600	DC-600	5.40	.11	7.0	8.0	55	50	45	30	35	30	45	40	40	25	30	25	1-90	A04	†	20.95
TAK-7	2-1000	5-500	5.86	.08	7.5	8.5	45	30	35	20	30	20	45	30	35	20	30	20	1-56	A04	j	20.95
TSM-3	.1-500	DC-500	4.75	.04	7.5	8.5	60	50	50	35	35	25	55	45	45	30	35	25	1-106	A11	e	21.95
TFM-2	1-1000	DC-1000	5.74	.07	7.5	8.5	50	45	40	25	30	25	45	40	35	25	25	18	1-66	B02	z	13.95
† TFM-2P	1-1000	DC-1000	5.74	.07	7.5	8.5	50	45	40	25	30	25	45	40	35	25	25	18	1-66	B02	z	13.95
† TFM-3••	0.04-400	DC-400	4.70	.06	7.0	8.0	60	50	50	35	35	25	55	40	45	30	35	25	1-68	B02	z	21.45
† TFM-4	5-1250	DC-1250	6.47	.05	7.5	8.5	50	45	40	30	30	25	45	40	35	25	25	20	1-70	B02	z	23.45
TFM-5	5-1500	DC-1000	6.33	.06	8.5	9.5	60	45	35	25	30	25	60	40	35	15	25	14	1-189	B02	aa	25.45
TFM-11	1-2000	5-600	7.16	.07	8.5	9.0	50	45	35	25	25	20	45	40	27	20	25	20	1-72	B13	z	47.45
TFM-12	800-1250	50-90	5.71	.14	—	7.5	35	25	35	25	35	25	30	20	30	20	30	20	1-74	B13	z	47.45
TFM-2400	750-2400	DC-400	6.65	.20	—	9.0	30	20	30	20	30	20	30	10	30	10	30	10	1-191	B13	aa	28.95
TFM-4300	300-4300	DC-800	5.87	.13	—	10.5	30	20	—	—	30	17	15	7	—	—	10	7	1-211	B13	aa	38.95
❑ TUF-1	2-600	DC-600	5.85	.04	7.0	8.0	60	50	42	30	37	25	60	45	47	30	36	22	1-192	B02	z	4.25
❑ TUF-2	50-1000	DC-1000	5.85	.07	7.5	9.0	58	40	47	30	42	25	50	35	44	20	29	18	1-194	B02	z	5.20
❑ TUF-3	0.15-400	DC-400	4.7	.02	7.0	8.0	60	50	46	30	35	25	60	40	47	25	35	20	1-200	B02	z	6.10
❑ TUF-5	20-1500	DC-1000	5.7	.04	9.0	9.0	54	40	42	30	39	25	40	25	32	18	23	8	1-206	B02	z	9.45
❑ TUF-5X	1-1500	1-1000	5.9	.10	7.0	9.0	60	40	40	20	28	17	60	45	45	25	38	20	1-83	B02	gm	11.95
❑ TUF-11A	1400-1900	40-500	6.8	.30	8.6	8.6			33 (typ.)		20 (min.)				29 (typ.)		15 (min.)		1-167	B02	z	16.95
❑ TUF-860	800-1050	DC-250	5.6	.24	7.75	7.75			35 (typ.)		25 (min.)				27 (typ.)		20 (min.)		1-165	B02	z	9.45

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)



pin connections see case style outline drawings

PORT	d	e	f	j	m	p	s	t	w	z	aa	ab	gm
LO	8	8	8	8	8	8	1	1	1	4	1	1	4
RF	1	1	1	3,4^	1	2	8	8	4	1	4	3	2
IF	3,4^	3,4^	3,4^	1	3	5,6^	3	5,6^	5	2	2	2	1
GND EXT.	2,5,6,7	2,5,6,7	2,5,6,7	2,5,6,7	2,5,6,7	1,3,4,7	2,5,6,7	2,3,4,7	2,3,6	3	3	4	3
CASE GND	—	2	2,5,6,7	2,5,6,7	2,5,6,7	3,4,7	2,5,6,7	3,4,7	—	3	3	4	3
NOT USED	—	—	—	—	4	—	4	—	—	—	—	—	—

^ pins must be connected together externally

CAPD now available! computer-automated performance data

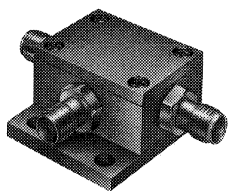
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

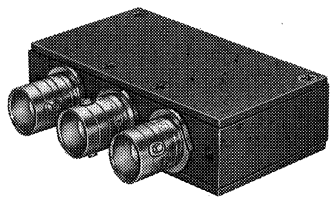
FREQUENCY MIXERS

Coaxial

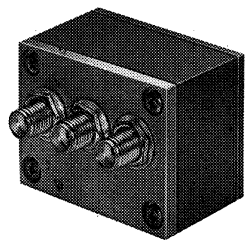
LEVEL 7 *500 Hz to 10 GHz*



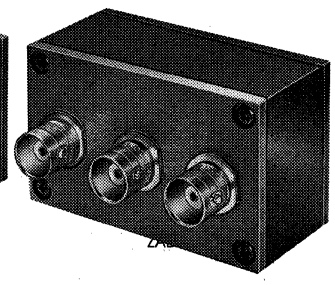
ZMX



ZP



ZLW



ZAD

+7 dBm LO, up to +1 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band $\bar{x}$	m σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	LO-IF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
ZMX-7GR	3700-7000	DC-1000	5.0	.30	—	8.2			30 (typ.)		20 (min.)				36 (typ.)		20 (min.)		1-67	BU413	af	71.95
ZMX-10G	3700-10000	DC-2000	5.0	.10	—	8.5			37 (typ.)		20 (min.)*				17 (typ.)		8 (min.)		1-69	BU413	ad	81.95
ZP-1	2-600	DC-600	5.85	.10	7.0	8.0	60	50	42	30	37	25	60	45	47	30	36	22	1-192	GG60	ag	39.95
ZP-2	50-1000	DC-1000	5.85	.10	7.5	9.0	58	40	47	30	42	25	50	35	44	20	29	18	1-194	GG60	ag	39.95
† ZP-3	0.15-400	DC-400	4.7	.10	7.0	8.0	60	50	46	30	35	25	60	40	47	25	35	20	1-200	GG60	ag	39.95
ZP-5	20-1500	DC-1000	5.7	.10	9.0	9.0	54	40	42	30	39	25	40	25	32	18	23	8	1-206	GG60	ag	47.95
ZP-5X	1-1500	1-1000	5.9	.10	7.0	9.0	60	40	40	20	28	17	60	45	45	25	38	20	1-83	GG60	hg	47.95
ZP-11A	1400-1900	40-500	6.8	.30	8.6	8.6			33 (typ.)		20 (min.)				29 (typ.)		15 (min.)		1-167	GG60	ag	47.95
ZP-860	800-1050	DC-250	5.6	.24	7.75	7.75			35 (typ.)		25 (min.)				27 (typ.)		20 (min.)		1-165	GG60	ag	47.95
ZP10514	.2-500	DC-500	5.18	.10	7.0	8.5	55	45	50	35	35	30	50	40	36	30	30	20	1-124	GG60	ag	62.95
△ ZLW-1	.5-500	DC-500	5.81	.08	7.0	8.5	50	45	45	30	35	25	45	35	40	25	30	20	1-92	M21	ae	51.95
△ ZLW-1W	1-750	DC-750	5.74	.05	7.5	8.5	50	45	45	30	35	25	45	30	40	25	30	20	1-54	M21	ae	56.95
△ ZLW-1-1	.1-500	DC-500	4.82	.07	7.5	8.5	50	45	45	30	35	25	45	30	40	25	30	20	1-52	M21	ae	53.95
△ ZLW-2	1-1000	DC-1000	5.68	.08	7.5	9.5	55	45	40	25	35	20	50	40	40	25	30	20	1-66	M21	ae	56.95
△ ZLW-3	.025-200	DC-200	4.61	.06	7.5	8.5	60	50	45	35	35	25	45	35	40	30	30	20	1-46	M21	ae	53.95
△ ZLW-5	5-1500	10-600	5.81	.08	7.5	8.5	55	40	35	25	30	20	50	40	35	25	30	20	1-120	M21	ae	61.95
△ ZLW-6	.003-100	DC-100	4.58	.05	7.5	8.5	60	50	45	30	35	25	60	45	40	25	30	25	1-48	M21	ae	64.95
△ ZLW-8	.0005-10	DC-10	5.66	.08	7.5	8.5	60	50	50	40	45	35	60	50	50	40	45	35	1-50	M21	ae	69.95
△ ZLW-11	5-2000	10-600	6.85	.10	8.5	9.0	50	45	35	25	30	20	45	40	30	20	25	15	1-58	M21	ae	71.95
△ ZLW-12	800-1250	50-90	6.21	.13	—	7.5	35	25	35	25	35	25	30	20	30	20	30	20	1-74	M21	ae	71.95
ZAD-1	.5-500	DC-500	5.24	.10	7.0	8.5	50	45	45	30	35	25	45	35	40	25	30	20	1-92	M22	ae	43.95
ZAD-1W	1-750	DC-750	5.56	.05	7.5	8.5	50	45	45	30	35	25	45	30	40	25	30	20	1-54	M22	ae	45.95
ZAD-1-1	.1-500	DC-500	4.83	.04	7.5	8.5	50	45	45	30	35	25	45	30	40	25	30	20	1-52	M22	ae	44.95
ZAD-2	1-1000	.5-500	5.66	.07	7.5	8.5	45	30	35	20	30	20	45	30	35	20	30	20	1-56	M22	ad	49.95
ZAD-3	.025-200	DC-200	4.61	.06	7.5	8.5	60	50	45	35	35	25	45	35	40	30	30	20	1-46	M22	ae	45.95
ZAD-4	5-1250	.5-500	5.71	.08	7.5	8.5	50	40	40	20	30	20	50	40	40	20	30	20	1-122	M22	ad	51.95
ZAD-6	.003-100	DC-100	4.65	.08	7.5	8.5	60	50	45	30	35	25	60	45	40	25	30	20	1-48	M22	ae	51.95
ZAD-8	.0005-10	DC-10	5.79	.05	7.5	8.5	60	50	50	40	45	35	60	50	50	40	45	35	1-50	M22	ae	54.95
ZAD-11	5-2000	10-600	7.12	.12	8.5	9.0	50	45	35	25	30	20	45	40	30	20	25	15	1-58	M22	ae	61.95
ZAD-12	800-1250	50-90	6.21	.13	7.5	7.5	35	25	35	25	35	25	30	20	30	20	30	20	1-74	M22	ae	61.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

m = mid band (2f_L to f_U/2)

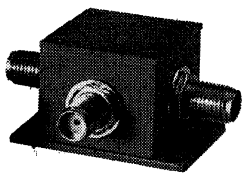
NOTES:

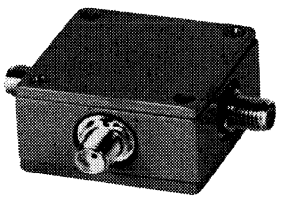
$\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
σ Standard deviation
△ Available only with SMA connectors
† Phase detection, positive polarity
* 15 dB min. 8.5 to 10 GHz
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
1a. RF power, 50mW
1b. Peak IF current, 40mA

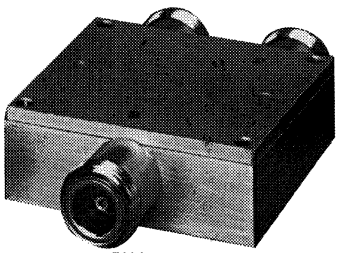
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

Mini-Circuits®

ULTRA·REL® MIXERS
5 YEAR GUARANTEE


ZEM


ZFM


ZAM

+7 dBm LO, up to +1 dBm RF

	MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	FREQUENCY MHz IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	CONVERSION LOSS dB Mid-Band m σ	CONVERSION LOSS dB Mid-Band m Max.	CONVERSION LOSS dB Total Range Max.	LO-RF ISOLATION, dB L Typ.	LO-RF ISOLATION, dB L Min.	LO-RF ISOLATION, dB M Typ.	LO-RF ISOLATION, dB M Min.	LO-RF ISOLATION, dB U Typ.	LO-RF ISOLATION, dB U Min.	LO-IF ISOLATION, dB L Typ.	LO-IF ISOLATION, dB L Min.	LO-IF ISOLATION, dB M Typ.	LO-IF ISOLATION, dB M Min.	LO-IF ISOLATION, dB U Typ.	LO-IF ISOLATION, dB U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
△	ZEM-2B	10-1000	DC-1000	5.74	.07	7.0	8.5	55	50	30	25	25	20	55	45	30	20	25	20	1-66	V37	ad	59.95
△	ZEM-4300	300-4300	DC-1000	6.65	.06	—	9.5	40	20	—	—	30	17	15	8	—	—	15	8	1-211	V37	af	79.95
	ZFM-1W	10-750	DC-750	5.42	.14	7.0	8.0	50	45	45	30	35	25	45	40	40	25	27	20	1-54	K18	ad	51.95
	ZFM-2	1-1000	DC-1000	5.72	.06	7.5	8.5	50	45	40	25	30	25	45	40	35	25	25	20	1-66	K18	ad	53.95
	ZFM-3	0.04-400	DC-400	4.78	.03	7.0	8.0	60	50	50	35	35	25	55	40	45	30	35	25	1-68	K18	ad	61.95
†	ZFM-4	5-1250	DC-1250	5.70	.34	7.5	8.5	50	45	40	30	30	25	45	40	35	25	25	20	1-70	K18	ad	61.95
	ZFM-5X	1-1500	1-1000	5.9	.10	7.0	9.0	60	40	40	20	28	17	60	45	45	25	38	20	1-83	K18	ad	59.95
	ZFM-11	1-2000	5-600	7.03	.17	8.5	9.0	50	45	35	25	25	20	45	40	27	20	25	20	1-72	K18	ad	89.95
	ZFM-12	800-1250	50-90	5.67	.12	—	7.5	35	25	35	25	35	25	30	20	30	20	30	20	1-74	K18	ad	79.95
△	ZFM-2000	100-2000	DC-600	7.49	.20	9.5	9.5	—	—	37	20	—	—	—	—	—	—	30	20	1-60	K18	ad	71.95
△	ZFM-4212	2000-4200	DC-1300	5.44	.088	—	8.5	—	—	25	17	—	—	—	—	18	10	—	—	—	K18	ad	54.95
△	ZAM-42	1500-4200	DC-500	5.67	.11	—	8.5	25	14	25	14	25	14	18	10	18	10	18	10	—	F14	af	54.95

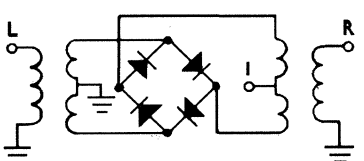
L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)
m = mid band (2f_L to f_U/2)

U = upper range (f_U/2 to f_U)

NSN GUIDE

MCL NO.	NSN
ZAD-1B(BNC)	5985-00-280-7750
ZAD-4B	5895-01-127-0376
ZAD-6B	5895-01-344-7843
ZEM-2	5895-01-235-7834
ZFM-1W	5895-01-412-3037
ZFM-2	4935-01-230-3782
ZFM-3	5895-01-257-9523
ZFM-3 (SMA)	5895-01-214-7362
ZFM-3B	5895-01-381-9289
ZFM-11(SMA)	6625-01-415-2182
ZLW-1W	5895-00-607-7010
ZLW-2	6920-01-037-1974
ZLW-2B	5840-01-186-8398
ZP-10514	6625-01-108-6156
ZP-10514(BNC)	5895-01-384-7453



coaxial connections

see case style outline drawings

PORT	ad	ae	af	ag	hg
LO	1	1	2	L	L
RF	2	3	1	R	X
IF	3	2	3	X	R
GND EXT.	—	—	—	—	—
CASE GND	—	—	—	—	—
NOT USED	—	—	—	—	—

CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

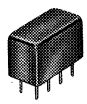
FREQUENCY MIXERS

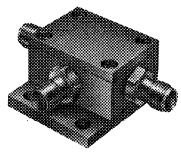
Plug-In & Coaxial

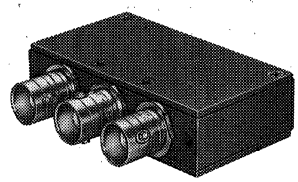
LEVEL 10 *50 kHz to 8 GHz*

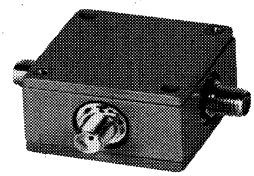
TFM / TUF

ROK


SBL / SRA


ZMX


ZP


ZFM

+10 dBm LO, up to +5 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band $\bar{x}$	m σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	QQQ	Price $ Qty. (1-9)
TFM-15	10-3000	10-800	6.75	.08	8.0	8.5	35	25	35	25	35	25	30	20	30	20	30	20	1-126	B13	aa	49.95
TFM-150**	10-2000	DC-1000	6.19	.11	8.0	8.0	32	25	35	25	35	25	33	20	30	20	30	20	1-128	B13	aa	45.45
TFM-2LH	2-1000	DC-1000	5.70	.177	7.5	9.2	62	45	44	25	37	25	58	40	45	25	31	18	1-195	B02	z	16.95
❑ TUF-1LH	2-600	DC-600	6.0	.17	7.0	8.0	70	50	50	30	42	25	65	45	50	30	41	22	1-141	B02	z	6.25
❑ TUF-2LH*	50-1000	DC-1000	5.2	.30	7.0	8.5	58	40	44	30	39	25	60	35	50	25	38	20	1-195	B02	z	7.20
❑ TUF-3LH	0.15-400	DC-400	4.8	.37	7.0	8.0	67	50	51	30	40	25	67	40	45	25	34	20	1-139	B02	z	8.10
❑ TUF-5LH	20-1500	DC-1000	6.9	.27	8.5	9.0	53	40	42	30	38	25	40	25	30	18	22	8	1-137	B02	z	11.45
❑ TUF-11ALH	1400-1900	40-500	7.0	.20	8.6	8.6	36 (Typ.)		20 (Min.)				28 (Typ.)		15 (Min.)				1-135	B02	z	18.95
❑ TUF-860LH	800-1050	DC-250	6.3	.27	7.9	7.9	35 (Typ.)		25 (Min.)				27 (Typ.)		18 (Min.)				1-133	B02	z	11.45
ROK-2500LH	1-2500	DC-500	6.4	.20	8.4	9.0	55	40	48	20	30	20	55	38	27	15	22	15	1-77	PP230	ah	32.95
❑ SBL-1LH	2-500	DC-500	5.8	.03	7.0	8.0	75	45	68	35	56	25	61	35	45	25	36	20	1-205	A06	d	5.75
❑ SBL-1-1LH	.2-400	DC-400	5.2	.06	7.0	9.0	67	45	64	30	51	25	62	30	52	25	34	20	1-201	A06	d	8.45
❑ SBL-1XLH	10-1000	5-500	6.0	.12	7.5	8.5	50	40	40	25	30	20	70	45	55	40	45	30	1-199	A06	j	7.45
❑ SBL-2LH	5-1000	DC-1000	5.9	.09	7.5	9.5	67	45	61	30	57	30	68	40	54	30	43	20	1-195	A06	h	8.45
❑ SBL-3LH	.07-250	DC-250	4.9	.22	7.0	8.5	60	45	60	35	45	30	57	35	53	30	42	25	1-193	A06	d	8.45
❑ SBL-11LH	5-2000	10-600	7.0	.11	8.5	9.5	60	45	45	30	30	20	50	35	30	20	25	16	1-203	A06	m	20.95
SRA-2CR	10-1000	5-500	5.68	.12	7.5	8.0	50	40	40	30	30	20	40	25	30	18	25	15	1-215	A01	s	17.95
SRA-215	.05-1500	.05-500	5.20	.08	7.5	9.0	25	20	35	25	30	20	25	20	35	25	25	15	1-134	A01	m	28.95
SRA-220	.05-2000	.05-500	5.59	.11	8.0	9.0	25	20	40	30	30	20	25	20	40	30	25	15	1-136	A01	m	31.95
ZMX-7GLHR	3700-7000	DC-1500	5.4	.30	—	8.5	33 (Typ.)		20 (Min.)				35 (Typ.)		20 (Min.)				1-84	BU413	af	71.95
ZMX-8GLH	3700-8000	DC-2000	5.5	.20	—	8.5	40 (Typ.)		20 (Min.)				18 (Typ.)		8 (Min.)				1-85	BU413	ad	74.95
ZP-1LH	2-600	DC-600	6.0	.17	7.0	8.0	70	50	50	30	42	25	65	45	50	30	41	22	1-141	GG60	ag	41.95
ZP-2LH*	50-1000	DC-1000	5.2	.30	7.0	8.5	58	40	44	30	39	25	60	35	50	25	38	20	1-195	GG60	ag	41.95
ZP-3LH	0.15-400	DC-400	4.8	.37	7.0	8.0	67	50	51	30	40	25	67	40	45	25	34	20	1-139	GG60	ag	41.95
ZP-5LH	20-1500	DC-1000	6.9	.27	8.5	9.0	53	40	42	30	38	25	40	25	30	18	22	8	1-137	GG60	ag	45.95
ZP-11ALH	1400-1900	40-500	7.0	.20	8.6	8.6	36 (Typ.)		20 (Min.)				28 (Typ.)		15 (Min.)				1-135	GG60	ag	45.95
ZP-860LH	800-1050	DC-250	6.3	.27	7.9	7.9	35 (Typ.)		25 (Min.)				27 (Typ.)		18 (Min.)				1-133	GG60	ag	45.95
ZFM-15	10-3000	10-800	6.13	.14	8.0	8.5	35	25	35	25	35	25	30	20	30	20	30	20	1-126	K18	ad	89.95
ZFM-150**	10-2000	DC-1000	6.05	.12	8.0	8.0	32	25	35	25	35	20	33	20	30	20	25	20	1-128	K18	ad	69.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

m = mid band (2f_L to f_U/2)

NOTES:

- $\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
- σ Standard deviation
- ◆ For aqueous washable units add suffix J to L model number. See outline QQQ569. Footprint for L models and L models suffix J are the same.
- ❑ Non-hermetic
- † Phase detection, positive polarity
- * L=50-100 MHz; M=100-500 MHz
- ** Below 10 MHz IF, conversion loss increase up to 6 dB higher as frequency decreases to DC.
- *** Prices for quantities 10-49
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
- C. Prices and Specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings: 1a. RF power 50mW; 1b. Peak IF current, 40mA

NSN GUIDE

MCL NO.	NSN
LMX-123	5895-01-367-9005
LMX-148	5962-01-357-4432
TFM-15	5895-01-292-2759
ZFM-15	5895-01-412-3035
ZFM-150	5895-01-217-6878

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

Mini-Circuits®
ULTRA·REL® MIXERS
5 YEAR GUARANTEE

Surface Mount

LEVEL 10 150 kHz to 6 GHz

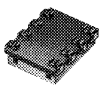
†JMS

†LRMS

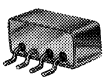
†LRMS-J

†RMS

SCM


SKY

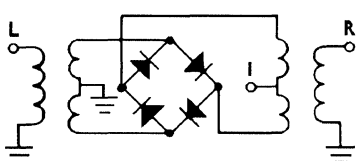
SYM


TUF-SM

+10 dBm LO, up to +5 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
JMS-1LH	2-500	DC-500	5.75	.10	7.0	8.0	67	50	55	30	42	25	50	40	45	25	32	20	1-220	BH292	ht	8.45
JMS-2LH	20-1000	DC-1000	6.5	.10	7.5	9.0	60	40	48	25	37	20	45	30	35	20	27	11	1-226	BH292	ht	9.45
JMS-5LH	5-1500	DC-1000	6.0	.20	8.0	9.5	60	40	50	25	35	20	55	40	35	14	15	6	1-163	BH292	ht	10.95
◆ LRMS-1LH	2-500	DC-500	5.36	.08	7.0	8.0	58	45	44	25	30	20	55	40	40	25	28	17	1-220	QQQ130	w	7.95
◆ LRMS-2LH	5-1000	DC-1000	6.44	.10	8.0	9.5	58	40	39	20	22	16	52	30	30	17	18	11	1-226	QQQ130	w	8.95
◆ LRMS-5LH	10-1500	DC-900	5.27	.09	8.0	9.8	58	35	38	20	25	18	56	30	38	14	17	6	1-163	QQQ130	w	14.95
LRMS-20J	1500-2000	DC-500	5.0	.15	—	7.5	35 (Typ.)		22 (Min.)				26 (Typ.)		18 (Min.)				—	QQQ569	w	6.95***
LRMS-25J	750-2500	DC-600	5.2	.15	—	9.5	35 (Typ.)		17 (Min.)				20 (Typ.)		7 (Min.)				—	QQQ569	w	7.95***
RMS-1LH	2-500	DC-500	5.36	.08	7.0	8.0	58	45	44	25	30	20	55	40	40	25	28	17	1-220	TT100	w	7.95
RMS-2LH	5-1000	DC-1000	6.44	.10	8.0	9.5	58	40	39	20	22	16	52	30	30	17	18	11	1-226	TT100	w	8.95
RMS-5LH	10-1500	DC-900	5.27	.09	8.0	9.8	58	35	38	20	25	18	56	30	38	14	17	6	1-163	TT100	w	14.95
SCM-1LH	1-500	DC-500	5.75	.20	7.0	8.0	60	40	50	35	40	30	50	40	45	35	40	25	1-71	YY101	d	6.25
SCM-2LH	5-1000	DC-500	7.15	.20	8.4	9.7	65	40	50	25	44	20	58	40	50	25	28	15	1-73	YY101	d	7.45
SCM-5LH	1250-1800	DC-500	6.0	.46	—	8.8	26 (Typ.)		17 (Min.)				18 (Typ.)		8 (Min.)				—	YY101	r	13.95
SCM-2500LH	500-2500	DC-500	5.6	.20	6.8	10.0	35 (Typ.)		20 (Min.)				18 (Typ.)		10 (Min.)				1-75	YY101	r	13.95
SKY-53LHR	2800-5300	DC-500	5.7	.20	—	9.5	28 (typ.)		15 (min.)				12 (typ.)		8 (min.)				—	BJ398	hp	16.95
SKY-60LH	2500-6000	DC-1500	6.2	.20	—	9.7	28 (typ.)		17 (min.)				14 (typ.)		8 (min.)				—	BJ398	je	16.95
SYM-11LH	1-2000	10-600	7.0	.10	8.3	9.85	60	40	45	25	37	25	59	40	33	20	25	20	1-161	TTT167	x	11.95
TUF-1LHSM	2-600	DC-600	6.0	.17	7.0	8.0	70	50	50	30	42	25	65	45	50	30	41	22	1-141	NNN150	z	6.25
TUF-2LHSM*	50-1000	DC-1000	5.2	.30	7.0	8.5	58	40	44	30	39	25	60	35	50	25	38	20	1-195	NNN150	z	7.20
TUF-3LHSM	0.15-400	DC-400	4.8	.37	7.0	8.0	67	50	51	30	40	25	67	40	45	25	34	20	1-139	NNN150	z	8.10
TUF-5LHSM	20-1500	DC-1000	6.9	.27	8.5	9.0	53	40	42	30	38	25	40	25	30	18	22	8	1-137	NNN150	z	11.45
TUF-11ALHSM	1400-1900	40-500	7.0	.20	8.6	8.6	36 (Typ.)		20 (Min.)				28 (Typ.)		15 (Min.)				1-135	NNN150	z	18.95
TUF-860LHSM	800-1050	DC-250	6.3	.27	7.9	7.9	35 (Typ.)		25 (Min.)				27 (Typ.)		18 (Min.)				1-133	NNN150	z	11.45

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)



pin and coaxial connections see case style outline drawings for pin locations

PORT	d	h	j	m	r	w	x	z	aa	ad	af	ag	ah	ht[1]	hp	je
LO	8	8	8	8	1	1	2	4	1	1	2	L	4	6	5	1
RF	1	1	3,4^	1	8	4	1	1	4	2	1	R	2	3	1	5
IF	3,4^	3,4^	1	3	3	5	3	2	2	3	3	X	1	2	7	7
GND EXT.	2,5,6,7	2,5,6,7	2,5,6,7	2,5,6,7	2,4,5,6,7	2,3,6	4,5,6	3	3	—	—	—	3	1,4,5	2,3,4,6,8	2,3,4,6,8
CASE GND	—	2,5,6	2,5,6,7	2,5,6,7	—	—	—	3	3	—	—	—	3	—	—	—
NOT USED	—	—	—	4	—	—	—	—	—	—	—	—	—	—	—	—

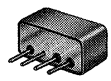
^ pins must be connected together externally
[1] pin connection physically same as w

In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

FREQUENCY MIXERS

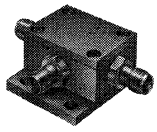
Plug-In & Coaxial

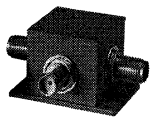
LEVEL 13 *25 kHz to 7 GHz*

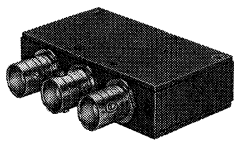

TFM / TUF

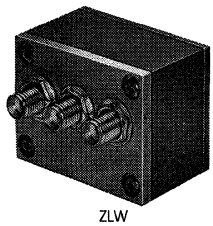
ROK

SBL / SIMA / SRA


ZMX


ZEM


ZP


ZLW

+13 dBm LO, up to +9 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTOR	Price $ Qty. (1-9)
TFM-1MH	2-500	DC-500	5.80	.05	7.5	8.5	50	45	40	30	30	20	45	40	35	25	25	20	1-138	B02	z	24.95
TFM-3MH	1-250	DC-250	4.79	.23	7.0	8.5	50	45	40	30	28	23	45	40	35	25	26	20	1-140	B02	z	24.95
TFM-12MH	0.5-2000	0.2-600	6.99	.16	8.0	9.5	60	45	35	30	30	25	55	40	30	25	25	20	1-104	B13	z	48.95
TFM-42MH	10-4200	10-1000	7.46	.12	8.5	11	35	25	40	25	35	25	35	20	35	25	27	20	1-94	B13	aa	69.95
❑ TUF-1MH	2-600	DC-600	6.3	.12	7.0	8.0	68	50	50	30	43	25	65	45	48	30	37	22	1-138	B02	z	7.25
❑ TUF-2MH*	50-1000	DC-1000	6.0	.25	7.5	9.0	58	40	47	30	37	25	55	35	47	20	32	18	1-131	B02	z	8.20
❑ TUF-3MH	0.15-400	DC-400	5.0	.33	7.0	8.0	60	50	46	30	35	25	60	40	42	25	35	20	1-140	B02	z	9.10
❑ TUF-5MH	20-1500	DC-1000	7.0	.25	8.5	9.0	50	40	41	30	35	25	38	25	28	18	20	8	1-129	B02	z	12.45
❑ TUF-11AMH	1400-1900	40-500	7.4	.20	8.6	8.6	33 (Typ.) 20 (Min.)						24 (Typ.) 15 (Min.)						1-127	B02	z	19.95
❑ TUF-860MH	800-1050	DC-250	6.8	.32	8.3	8.3	35 (Typ.) 25 (Min.)						27 (Typ.) 18 (Min.)						1-125	B02	z	12.45
❑ TUF-2500MH	400-2500	30-800	7.3	.15	8.5	10.0	32 (Typ.) 24 (Min.)						27 (Typ.) 17 (Min.)						1-87	B02	z	24.95
ROK-186MH	5-2500	10-1000	6.57	.11	8.5	9.5	33	25	35	25	25	20	33	20	31	25	27	20	1-112	QQ96	v	47.95
❑ SBL-1MH	1-500	DC-500	5.73	.08	7.5	8.5	50	35	45	30	35	25	45	30	40	25	30	20	1-144	A06	d	10.45
❑ SBL-1ZMH	2-1100	DC-500	6.63	.10	8.0	9.0	50	40	40	30	30	20	40	30	25	20	25	15	1-197	A06	s	12.45
SIMA-5MH	2-1500	DC-1000	7.11	.11	8.6	9.0	70	44	44	23	31	22	57	38	30	20	25	15	1-204	A06	m	28.95
SRA-1MH	.5-500	DC-500	5.65	.04	7.0	8.5	50	45	45	30	35	25	45	35	40	25	30	20	1-146	A01	e	14.95
SRA-3MH	.025-200	DC-200	4.77	.07	7.5	8.5	60	50	45	35	35	25	45	35	40	30	30	20	1-148	A01	e	16.95
SRA-2010MH	10-2000	DC-600	7.50	.20	8.5	9.8	50	45	45	30	40	25	45	45	35	30	35	20	1-98	A06	m	38.95
ZMX-7GMH	3700-7000	DC-2000	4.7	.20	—	8.0	37 (Typ.) 20 (Min.)						17 (Typ.) 8 (Min.)						1-97	BU413	ad	74.95
ZMX-7GMHR	3700-7000	DC-1000	6.0	.20	—	8.6	30 (Typ.) 20 (Min.)						35 (Typ.) 20 (Min.)						1-99	BU413	af	75.95
ZEM-4300MH	300-4300	DC-1000	6.42	.15	—	8.5	40	20	—	—	40	20	14	7	—	—	12	7	1-155	V37	af	89.95
ZEM-M2TMH	10-2400	10-1000	6.9	.10	9.0	9.5	49	40	43	35	42	35	49	40	44	30	40	30	—	V37	hq	114.95
ZP-1MH	2-600	DC-600	6.3	.12	7.0	8.0	68	50	50	30	43	25	65	45	48	30	37	22	1-138	GG60	ag	43.95
ZP-2MH*	50-1000	DC-1000	6.0	.25	7.5	9.0	58	40	47	30	37	25	55	35	47	20	32	18	1-131	GG60	ag	43.95
ZP-3MH	0.15-400	DC-400	5.0	.33	7.0	8.0	60	50	46	30	35	25	60	40	42	25	35	20	1-140	GG60	ag	43.95
ZP-5MH	20-1500	DC-1000	7.0	.25	8.5	9.0	50	40	41	30	35	25	38	25	28	18	20	8	1-129	GG60	ag	47.95
ZP-11AMH	1400-1900	40-500	7.4	.20	8.6	8.6	33 (Typ.) 20 (Min.)						24 (Typ.) 15 (Min.)						1-127	GG60	ag	47.95
ZP-860MH	800-1050	DC-250	6.8	.32	8.3	8.3	35 (Typ.) 25 (Min.)						27 (Typ.) 18 (Min.)						1-125	GG60	ag	47.95
ZLW-186MH	2-2500	2-1000	6.9	.11	8.5	9.5	33	25	35	25	30	20	42	25	49	25	32	20	—	M21	ae	69.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

m = mid band (2f_L to f_U/2)

NOTES:

- $\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
- σ Standard deviation
- ◆ For aqueous washable units add suffix J to L model number. See outline QQQ569. Footprint for L models and L models suffix J are the same.
- ❑ Non-hermetic
- † Phase detection, positive polarity
- * L=50-100 MHz; M=100-500 MHz
- ✪ Frequency Specified m=1000 - 2000 MHz, L=800 - 2100 MHz, U=2100 - 4200 MHz
- *** Prices for quantities 10-49
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
- C. Prices and Specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings: 1a. RF power 200mW; 1b. Peak IF current, 40mA

NSN GUIDE

MCL NO.	NSN
ROK-186MH	5895-01-392-2276
SRA-1MH	5895-01-391-0113
TFM-3MH	5895-01-302-7047
TFM-42MH	5895-01-408-6093

Mini-Circuits® *INTERNET* http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

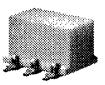
Mini-Circuits®
ULTRA·REL® MIXERS
5 YEAR GUARANTEE

Surface Mount□

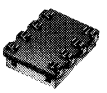
LEVEL 13 150 kHz to 6 GHz

ALY

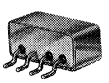
† JMS


† LRMS

† RMS


SKY

SYM


TUF-SM

+13 dBm LO, up to +9 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	m σ	m Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	LO-IF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
ALY-44MH	2400-4400	DC-1400	7.5	.20	--	8.9	30 (Typ.)		20 (Min.)				20 (Typ.)		10 (Min.)				—	CB518	jy	18.95
ALY-44MHW	1800-4900	DC-1400	7.5	.20	--	9.2	30 (Typ.)		20 (Min.)				14 (Typ.)		8 (Min.)				—	CB518	jy	19.95
JMS-1MH	2-500	DC-500	5.75	.10	7.0	8.0	70	55	60	40	44	25	55	42	45	25	35	20	1-222	BH292	ht	9.45
JMS-2MH	20-1000	DC-1000	7.0	.15	8.4	9.5	63	40	50	28	35	20	56	30	47	22	37	20	1-228	BH292	ht	10.45
JMS-5MH	5-1500	DC-1000	5.7	.10	8.0	9.5	67	40	57	25	35	20	60	40	35	18	15	8	1-223	BH292	ht	11.95
◆ LRMS-1MH	2-500	DC-500	5.65	.08	7.0	8.0	58	45	44	25	30	20	55	40	36	25	28	17	1-222	QQQ130	w	8.95
◆ LRMS-2MH	5-1000	DC-1000	6.72	.08	8.5	9.5	55	40	39	20	22	16	52	35	30	17	18	12	1-228	QQQ130	w	9.95
◆ LRMS-2UMH	10-1000	20-500	7.0	.10	8.5	9.5	52	40	43	30	33	25	53	30	44	25	39	22	1-89	QQQ130	w	14.45
◆ LRMS-5MH	10-1500	DC-900	5.67	.09	9.0	9.5	58	40	40	20	26	18	50	30	38	18	17	8	1-223	QQQ130	w	15.95
RMS-1MH	2-500	DC-500	5.65	.08	7.0	8.0	58	45	44	25	30	20	55	40	36	25	28	17	1-222	TT100	w	8.95
RMS-2MH	5-1000	DC-1000	6.72	.08	8.5	9.5	55	40	39	20	22	16	52	35	30	17	18	12	1-228	TT100	w	9.95
RMS-2UMH	10-1000	20-500	7.0	.10	8.5	9.5	52	40	43	30	33	25	53	30	44	25	39	22	1-89	TT100	w	14.45
RMS-5MH	10-1500	DC-900	5.67	.09	9.0	9.5	58	40	40	20	26	18	50	30	38	18	17	8	1-223	TT100	w	15.95
RMS-25MH	5-2500	5-1500	7.0	.20	8.5	9.8	54	28	32	23	32	20	34	23	32	25	28	17	1-91	TT240	w	7.95***
✪ RMS-42MH	800-4200	DC-800	5.3	.20	9.0	10.8	35	25	—	—	28	17	18	10	—	—	15	7	1-94	TT240	w	24.95
SKY-53MHR	2800-5300	DC-500	5.7	.20	—	9.5	28 (Typ.)		15 (Min.)				12 (Typ.)		8 (Min.)				1-93	BJ398	hp	17.95
SKY-60MH	2500-6000	DC-1500	6.2	.20	—	9.5	28 (Typ.)		17 (Min.)				14 (Typ.)		8 (Min.)				1-95	BJ398	je	17.95
SYM-11MH	50-2000	50-1000	6.6	.10	8.0	9.9	55	35	44	25	30	20	40	25	36	20	29	20	1-157	TTT167	x	15.95
TUF-1MHSM	2-600	DC-600	6.3	.12	7.0	8.0	68	50	50	30	43	25	65	45	48	30	37	22	1-138	NNN150	z	7.25
TUF-2MHSM*	50-1000	DC-1000	6.0	.25	7.5	9.0	58	40	47	30	37	25	55	35	47	20	32	18	1-131	NNN150	z	8.20
TUF-3MHSM	0.15-400	DC-400	5.0	.33	7.0	8.0	60	50	46	30	35	25	60	40	42	25	35	20	1-140	NNN150	z	9.10
TUF-5MHSM	20-1500	DC-1000	7.0	.25	8.5	9.0	50	40	41	30	35	25	38	25	28	18	20	8	1-129	NNN150	z	12.45
TUF-11AMHSM	1400-1900	40-500	7.4	.20	8.6	8.6	33 (Typ.)		20 (Min.)				24 (Typ.)		15 (Min.)				1-127	NNN150	z	19.95
TUF-860MHSM	800-1050	DC-250	6.8	.32	8.3	8.3	35 (Typ.)		25 (Min.)				27 (Typ.)		18 (Min.)				1-125	NNN150	z	12.45
TUF-2500MHSM	400-2500	30-800	7.3	.15	8.5	10.0	32 (Typ.)		24 (Min.)				27 (Typ.)		17 (Min.)				1-87	NNN150	z	24.95

L = low range (f_L to 10 f_L)
M = mid range (10 f_L to f_U/2)
m = mid band (2f_L to f_U/2)
U = upper range (f_U/2 to f_U)

pin and coaxial connections see case style outline drawings

PORT	d	e	m	s	v	w	x	z	aa	ad	ae	af	ag	hq	ht[1]	hp	je	jy
LO	8	8	8	1	5	1	2	4	1	1	1	2	L	3	6	5	1	1
RF	1	1	1	8	11	4	1	1	4	2	3	1	R	2	3	1	5	6
IF	3,4^	3,4^	3	3	2	5	3	2	2	3	2	3	X	1	2	7	7	10
GND EXT.	2,5,6,7	2,5,6,7	2,5,6,7	2,5,6,7	1,3,4,6,7,8,9,10,12	2,3,6	4,5,6	3	3	—	—	—	—	—	1,4,5	2,3,4,6,8	2,3,4,6,8	all others
CASE GND	—	2	2,5,6,7	2,5,6,7	1,3,4,6,7,8,9,10,12	—	—	3	3	—	—	—	—	—	—	—	—	—
NOT USED	—	—	4	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—

^ pins must be connected together externally
[1] pin connection physically same as w

In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

FREQUENCY MIXERS

Plug-In

LEVEL 17 10 kHz to 3 GHz

SBL/SIMA SRA TFM/TUF TAK

+17 dBm LO, up to +10 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band $\bar{x}$	m σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
❑ SBL-173H	5-1200	1-1200	5.70	.10	7.0	8.5	40	35	35	25	35	20	40	35	35	20	30	20	1-113	A06	u,f	15.95
❑ SBL-2500H	5-2500	1-1000	5.50	.10	7.5	10.5	46	35	44	30	35	25	50	35	44	27	32	19	1-117	A06	f	33.95
SRA-1H	.5-500	DC-500	6.01	.08	7.5	8.5	55	45	45	30	35	25	45	35	40	30	30	20	1-150	A01	e	20.95
SRA-1WH	1-750	DC-750	5.85	.11	7.5	8.5	50	40	45	25	35	25	45	35	40	30	30	20	1-152	A01	f	24.95
SRA-2H	2-1000	DC-1000	6.34	.14	7.5	10.0	50	40	35	25	35	25	45	30	30	20	25	20	1-154	A01	f	38.95
SRA-3H	.05-200	DC-200	5.18	.05	7.0	7.5	50	45	40	30	35	25	45	35	40	30	30	20	1-156	A01	e	22.95
SRA-6H	.01-50	DC-50	4.97	.06	6.0	7.0	50	45	45	30	35	25	50	40	47	35	32	25	1-162	A01	e	38.95
SRA-11H	10-3000	10-1000	6.83	.09	10.0	12.0	27	20	25	18	23	16	27	20	25	18	23	16	1-158	A01	m	47.95
SRA-173H	5-1200	DC-1200	5.38	.05	7.0	8.5	40	35	35	25	35	20	40	35	35	20	30	20	1-160	A01	u,f	31.95
SIMA-5H	2-1500	DC-1000	6.94	.07	8.5	8.5	65	35	44	23	40	22	54	25	30	23	25	13	1-202	A06	m	32.95
NEW❑ TUF-18DH	100-1800	50-750	7.3	.15	8.5	9.0	41 (Typ.)		23 (Min.)				33 (Typ.)		20 (Min.)				--	B02	z	21.95

+17 dBm LO, up to +14 dBm RF

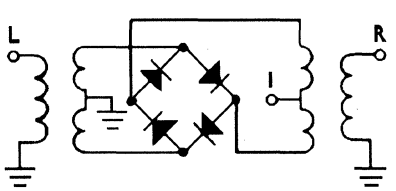
TFM-1H	2-500	DC-500	6.14	.11	7.5	8.5	50	45	40	30	30	20	45	40	35	25	25	20	1-164	B02	z	25.95
TFM-2H	5-1000	DC-1000	6.12	.12	7.0	10.0	50	45	40	30	30	20	45	40	35	25	25	17	1-166	B02	z	36.95
TFM-3H	.1-250	DC-250	4.58	.11	7.0	8.5	50	45	40	30	28	23	45	40	35	25	26	20	1-170	B02	z	25.95
† TFM-4H	5-1200	DC-1200	5.24	.05	8.0	9.0	50	40	35	25	30	20	50	40	35	20	30	20	1-174	B13	z	39.45
❑ TUF-1H	2-600	DC-600	5.90	.18	7.0	8.0	68	50	50	30	43	25	62	45	48	30	33	22	1-164	B02	z	9.25
❑ TUF-2H	50-1000	DC-1000	6.20	.22	7.5	9.0	58	40	47	30	42	25	58	35	44	25	28	18	1-166	B02	z	10.20
❑ TUF-3H	0.15-400	DC-400	5.00	.33	7.0	8.0	60	50	50	35	40	30	60	40	45	25	35	20	1-170	B02	z	11.10
❑ TUF-5H	20-1500	DC-1000	7.50	.17	8.5	9.0	62	55	50	40	38	25	40	25	29	18	20	8	1-123	B02	z	14.45
❑ TUF-11AH	1400-1900	40-500	7.30	.28	9.0	9.0		35 (Typ.)		25 (Min.)				30 (Typ.)		15 (Min.)			1-121	B02	z	21.95
❑ TUF-860H	800-1050	DC-250	6.80	.31	8.3	8.3		38 (Typ.)		25 (Min.)				24 (Typ.)		18 (Min.)			1-119	B02	z	14.45
TAK-1H	2-500	DC-500	5.93	.08	7.5	8.5	50	40	40	30	30	25	45	35	35	25	25	20	1-164	A05	e	21.45
TAK-1WH	5-750	DC-750	5.71	.08	7.5	9.0	50	40	40	30	30	25	45	35	35	25	30	20	1-168	A05	f	25.95
TAK-3H	.05-300	DC-300	4.82	.09	7.0	8.5	55	45	40	30	30	25	50	40	35	25	25	20	1-172	A05	e	23.45
❑ SBL-173SH	5-1200	1-1200	5.7	.10	7.0	8.5	40	35	35	25	35	20	40	35	35	20	30	20	1-115	A06	u,f	21.95
SRA-173SH	5-1200	1-1200	5.7	.10	7.0	8.5	40	35	35	25	35	20	40	35	35	20	30	20	1-115	A06	u,f	33.95
SRA-2500SH	5-2500	1-1000	5.8	.10	7.5	10.5	40	25	37	28	30	18	50	35	42	25	25	17	1-115	A06	f	35.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

m = mid band (2f_L to f_U/2)

NOTES:

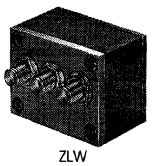
$\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
σ Standard deviation
❑ Non-hermetic
† Phase detection, positive polarity.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel, and MIL description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
1a. RF power 200mW 1b. Peak IF current, 40mA
2. Two-Tone 3rd order IM below IF, each tone at 0dBm (200 and 202 MHz), LO at +17dBm (180 MHz). All models 60dB typ., 55dB min. , except 55 dB typ., 45 dBm min. for TFM-3H, TAK-3H, ZFM-3H, ZLW-3SH, ZAD-3SH.

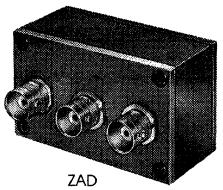


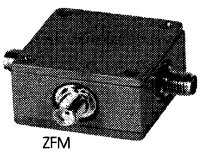
Mini-Circuits®
ULTRA·REL® MIXERS
5 YEAR GUARANTEE

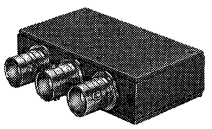
Coaxial

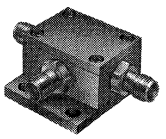
LEVEL 17 50 kHz to 8 GHz


ZLW


ZAD


ZFM


ZP


ZMX

+17 dBm LO, up to +10 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
ZLW-1H	.5-500	DC-500	6.13	.08	7.5	8.5	55	45	45	30	35	25	45	35	40	30	30	20	1-150	M21	ae	56.95
ZLW-1WH	1-750	DC-750	6.07	.13	7.5	8.5	50	45	45	25	35	25	45	35	40	25	30	20	1-152	M21	ae	59.95
ZLW-2H	2-1000	DC-1000	6.34	.14	7.5	10.0	50	40	35	25	35	25	45	35	30	20	25	20	1-154	M21	ae	64.95
ZLW-3H	.05-200	DC-200	5.18	.05	7.0	7.5	55	45	45	30	35	25	45	35	40	30	30	20	1-156	M21	ae	58.95
ZLW-11H	10-3000	10-1000	6.83	.09	10.0	12.0	27	20	25	18	23	16	27	20	25	18	23	16	1-158	M21	ae	99.95
ZAD-1H	.5-500	DC-500	6.16	.08	7.5	8.5	50	45	45	30	35	25	45	35	40	30	30	20	1-150	M22	ae	48.95
ZAD-1WH	1-750	DC-750	6.16	.09	7.5	8.5	50	45	45	25	35	25	45	35	40	25	30	20	1-152	M22	ae	52.95
ZAD-2H	2-1000	DC-1000	6.22	.15	7.5	10.0	50	40	35	25	35	25	45	35	30	20	25	20	1-154	M22	ae	59.95
ZAD-3H	.05-200	DC-200	4.89	.09	7.0	7.5	55	45	45	30	35	25	45	35	40	30	30	20	1-156	M22	ae	50.95
ZAD-11H	10-3000	10-1000	6.83	.09	10.0	12.0	27	20	25	18	23	16	27	20	25	18	23	16	1-158	M22	ae	89.95

+17 dBm LO, up to +14 dBm RF

ZFM-1H	2-500	DC-500	6.14	.11	7.5	8.5	50	45	40	30	30	25	45	35	35	25	25	20	1-164	K18	ad	64.95
ZFM-2H	5-1000	DC-1000	6.12	.12	7.0	10.0	50	40	40	30	30	20	45	40	35	25	25	17	1-166	K18	ad	71.95
ZFM-3H	.05-300	DC-300	5.18	.11	7.0	8.5	55	45	40	30	30	25	50	40	35	25	25	20	1-172	K18	ad	64.95
† ZFM-4H	5-1200	DC-1200	4.97	.11	8.0	9.0	50	40	35	25	30	20	50	40	35	20	30	20	1-174	K18	ad	73.95
ZP-1H	2-600	DC-600	5.90	.18	7.0	8.0	68	50	50	30	43	25	62	45	48	30	33	22	1-164	GG60	ag	45.95
ZP-2H	50-1000	DC-1000	6.20	.22	7.5	9.0	58	40	47	30	42	25	58	35	44	25	28	18	1-166	GG60	ag	45.95
ZP-3H	0.15-400	DC-400	5.00	.33	7.0	8.0	60	50	50	35	40	30	60	40	45	25	35	20	1-170	GG60	ag	45.95
ZP-5H	20-1500	DC-1000	7.50	.17	8.5	9.0	62	55	50	40	38	25	40	25	29	18	20	8	1-123	GG60	ag	49.95
ZP-11AH	1400-1900	40-500	7.30	.28	9.0	9.0	35 (Typ.)		25 (Min.)				30 (Typ.)		15 (Min.)				1-121	GG60	ag	49.95
ZP-860H	800-1050	DC-250	6.80	.31	8.3	8.3	38 (Typ.)		25 (Min.)				24 (Typ.)		18 (Min.)				1-119	GG60	ag	49.95
ZMX-7GHR	3700-7000	DC-1000	5.3	.30	—	8.5	33 (Typ.)		20 (Min.)				34 (Typ.)		20 (Min.)				1-109	BU413	af	84.95
ZMX-8GH	3700-8000	DC-2000	5.8	.30	—	8.5	40 (Typ.)		20 (Min.)				18 (Typ.)		8 (Min.)				1-111	BU413	ad	89.95
ZLW-1SH	2-500	DC-500	5.93	.08	7.5	8.5	50	40	40	30	30	25	45	35	35	25	25	20	1-164	M21	ae	62.95
ZLW-1WSH	5-750	DC-750	5.83	.07	7.5	9.0	50	45	40	30	30	20	45	40	35	25	30	20	1-168	M21	ae	66.95
ZLW-3SH	.05-300	DC-300	4.65	.09	7.0	8.5	55	45	40	30	30	25	50	40	35	25	25	20	1-172	M21	ae	64.95
ZAD-1SH	2-500	DC-500	5.98	.08	7.5	8.5	50	40	40	30	30	25	45	35	35	25	25	20	1-164	M22	ae	54.95
ZAD-1WSH	5-750	DC-750	5.64	.08	7.5	9.0	50	45	40	30	30	20	45	40	35	25	30	20	1-168	M22	ae	56.95
ZAD-3SH	.05-300	DC-300	5.08	.09	7.0	8.5	55	45	40	30	30	25	50	40	35	25	25	20	1-172	M22	ae	55.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)

NSN GUIDE

MCL NO.	NSN	MIL-M-28837/1*
SRA-1H	6625-00-594-0223	08
SRA-1WH	5895-00-576-0716	
SRA-2H	5895-01-063-1078	
SRA-3H	5895-01-117-4537	
SRA-11H	5895-01-192-0173	
ZAD-1WH	5895-01-045-4647	
ZAD-3H	5895-01-149-0771	
ZLW-1H	5985-01-080-7637	
ZLW-1HB	5962-01-045-7500	
ZLW-1HB(SMA)	5895-01-141-4646	

* units are not QPL listed

pin and coaxial connections

see case style outline drawings

PORT	e	f	m	u	x	z	ad	ae	af	ag
LO	8	8	8	3,4 ^	2	4	1	1	2	L
RF	1	1	1	1	1	1	2	3	1	R
IF	3,4 ^	3,4 ^	3	8	3	2	3	2	3	X
GND EXT.	2,5,6,7	2,5,6,7	2,5,6,7	2,5,6,7	4,5,6	3	—	—	—	—
CASE GND	2	2,5,6,7	2,5,6,7	2,5,6,7	—	3	—	—	—	—
NOT USED	—	—	4	—	—	—	—	—	—	—

^ pins must be connected together externally

CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

FREQUENCY MIXERS

Surface Mount

LEVEL 17 *150 MHz to 6 GHz*

ADE

ADM

JYM

SYM-J

SYM

TUF-SM

+17 dBm LO, up to +10 dBm RF

	MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band $\bar{x}$	m σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	IP3 @ center band Typ. (dBm)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
	ADE-10H	400-1000	DC-500	7.0	.10	--	8.5	39 (Typ.)	29 (Min.)					25 (Typ.)	17 (Min.)					30	--	CD542	jw	7.95***
	ADE-20H	1500-2000	DC-300	5.2	.20	--	7.8	29 (Typ.)	22 (Min.)					31 (Typ.)	20 (Min.)					24	--	CD542	jv	8.95***
NEW	ADM-10DH	800-1000	10-200	6.0	.10	--	7.5	35 (Typ.)	25 (Min.)					37 (Typ.)	25 (Min.)					30	--	CJ608	je	15.95
	JYM-20H	2-2000	4-700	5.7	.20	8.5	9.0	40	30	44	28	40	25	40	35	40	22	29	15	--	1-101	BJ293	hp	17.95
	JYM-28H	400-2800	4-700	6.3	.20	8.0	9.0	40 (Typ.)	25 (Min.)					30 (Typ.)	15 (Min.)					--	1-103	BJ293	hp	21.95
	JYM-30H	2-3000	4-1400	6.0	.20	8.9	10.6	40	30	40	25	30	25	40	35	30	20	22	15	--	1-101	BJ293	hp	23.95
	SYM-10HJ	400-1000	DC-400	6.6	.10	--	8.0	46 (Typ.)	33 (Min.)					32 (Typ.)	18 (Min.)					25	--	CG581	ka	9.95***
	SYM-11H	50-2000	50-1950	6.3	.10	7.5	9.0	45	35	40	25	37	25	40	25	32	20	30	20	--	1-153	TTT167	x	17.95
NEW	SYM-10DH	800-1000	20-200	7.6	--	--	9.3	45 (Typ.)	34 (Min.)					29 (Typ.)	20 (Min.)					31	--	TTT167	x	18.95
NEW	SYM-10DHW	50-1000	20-800	7.0	--	8.5	9.8	48 (Typ.)	30 (Min.)					29 (Typ.)	20 (Min.)					25	--	TTT167	x	16.95
NEW	SYM-22H	500-2200	DC-200	5.6	.30	--	8.8	33 (Typ.)	22 (Min.)					38 (Typ.)	22 (Min.)					30	--	TTT167	x	19.95
NEW	TUF-18DHSM	100-1800	50-750	7.3	.15	8.5	9.0	41 (Typ.)	23 (Min.)					33 (Typ.)	20 (Min.)					27	--	NNN150	z	21.95

L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)
m = mid band (2f_L to f_U/2)

U = upper range (f_U/2 to f_U)

NOTES:

$\bar{x}$ Average of conversion loss at center of mid-band frequency (fL+fU/4)
σ Standard deviation
◆ For aqueous washable units add suffix J to L model number. See outline QQQ569. Footprint for L models and L models suffix J are the same.
† Phase detection, positive polarity
*** Prices for quantities 10-49
A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
1a. RF power 200mW
1b. Peak IF current, 40mA
2. Level 17 mixers, two-tone 3rd order IM below IF, each tone at 0dBm (200 and 202 MHz), LO at +17dBm (180 MHz). All models 60 dB., 55 dB min.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

Mini-Circuits®

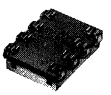
ULTRA-REL® MIXERS
5 YEAR GUARANTEE

ADE

†JMS

†LRMS

†RMS


SKY

SYM

TUF-SM

+17 dBm LO, up to +14 dBm RF

	MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band $\bar{x}$	m σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	LO-IF ISOLATION, dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	IP3 @ center band Typ. (dBm)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
NEW	ADE-12H	500-1200	DC-250	6.7	.20	—	8.2	34 (Typ.)		25 (Min.)				28 (Typ.)		20 (Min.)				28	—	CD542	jv	8.95***
	JMS-1H	2-500	DC-500	5.90	.10	7.0	8.5	60	45	50	25	37	22	55	45	50	25	37	22	—	1-151	BH292	ht	11.45
	JMS-2H	20-1000	DC-1000	7.00	.15	8.4	9.5	63	40	50	28	35	20	56	30	47	22	37	20	—	1-147	BH292	ht	12.45
	JMS-5H	5-1500	DC-1000	5.90	.10	8.0	9.5	70	50	50	25	35	20	60	40	35	18	20	8	—	1-207	BH292	ht	12.95
◆	LRMS-1H	2-500	DC-500	6.25	.034	7.0	8.5	55	44	44	25	33	20	50	34	45	25	37	22	—	1-151	QQQ130	w	10.95
◆	LRMS-1WH	10-750	DC-750	7.00	.11	8.5	8.8	55	40	43	22	28	20	52	30	38	22	29	20	—	1-149	QQQ130	w	11.95
◆	LRMS-2H	5-1000	DC-900	6.98	.054	8.5	9.3	55	40	39	22	33	20	52	30	45	22	30	17	—	1-147	QQQ130	w	11.95
◆	LRMS-2UH	10-1000	10-750	7.10	.083	9.2	9.9	50	40	38	30	30	23	50	30	40	25	34	22	—	1-145	QQQ130	w	14.45
◆	LRMS-5H	10-1500	DC-900	6.36	.05	8.0	9.8	65	40	36	20	22	15	50	30	30	18	17	7	—	1-207	QQQ130	w	17.95
	RMS-1H	2-500	DC-500	6.25	.034	7.0	8.5	55	44	44	25	33	20	50	34	45	25	37	22	—	1-151	TT100	w	10.95
	RMS-1WH	10-750	DC-750	7.00	.11	8.5	8.8	55	40	43	22	28	20	52	30	38	22	29	20	—	1-149	TT100	w	11.95
	RMS-2H	5-1000	DC-900	6.98	.054	8.5	9.3	55	40	39	22	33	20	52	30	45	22	30	17	—	1-147	TT100	w	11.95
	RMS-2UH	10-1000	10-750	7.10	.083	9.2	9.9	50	40	38	30	30	23	50	30	40	25	34	22		1-145	TT100	w	14.45
	RMS-5H	10-1500	DC-900	6.36	.05	8.0	9.8	65	40	36	20	22	15	50	30	30	18	17	7		1-207	TT100	w	17.95
	SKY-53HR	2800-5300	DC-500	5.70	.20	—	9.5	28 (Typ.)		15 (Min.)				12 (Typ.)		8 (Min.)				—	1-105	BJ398	hp	18.95
	SKY-60H	2500-6000	DC-1500	6.20	.20	—	9.7	28 (Typ.)		17 (Min.)				14 (Typ.)		8 (Min.)				—	1-107	BJ398	je	18.95
NEW	SYM-14H	100-1370	10-1000	6.50	.20	7.4	8.9	36 (Typ.)		28 (Min.)				30 (Typ.)		24 (Min.)				30	—	TTT167	x	16.95
NEW	SYM-20DH	1700-2000	10-300	6.70	.16	—	8.2	35 (Typ.)		22 (Min.)				34 (Typ.)		22 (Min.)				32	—	TTT167	x	16.95
NEW	SYM-20DHW	10-2000	10-1800	6.20	.10	7.5	8.8	33	20	40	25	37	22	44	30	42	28	34	22	27	—	TTT167	x	17.95
	TUF-1HSM	2-600	DC-600	5.90	.18	7.0	8.0	68	50	50	30	43	25	62	45	48	30	33	22	—	1-164	NNN150	z	9.25
	TUF-2HSM	50-1000	DC-1000	6.20	.22	7.5	9.0	58	40	47	30	42	25	58	35	44	25	28	18	—	1-166	NNN150	z	10.20
	TUF-3HSM	0.15-400	DC-400	5.00	.33	7.0	8.0	60	50	50	35	40	30	60	40	45	25	35	20	—	1-170	NNN150	z	11.10
	TUF-5HSM	20-1500	DC-1000	7.50	.17	8.5	9.0	62	55	50	40	38	25	40	25	29	18	20	8	—	1-123	NNN150	z	14.45
	TUF-11AHSM	1400-1900	40-500	7.30	.28	9.0	9.0	35 (Typ.)		25 (Min.)				30 (Typ.)		15 (Min.)				—	1-121	NNN150	z	21.95
	TUF-860HSM	800-1050	DC-250	6.80	.31	8.3	8.3	38 (Typ.)		25 (Min.)				24 (Typ.)		18 (Min.)				—	1-119	NNN150	z	14.45

L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)
m = mid band (2f_L to f_U/2)

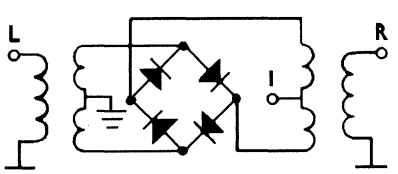
U = upper range (f_U/2 to f_U)

pin connections

see case style outline drawings

PORT	w	x	z	hp	ht[1]	je	jv	jw	ka
LO	1	2	4	5	6	1	6	4	11
RF	4	1	1	1	3	5	4	6	5
IF	5	3	2	7	2	7	3	3	2
GND EXT.	2,3,6	4,5,6	3	2,3,4,6,8	1,4,5	2,3,4,6,8	1,2,5	1,2,5	all other
CASE GND	—	—	3	—	—	—	—	—	pins
NOT USED	—	—	—	—	—	—	—	—	—

[1] pin connection physically same as w

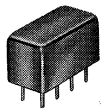


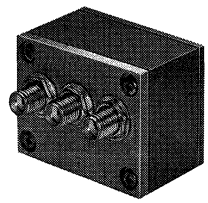
In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

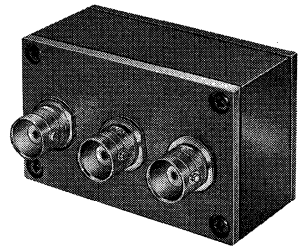
FREQUENCY MIXERS

Plug-In & Coaxial

LEVEL 23 *10 kHz to 2.5 GHz*


RAY

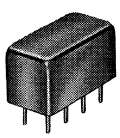

ZMY

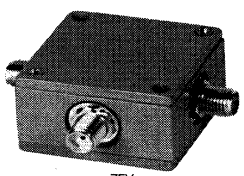

ZAY

+23 dBm LO, up to +15 dBm RF

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTOR	Price $ Qty. (1-9)
RAY-1	5-500	DC-500	6.57	.09	7.5	8.5	55	45	40	30	30	25	55	45	40	30	30	20	1-176	A01	e	40.95
RAY-2	10-1000	DC-1000	6.89	.22	8.5	10.0	50	35	40	30	35	25	50	35	35	25	25	20	1-178	A01	f	64.45
RAY-3	.07-200	DC-200	5.53	.08	7.5	8.0	55	45	40	30	30	25	55	45	40	30	30	20	1-180	A01	e	40.95
RAY-6	0.03-50	DC-50	5.36	.15	7.5	8.5	60	50	45	30	35	25	60	45	40	25	30	20	1-182	A01	d	52.45
RAY-6U	0.01-100	DC-100	5.09	.15	7.0	8.0	60	50	50	40	40	30	50	45	40	30	35	25	1-216	A01	e	46.95
RAY-11	100-2500	DC-500	6.23	.21	9.0	9.0	35	25	32	25	32	25	14	10	20	10	20	10	1-143	A01	s	74.95
ZMY-1	5-500	DC-500	6.62	.10	7.5	8.5	55	45	40	30	30	25	55	45	40	30	30	20	1-176	M21	ae	67.95
ZMY-2	10-1000	DC-1000	6.89	.22	8.5	10.0	50	35	40	30	35	25	50	35	35	25	25	20	1-178	M21	ae	84.95
ZMY-3	.07-200	DC-200	5.53	.08	7.5	8.0	55	45	40	30	30	25	55	45	40	30	30	20	1-180	M21	ae	69.95
ZAY-1	5-500	DC-500	6.57	.09	7.5	8.5	55	45	40	30	30	25	55	45	40	30	30	20	1-176	M22	ae	64.95
ZAY-2	10-1000	DC-1000	6.89	.22	8.5	10.0	50	35	40	30	35	25	50	35	35	25	25	20	1-178	M22	ae	84.95
ZAY-3	.07-200	DC-200	5.53	.08	7.5	8.0	55	45	40	30	30	25	55	45	40	30	30	20	1-180	M22	ae	64.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)


SAY


ZFY

+23 dBm LO, up to +20 dBm RF

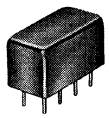
MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTOR	Price $ Qty. (1-9)
SAY-1	0.1-500	.01-500*	4.85	.18	6.0	7.5	40	20	46	35	40	30	37	23	46	35	40	30	1-184	A01	m	62.95
SAY-2	0.1-1000	.01-500*	5.40	.24	7.5	9.5	40	20	40	30	30	25	37	23	40	25	25	15	1-186	A01	m	67.95
SAY-11	10-2400	5-1000	7.40	.09	8.5	10	28	20	26	20	25	20	28	20	26	20	25	20	1-188	A01	m	72.95
ZFY-1	0.1-500	.01-500	4.85	.18	6.0	7.5	40	20	46	35	40	30	37	23	46	35	40	30	1-184	K18	ad	74.95
ZFY-2	0.1-1000	.01-500	5.40	.24	7.5	9.5	40	20	40	30	30	25	37	23	40	25	25	15	1-186	K18	ad	79.95
ZFY-11	10-2400	5-1000	7.40	.09	8.5	10	28	20	25	20	25	20	28	20	26	20	25	20	1-188	K18	ad	84.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

Mini-Circuits®
ULTRA·REL® MIXERS
5 YEAR GUARANTEE

LEVEL 27 *0.5 to 500 MHz*



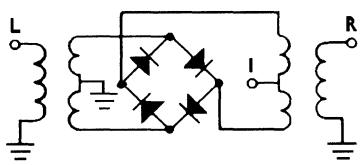
VAY

MODEL NO.	FREQUENCY MHz LO/RF f_L-f_U	IF	CONVERSION LOSS dB Mid-Band m $\bar{x}$	σ	Max.	Total Range Max.	LO-RF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	LO-IF ISOLATION, dB L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
VAY-1	0.5-500	.02-500	5.79	.15	7.5	8.5	47	40	46	35	35	25	35	28	46	35	35	25	1-190	A01	m	84.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)

NOTES:

$\bar{x}$ Average of conversion loss at center of mid-band frequency (f_L+f_U/4)
σ Standard deviation
* IF response from .01 to .1 MHz falls off 3 dB
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
   1a. Level 23 mixers, RF power 350mW
   1b. Level 27 mixers, RF power 500mW
   1c. Peak IF current, 40mA



pin and coaxial connections
see case style outline drawings

PORT	d	e	f	m	s	ad	ae
LO	8	8	8	8	1	1	1
RF	1	1	1	1	8	2	3
IF	3,4^	3,4^	3,4^	3	3	3	2
GND EXT.	2,5,6,7	2,5,6,7	2,5,6,7	2,5,6,7	2,5,6,7		
CASE GND	—	2	2,5,6,7	2,5,6,7	2,5,6,7		
NOT USED	—	—	—	4	4		

^ pins must be connected together externally

NSN GUIDE

MCL NO.	NSN
RAY-1	5895-01-105-6188
RAY-2	5895-01-111-7368
RAY-3	5895-01-064-5082
RAY-6	5895-01-317-5882
SAY-11	5895-01-199-3893
VAY-1	5895-01-232-5890
ZMY-1B	5895-01-213-3888
ZMY-2	4935-01-080-7636

*units are not QPL listed

CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

dBm - volts - watts conversion

(50-ohm system)

dBm	V	Po
+53	100.0	200W
+50	70.7	100W
+49	64.0	80W
+48	58.0	64W
+47	50.0	50W
+46	44.5	40W
+45	40.0	32W
+44	32.5	25W
+43	32.0	20W
+42	28.0	16W
+41	26.2	12.5W
+40	22.5	10W
+39	20.0	8W
+38	18.0	6.4W
+37	16.0	5W
+36	14.1	4W
+35	12.5	3.2W
+34	11.5	2.5W
+33	10.0	2W
+32	9.0	1.6W
+31	8.0	1.25W
+30	7.10	1.0W
+29	6.40	800 mW
+28	5.80	640 mW
+27	5.00	500 mW
+26	4.45	400 mW
+25	4.00	320 mW
+24	3.55	250 mW
+23	3.20	200 mW
+22	2.80	160 mW
+21	2.52	125 mW
+20	2.25	100 mW
+19	2.00	80 mW
+18	1.80	64 mW
+17	1.60	50 mW
+16	1.41	40 mW
+15	1.25	32 mW
+14	1.15	25 mW
+13	1.00	20 mW
+12	.90	16 mW
+11	.80	12.5 mW
+10	.71	10 mW
+9	.64	8 mW
+8	.58	6.4 mW
+7	.500	5 mW
+6	.445	4 mW
+5	.400	3.2 mW
+4	.355	2.5 mW
+3	.320	2.0 mW
+2	.280	1.6 mW
+1	.252	1.25 mW

dBm	V	Po
0	.225	1.0 mW
-1	.200	.80 mW
-2	.180	.64 mW
-3	.160	.50 mW
-4	.141	.40 mW
-5	.125	.32 mW
-6	.115	.25 mW
-7	.100	.20 mW
-8	.090	.16 mW
-9	.080	.125 mW
-10	.071	.10 mW
-11	.064	
-12	.058	
-13	.050	
-14	.045	
-13	.050	
-16	.0355	
dBm	**mV**	
-17	31.5	
-18	28.5	
-19	25.1	
-20	22.5	.01 mW
-21	20.0	
-22	17.9	
-23	15.9	
-24	14.1	
-25	12.8	
-26	11.5	
-27	10.0	
-28	8.9	
-29	8.0	
-30	7.1	.001mW
-31	6.25	
-32	5.8	
-33	5.0	
-34	4.5	
-35	4.0	
-36	3.5	
-37	3.2	
-38	2.85	
-39	2.5	
-40	2.25	.1μW
-41	2.0	
-42	1.8	
-43	1.6	
-44	1.4	
-45	1.25	
-46	1.18	
-47	1.00	
-48	0.90	

dBm	mV	Po
-49	0.80	
-50	0.71	.01 μW
-51	0.64	
-52	0.57	
-53	0.50	
-54	0.45	
-55	0.40	
-56	0.351	
-57	0.32	
-58	0.286	
-59	0.251	
-60	0.225	.001 μW
-61	0.200	
-62	0.180	
-63	0.160	
-64	0.141	
dBm	**μV**	
-65	128	
-66	115	
-67	100	
-68	90	
-69	80	
-70	71	.1nW
-71	65	
-72	58	
-73	50	
-74	45	
-75	40	
-76	35	
-77	32	
-78	29	
-79	25	
-80	22.5	.01 nW
-81	20.0	
-82	18.0	
-83	16.0	
-84	11.1	
-85	12.9	
-86	11.5	
-87	10.0	
-88	9.0	
-89	8.0	
-90	7.1	.001 nW
-91	6.1	
-92	5.75	
-93	5.0	
-94	4.5	
-95	4.0	
-96	3.51	
-97	3.2	

dBm	μV	Po
-98	2.9	
-99	2.51	
-100	2.25	.1 pW
-101	2.0	
-102	1.8	
-103	1.6	
-104	1.41	
-105	1.27	
-106	1.18	
dBm	**nV**	
-107	1000	
-108	900	
-109	800	
-110	710	.01 pW
-109	640	
-112	580	
-113	500	
-114	450	
-115	400	
-116	355	
-117	825	
-118	285	
-119	251	
-120	225	.001 pW
-121	200	
-122	180	
-123	160	
-124	141	
-125	128	
-126	117	
-127	100	
-128	90	
-129	80	.1fW
-130	71	
-131	61	
-132	58	
-133	50	
-134	45	
-135	40	
-136	35	
-137	33	
-138	29	
-139	25	
-140	23	.01fW

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

Mini-Circuits®

return loss Vs. VSWR

table of return loss vs. voltage standing wave ratio

RETURN LOSS (dB)	VSWR	RETURN LOSS (dB)	VSWR	RETURN LOSS (dB)	VSWR	RETURN LOSS (dB)	VSWR	RETURN LOSS (dB)	VSWR
46.064	1.01	13.842	1.51	9.485	2.01	7.327	2.51	5.999	3.01
40.086	1.02	13.708	1.52	9.428	2.02	7.294	2.52	5.970	3.02
36.607	1.03	13.577	1.53	9.372	2.03	7.262	2.53	5.956	3.03
34.151	1.04	13.449	1.54	9.317	2.04	7.230	2.54	5.935	3.04
32.256	1.05	13.324	1.55	9.262	2.05	7.198	2.55	5.914	3.05
30.714	1.06	13.201	1.56	9.208	2.06	7.167	2.56	5.893	3.06
29.417	1.07	13.081	1.57	9.155	2.07	7.135	2.57	5.872	3.07
28.299	1.08	12.964	1.58	9.103	2.08	7.105	2.58	5.852	3.08
27.318	1.09	12.849	1.59	9.051	2.09	7.074	2.59	5.832	3.09
26.444	1.10	12.736	1.60	8.999	2.10	7.044	2.60	5.811	3.10
25.658	1.11	12.625	1.61	8.949	2.11	7.014	2.61	5.791	3.11
24.943	1.12	12.518	1.62	8.899	2.12	6.984	2.62	5.771	3.12
24.289	1.13	12.412	1.63	8.849	2.13	6.954	2.63	5.751	3.13
23.686	1.14	12.308	1.64	8.800	2.14	6.925	2.64	5.732	3.14
23.127	1.15	12.207	1.65	8.752	2.15	6.896	2.65	5.712	3.15
22.607	1.16	12.107	1.66	8.705	2.16	6.867	2.66	5.693	3.16
22.120	1.17	12.009	1.67	8.657	2.17	6.839	2.67	5.674	3.17
21.664	1.18	11.913	1.68	8.611	2.18	6.811	2.68	5.654	3.18
21.234	1.19	11.818	1.69	8.565	2.19	6.783	2.69	5.635	3.19
20.828	1.20	11.725	1.70	8.519	2.20	6.755	2.70	5.617	3.20
20.443	1.21	11.634	1.71	8.474	2.21	6.728	2.71	5.598	3.21
20.079	1.22	11.545	1.72	8.430	2.22	6.700	2.72	5.579	3.22
19.732	1.23	11.457	1.73	8.386	2.23	6.673	2.73	5.561	3.23
19.401	1.24	11.370	1.74	8.342	2.24	6.646	2.74	5.542	3.24
19.085	1.25	11.285	1.75	8.299	2.25	6.620	2.75	5.524	3.25
18.783	1.26	11.202	1.76	8.257	2.26	6.594	2.76	5.506	3.26
18.493	1.27	11.120	1.77	8.215	2.27	6.567	2.77	5.488	3.27
18.216	1.28	11.039	1.78	8.173	2.28	6.541	2.78	5.470	3.28
17.949	1.29	10.960	1.79	8.138	2.29	6.516	2.79	5.452	3.29
17.690	1.30	10.881	1.80	8.091	2.30	6.490	2.80	5.435	3.30
17.445	1.31	10.804	1.81	8.051	2.31	6.465	2.81	5.417	3.31
17.207	1.32	10.729	1.82	8.011	2.32	6.440	2.82	5.400	3.32
16.977	1.33	10.654	1.83	7.972	2.33	6.415	2.83	5.383	3.33
16.755	1.34	10.581	1.84	7.933	2.34	6.390	2.84	5.365	3.34
16.540	1.35	10.509	1.85	7.894	2.35	6.366	2.85	5.348	3.35
16.332	1.36	10.437	1.86	7.856	2.36	6.341	2.86	5.331	3.36
16.131	1.37	10.367	1.87	7.818	2.37	6.317	2.87	5.315	3.37
15.936	1.38	10.298	1.88	7.781	2.38	6.293	2.88	5.298	3.38
15.747	1.39	10.230	1.89	7.744	2.39	6.270	2.89	5.281	3.39
15.563	1.40	10.163	1.90	7.707	2.40	6.246	2.90	5.265	3.40
15.385	1.41	10.097	1.91	7.671	2.41	6.223	2.91	5.248	3.41
15.211	1.42	10.032	1.92	7.635	2.42	6.200	2.92	5.232	3.42
15.043	1.43	9.968	1.93	7.599	2.43	6.177	2.93	5.216	3.43
14.879	1.44	9.904	1.94	7.564	2.44	6.154	2.94	5.200	3.44
14.719	1.45	9.842	1.95	7.529	2.45	6.131	2.95	5.184	3.45
14.564	1.46	9.780	1.96	7.494	2.46	6.109	2.96	5.168	3.46
14.412	1.47	9.720	1.97	7.460	2.47	6.086	2.97	5.152	3.47
14.264	1.48	9.660	1.98	7.426	2.48	6.064	2.98	5.137	3.48
14.120	1.49	9.601	1.99	7.393	2.49	6.042	2.99	5.121	3.49
13.979	1.50	9.542	2.00	7.360	2.50	6.021	3.00	5.105	3.50

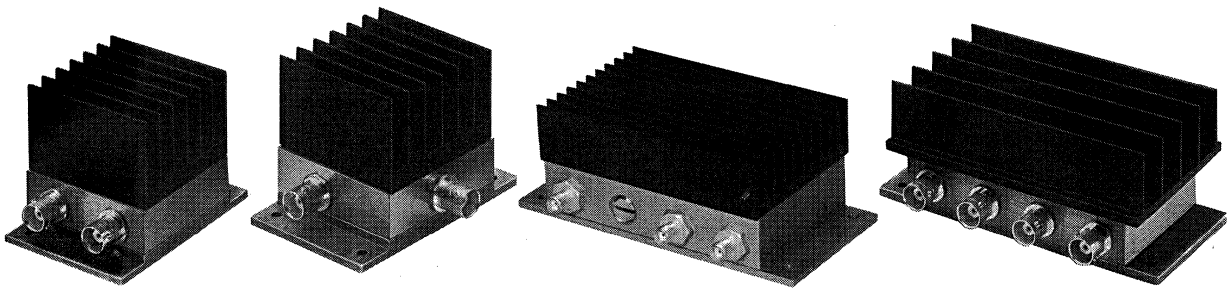
CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

HIGH POWER COMBINERS/SPLITTERS

2,3 and 4 WAY 2 MHz to 2 GHz



ZA2CS ZA3CS ZB3CS ZB4CS

	MODEL NO.	No. of WAYS	FREQ. MHz f_L	f_U	ISOLATION dB Typ.	Min.	INSERTION LOSS+ dB (above theoretical) Typ.	Max.	PHASE UNBALANCE Degrees Typ.	Max.	AMPLITUDE UNBALANCE dB Typ.	Max.	POWER INPUT, W[1] as Combiner[2] Max.	as Splitter Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	ZA2CS-500-15W	2	200-500		31	20	0.3	1.0	0.3	3.0	0.10	0.4	15	15	2-121	AW254	—	74.95
	ZA2CS-600-10W	2	100-600		27	15	0.4	1.3	0.4	3.0	0.15	0.5	10	10	2-121	AW254	—	74.95
△	ZA2CS-2G-20W	2	1800-2000		30	20	0.2	0.5	0.5	4.0	0.05	0.2	20	20	2-122	AW254	—	89.95
	ZA2CS-10-20W	2	900-1000		38	20	0.2	0.5	0.5	3.0	0.11	0.3	20	20	—	AW254	—	89.95
	ZA3CS-400-3W*	3	2-400		25	17	0.5	1.2	0.2	3.0	0.15	0.5	3	10	2-122	CC258	—	59.95
	ZA3CS-450-9W	3	100-450		22	15	0.9	1.8	2.5	8.0	0.20	0.7	9	12	2-123	AX255	—	99.95
△	ZB3CS-920-15W	3	825-920		27	17	0.2	0.8	1.7	6.0	0.11	0.5	15	15	2-123	AW256	—	114.95
	ZB4CS-440-12W	4	100-440		27	17	0.6	1.2	0.8	4.0	0.15	0.5	12	10	2-124	AW256	—	134.95
△	ZB4CS-960-12W	4	820-960		28	17	0.3	0.8	2.0	6.0	0.2	0.6	12	12	2-124	AW256	—	134.95

features

- low insertion loss
- very low amplitude unbalance
- low phase unbalance
- as a combiner, ideal for VHF transmitter applications
- cellular applications

+Theoretical Insertion Loss

2-Way ..... 3.0 dB
3-Way ..... 4.8 dB
4-Way ..... 6.0 dB
5-Way ..... 7.0 dB
6-Way ..... 7.8 dB
8-Way ..... 9.0 dB

NSN GUIDE

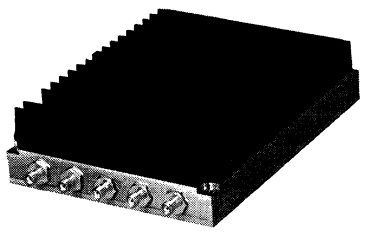
MCL NO.	NSN
ZA2CS-500-15W(N)	1680-01-434-4480

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

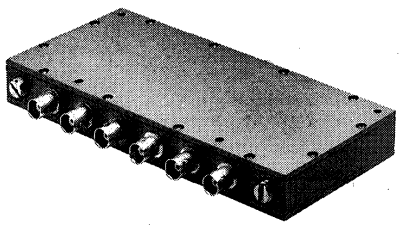
Mini-Circuits®

up to 50W Coaxial

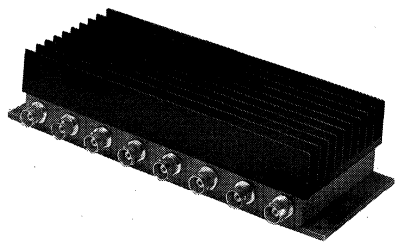
5,6 AND 8 WAY 50 MHz to 950 MHz



ZB5PD



ZB6CS



ZB8CS

	MODEL NO.	No. of WAYS	FREQ. MHz f_L f_U	ISOLATION dB Typ.	ISOLATION dB Min.	INSERTION LOSS+ dB (above theoretical) Typ.	INSERTION LOSS+ dB (above theoretical) Max.	PHASE UNBALANCE Degrees Typ.	PHASE UNBALANCE Degrees Max.	AMPLITUDE UNBALANCE dB Typ.	AMPLITUDE UNBALANCE dB Max.	POWER INPUT, W[1] as Combiner[2] Max.	POWER INPUT, W[1] as Splitter Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
△	ZB5PD-894-50W	5	800-894	32	20	0.4	0.8	--	--	0.15	0.45	50	50	--	BV278	---	274.95
	ZB6CS-150-12W	6	50-150	32	20	0.5	1.2	3.0	9.0	0.15	0.5	12	10	2-125	Z259	--	159.95
	ZB8CS-950-32W	8	800-950	30	18	0.4	1.0	2.0	6.0	0.10	0.5	32	32	2-125	AW257	---	199.95

NOTES:
△ Available only with SMA connectors
A. General Quality Control Procedures, Environmental Specifications are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted option, case finishes are given in section 0, see "Case styles & Outline drawings".
C. Prices and Specifications subject to change without notice.
* Photo for ZA3CS-400-3W not shown. See outline drawing CC258.
1. Over -55°C to +55°C. Derate linearly to 20% of rating at 90°C.
2. As a combiner of noncoherent signals, max. power per port is power rating divided by number of ports.
3. Operating temperature: -55°C to 90°C
Storage temperature: -55°C to 100°C

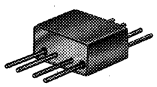
CAPD now available! computer-automated performance data

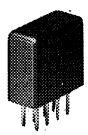
In Stock... Immediate Delivery

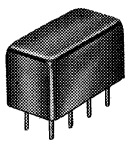
For Custom Versions Of Standard Models Consult Our Applications Dept.

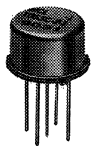
POWER SPLITTERS/COMBINERS 50 & 75Ω Plug-In

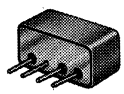
2 WAY-0° 4 kHz to 2.5 GHz


LPS


MSC


PSC


TO5SC


TSC

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB L Min.	ISOLATION dB M° Typ.	ISOLATION dB M° Min.	ISOLATION dB U Typ.	ISOLATION dB U Min.	INSERTION LOSS, dB Above 3dB L Typ.	INSERTION LOSS, dB Above 3dB L Max.	INSERTION LOSS, dB Above 3dB M° Typ.	INSERTION LOSS, dB Above 3dB M° Max.	INSERTION LOSS, dB Above 3dB U Typ.	INSERTION LOSS, dB Above 3dB U Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M° Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M° Max.	AMPLITUDE UNBALANCE dB U Max.	CAPD DATA (see RF/IF Designer Handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	LPS-109	10-500	35	25	30	25	30	25	0.3	0.5	0.4	0.6	0.5	1.1	2.0	3.0	4.0	0.15	0.2	0.3	2-84	BB48	an	17.95
	MSC-2-1	0.1-450	20	15	30	20	30	20	0.3	0.5	0.4	0.75	0.6	1.0	2.0	3.0	4.0	0.15	0.2	0.3	2-89	A03	ap	18.95
	MSC-2-1W	2-650	22	18	30	20	22	18	0.3	0.5	0.5	0.8	0.8	1.2	1.0	2.0	4.0	0.3	0.2	0.3	2-89	A03	ap	20.95
	MSC-2-5	5-1500	18	16	20	16	20	14	0.6	0.8	0.6	0.8	0.6	1.1	2.0	3.0	5.0	0.2	0.3	0.4	2-29	A03	ap	24.95
	MSC-2-11	5-2000	18	16	20	16	18	11	0.6	0.8	0.6	0.8	1.2	1.8	2.0	3.0	5.0	0.2	0.3	0.5	2-94	A03	ap	29.95
	PSC-2-1	0.1-400	20	15	25	20	25	20	0.2	0.6	0.4	0.75	0.6	1.0	2.0	3.0	4.0	0.15	0.2	0.3	2-84	A01	ap	10.95
	PSC-2-1W	1-650	25	20	35	20	25	20	0.3	0.6	0.5	0.9	0.7	1.0	2.0	3.0	4.0	0.15	0.2	0.3	2-85	A01	ap	16.95
✣	PSC-2-2	0.004-60	27	20	30	20	27	20	0.3	0.6	0.3	0.6	0.6	1.0	2.0	3.0	4.0	0.15	0.25	0.3	2-85	A01	ap	23.95
	PSC-2-4	10-1000	30	25	25	20	25	20	0.6	1.0	0.6	1.2	0.7	1.3	2.0	4.0	8.0	0.15	0.2	0.4	2-86	A01	ap	23.95
	PSC-2-5	10-1400	28	18	22	17	24	17	0.3	0.6	0.6	1.0	0.9	1.6	2.0	3.0	4.0	0.15	0.2	0.4	2-29	A01	ap	29.95
	PSC-2-11	5-2000	21	16	22	18	19	9	0.5	0.8	0.6	0.9	0.7	1.5	1.0	3.0	6.0	0.20	0.4	1.0	2-126	A01	ap	34.95
	PSC-2-45	700-900			20	17					0.2	0.4				3.0			0.2		2-86	A01	ap	22.95
	PSC-2-1000	400-1000			35	25					0.5	1.0				2.0			0.3		2-126	A06	ap	22.95
■	PSC-2-1-75	0.25-300	20	15	30	20	20	15	0.4	0.75	0.4	0.75	0.4	1.0	2.0	3.0	5.0	0.15	0.2	0.3	2-87	A01	ap	13.45
■	PSC-2-1-75A*	1-200	35	27	46	35	36	25	0.1	0.3	0.2	0.4	0.35	0.6	1.0	1.0	2.0	0.1	0.15	0.15	2-97	A06	ap	14.45
■	PSC-2-1V-75	40-450			31	27					0.5	1.0				4.0			0.3		2-96	A01	ap	14.45
■	PSC-2-1W-75**	30-600	30	22	—	—	30	20	0.4	0.8	—	—	0.6	1.2	2.0	—	4.0	0.2	—	0.3	2-97	A06	ap	18.95
✣■	PSC-2-2-75	0.008-60	35	20	40	25	30	22	0.1	0.4	0.15	0.4	0.3	0.8	1.0	1.0	1.0	0.15	0.15	0.15	2-96	A01	ap	23.95
■	PSC-2-4-752	10-850	31	20	32	23	23	15	0.3	0.5	0.4	0.6	0.5	1.0	2.0	5.0	10.0	0.1	0.2	0.5	2-88	A01	ap	23.95
■	PSC-2375	55-85			35	25					0.3	0.5				1.0			0.1		2-87	A01	ap	23.95
	PSC-2-500-1W	225-500			27	20					0.2	0.6				2.0			0.2		2-127	A01	ap	21.95
	PSC-2-960-1W	300-960			27	20					0.5	1.2				3.0			0.4		2-127	A01	ap	25.95
	TO5SC-110	5-500	36	20	40	25	36	20	0.3	0.6	0.3	0.7	0.6	1.0	1.0	2.0	2.0	0.10	0.20	0.2	2-128	PP163	ak	19.95
	TO5SC-2-1	1-500	30	20	28	20	26	20	0.2	0.5	0.3	0.7	0.7	1.5	2.0	1.0	2.5	0.25	0.25	0.4	2-95	PP163	ak	18.95
	TSC-2-1	1-400	30	25	30	25	30	20	0.25	0.5	0.4	0.75	0.8	1.0	2.0	3.0	4.0	0.15	0.2	0.6	2-90	B02	aj	15.95
			L2		U2				L2		U2				L2	U2		L2	U2					
	TSC-2-1W	200-1000	26	20	23	14			0.3	0.8	0.7	1.5			5	10		0.7	0.5		2-129	B02	aj	19.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

L_2 = (f_L to f_U/2) U_2 = (f_U/2 to f_U)

NOTES:

❄ Smaller size package available. See outline drawing CA531, TP model series.

◆ For aqueous washable units add suffix J to L model number. See outline QQQ569. Footprint for L models and L models suffix J are the same.

❑ Non-hermetic

✪ When only specification for M range given, specification applies to entire frequency range.

✣ At low range frequency band (f_L to 10 f_L), linearly derate maximum input power by 13 dB.

■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.

* VSWR typical 1.1:1 over total range of frequency, max 1.2:1 for low and upper range, max 1.15:1 for mid range.

** VSWR low range 1.1:1 typical, 1.3:1 max; upper range 1.15:1 typical, 1.25:1 max.

*** Price for quantities 10-49

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".

C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:

1a. Matched power rating,
- Models BP2C, BP2G, BP2P 1.5 Watts
- Models JYPS-2-4-75, PSC-2-11, ADP-10-2-75 0.5 Watt
- All other models 1 Watt

1b. Internal load dissipation,
- Models BP2C, BP2G, BP2P 0.375 Watt
- Models PSC-2-500-1W, PSC-2-960-1W 0.5 Watt
- Model ADP-2-10-75 0.250 Watt
- All other models 0.125 Watt

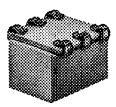
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

Mini-Circuits®

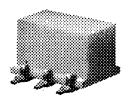
Surface Mount□

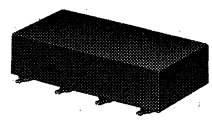
ADP

BP2


JPS

JYPS


LRPS


SCP

SYPS

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB L Min.	ISOLATION dB M° Typ.	ISOLATION dB M° Min.	ISOLATION dB U Typ.	ISOLATION dB U Min.	INSERTION LOSS, dB Above 3dB L Typ.	INSERTION LOSS, dB Above 3dB L Max.	INSERTION LOSS, dB Above 3dB M° Typ.	INSERTION LOSS, dB Above 3dB M° Max.	INSERTION LOSS, dB Above 3dB U Typ.	INSERTION LOSS, dB Above 3dB U Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M° Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M° Max.	AMPLITUDE UNBALANCE dB U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
NEW ■	ADP-2-10-75	50-1000	26	20	—	—	22	18	0.6	1.0	—	—	0.8	1.4	2.0	—	3.0	0.15	—	0.3	—	CD542	hv	12.95***
	BP2C	810-960			25	18					0.6	0.9				3.0			0.2		—	XX211	jm	1.29***
	BP2G	1420-1660			28	20					0.6	1.0				3.0			0.2		—	XX211	jm	0.99***
	BP2P	1710-1990			30	20					0.7	1.0				3.0			0.2		—	XX211	jm	1.24***
	JPS-2-1N	350-550			30	20					0.25	0.5				3.0			0.3		2-129	BH292	hv	8.95
	JPS-2-1W	3-750	36	20	28	17	19	16	0.5	0.8	0.4	1.0	0.9	1.4	1.0	2.0	4.0	0.2	0.3	0.4	2-130	BH292	hv	8.95
	JPS-2-4	100-1000			22	16					0.5	1.4				5.0			0.4		2-130	BH292	hv	9.95
	JPS-2-900	400-900			24	18					0.5	1.2				3.0			0.4		2-131	BH292	hv	9.95
■	JYPS-2-4-75	5-1000	24	17	25	20	30	18	0.4	0.8	0.4	1.0	0.8	1.5	3.0	4.0	5.0	0.2	0.3	0.4	2-138	BJ293	jf	16.95
◆	LRPS-2-1	5-500	50	25	33	24	30	23	0.25	0.5	0.3	0.6	0.5	1.2	1.0	2.0	3.0	0.15	0.2	0.3	2-118	QQQ130	am	8.95
◆■	LRPS-2-1-75	2-500	35	18	35	25	27	20	0.30	0.8	0.35	0.6	0.5	1.0	1.0	2.0	3.0	0.15	0.2	0.3	2-139	QQQ130	am	8.95
◆■	LRPS-2-1W-75	10-650	28	22	29	24	30	20	0.5	1.0	0.6	0.75	0.6	1.2	1.0	2.0	3.0	0.15	0.2	0.3	2-139	QQQ130	am	9.95
◆	LRPS-2-4	10-1000	25	20	23	16	19	14	0.3	0.5	0.4	0.9	0.8	1.5	1.0	3.0	5.0	0.15	0.2	0.4	2-120	QQQ130	am	19.95
◆	LRPS-2-11	20-2000	19	15	21	15	30	15	0.6	0.8	0.7	1.0	0.8	1.5	2.0	3.0	5.0	0.2	0.3	0.7	2-132	QQQ130	gn	24.95
◆	LRPS-2-25	1700-2500			20	16					0.8	1.3				10.0			0.9		2-132	QQQ130	gn	21.95
◆	LRPS-2-980	800-980			30	18					0.5	1.0				3.0			0.5		2-133	QQQ130	am	8.95
	SCP-2-1	0.1-400	25	15	30	20	25	20	0.3	1.2	0.2	0.6	0.4	1.1	2.0	2.0	3.0	0.15	0.2	0.3	2-92	YY101	aq	10.45
	SCP-2-1A	1-550	25	20	25	20	25	20	0.3	0.6	0.3	0.6	0.7	1.3	2.0	2.0	3.0	0.15	0.2	0.4	2-92	YY101	aq	10.45
	SYPS-2-1	2-500	40	20	32	20	30	20	0.2	0.6	0.3	0.75	0.6	1.0	2.0	3.0	4.0	0.2	0.3	0.5	2-133	TTT167	hk	12.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NSN GUIDE

MCL NO.	NSN	MIL-P-23971/15*
MSC-2-1	6625-01-124-8595	02
MSC-2-1W	5985-01-437-3528	
PSC-2-1	6625-00-548-0739	01
PSC-2-1W	5985-01-190-7701	
PSC-2-2	6625-01-143-2571	
PSC-2-4	6625-01-230-0492	
TSC-2-1	5895-01-332-8100	

* units are not QPL listed

pin connections see case style outline drawings for pin loacations

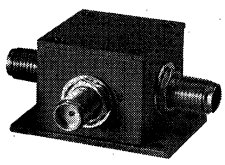
PORT	aj	ak	am	an	ap	aq	gn	he	hk	hv(1)	jf	jm
SUM PORT	1	2	6	1	1	1	6	5	3	1	1	2
PORT 1	2	1	4	4	5	5	4	9	1	3	3	8
PORT 2	4	3	3	5	6	6	3	1	2	4	6	5
GND EXT.	3	4,5	1	2,3,6,7,8	2,3,4,7,8	2,3,4,7,8	1,2,5	all other pins	4,5,6	6	7,8	1,3,4,6,7
CASE GND	3	4,5	—	2,3,6,7,8	2,3,4,7,8	—	—	all other pins	—	—	—	—
NOT USED	—	—	2,5	—	—	—	—	—	—	2,5	2,4,5	—

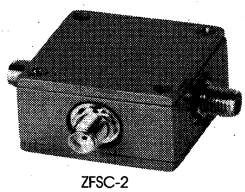
(1) For ADP-2-10-75, pins 2 & 5 must be connected together on PC board.

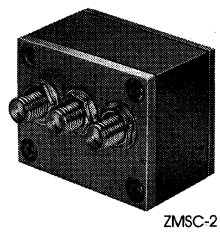
In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

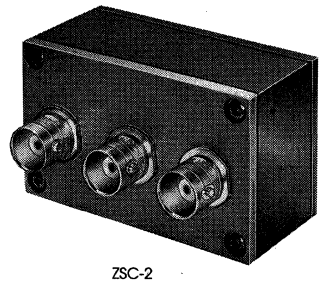
POWER SPLITTERS/COMBINERS 50 & 75Ω

2 WAY-0° 2 kHz to 10 GHz


ZESC-2


ZFSC-2


ZMSC-2


ZSC-2

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M° Typ.	M° Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 3dB L Typ.	L Max.	M° Typ.	M° Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M° Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M° Max.	U Max.	VSWR (:1) S Typ. Max.	OUT Typ. Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
ZESC-2-11	10-2000	19	10	18	13	20	11	0.5	0.9	0.5	1.0	0.6	1.2	1	3	6	0.20	0.30	0.50			2-94	V37	ar	71.95
ZFSC-2-1	5-500	30	25	28	20	25	20	0.2	0.5	0.3	0.6	0.6	0.8	2	4	4	0.15	0.15	0.30			2-91	K18	ar	44.95
■ ZFSC-2-1-75	0.25-300	20	15	30	25	25	20	0.4	0.75	0.4	0.75	0.4	1.0	2	3	5	0.15	0.20	0.30			2-91	K18	ar	45.95
■ ZFSC-2-1W-75	5-600	44	26	45	30	31	20	0.22	0.6	0.27	0.7	0.46	0.9	1	2	3	0.20	0.30	0.40			2-138	K18	ar	50.95
ZFSC-2-1W	1-750	30	20	28	20	25	20	0.2	0.5	0.4	0.8	0.8	1.0	2	4	4	0.15	0.15	0.30			2-163	K18	ar	48.95
ZFSC-2-2	10-1000	30	20	25	20	23	18	0.2	0.5	0.5	1.0	0.9	1.2	2	4	4	0.15	0.15	0.30			2-163	K18	ar	51.95
	GHz	L1		U1				L1		U1				L1	U1		L1	U1							
ZFSC-2-9G	3.5-9.0	18	12	20	12			0.5	1.5	0.6	1.2			7	10		0.30	0.50				2-93	JJJ142	as	59.95
ZFSC-2-10G	2.0-10.0	15	9	20	12			0.5	1.5	0.6	1.6			7	12		0.60	0.50				2-93	JJJ142	as	69.95
ZFSC-2-4	0.2-1000	20	15	25	20	23	18	0.2	0.5	0.5	1.0	0.9	1.2	2	4	4	0.15	0.15	0.30	see		2-164	K18	ar	55.95
ZFSC-2-5	10-1500	25	15	30	20	25	18	0.25	0.6	0.5	1.0	0.8	1.5	2	3	4	0.15	0.20	0.50			2-164	K18	ar	59.95
✣ ZFSC-2-6*	0.002-60	27	20	30	20	27	20	0.3	0.6	0.3	0.6	0.6	1.0	2	3	4	0.15	0.20	0.30	Performance		2-165	K18	ar	49.95
✣■ ZFSC-2-6-75	0.004-60	30	20	35	20	25	20	0.5	0.8	0.4	0.8	0.7	1.0	1	2	3	0.15	0.20	0.30			2-165	K18	ar	51.95
ZFSC-2-11	10-2000	14	10	16	14	20	15	1.2	1.5	1.2	1.5	1.0	2.2	1	2	4	0.20	0.30	0.50	Data and		2-94	K18	ar	64.95
△ ZFSC-2-2500	10-2500	16	11	17	14	17	14	0.5	0.8	0.6	1.4	0.8	1.5	1	4	8	0.20	0.30	0.40			2-94	K18	ar	74.95
ZMSC-2-1	0.1-400	20	15	25	20	25	20	0.2	0.5	0.4	0.75	0.6	1.0	2	3	4	0.15	0.20	0.30	curves		2-32	M21	at	49.95
ZMSC-2-1W	1-650	25	20	35	20	25	20	0.3	0.5	0.5	0.8	0.7	1.0	2	3	4	0.15	0.20	0.30			2-32	M21	at	54.95
✣ ZMSC-2-2*	0.002-60	27	20	30	20	27	20	0.3	0.6	0.3	0.6	0.6	1.0	2	3	4	0.15	0.25	0.30			2-33	M21	at	59.95
ZSC-2-1	0.1-400	20	15	25	20	25	20	0.2	0.5	0.4	0.75	0.6	1.0	2	3	4	0.15	0.20	0.30			2-32	M22	at	47.95
ZSC-2-1W	1-650	25	20	35	25	25	20	0.3	0.5	0.5	0.8	0.7	1.0	2	3	4	0.15	0.20	0.30			2-32	M22	at	49.95
✣ ZSC-2-2*	0.002-60	25	20	30	20	27	20	0.3	0.6	0.3	0.6	0.6	1.0	2	3	4	0.15	0.25	0.30			2-33	M22	at	52.95
✣■ ZSC-2-2-75*	0.002-60	25	20	30	20	27	20	0.3	0.6	0.3	0.6	0.6	1.0	2	3	4	0.15	0.25	0.30			2-96	M22	at	53.95
ZSC-2-4	10-1000	25	20	35	20	25	20	0.2	0.5	0.5	0.8	0.7	1.3	2	4	6	0.15	0.20	0.30			2-33	M22	at	52.95
■ ZSC-2375	55-85			35	25					0.3	0.5				1			0.10				2-166	M22	at	52.95
■ ZSC-2-1-75	0.25-300	20	15	30	20	20	15	0.4	0.75	0.4	0.75	0.4	1.0	2	3	5	0.15	0.20	0.30			2-166	M22	at	49.95

NOTES:

* Isolation specified to 0.004 MHz

✪ When only specification for M range given, specification applies to entire frequency range.

✣ At low range frequency band (fL to 10 fL), linearly derate maximum input power by 13 dB.

■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.

△ Available only with SMA connectors

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".

C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:
   - 1a. Matched power rating, models ZAPD, ZN2PD, ZC2PD 10 Watt ZAPD-900-5W, ZN2PD-20, 5W (as a splitter), other models 1 Watt
   - 1b. Internal load dissipation 0.125 Watt; ZAPD-900-5W, 1W max.; ZN2PD-20, 0.725W max.; ZN2PD-9G, ZAPD-2-22-75, 0.25W max.

coaxial connections

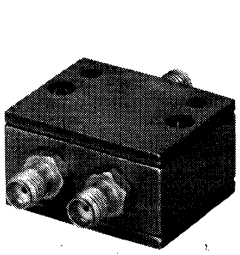
see case style outline drawing for pin locations

PORT	ar	as	at
SUM PORT	3	S	2
PORT 1	1	1	1
PORT 2	2	2	3
GND EXT.	—	—	—
CASE GND	—	—	—
NOT USED	—	—	—

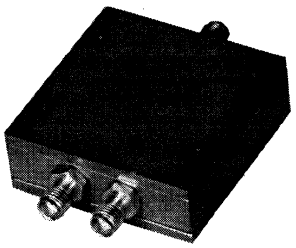
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

Mini-Circuits®

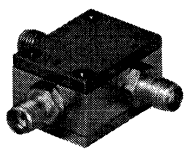
Coaxial



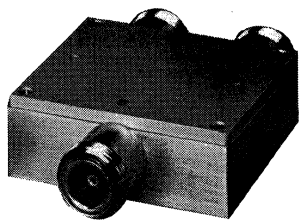
ZC2PD



ZN2PD



IZY2PD



ZAPD

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB L Min.	ISOLATION dB M° Typ.	ISOLATION dB M° Min.	ISOLATION dB U Typ.	ISOLATION dB U Min.	INSERTION LOSS, dB Above 3dB L Typ.	INSERTION LOSS, dB Above 3dB L Max.	INSERTION LOSS, dB Above 3dB M° Typ.	INSERTION LOSS, dB Above 3dB M° Max.	INSERTION LOSS, dB Above 3dB U Typ.	INSERTION LOSS, dB Above 3dB U Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M° Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M° Max.	AMPLITUDE UNBALANCE dB U Max.	VSWR (:1) S Typ.	VSWR (:1) S Max.	VSWR (:1) OUT Typ.	VSWR (:1) OUT Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
				L°			U°																				
	ZC2PD-900	800-900			30	20			0.1	0.4			2			0.20	1.10	1.30	1.10	1.30	2-109	F183	as	64.95
	ZN2PD-20	750-2000	18	15	25	20	18	15	0.2	0.5			4			0.30	1.16	1.5	1.10	1.35	—	VVV180	as	67.95
	ZN2PD-920	800-920			30	20			0.15	0.4			2			0.20	1.10	1.20	1.04	1.20	2-108	VVV180	as	59.95
	ZN2PD-920W	700-1050			22	15			0.15	0.5			3			0.30	1.20	1.50	1.04	1.20	2-108	VVV180	as	54.95
	ZN2PD-1900	1600-1900			30	20			0.18	0.4			2			0.20	1.20	1.35	1.04	1.20	2-134	VVV180	as	69.95
	ZN2PD-1900W	1500-2000			24	15			0.2	0.5			3			0.30	1.20	1.50	1.04	1.20	2-134	VVV180	as	64.95
	ZN2PD-9G	1700-9000 GHz			22	15			0.5	1.4			4			0.60					—	VVV180	as	69.95
	IZY2PD-64	5.8-6.4			35	24			0.2	0.5			5			0.30	1.05	1.30	1.20	1.35	2-135	JJJ245	as	89.95
	IZY2PD-86	7.0-8.6			30	18			0.1	0.5			6			0.25	1.10	1.45	1.10	1.40	2-135	JJJ245	as	94.95
	ZAPD-1	0.5-1.0			25	19			0.25	0.6			2			0.20	see				2-34	F14	ar	54.95
	ZAPD-2	1.0-2.0			25	19			0.25	0.6			2			0.20	Performance				2-34	F14	ar	54.95
	ZAPD-21	0.5-2.0			25	18			0.25	1.0			3			0.20	Data and curves				2-35	F53	ar	59.95
NEW■	ZAPD-2-22-75	0.91-2.15			30	20			0.2	0.7			2			0.40	1.15	1.60	1.10	1.30	—	F14	ar	58.95
	ZAPD-4	2.0-4.2			25	19			0.4	0.8			6			0.40					2-35	F14	ar	59.95
	ZAPD-50	4.4-5.0			26	20			0.3	0.8			5			0.50					2-136	F14	ar	54.95
	ZAPD-50W	4.2-6.0			26	16			0.3	0.8			5			0.70					2-136	F14	ar	64.95
	ZAPD-900-5W	0.1-0.9			23	18			0.3	1.0			3			0.30	1.15	1.50	1.22	1.50	2-137	F14	ar	59.95
	ZAPD-1750	0.95-1.75			30	22			0.2	0.4			4			0.50	1.15	1.50	1.22	1.50	2-137	F14	ar	54.95

L = low range (f_L to 10 f_L)
L1 = f_L to 6 GHz
L^0 = 750 to 875 MHz

M = mid range (10 f_L to $f_U/2$)
U1 = 6 GHz to f_U
U^0 = 1850 to 2000 MHz

U = upper range ($f_U/2$ to f_U)

NSN GUIDE

MCL NO.	NSN	MCL NO.	NSN	MCL NO.	NSN
ZAPD-1(TNC)	5985-01-250-4883	ZFSC-2-2(SMA)	6625-01-333-1127	ZSC-2-1(TNC)	6625-01-310-2129
ZAPD-2(SMA)	5895-01-229-7431	ZFSC-2-2B	5895-01-330-4416	ZSC-2-1	5895-01-214-6032
ZAPD-4	6625-01-173-1887	ZFSC-2-4(TNC)	5985-01-250-4882	ZSC-2-1B	6625-01-018-1066
ZAPD-4(SMA)	5985-01-383-0636	ZFSC-2-5	6625-01-253-2444	ZSC-2-1B(TNC)	6625-01-109-3706
ZESC-2-11	5985-01-381-9081	ZFSC-2-6	6625-01-419-4241	ZSC-2-1(BNC)	5895-01-036-6254
ZFSC-2-1	6625-01-139-3499	ZFSC-2-6(BNC)	5895-01-408-6857	ZSC-2-1B(BNC)	6625-00-270-3055
ZFSC-2-1(SMA)	6625-01-213-6490	ZFSC-2-6B	5985-01-315-2869	ZSC-2-1W	5895-01-283-0850
ZFSC-2-1(BNC)	5985-01-176-4551	ZFSC-2-11(SMA)	6625-01-415-2183	ZSC-2-1WB	6625-01-264-8985
ZFSC-2-1-75	5895-01-325-4795	ZMSC-2-1	5985-01-333-1128	ZSC-2-1-75B	5895-01-136-8182
ZFSC-2-1W(SMA)	6625-01-200-5094	ZMSC-2-1B	5895-01-253-2445	ZSC-2-2B	5820-01-136-7245
ZFSC-2-1W	5895-01-348-3534	ZMSC-2-1BR	5985-01-338-9329	ZSC-2-2-75B	5915-01-012-8162
ZFSC-2-2B(SMA)	6625-01-362-1801	ZMSC-2-1W	5895-01-127-0232	ZSC-2375	5895-01-229-0157

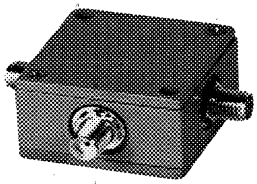
CAPD now available! computer-automated performance data

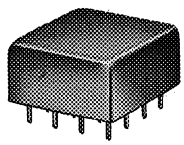
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

POWER SPLITTERS/COMBINERS 50 Ω

2 WAY-0° RESISTIVE DC to 4200 MHz


ZFRSC


PRSC

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB M Typ.	ISOLATION dB U Typ.	INSERTION LOSS, dB Above 6dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
△	ZFRSC-42	DC-4200	6.2	6.5	7.0	0.1	0.2	0.1	0.5	0.4	1.4	1	3	5	0.1	0.2	0.5	2-90	K18	ar	59.95
■	ZFRSC-2075	DC-2000	6.2	6.6	7.0	0.1	0.2	0.3	0.6	0.5	1.4	1	2	5	0.1	0.2	0.5	2-88	K18	ar	59.95
	ZFRSC-2050	DC-2000	6.2	6.6	7.0	0.1	0.2	0.3	0.6	0.5	1.4	1	2	5	0.1	0.2	0.5	2-95	K18	ar	59.95
	PRSC-2050	DC-2000	6.0	6.2	6.5	0.1	0.3	0.2	0.7	0.5	1.0	1	3	5	0.1	0.3	0.5	2-95	C145	au	29.95

L = DC to 100 MHz M = mid range (100 MHz to f_U/2) U = upper range (f_U/2 to f_U)

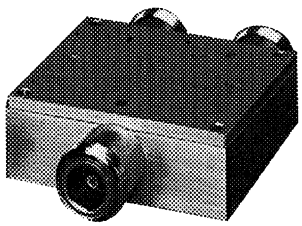
Above models are resistive power dividers to enable frequency coverage from dc to the highest rated frequency. Since resistive power dividers do not provide a high degree of isolation (basically isolation equals the insertion loss between ports), an amplifier such as Mini-Circuits' ZFL series is recommended when high isolation is required. Matched power rating 0.75W, internal load dissipation 0.375W.

NOTES:
- ■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.
- △ Available only with SMA connectors
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
- C. Prices and specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings:
  - 1a. Matched power rating,
    model ZAPDQ 10 Watt
    all other models 1 Watt
  - 1b. Internal load dissipation, 0.125 Watt

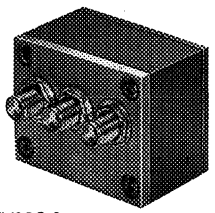
Mini-Circuits®

Plug-In & Coaxial

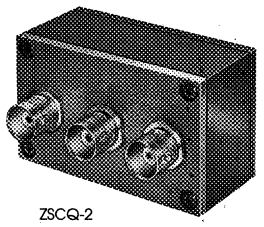
2 WAY-90° 20 to 4200 MHz



ZAPDQ



ZMSCQ-2



ZSCQ-2

MODEL NO.	FREQ. RANGE MHz	ISOLATION dB		INSERTION LOSS, dB Avg. of Coupled Outputs less 3dB		PHASE UNBALANCE Degrees	AMPLITUDE UNBALANCE dB	CAPD DATA (see RF/IF Designer handbook)	CASE STYLE	CONNECTION	PRICE $
	f_L-f_U	Typ.	Min.	Typ.	Max.	Max.	Max.	Page	Note B		Qty. (1-9)
ZAPDQ-2	1000-2000	22	16	0.4	1.4	6.0	0.8	2-42	F14	ar	79.95
ZAPDQ-4	2000-4200	22	16	0.4	0.9	8.0	1.0	2-42	F14	ar	79.95
ZMSCQ-2-21.4	20-23	30	25	0.4	0.7	3.0	1.2	2-39	M21	at	61.95
ZMSCQ-2-50	25-50	30	20	0.3	0.7	3.0	1.5	2-39	M21	at	61.95
ZMSCQ-2-90	55-90	30	20	0.3	0.7	3.0	1.2	2-40	M21	at	61.95
ZMSCQ-2-120	80-120	25	18	0.3	0.7	3.0	1.5	2-99	M21	at	61.95
ZMSCQ-2-180	120-180	23	15	0.3	0.7	4.0	1.2	2-40	M21	at	61.95
ZSCQ-2-50	25-50	30	20	0.3	0.7	3.0	1.5	2-39	M22	at	54.95
ZSCQ-2-90	55-90	30	20	0.3	0.7	3.0	1.2	2-39	M22	at	54.95
ZSCQ-2-180	120-180	23	15	0.3	0.7	4.0	1.2	2-40	M22	at	54.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NSN GUIDE

MCL NO.	NSN
ZAPDQ-4	5985-01-412-9064
ZMSCQ-2-250	5985-01-394-4982
ZFRSC-2050B	5985-01-310-5748
ZFRSC-2075	5985-01-266-6144
ZFRSC-42	5985-01-332-3083

* units are not QPL listed

pin and coaxial connections

see case style outline drawings for pin connections

PORT	ar	at	au
SUM PORT	3	2	5
PORT 1	1	1	3
PORT 2	2	3	15
GND EXT.	—	—	1,2,4,8,9,12,13,14,16
CASE GND	—	—	1,2,4,8,9,12,13,14,16

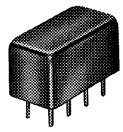
CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

POWER SPLITTERS/COMBINERS 50Ω Plug-In

2 WAY-90° 0.42 MHz to 4200 MHz



PSCQ-2 / PQW-2

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB Typ.	ISOLATION dB Min.	INSERTION LOSS, dB Avg. of Coupled Outputs less 3dB Typ.	INSERTION LOSS, dB Avg. of Coupled Outputs less 3dB Max.	PHASE UNBALANCE Degrees Max.	AMPLITUDE UNBALANCE dB Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
PQW-2-90	30-90	27	20	0.3	0.6	3	1.0	2-142	A01	gy	27.95
PQW-2-270	90-270	20	17	0.4	0.7	4	1.4	2-142	A01	gy	29.95
PSCQ-2-0.455	0.42-0.51	30	25	0.1	0.5	3	1.2	2-99	A01	aw	25.95
PSCQ-2-1.25	1.13-1.38	29	25	0.4	0.7	3	1.2	2-36	A01	aw	14.95
PSCQ-2-1.5	1.4-1.7	29	25	0.4	0.7	3	1.2	2-36	A01	aw	14.95
PSCQ-2-3.4	3.0-3.8	30	25	0.4	0.7	3.8	1.2	2-36	A01	aw	19.95
PSCQ-2-4	3.5-4.5	36	25	0.4	0.7	3	1.5	2-100	A01	aw	14.95
PSCQ-2-6.4	5.8-7.0	30	25	0.4	0.7	3	1.2	2-37	A01	aw	14.95
PSCQ-2-7.5	7-8	35	25	0.4	0.7	3	1.2	2-37	A01	aw	14.95
PSCQ-2-8	2-8	36	27	0.3	0.7	6	0.5	2-142	A01	gx	49.95
PSCQ-2-10.5	9-11	25	20	0.4	0.7	3	1.2	2-37	A01	aw	14.95
PSCQ-2-13	12-14	29	25	0.4	0.7	3	1.2	2-38	A01	aw	14.95
PSCQ-2-14	12-16	30	25	0.3	0.6	3	1.8	2-38	A01	aw	19.95
PSCQ-2-17.5	16-19	28	25	0.6	0.7	3	1.6	2-38	A01	aw	14.95
PSCQ-2-21.4	20-23	30	25	0.4	0.7	3	1.2	2-39	A01	aw	14.95
PSCQ-2-26	14-30	25	20	0.4	0.7	3	1.5	2-100	A01	aw	23.95
PSCQ-2-32	3.2-32	32	25	0.4	0.8	5	0.4	2-143	A01	gx	89.95
PSCQ-2-40	23-40	21	18	0.3	0.7	3	1.5	2-100	A01	aw	19.95
PSCQ-2-50	25-50	30	20	0.3	0.7	3	1.5	2-39	A01	aw	23.95
PSCQ-2-60	30-60	30	20	0.3	0.7	3	1.5	2-143	A01	aw	23.95
PSCQ-2-70	40-70	30	20	0.3	0.7	3	1.5	2-39	A01	aw	23.95
PSCQ-2-70N	66-74	22	19	0.2	0.5	0.8	0.25	2-101	A01	aw	23.95
PSCQ-2-85A	55-85	35	20	0.3	0.6	3	0.6	2-143	A01	ax	24.95
PSCQ-2-90	55-90	30	20	0.3	0.7	3	1.2	2-40	A01	aw	23.95
PSCQ-2-120	80-120	25	18	0.3	0.7	3	1.5	2-40	A01	aw	23.95
PSCQ-2-160	100-160	24	19	0.3	0.7	3	1.5	2-101	A01	aw	23.95
PSCQ-2-180	120-180	23	15	0.3	0.7	4	1.2	2-40	A01	aw	23.95
PSCQ-2-250	150-250	30	22	0.4	0.8	4	1.5	2-41	A01	aw	23.95
PSCQ-2-300	220-300	27	20	0.3	0.7	3	1.3	2-101	A01	aw	23.95
PSCQ-2-400	250-400	23	16	0.5	0.9	4	1.5	2-41	A01	aw	23.95
PSCQ-2-450	350-450	23	16	0.5	0.9	5	1.5	2-41	A01	aw	23.95
PSCQ-2-550	450-550	19	15	0.4	0.7	5	1.5	2-42	A01	aw	23.95
PSCQ-2-1000	800-1000	27	20	0.28	0.6	3	1.3	2-109	A05	ax	25.95

NOTES:

◆ For aqueous washable units add suffix J to L model number.
See outline QQQ569. Footprint for L models and L models suffix J are the same.

❑ Non-hermetic

** LRPQ units have bottom barrier ground plane insulated with glass barrier.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".

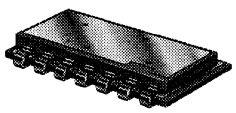
C. Prices and specifications subject to change without notice.

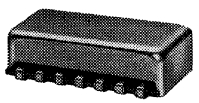
1. Absolute maximum power, voltage and current ratings:
   1a. Matched power rating
   models PSCQ-2-8,PSCQ-2-32 50mWatt
   models SCPQ-10.5 0.5 Watt
   all other models 1Watt
   1b. Internal load dissipation 0.125 Watt

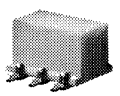
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

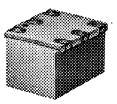
Mini-Circuits®

Surface Mount□


JSPQ


JSPQW


LRPQ


RPQ

SCPQ

SYPQ

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB Typ.	ISOLATION dB Min.	INSERTION LOSS dB Avg. of Coupled Outputs less 3dB Typ.	INSERTION LOSS dB Avg. of Coupled Outputs less 3dB Max.	PHASE UNBALANCE Degrees Max.	AMPLITUDE UNBALANCE dB Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note 8	CONNECTION	PRICE $ Qty. (1-9)
	JSPQ-1875W	1325-1875	28	18	0.2	0.5	6	1.0	2-144	BK343	ja	17.95
	JSPQW-100	40-100	24	18	0.2	0.6	3	1.2	2-144	BK276	hm	14.95
◆	LRPQ-70**	65-75	30	20	0.1	0.5	3	1	2-119	QQQ130	ay	9.95
◆	LRPQ-700**	500-700	23	18	0.2	0.6	3	1.5	2-119	QQQ130	ay	9.95
◆	LRPQ-980**	820-980	28	20	0.15	0.5	4	1	2-120	QQQ130	ay	13.95
	RPQ-820	760-860	22	15	0.15	0.7	4	1	2-145	TT240	gp	13.95
	RPQ-1495	1400-1600	18	14	0.3	0.8	5	1	2-145	TT240	gp	15.95
	SCPQ-10.5	9-11	31	20	0.15	0.7	3	1.2	—	YY101	aw	13.95
	SCPQ-21.4	20-23	32	25	0.15	0.5	2.5	1	2-98	YY101	aw	13.95
	SCPQ-50	25-50	25	20	0.15	0.7	3	1.5	2-145	YY101	aw	14.95
	SCPQ-60	30-60	30	20	0.15	0.7	3	1.5	2-146	YY101	aw	14.95
	SCPQ-85C	55-85	30	20	0.3	0.6	3	0.6	2-146	YY101	gy	14.95
	SCPQ-90	55-90	26	20	0.2	0.7	3	1.2	2-98	YY101	aw	13.95
	SCPQ-150	95-150	22	18	0.3	0.7	3	1.2	2-146	YY101	aw	14.95
	SCPQ-180	120-180	20	16	0.3	0.7	3	1.2	2-98	YY161	aw	13.95
	SCPQ-400	250-400	20	16	0.3	0.7	3	1.2	2-99	YY161	aw	14.95
	SYPQ-21.4	20-23	33	25	0.1	0.4	3	1.1	2-98	AH202	av	13.95
	SYPQ-70	65-75	31	24	0.1	0.4	3	1.1	2-119	AH202	av	13.95
	SYPQ-113-1	108-118	25	20	0.15	0.4	3	1.0	2-144	AH202	av	13.95

NSN GUIDE

MCL NO.	NSN
PSCQ-2-21.4	6625-01-415-3074
PSCQ-2-180	6625-01-186-4456
PSCQ-2-90	6625-01-160-0151
PSCQ-2-70	5985-01-292-8834
PSCQ-2-50	5895-01-374-0023
PSCQ-2-550	5895-01-347-0206

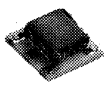
pin connections see case style outline drawings

PORT	av	aw	ax	ay	gp	gx	gy	hm	ja
SUM PORT	1	1	1	6	4	1	1	9	1
PORT 1	5	2	2	4	1	2	2(0°)	2(0°)	8
PORT 2	8	5	8	1	3	5	6(90°)	6(-90°)	14
GND EXT.	2,3,6,7	3,4,7,8	3,4,5,6 3,5,6	2,5	2,5	3,4,7,8 —	3,4,7,8	1,3,4,5,7,8 10,11,12,14	2,3,4,5,6,9 10.11.12.13
50 OHM TERM.	4	6	7	3	6	—	5	13	7

In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

POWER SPLITTERS/COMBINERS 50Ω Surface Mount

2 WAY-90° 380 MHz to 1460 MHz



HPQ

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB Typ.	ISOLATION dB Min.	INSERTION LOSS, dB Avg. of Coupled Outputs less 3 dB Typ.	INSERTION LOSS, dB Avg. of Coupled Outputs less 3 dB Max.	PHASE UNBALANCE Degrees Typ.	PHASE UNBALANCE Degrees Max.	AMPLITUDE UNBALANCE (dB) Typ.	AMPLITUDE UNBALANCE (dB) Max.	VSWR (:1) S Typ.	VSWR (:1) OUT Typ.	CAPD DATA Page	CASE STYLE Note B	CONNECTOR	PRICE $ Qty. (10-49)
NEW	HPQ-05	410 - 455	25	20	0.17	0.35	0.5	3	0.5	1.0	1.12	1.12		AT577	km	6.95
NEW	HPQ-05W	380 - 490	25	20	0.20	0.40	0.6	3	1.1	1.6	1.12	1.12		AT577	km	6.95
NEW	HPQ-06	510 - 570	26	18	0.20	0.40	0.6	3	0.5	1.2	1.10	1.12		AT577	km	6.95
NEW	HPQ-06W	480 - 600	26	18	0.20	0.40	0.6	3	0.9	1.6	1.10	1.12		AT577	km	6.95
NEW	HPQ-07	580 - 690	24	18	0.20	0.40	0.5	3	0.8	1.6	1.17	1.17		AT577	km	6.95
NEW	HPQ-08	680 - 790	24	18	0.25	0.40	0.8	3	0.6	1.6	1.10	1.20	see	AT577	km	6.95
NEW	HPQ-09	730 - 800	25	20	0.20	0.40	0.6	3	0.6	1.2	1.14	1.14		AT577	km	6.95
NEW	HPQ-09W	690 - 830	24	20	0.20	0.40	0.7	3	1.1	1.6	1.14	1.14	facing	AT577	km	6.95
NEW	HPQ-10	900 - 970	22	17	0.25	0.45	0.7	4	0.5	1.2	1.17	1.17		AT577	km	6.95
NEW	HPQ-10W	880 - 1030	22	16	0.28	0.50	1.0	4	0.85	1.6	1.17	1.17		AT577	km	6.95
NEW	HPQ-11	980 - 1070	23	18	0.25	0.50	0.5	3.5	0.4	1.2	1.17	1.17	page	AT577	km	6.95
NEW	HPQ-12	990 - 1100	21	16	0.25	0.45	0.8	4	0.5	1.2	1.20	1.20		AT577	km	6.95
NEW	HPQ-12W	940 - 1130	21	16	0.30	0.50	1.0	4	0.8	1.6	1.20	1.20		AT577	km	6.95
NEW	HPQ-15	1320 - 1430	19	15	0.30	0.50	1.8	5	0.35	1.2	1.22	1.22		AT577	km	6.95
NEW	HPQ-15W	1240 - 1460	19	15	0.30	0.60	1.8	5	0.8	1.6	1.22	1.22		AT577	km	6.95

features

- excellent amplitude and phase unbalance
- good insertion loss
- good isolation
- excellent input VSWR
- excellent output VSWR
- excellent unit-to-unit repeatability

applications

- image rejection mixer
- wideband amplifier matching
- I&Q modulator

NOTES:

A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
D. For Quality Control Procedures see Table of Contents, Section 0, "Mini-Circuits Guarantees Quality" article. For Environmental Specifications see Amplifier Selection Guide.
1. Absolute maximum power, voltage and current ratings:
   1a. Matched power rating 1Watt

pin connections

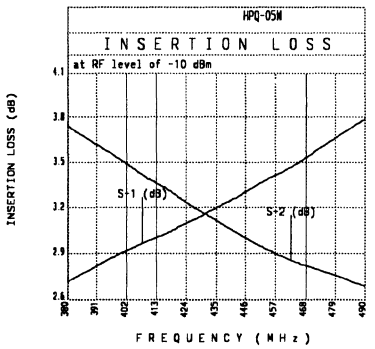
see case style outline drawings

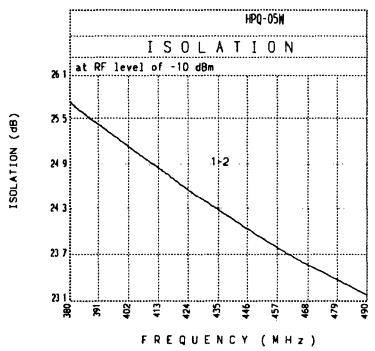
PORT	km
SUM PORT	3
PORT 1	6
PORT 2	4
GND EXT.	2,5
50 OHM TERM.	1

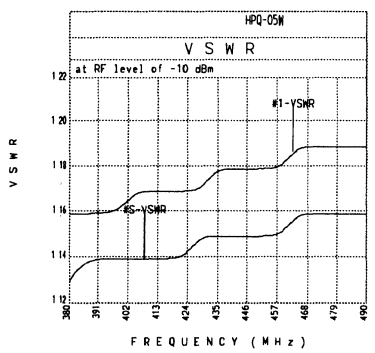
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

Mini-Circuits®

HPQ-05W 380 to 490 MHz

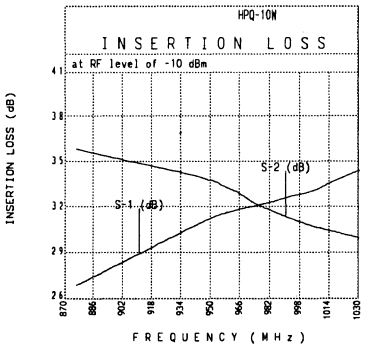


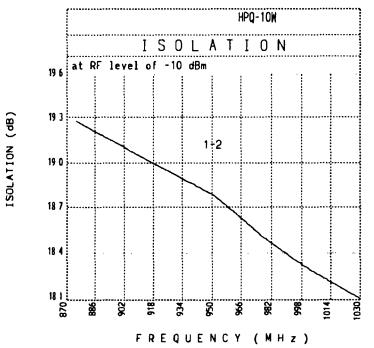


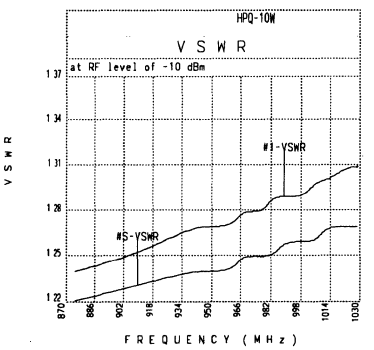


FREQ. (MHz)	INSERTION LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
380.00	2.72	3.76	1.05	90.29	25.77
386.00	2.78	3.69	0.91	90.30	25.59
398.00	2.90	3.55	0.65	90.24	25.27
404.00	2.95	3.48	0.53	90.27	25.11
410.00	3.00	3.40	0.41	90.28	24.95
416.00	3.04	3.35	0.30	90.33	24.80
422.00	3.10	3.27	0.17	90.36	24.63
428.00	3.15	3.20	0.05	90.51	24.48
434.00	3.21	3.14	0.07	90.59	24.34
440.00	3.26	3.07	0.20	90.57	24.19
452.00	3.39	2.95	0.44	90.52	23.92
458.00	3.44	2.90	0.54	90.47	23.79
464.00	3.50	2.85	0.65	90.56	23.66
470.00	3.57	2.82	0.75	90.59	23.55
490.00	3.81	2.69	1.11	90.69	23.19

HPQ-10W 880 to 1030 MHz

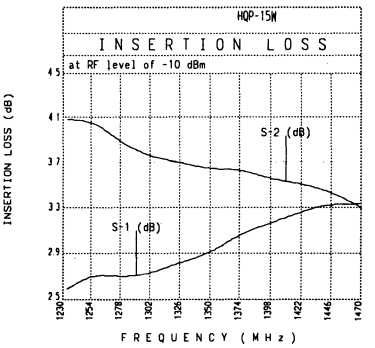


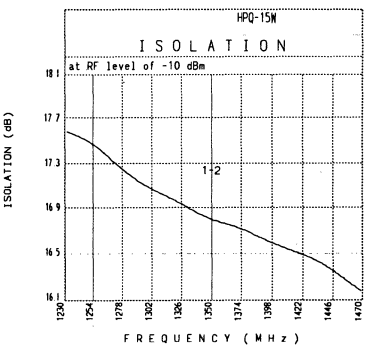


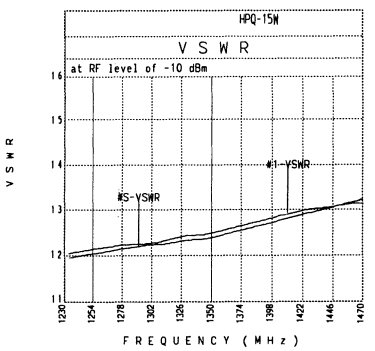


FREQ. (MHz)	INSERTION LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
875.55	2.69	3.60	0.91	90.36	19.30
907.77	2.89	3.51	0.62	90.83	19.08
940.00	3.09	3.43	0.34	90.93	18.87
950.00	3.15	3.39	0.24	90.98	18.81
961.14	3.19	3.33	0.14	91.07	18.69
967.14	3.21	3.29	0.09	91.08	18.63
972.85	3.22	3.24	0.03	91.09	18.57
978.57	3.24	3.21	0.03	91.02	18.51
984.28	3.25	3.18	0.08	91.04	18.46
990.00	3.28	3.15	0.13	90.89	18.41
1001.42	3.31	3.10	0.21	90.92	18.31
1007.14	3.33	3.08	0.25	90.96	18.27
1012.85	3.37	3.06	0.30	91.02	18.23
1024.28	3.43	3.03	0.39	91.09	18.15
1030.00	3.46	3.01	0.45	91.05	18.11

HPQ-15W 1240 to 1460 MHz







FREQ. (MHz)	INSERTION LOSS (dB) S-1	S-2	AMP. UNBAL. (dB)	PHASE (Deg.)	ISOL. (dB)
1233.33	2.59	4.11	1.51	91.69	17.61
1255.55	2.74	4.10	1.36	91.67	17.51
1277.77	2.69	3.89	1.20	91.87	17.26
1300.00	2.73	3.78	1.05	91.72	17.10
1314.28	2.79	3.75	0.96	91.84	17.03
1328.57	2.84	3.71	0.87	91.96	16.94
1342.85	2.89	3.68	0.79	92.09	16.85
1357.14	2.97	3.66	0.69	92.18	16.79
1371.42	3.07	3.66	0.59	92.27	16.75
1385.71	3.14	3.62	0.48	92.36	16.68
1400.00	3.19	3.57	0.38	92.33	16.60
1428.57	3.31	3.52	0.21	92.38	16.49
1442.85	3.35	3.47	0.12	92.35	16.40
1457.14	3.35	3.40	0.05	92.47	16.28
1471.42	3.36	3.31	0.04	92.62	16.17

CAPD now available! computer-automated performance data

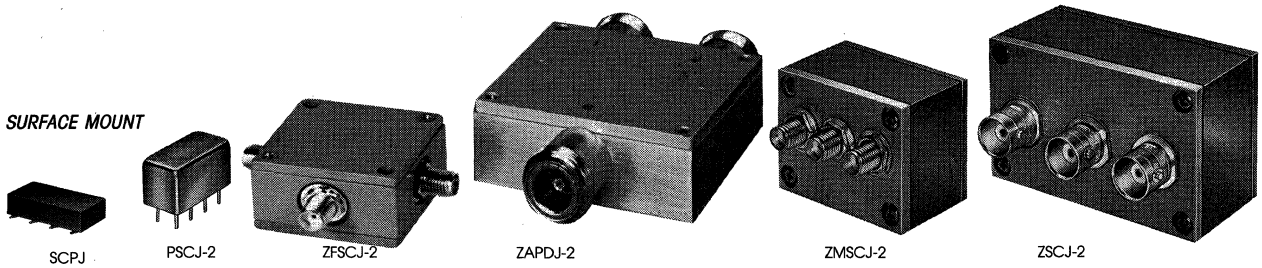
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

POWER SPLITTERS/COMBINERS 50 & 75Ω

2 WAY-180° 10 kHz to 2 GHz

SURFACE MOUNT



SCPJ PSCJ-2 ZFSCJ-2 ZAPDJ-2 ZMSCJ-2 ZSCJ-2

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB L Min.	ISOLATION dB M° Typ.	ISOLATION dB M° Min.	ISOLATION dB U Typ.	ISOLATION dB U Min.	INSERTION LOSS, dB Above 3dB L Typ.	INSERTION LOSS, dB Above 3dB L Max.	INSERTION LOSS, dB Above 3dB M° Typ.	INSERTION LOSS, dB Above 3dB M° Max.	INSERTION LOSS, dB Above 3dB U Typ.	INSERTION LOSS, dB Above 3dB U Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M° Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M° Max.	AMPLITUDE UNBALANCE dB U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
■	SCPJ-2-1W-75	10-500	30	25	27	20	22	16	1.0	1.5	1.1	1.6	1.5	2.2	3	4	6	0.3	0.5	0.9	2-140	YY161	az	26.95
**■	SCPJ-2-750-75	30-750	26	20	—	—	26	16	1.0	1.5	—	—	1.5	2.2	3	—	6	0.8	—	0.9	2-140	YY161	az	27.95
	PSCJ-2-1	1-200	35	30	35	25	30	23	0.75	1	0.5	0.8	0.75	1.2	2	2.5	4	0.3	0.15	0.3	2-43	A01	az	23.95
	PSCJ-2-1W	100-600			30	20					1.0	1.9				6			0.5		2-141	A06	az	26.95
✤	PSCJ-2-2	0.01-20	35	25	30	25	25	18	0.3	0.8	0.2	0.5	0.3	0.6	1*	2	2.5	0.1	0.1	0.2	2-43	A01	az	34.95
■	PSCJ-2-1-75	1-200	35	30	31	25	26	20	0.6	1.2	0.8	1.2	1.2	1.8	2	4	6	0.25	0.2	0.5	2-45	A01	az	23.95
	ZFSCJ-2-1	1-500	30	20	33	25	30	18	1	1.5	1	1.5	1	1.5	2	4	7	0.5	0.2	0.5	2-44	K18	as	59.95
△✤	ZFSCJ-2-2	0.01-20	35	25	30	25	25	18	0.3	0.8	0.2	0.5	0.3	0.6	1*	2	2.5	0.1	0.1	0.2	2-43	K18	as	57.95
	ZFSCJ-2-3	5-300	30	20	33	25	30	18	1	1.5	1	1.5	1	1.5	2	4	6	0.15	0.2	0.5	2-44	K18	as	49.95
△	ZFSCJ-2-4	50-1000	30	20	—	—	25	18	1.2	1.9	—	—	1.6	2.4	6	—	7	0.6	—	0.6	2-102	K18	as	69.95
	ZMSCJ-2-1	1-200	35	30	35	25	30	23	0.75	1	0.6	0.8	0.75	1.2	2	2.5	4	0.15	0.15	0.3	2-45	M21	at	57.95
✤	ZMSCJ-2-2	0.01-20	35	25	30	25	25	18	0.3	0.8	0.2	0.5	0.3	0.6	1*	2	2.5	0.1	0.1	0.2	2-43	M21	at	67.95
	ZSCJ-2-1	1-200	35	30	35	25	30	23	0.75	1	0.6	0.8	0.75	1.2	2	2.5	4	0.15	0.15	0.3	2-45	M22	at	51.95
✤	ZSCJ-2-2	0.01-20	35	25	30	25	25	18	0.3	0.8	0.2	0.5	0.3	0.6	1*	2	2.5	0.1	0.1	0.2	2-43	M22	at	59.95
	ZAPDJ-2	1000-2000	22	18	22	18	22	18	1.3	1.8	1.3	1.8	1.3	1.8	6	6	6	0.8	0.8	0.8	2-102	F53	as	71.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NOTES:

❑ Non-hermetic
* Phase unbalance is 3 degrees max from fL to 3 fL.
** For SCPJ-2-750-75: L=30-375 MHz, U=375-750 MHz
✪ When only specification for M range given, specifications applied to entire frequency range.
■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.
△ Available only with SMA connectors.
✤ At low range frequency band (fL to 10 fL), linearly derate maximum input power by 13 dB.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
1a. Matched power rating, 1 Watt, except models PSCJ-2-1W and SCPJ-2-1W-75, SCPJ-2-750-75 0.5 Watt
1b. Internal load dissipation 0.125 Watt

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

Mini-Circuits®

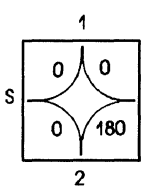
Surface Mount, Plug-In & Coaxial

2 WAY-0°/180° 5 to 200 MHz

PMT

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB L Min.	ISOLATION dB M Typ.	ISOLATION dB M Min.	ISOLATION dB U Typ.	ISOLATION dB U Min.	INSERTION LOSS, dB Above 3dB L Typ.	INSERTION LOSS, dB Above 3dB L Max.	INSERTION LOSS, dB Above 3dB M Typ.	INSERTION LOSS, dB Above 3dB M Max.	INSERTION LOSS, dB Above 3dB U Typ.	INSERTION LOSS, dB Above 3dB U Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M Max.	AMPLITUDE UNBALANCE dB U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
PMT-1	5-200	22	20	24	20	24	18	0.8	1.0	0.9	1.1	1.0	1.5	2	4	8	0.1	0.2	0.5	2-83	A01	ba	23.95
■ PMT-1-75	5-200	22	18	22	18	22	18	1.0	1.3	1.0	1.4	1.0	1.5	2	4	8	0.1	0.2	0.5	2-83	A01	ba	23.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)



- S-J ports, isolation 40 dB typical
- Inphase ports, S-1 and S-2, insertion loss 0.2 dB typical
- Amplitude unbalance defined by input S or J ports to output 1 and 2

pin and coaxial connections

see case style outline drawing

PORT	as	at	az	ba
SUM PORT	S	2	1	1
PORT 1	1	1	5	2
PORT 2	2	3	6	3
PORT J	—	—	—	4
GND EXT.	—	—	2,3,4,7,8	5,6,7,8
CASE GND	—	—	2,3,4,7,8	5,6,7,8

NSN GUIDE

MCL NO.	NSN
PSCJ-2-1	6625-01-413-2386
PSCJ-2-2	5985-01-332-3084
ZSCJ-2-2	5895-01-340-7761

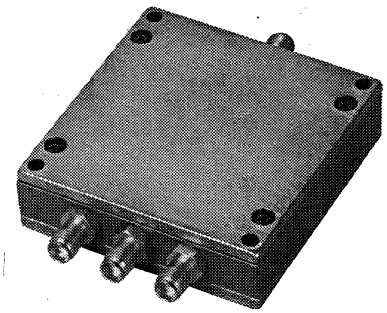
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

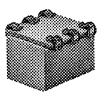
Available Tape & Reel

POWER SPLITTERS/COMBINERS 50 & 75Ω

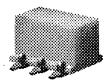
3 WAY-0° 10 kHz to 4.2 GHz



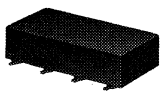
SURFACE MOUNT



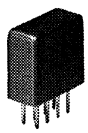
JPS



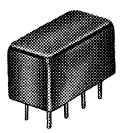
LRPS



SCP



MSC-3



PSC-3

ZN3PD

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB L Min.	ISOLATION dB M° Typ.	ISOLATION dB M° Min.	ISOLATION dB U Typ.	ISOLATION dB U Min.	INSERTION LOSS, dB Above 4.8dB L Typ.	INSERTION LOSS, dB Above 4.8dB L Max.	INSERTION LOSS, dB Above 4.8dB M° Typ.	INSERTION LOSS, dB Above 4.8dB M° Max.	INSERTION LOSS, dB Above 4.8dB U Typ.	INSERTION LOSS, dB Above 4.8dB U Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M° Max.	AMPLITUDE UNBALANCE dB U Max.	VSWR (:1) S Typ.	VSWR (:1) S Max.	VSWR (:1) OUT Typ.	VSWR (:1) OUT Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
		L2		U2				L2		U2				L2	U2		L2	U2									
JPS-3-1	5-300	34	25	33	23	32	20	0.3	0.6	0.3	0.7	0.5	1.4	2	4	6	0.4	0.4	0.6					2-147	BH292	jg	13.95
JPS-3-1W	50-750	23	17	26	17			0.4	1.0	0.9	1.4			6	7		0.3	0.6						2-147	BH292	jg	14.95
MSC-3-1W	50-750	22	18	22	17			0.4	1.0	0.9	1.5			4	7		0.4	0.7						—	A03	jq	19.95
◆ LRPS-3-1	10-300	25	20	25	20	25	20	0.2	0.6	0.3	0.8	0.5	1.2	2	3	4	0.1	0.3	0.7	see				2-148	QQQ130	gt	19.95
◆ LRPS-3-850	500-850			23	16					0.7	1.6				8			0.9					2-148	QQQ130	hc	16.95
SCP-3-1	1-300	30	25	25	20	20	15	0.3	0.6	0.4	0.8	0.7	1.5	1	2	4	0.1	0.15	0.5	Performance				2-104	YY101	bd	16.95
PSC-3-1	1-200	45	30	40	30	40	25	0.6	1.0	0.4	0.7	0.6	1	1	2	4	0.15	0.2	0.3	Data and				2-46	A01	bb	23.95
PSC-3-1A	1-300	38	30	33	23	29	22	0.2	0.5	0.2	0.7	0.6	1.5	1	3	5	0.2	0.3	0.6	curves				2-104	A01	bb	26.95
PSC-3-1W	5-500	25	20	31	15	25	15	0.4	0.8	0.4	1.4	0.8	1.4	2	3	5	0.1	0.3	0.6					2-46	A01	bc	35.95
✣ PSC-3-2	0.01-30	35	30	40	25	30	25	0.25	0.45	0.15	0.45	0.45	0.75	1	2	4	0.2	0.3	0.4					2-105	A01	bb	35.95
■ PSC-3-1-75	1-200	35	23	35	25	35	25	0.6	1.0	0.3	0.7	0.6	1	2	3	4	0.15	0.2	0.3					2-48	A01	bb	23.95
■ PSC-3-1-75-2	10-300	28	20	25	20	28	20	0.2	0.4	0.3	0.5	0.4	0.7	2	3	4	0.15	0.2	0.3					2-48	A01	bc	27.95
PSC-3-13	1-200	45	35	45	30	37	30	0.25	0.5	0.35	0.6	0.35	0.8	1	3	4	0.1	0.2	0.2					2-47	A01	bb	29.95
PSC-3-13-39	0.5-50	47	33	46	35	40	33	0.15	0.4	0.15	0.4	0.15	0.4	1	1	2	0.1	0.1	0.1					2-105	A01	bb	29.95
ZN3PD-900	800-900			30	20					0.2	0.4				—			0.5		1.09	1.30	1.09	1.30	2-103	UU181	be	74.95
ZN3PD-900W	650-1050			22	15					0.3	0.8				—			0.8		1.09	1.80	1.09	1.30	2-103	UU181	be	69.95

L = low range (f_L to 10 f_L)
L_2 = (f_L to f_U/2)

M = mid range (10 f_L to f_U/2)
U_2 = (f_U/2 to f_U)

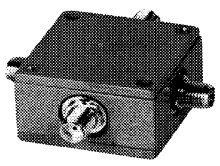
U = upper range (f_U/2 to f_U)

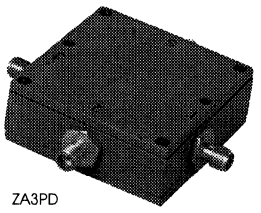
NOTES:
- ◆ For aqueous washable units add suffix J to L model number. See outline QQQ569. Footprint for L models and L models suffix J are the same.
- ❑ Non-hermetic
- * Isolation 25 dB, -55 to 0 deg.C over 0.01-0.1 MHz
- ■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.
- ✣ At low range frequency band (f_L to 10 f_L), linearly derate maximum input power by 13 dB.
- ✪ When specification for only M range given, specifications apply to entire frequency range.
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
- C. Prices and specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings:
  - 1a. Matched power rating, models ZA3PD, ZN3PD 10 Watt
    other models 1 Watt
  - 1b. Internal load dissipation 0.375 Watt, except models JPS-3-1, JPS-3-1W, MSC-3-1W, 0.5 Watt.

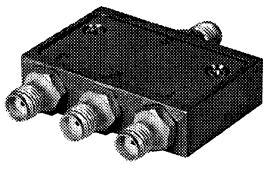
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

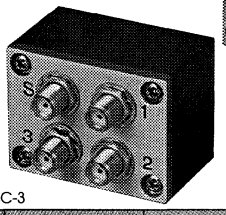
Mini-Circuits®

Surface Mount, Plug-In & Coaxial


ZFSC-3


ZA3PD


ZCSC-3



ZMSC-3

ZSC-3

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 4.8dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	ZFSC-3-1	1-500	30	20	30	20	25	18	0.4	0.75	0.5	0.9	0.8	1.2	2	3	4	0.2	0.3	0.4	2-50	J17	be	51.95
	ZFSC-3-1W	2-750	30	20	30	20	25	18	0.4	0.75	0.5	1.0	1.0	1.6	3	5	7	0.2	0.3	0.5	2-50	J17	be	53.95
	ZFSC-3-13	1-200	45	30	48	35	37	30	0.25	0.5	0.35	0.6	0.35	0.6	1	3	5	0.1	0.2	0.2	2-47	J17	be	51.95
	ZFSC-3-4	1-1000	35	20	20	18	20	17	0.2	0.5	0.7	1.4	1.0	2.0	3	6	10	0.2	0.4	0.9	2-51	J17	be	59.95
NEW■	ZFSC-3-4-75	1-1000	34	22	27	17	23	15	0.2	0.5	0.4	1.2	1.2	2.0	3	6	10	0.5	0.7	0.9	—	J17	be	59.95
	ZA3PD-1	500-1000	20	14	20	14	20	14	0.3	0.6	0.3	0.6	0.3	0.6	—	—	—	0.4	0.4	0.4	2-52	CC51	be	89.95
	ZA3PD-1.5	750-1500	20	14	20	14	20	14	0.3	0.7	0.3	0.7	0.3	0.7	—	—	—	0.4	0.4	0.4	2-52	CC51	be	89.95
	ZA3PD-2	1000-2000	20	15	20	15	20	15	0.3	0.6	0.3	0.6	0.3	0.6	—	—	—	0.3	0.3	0.3	2-53	CC51	be	89.95
	ZA3PD-4	2000-4200	18	14	18	14	18	14	0.7	1.0	0.7	1.0	0.7	1.0	—	—	—	0.9	0.9	0.9	2-53	CC51	be	89.95
	ZCSC-3-R3	2-300	32	28	31	28	32	22	0.3	0.8	0.4	1.0	0.8	1.2	1	2	3	0.1	0.3	0.3	2-149	UU233	be	43.95
	ZMSC-3-1	1-200	45	35	40	25	40	25	0.3	0.5	0.4	0.7	0.6	1	1	2	4	0.15	0.2	0.3	2-51	P26	be	57.95
✣	ZMSC-3-2*	0.01-30	35	30	40	25	30	25	0.25	0.45	0.15	0.45	0.45	0.75	1	2	4	0.2	0.3	0.4	2-47	P26	be	67.95
	ZSC-3-1	1-200	45	30	40	25	40	25	0.3	0.5	0.4	0.7	0.6	1.0	1	2	4	0.15	0.2	0.3	2-51	P25	be	51.95
✣	ZSC-3-2*	0.01-30	35	30	40	25	30	25	0.25	0.45	0.15	0.45	0.45	0.75	1	2	4	0.2	0.3	0.4	2-47	P25	be	61.95
■	ZSC-3-1-75	1-200	35	30	35	25	35	25	0.6	1.0	0.4	0.7	0.6	1.0	2	3	4	0.15	0.2	0.3	2-48	P25	be	52.95
✣■	ZSC-3-2-75	0.02-20	35	30	35	25	30	20	0.2	0.5	0.25	0.6	0.45	0.75	2	3	4	0.2	0.3	0.4	2-49	P25	be	62.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

pin and coaxial connections

see case style outline drawings

PORT	bb	bc	bd	be	gt	hc	jg	jq
SUM PORT	6	1	6	S	6	6	1	1
PORT 1	1	5	1	1	1	1	6	5
PORT 2	2	7	2	2	2	3	4	6
PORT 3	5	8	5	3	3	4	3	2
GND EXT.	3,4,7,8	2,3,4,6	3,4,7,8	—	4,5	2,5	2,5	3,4,7,8
CASE GND	3,4,7,8	2,3,4,6	—	—	—	—	—	3,4,7,8

MIL-P-23971/15, NSN GUIDE

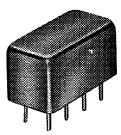
MCL NO.	NSN
PSC-3-1	6625-01-015-6027
PSC-3-1W	5985-01-295-5898
PSC-3-13	6625-01-249-8011
ZA3PD-2	5895-01-357-3919
ZFSC-3-1(SMA)	5895-01-361-8520
ZFSC-3-1	6625-01-235-6873
ZFSC-3-13	5895-01-335-1824
ZFSC-3-13(SMA)	5985-01-409-0884
ZFSC-3-4(SMA)	6625-01-333-1126
ZFSC-3-4(BNC)	6625-01-454-7617
ZMSC-3-2B	6625-01-303-4624
ZMSC-3-1B(SMA)	6625-01-170-0102
ZSC-3-1	6625-01-327-4755
ZSC-3-1B(BNC)	6625-01-008-9566
ZSC-3-2BR	5985-01-315-2870
ZSC-3-2B(BNC)	5820-01-120-9320

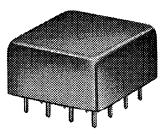
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

POWER SPLITTERS/COMBINERS 50 & 75Ω Plug-In

4 WAY-0° 10 kHz to 1000 MHz


PSC-4


PSC-4A

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 6dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	PSC-4-1	0.1-200	33	20	30	20	27	20	0.4	0.6	0.5	0.75	0.7	1	4	6	8	0.15	0.2	0.25	2-54	A01	bf	35.95
	PSC-4-1W	1-500	29	20	27	18	25	18	0.4	0.8	0.5	1	0.8	1.5	1	3	5	0.2	0.3	0.5	2-106	A01	bf	38.95
■	PSC-4-1-75	1-200	30	20	25	20	25	20	0.4	0.7	0.5	0.9	0.7	1.2	2	3	4	0.15	0.2	0.3	2-62	A01	bf	32.95
	PSC-4-3	0.25-250	33	20	30	20	27	20	0.4	0.7	0.5	0.75	0.7	1.2	4	6	8	0.15	0.2	0.25	2-55	A01	bf	31.95
	PSC-4-5	1-800	29	20	24	18	25	17	0.4	0.8	0.6	1.5	1.3	2.5	1	4	5	0.2	0.5	0.6	2-106	A01	bf	45.45
✣	PSC-4-6	0.01-40	35	18	32	25	25	18	0.4	0.8	0.3	0.5	0.5	1	2	2	2	0.1	0.15	0.2	2-55	A01	bf	36.95
■	PSC-4-1W-75	5-650	38	22	40	22	25	18	0.6	0.9	0.65	1.2	0.9	1.5	1	3	5	0.2	0.3	0.6	—	A05	bf	39.95
	PSC-4A-4	10-1000	25	20	21	15	18	15	0.5	0.8	0.8	1.8	1.5	2.5	4	16	20	0.2	0.5	0.7	2-54	C07	bg	64.95
■	PSC-4A-475	10-800	30	20	33	20	25	18	0.4	0.7	0.6	0.9	1.2	1.6	—	—	—	0.2	0.4	0.8	2-62	C07	bg	64.95
■	PSC-4A-1W-75*	30-600	27	20	—	—	22	18	0.6	0.8	—	—	0.8	1.1	2	—	5	0.2	—	5	2-107	C07	bg	49.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

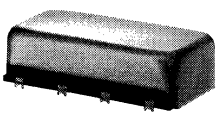
NOTES:
- ❑ Non-hermetic
- ■ Denotes 75 Ohm model
- ✪ When only specification for M range given, specification applies to entire frequency range.
- ✣ At low range frequency band (f_L to 10f_L), linearly derate maximum power by 13 dB.
- * Maximum VSWR: input 1.5:1, output 1.3:1
- *** Price for quantities 10-49
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
- C. Prices and specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings:
  - 1a. Matched power rating,
    - Models PSC-4-5, PSC-4-1W, SCP-4-1W-75 0.5 Watt
    - Models BP4C, BP4P 1.5 Watt
    - All other models 1 Watt
  - 1b. Internal load dissipation,
    - Model JS4PS 0.5 Watt
    - Models SCP-4-1W-75, SCP-4-4-75, BP4C, BP4P 0.375 Watt
    - All other models 0.250 Watt

Mini-Circuits®

Surface Mount□

1 to 1990 MHz

BP


JS4PS

SCP

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M° Typ.	M° Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 6dB L Typ.	L Max.	M° Typ.	M° Min.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M° Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M° Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	BP4C	810-960			25	19					1.0	1.5				8			0.6		—	XX211	js	1.99***
	BP4P	1710-1990			23	19					0.8	1.3				15			0.5		—	XX211	js	1.79***
	JS4PS-1	80-520			36	20					0.8	1.5				5			0.5		—	BJ360	kb	19.95
	SCP-4-1	1-400	32	23	26	18	21	17	0.4	1.2	0.6	1.2	1.0	1.5	1	4	9	0.2	0.3	0.5	2-150	YY101	bv	24.95
	SCP-4-1W	10-650	34	28	23	18	21	15	0.7	1.0	0.9	1.5	1.1	1.9	3	7	12	0.2	0.4	0.7	2-150	YY101	bv	26.95
■	SCP-4-1W-75	10-750	36	20	32	20	24	15	0.5	1.0	0.65	1.3	0.8	2.0	1.5	3	6	0.2	0.4	0.9	2-154	YY161	bv	27.95
	SCP-4-4	800-1000			24	17					0.7	1.5				12			1.0		2-151	YY101	bv	21.95
■	SCP-4-4-75	10-1000	36	20	32	18	24	14	0.5	1.0	0.65	1.3	0.8	2.0	3	6	12	0.2	0.4	0.9	2-154	YY161	bv	28.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

pin and coaxial connections

see case style outline drawing

PORT	bf	bg	bv	js	kb
SUM PORT	4	2	3	2	2
PORT 1	7	8	2	1	8
PORT 2	8	12	4	8	7
PORT 3	1	5	6	5	6
PORT 4	2	9	8	4	5
GND EXT.	3,5,6	All other pins	1,5,7	3,6,7	1,3,4
CASE GND	3,5,6	All other pins	—	—	—

NSN GUIDE

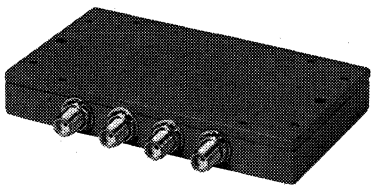
MCL NO.	NSN	MIL-P-23971/15*
PSC-4-1	5895-01-065-0106	-10
PSC-4-2	5825-01-044-8945	
PSC-4-3	5895-01-105-6189	-11
PSC-4-5	5985-01-423-7929	
PSC-4-6	5985-01-332-3086	
PSC-4A-4	5895-01-347-0205	

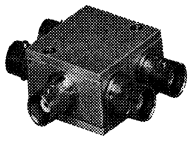
In Stock... Immediate Delivery

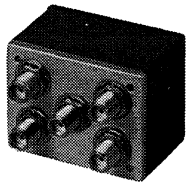
For Custom Versions Of Standard Models Consult Our Applications Dept.

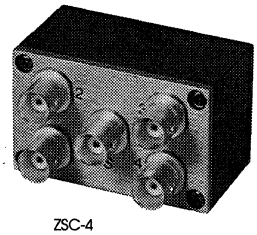
POWER SPLITTERS/COMBINERS 50 & 75Ω

4 WAY-0° 2 kHz to 8.4 GHz


ZBSC-4


ZFSC-4


ZMSC-4


ZSC-4

MODEL NO.	FREQ. RANGE MHz	ISOLATION dB						INSERTION LOSS, dB Above 6dB						PHASE UNBALANCE Degrees			AMPLITUDE UNBALANCE dB			CAPD DATA (see RF/IF Designer handbook)	CASE STYLE	CONNECTION	PRICE $
		L		M		U		L		M		U		L	M	U	L	M	U				
	f_L-f_U	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Max.	Typ.	Max.	Typ.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Page	Note B		Qty. (1-9)
ZBSC-413	10-800	26	20	18	15	18	15	0.6	1	1	1.5	1.6	2	4	8	8	0.2	0.4	0.6	2-57	UU102	bh	99.95
ZFSC-4-1	1-1000	25	20	23	18	20	15	0.4	1.2	0.6	1.5	1.6	2.5	4	8	8	0.2	0.4	0.7	2-56	G15	bh	89.95
ZFSC-4-1W	10-500	23	20	23	20	23	20	0.6	1.5	0.6	1.5	0.6	1.5	4	8	8	0.2	0.3	0.4	2-50	G15	bh	84.95
ZFSC-4-3	10-300	32	28	38	30	38	30	0.5	0.8	0.6	0.9	0.9	1.2	4	6	8	0.1	0.1	0.2	2-57	G15	bh	78.95
■ ZFSC-4375	50-90	34	30	34	30	34	30	0.3	0.8	0.3	0.8	0.3	0.8	4	6	8	0.15	0.15	0.15	2-63	G15	bh	89.95
■ ZFSC-4-2-75-1**	200-800	25	20	—	—	25	20	0.8	1.6	—	—	1	1.6	4	16	20	0.2	—	0.4	2-63	G15	bh	84.95
■ ZFSC-4-175	10-1000	35	25	38	20	22	18	0.5	0.8	0.6	1.2	0.9	2	—	—	—	0.2	0.3	0.6	2-61	G15	bh	89.95
ZMSC-4-1	0.1-200	33	20	30	20	27	20	0.4	0.6	0.5	0.75	0.7	1.0	4	6	8	0.15	0.20	0.25	2-60	N24	bh	66.95
✣ ZMSC-4-2	0.002-20	30	20	33	25	33	25	0.45	0.75	0.3	0.5	0.7	1.0	4	6	8	0.15	0.20	0.25	2-60	N24	bh	76.95
ZMSC-4-3	0.25-250	33	20	30	20	27	20	0.4	0.7	0.5	0.75	0.7	1.2	4	6	10	0.15	0.20	0.25	2-61	N24	bh	64.95
ZSC-4-1	0.1-200	33	20	30	20	27	20	0.4	0.6	0.5	0.75	0.7	1.0	4	6	8	0.15	0.20	0.25	2-60	N27	bh	59.95
■ ZSC-4-1-75	1-200	30	20	25	20	25	20	0.4	0.7	0.5	0.8	0.7	1.2	4	6	10	0.15	0.20	0.30	2-62	N27	bh	59.95
✣ ZSC-4-2	0.002-20	30	20	33	25	33	25	0.45	0.75	0.3	0.5	0.7	1.0	4	6	8	0.15	0.20	0.25	2-60	N27	bh	74.95
ZSC-4-3	0.25-250	33	20	30	20	27	20	0.4	0.7	0.5	0.75	0.7	1.2	4	6	10	0.15	0.20	0.25	2-61	N27	bh	56.95
■ ZSC-4-3-75	0.25-250	28	20	30	20	27	20	0.4	0.8	0.3	0.7	0.5	1.0	1	2	3	0.15	0.20	0.25	2-107	N27	bh	56.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

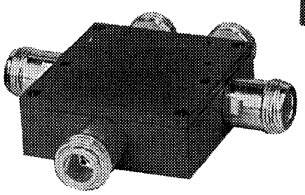
NOTES:

■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.
✪ When specification for only M range given, specification applies to entire frequency range.
△ Available only with SMA connectors.
✣ At low range frequency band (f_L to 10f_L), linearly derate maximum power by 13 dB.
* Maximum VSWR: input 1.5:1, output 1.3:1
** Frequency range L=f_L to f_U/2. Up to 15V and 15mA DC may be passed from input to all outputs.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
1a. Matched power rating,
Models ZA4PD, ZB4PD, ZB4PD1(except -500-75), ZN4PD, ZC4PD 10W
Model ZC4PD-18 5 W
All other models 1W
1b. Internal load dissipation,
Model ZB4PD-1750-75 0.750W
Models ZA4PD, ZB4PD-4, ZB4PD, ZB4PD1, ZN4PD, ZC4PD 0.375W
All other models 0.250W

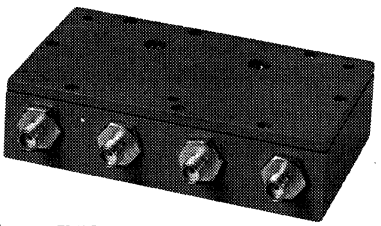
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

Mini-Circuits®

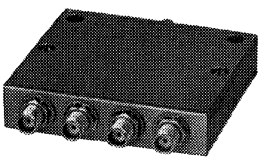
Coaxial



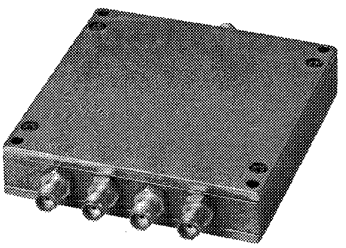
ZA4PD



ZB4PD
ZB4PD1



ZC4PD



ZN4PD

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M° Typ.	M° Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 6 dB L Typ.	L Max.	M° Typ.	M° Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M° Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M° Max.	U Max.	VSWR (:1) S Typ.	S Max.	OUT Typ.	OUT Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	ZA4PD-2	1000-2000			25	16					0.3	1.0			6			0.70			see Performance Data and curves				2-58	DD52	bh	89.95
	ZA4PD-4	2000-4200			25	16			0.5	1.0	0.3	1.0	0.3	1.0	16			0.80							2-58	DD52	bh	89.95
■	ZB4PD-1750-75	875-1750			30	20					0.4	0.8			3			0.40			1.08	1.50	1.25	1.50	2-153	UU188	bh	99.95
	ZB4PD-42	1700-4200			23	16					0.5	1.4			8			0.80							2-59	Z54	bh	99.95
	ZB4PD-4	3700-4200			24	15					0.6	1.1			8			0.80							2-59	Z54	bh	94.95
△	ZB4PD-6.4	5400-6800			25	18					0.6	1.2			9			0.90			1.15	1.30	1.10	1.30	---	UU188	bh	99.95
	ZB4PD1-500	5-500	34	20	34	20	28	20	0.4	1.0	0.5	0.9	0.9	1.5	1	3	6	0.2	0.2	0.4					---	UU188	bh	79.95
■	ZB4PD1-500-75	5-500	34	20	34	20	30	20	0.45	1.0	0.6	0.9	1.0	1.5	1	3	6		0.20						2-153	UU188	bh	89.95
	ZB4PD1-930	850-930			30	20					0.3	0.5			5				0.25		1.10	1.25	1.09	1.25	2-111	UU188	bh	99.95
	ZB4PD1-930W	725-1050			22	15					0.3	0.8			5				0.40		1.20	1.80	1.10	1.30	2-111	UU188	bh	94.95
	ZB4PD1-2000	800-2000			25	18					0.6	1.2			---				0.30		1.20	1.60	1.10	1.30	2-152	UU188	bh	94.95
	ZB4PD1-5.8	4600-5800			25	16					0.4	0.9			5				0.40		1.10	1.60	1.15	1.55	---	UU188	bh	129.95
	ZB4PD1-8.4	6700-8400			29	18					0.5	1.3			9				0.90		1.12	1.50	1.27	1.50	2-152	UU188	bh	149.95
NEW	ZC4PD-18	1000-1800			32	18					0.3	0.8			6				0.40		1.05	1.55	1.08	1.45	---	Z184	bh	91.95
	ZC4PD-900	800-900			30	20					0.3	0.6			3				0.20		1.08	1.25	1.17	1.30	2-118	Z184	bh	89.95
	ZN4PD-920	800-920			30	20					0.25	0.5			2				0.20		1.08	1.25	1.07	1.25	2-110	UU182	bh	84.95
	ZN4PD-920W	670-1000			22	15					0.3	0.6			3				0.20		1.20	1.60	1.07	1.25	2-110	UU182	bh	79.95
	ZN4PD-20	1800-2000			31	20					0.3	0.7			4				0.50						---	UU182	bh	89.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

coaxial connections

see case style outline drawing

PORT	bh
SUM PORT	S
PORT 1	1
PORT 2	2
PORT 3	3
PORT 4	4

NSN GUIDE

MCL NO.	NSN
ZBSC-413(SMA)	5985-01-370-6145
ZFSC-4-1	6625-01-303-4623
ZFSC-4-1(SMA)	6625-01-303-4623
ZFSC-4-1A	5825-01-227-6681
ZFSC-4-1W(SMA)	5985-01-372-6418
ZFSC-4-1WB(SMA)	5985-01-364-1944
ZFSC-4-3B	5985-01-253-2843
ZMSC-4-1B	4935-01-229-3228
ZMSC-4-1BR	5895-01-451-0601
ZSC-4-1B	5820-00-270-3056
ZSC-4-1B(BNC)	6625-00-270-3056
ZSC-4-1B(TNC)	6625-01-109-3707
ZSC-4-1-75	5998-01-228-8995
ZSC-4-2BR	6625-01-357-2227
ZSC-4-2B(BNC)	5820-01-120-5238
ZSC-4-3B	6625-01-038-8553

CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

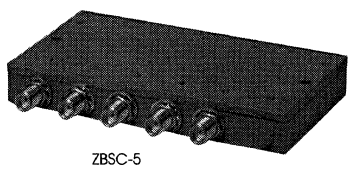
POWER SPLITTERS/COMBINERS 50 & 75Ω

5 WAY-0° 1 MHz to 750 MHz

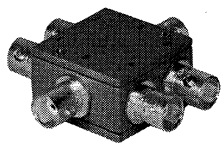
SURFACE MOUNT

PSC-5

SCP-5



ZBSC-5



ZFSC-5

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB L Min.	ISOLATION dB M° Typ.	ISOLATION dB M° Min.	ISOLATION dB U Typ.	ISOLATION dB U Min.	INSERTION LOSS, dB Above 7.0dB L Typ.	INSERTION LOSS, dB Above 7.0dB L Max.	INSERTION LOSS, dB Above 7.0dB M° Typ.	INSERTION LOSS, dB Above 7.0dB M° Max.	INSERTION LOSS, dB Above 7.0dB U Typ.	INSERTION LOSS, dB Above 7.0dB U Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M° Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M° Max.	AMPLITUDE UNBALANCE dB U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
PSC-5-1	1-300	25	20	23	18	20	17	0.2	0.5	0.6	1.0	1.5	2.0	2	4	8	0.2	0.3	0.6	2-64	C07	bj	64.45
PSC-5-2	250-750			22	17					1.1	2.5				14			0.7		2-155	C07	gq	67.95
■ PSC-5-1-75	1-300	35	20	30	18	25	17	0.4	0.6	0.6	0.9	0.9	1.3	2	4	8	0.2	0.3	0.6	2-64	C07	bj	64.45
SCP-5-1	2-200	30	20	29	20	30	20	0.2	0.5	0.3	0.75	0.6	1.5	1	3	5	0.2	0.3	0.6	2-155	YY161	hv	26.95
ZBSC-5-1	120-520			25	18					1.0	2.0				8			0.9		--	UU102	bm	119.95
ZFSC-5-1	1-300	25	20	23	18	20	17	0.2	0.5	0.6	1.0	1.5	2.0	2	4	8	0.2	0.3	0.6	2-64	G15	bm	99.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

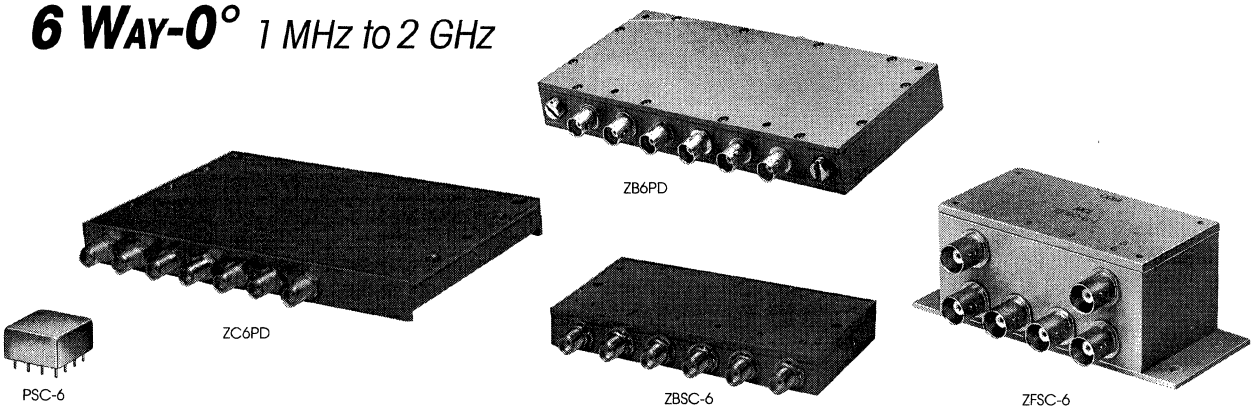
NOTES:

- ❑ Non-hermetic
- ■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.
- ✪ When only specification for M range given, specification applies to entire frequency range.
- △ Available only with SMA connectors.
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
- C. Prices and specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings:
  - 1a. Matched power rating:
    - Models ZB6PD, ZC6PD — 10 Watt
    - Model PSC-5-2 — 2 Watt
    - All other models — 1 Watt
  - 1b. Internal load dissipation:
    - Models ZB6PD, ZC6PD — 0.875 Watt
    - ZB6PD-1700 — 0.750 Watt
    - Models PSC-5-2, SCP-5-1, ZBSC-5-1 — 0.625 Watt
    - All other models — 0.500 Watt

Mini-Circuits®

Surface Mount, Plug-In & Coaxial

6 WAY-0° 1 MHz to 2 GHz



	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB L Min.	ISOLATION dB M° Typ.	ISOLATION dB M° Min.	ISOLATION dB U Typ.	ISOLATION dB U Min.	INSERTION LOSS, dB Above 7.8dB L Typ.	INSERTION LOSS, dB Above 7.8dB L Max.	INSERTION LOSS, dB Above 7.8dB M° Typ.	INSERTION LOSS, dB Above 7.8dB M° Max.	INSERTION LOSS, dB Above 7.8dB U Typ.	INSERTION LOSS, dB Above 7.8dB U Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M° Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M° Max.	AMPLITUDE UNBALANCE dB U Max.	VSWR (:1) S Typ.	VSWR (:1) S Max.	VSWR (:1) OUT Typ.	VSWR (:1) OUT Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	PSC-6-1	1-175	30	24	26	18	26	18	0.50	0.80	0.70	1.00	1.00	1.50	4	6	12	0.2	0.4	0.8					2-67	C07	bk	74.95
■	PSC-6-1-75	1-300	35	25	30	23	25	18	0.60	1.20	0.60	1.10	0.60	1.30	2	4	8	0.2	0.3	0.6					2-65	C07	bk	78.95
	ZC6PD-960	890-960			30	20					0.40	0.80			—	—	—		0.4		1.20	1.50	1.10	1.50	2-112	AB185	bn	124.95
	ZC6PD-960W	700-1000			28	15					0.40	1.00			—	—	—		0.6		1.30	1.50	1.20	1.50	2-112	AB185	bn	119.95
	ZC6PD-1900	1700-1900			30	20					0.40	0.80			—	—	—		0.5		1.10	1.40	1.10	1.50	2-113	AB185	bn	134.95
	ZC6PD-1900W	1500-2000			30	15					0.50	1.00			—	—	—		0.6		1.10	1.68	1.10	1.50	2-113	AB185	bn	129.95
	ZBSC-611	10-200	28	22	26	20	23	20	0.50	0.80	0.70	1.00	0.90	1.20	4	5	6	0.2	0.3	0.5					2-66	UU102	bn	114.95
	ZBSC-615	1-500	30	25	26	18	24	18	0.50	0.80	0.70	1.20	1.00	2.20	4	8	20	0.2	0.4	1.2					2-66	UU102	bn	119.95
	ZB6PD1-900	800-900			32	20					0.30	0.70			—	—	—		0.5		1.10	1.50	1.13	1.35	2-114	UU187	bn	139.95
	ZB6PD1-960	890-960			35	20					0.30	0.80			—	—	—		0.6		1.10	1.30	1.10	1.30	2-114	UU187	bn	139.95
	ZB6PD1-1900	1700-1900			32	20					0.40	0.80			—	—	—		0.6		1.10	1.30	1.09	1.40	2-115	UU187	bn	149.95
	ZB6PD-2	800-2000			27	17					0.70	1.70			—	—	—		0.7		1.20	1.60	1.13	1.30	2-156	Z259	bn	158.95
NEW	ZB6PD-17	600-1700			25	18					0.35	0.90			—	7	—		0.5		1.22	1.60	1.15	1.35	—	UU586	bn	139.95
	ZB6PD-1700	1500-1700			30	20					0.50	1.00			—	—	—		0.6		1.15	1.50	1.30	1.50	2-156	Z40	bn	149.95
	ZFSC-6-1	1-175	27	22	26	20	26	20	0.75	1.00	0.75	1.20	0.80	1.20	2	6	12	0.2	0.4	0.6					2-67	Q28	bn	99.95
■	ZFSC-6-1-75	1-200	30	25	30	22	20	18	0.75	1.00	0.75	1.00	0.90	1.20	2	6	12	0.2	0.4	0.6					2-65	Q28	bn	102.95
	ZFSC-6-110	1-500	35	25	26	20	25	20	0.50	0.80	0.60	1.10	1.00	1.70	2	6	12	0.3	0.3	0.8					2-67	Q28	bn	109.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

pin and coaxial connections

see case style outline drawing for pin locations

PORT	bj	bk	bm	bn	gg	hv
SUM PORT	1	1	S	S (COM)	1	1
PORT 1	4	3	1	1	3	6
PORT 2	8	4	2	2	8	8
PORT 3	12	8	3	3	12	7
PORT 4	16	12	4	4	16	5
PORT 5	15	16	5	5	15	3
PORT 6	—	15	—	6	—	—
GND EXT.	2,5,7,11,13,14	2,5,7,11,13,14	—	—	2,5,7,11,13,14	2,4
CASE GND	2,5,7,11,13,14	2,5,7,11,13,14	—	—	4,6,9,10	—
NOT USED	3,6,9,10	6,9,10	—	—	—	—

NSN GUIDE

MCL NO.	NSN
PSC-5-1	6625-01-255-3143
ZFSC-6-1(BNC)	6625-01-225-6965
ZFSC-6-1(SMA)	6625-01-263-9871
PSC-6-1	6625-01-249-8012
ZBSC-615	6625-01-391-5026

CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

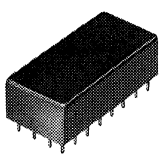
POWER SPLITTERS/COMBINERS 50 & 75Ω

8 WAY-0° 10 kHz to 850 MHz

SURFACE MOUNT

JCPS-8

PSC-8



PSC-8A

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB L Min.	ISOLATION dB M° Typ.	ISOLATION dB M° Min.	ISOLATION dB U Typ.	ISOLATION dB U Min.	INSERTION LOSS, dB Above 9dB L Typ.	INSERTION LOSS, dB Above 9dB L Max.	INSERTION LOSS, dB Above 9dB M° Typ.	INSERTION LOSS, dB Above 9dB M° Max.	INSERTION LOSS, dB Above 9dB U Typ.	INSERTION LOSS, dB Above 9dB U Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M° Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M° Max.	AMPLITUDE UNBALANCE dB U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
■ JCPS-8-850-75	10-850	34	20	25	15	20	15	0.7	1.5	1.0	2.0	1.8	3.0	--	--	--	0.6	0.7	1.0	2-157	BG291	hn	69.95
JCPS-8-850	10-850	34	20	25	17	20	15	0.8	1.5	1.0	2.5	1.8	3.0	5	10	15	0.6	0.7	1.0	--	BG291	hn	69.95
PSC-8-1	0.5-175	30	25	30	20	25	18	0.8	1.2	0.8	1.2	1.0	1.6	1.0	2.5	5.0	0.2	0.3	0.5	2-68	C07	bp	74.95
PSC-8-1W	10-600	25	20	23	16	20	16	1.0	1.8	1.2	2.2	1.7	2.8	2.0	4.0	10.0	0.3	0.6	0.9	2-157	C07	bp	109.95
■ PSC-8-1-75	0.5-175	25	20	30	20	25	20	0.5	1.0	0.6	1.1	0.7	1.3	1.0	2.5	5.0	0.2	0.2	0.3	2-73	C07	bp	78.95
❖ PSC-8-6	0.01-10	40	20	40	25	28	23	0.3	1.0	0.5	1.0	0.6	1.1	4.0	2.5	4.0	0.4	0.2	0.3	2-69	C07	bp	93.95
PSC-8A-4	5-500	25	20	23	18	20	15	0.7	1.2	1.0	1.8	1.4	2.5	3.0	8.0	16.0	0.2	0.3	0.5	2-68	E10	bq	103.95
■ PSC-8A4-75	1-300	26	20	30	25	30	23	0.8	1.2	0.7	1.1	0.9	1.3	1.0	3.0	8.0	0.2	0.2	0.4	2-72	E10	br	93.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NSN GUIDE

MCL NO.	NSN
PSC-8-1	6625-01-365-5615
ZB8PD-4(SMA)	5985-01-372-8880
ZFSC-8-1(BNC)	5820-01-136-7244
ZFSC-8-1(SMA)	6620-01-223-1235
ZFSC-8-1-75	5895-01-326-8664
ZFSC-8-43(SMA)	6625-01-333-1125
ZFSC-8375	5895-01-229-0156

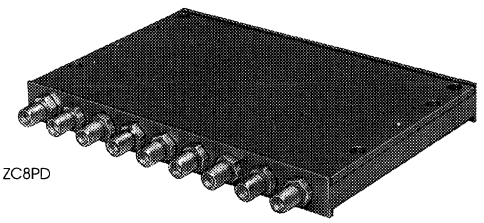
pin connections see case style outline drawings

PORT	SUM	#1	#2	#3	#4	#5	#6	#7	#8	NOT USED	GND EXT.	CASE GND
bp	2	1	5	9	13	16	12	8	4	10,11	3,6,7,14,15	3,6,7,14,15
bq	29	7	16	31	24	9	2	26	17	4,5,15	--	All other pins
br	29	7	16	31	24	9	2	26	17	15	--	All other pins
hn	1	3	4	5	6	9	10	11	12	--	2,7,8,13,14	2,7,8,13,14

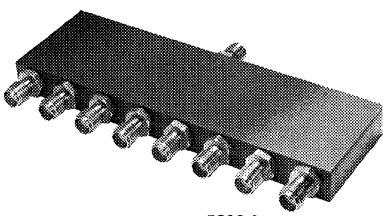
Mini-Circuits®

Surface Mount,❑ Plug-In & Coaxial

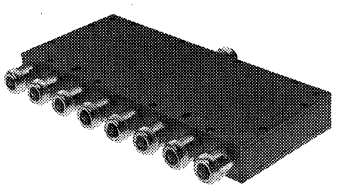
10 kHz to 8.4 GHz



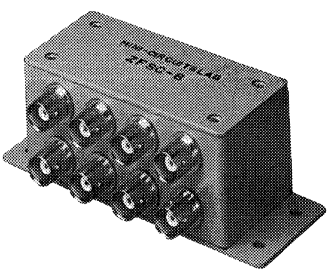
ZC8PD



ZCSC-8



ZB8PD



ZFSC-8

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M° Typ.	M° Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 9dB L Typ.	L Max.	M° Typ.	M° Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M° Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M° Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
ZC8PD-900*	800-900			30	20					0.4	0.7				5.0			0.4		2-115	AB186	—	158.95
ZCSC-8-1	2-250	37	27	30	20	24	18	0.65	1.2	0.8	1.2	1.0	1.6	2.0	4.0	8.0	0.2	0.3	0.5	2-158	UU215	—	119.95
ZFSC-8-1	0.5-175	30	25	30	20	25	18	0.8	1.2	0.8	1.2	1.0	1.6	1.0	2.5	5.0	0.2	0.2	0.3	2-68	R29	—	99.95
■ ZFSC-8-1-75	0.5-175	25	20	30	20	25	20	0.5	1.0	0.6	1.1	0.7	1.3	1.0	2.5	5.0	0.2	0.3	0.5	2-73	R29	—	102.95
■ ZFSC-82-75	10-900	35	17	23	17	20	15	0.6	0.9	0.9	1.6	1.6	2.7	2.0	4.0	10.0	0.2	0.5	1.2	2-73	R29	—	139.95
■ ZFSC-84-75	1-300	26	20	30	25	30	23	0.8	1.5	0.7	1.1	0.9	1.5	4.0	3.0	8.0	0.2	0.2	0.4	2-72	R29	—	119.95
■ ZFSC-8375	50-90	30	25	30	25	25	25	1.0	1.0	1.0	1.3	1.3	1.3	2.0	2.0	2.0	0.2	0.2	0.2	2-72	R29	—	119.95
ZFSC-8-4	5-700	35	20	25	17	20	17	0.8	1.2	1.2	1.8	1.8	2.5	2.0	5.0	15.0	0.2	0.4	0.7	2-70	R29	—	128.95
ZFSC-8-43	10-1000	23	20	25	20	26	20	1.0	1.6	1.4	2.1	2.1	2.9	5.0	10.0	20.0	0.2	0.4	0.7	2-70	R29	—	138.95
✣ ZFSC-8-6	0.01-10	35	20	40	25	35	25	0.3	1.0	0.2	0.6	0.3	0.7	4.0	2.0	3.0	0.4	0.2	0.3	2-69	R29	—	109.95
ZB8PD-1**	800-960			30	20					0.4	0.9				8.0			0.4		2-158	Z40	—	138.95
ZB8PD-2	1000-2000			24	17					0.8	1.3				18.0			0.8		2-71	Z40	—	138.95
ZB8PD-4	2000-4200			23	16					0.8	1.8				10.0			1.2		2-71	Z40	—	138.95
△ ZB8PD-6.4	5600-6800			26	18					0.8	1.7				15.0			0.7		—	Z40	—	138.95
ZB8PD-8.4	7200-8400			25	20					0.9	1.6				15.0			0.8		2-159	Z41	—	149.95
ZB8PD-2000***	800-2000			26	18					0.8	1.7				—			0.7		2-159	Z40	—	149.95
■ ZB8PD-22-75	950-2200			24	16					0.7	1.6				—			0.7		—	Z40	—	189.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

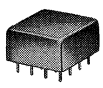
NOTES:

❑ Non-hermetic
* VSWR, input 1.06:1 typical, 1.2:1 max; output 1.17:1 typical, 1.35:1 max
** VSWR, input 1.22:1 typical, 1.5:1 max; output 1.11:1 typical, 1.30:1 max
*** VSWR, input 1.25:1 typical, 1.8:1 max; output 1.10:1 typical 1.40:1 max
✣ Below 0.1 MHz power handling decrease as to typically 15 dBm at 0.01 MHz, 23 dBm at 0.025 Mhz, and 29 dBm at 0.05 MHz.
■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.
✪ When specification for only M range given, specification applies to entire frequency range.
△ Available only with SMA connectors.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
1a. Matched power rating,
Models ZB8PD, ZC8PD 10 Watt
All other models, 1 Watt
1b. Internal load dissipation,
Models JCPS, ZB8PD, ZC8PD 0.875 Watt
All other models, 0.62 Watt

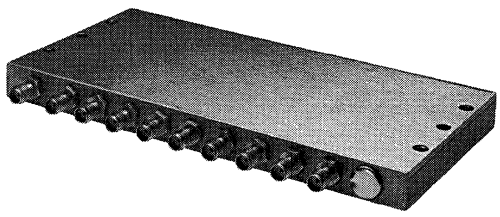
In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

POWER SPLITTERS/COMBINERS 50Ω Plug-In & Coaxial

9 WAY-0° 2 to 1000 MHz



PSC-9



ZC9PD

MODEL NO.	FREQ. RANGE MHz	ISOLATION dB						INSERTION LOSS, dB Above 9.6dB						PHASE UNBALANCE Degrees			AMPLITUDE UNBALANCE dB			VSWR (:1)		CAPD DATA (see RF/IF Designer handbook)	CASE STYLE	CONNECTION	PRICE $
		L		M°		U		L		M°		U		L	M°	U	L	M°	U	S	OUT				
	f_L-f_U	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Max.	Typ.	Max.	Typ.	Max.	Max.	Max.	Max.	Max.	Max.	Max.	Typ. Max.	Typ. Max.	Page	Note B		Qty. (1-9)
PSC-9-1	2-300	38	25	26	20	22	15	0.6	1.1	0.9	1.4	1.5	2.0	2.0	5.0	10.0	0.2	0.3	0.8	—	—	2-160	C07	gr	93.95
ZC9PD-1000	800-1000			30	20					0.6	1.2				—			0.6		1.22	1.60 1.11 1.30	2-160	AB204	—	169.95

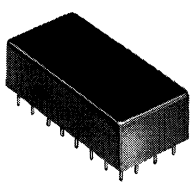
L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NOTES:

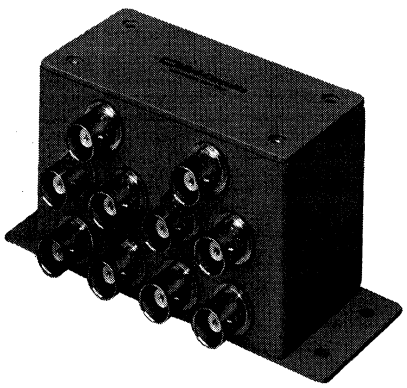
* VSWR, input 1.2:1 typ., 1.6:1 max; output 1.2:1 typ., 1.35:1 max.
** Input 1.3:1 typ., 1.7 max.; output 1.2:1 typ., 1.6:1 max.
✪ When only specification for M range given, specification applies to entire frequency range.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
   1a. Matched power rating.
   Models PSC-9-1, ZC9PD-1000 0.5 Watt
   Model ZC10PD 10 Watt
   All other models 1 Watt
   1b. Internal load dissipation,
   Models PSC-9-1, ZC9PD-1000, ZC10PD 1.5 Watt
   ZC10PD-26 0.80 Watt
   All other models 0.87 Watt

Mini-Circuits®

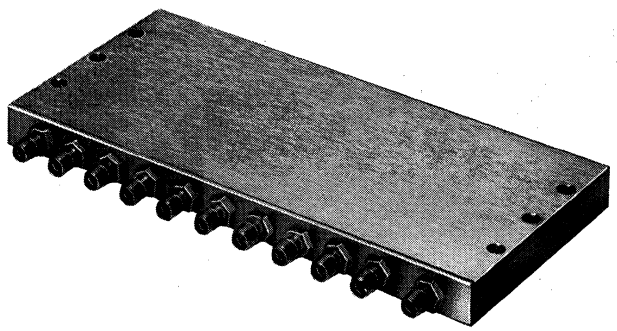
10 WAY-0° 0.5 to 2600 MHz



PSC-10



ZFSC-10



ZC10PD

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	ISOLATION dB L Min.	ISOLATION dB M° Typ.	ISOLATION dB M° Min.	ISOLATION dB U Typ.	ISOLATION dB U Min.	INSERTION LOSS, dB Above 10dB L Typ.	INSERTION LOSS, dB Above 10dB L Max.	INSERTION LOSS, dB Above 10dB M° Typ.	INSERTION LOSS, dB Above 10dB M° Max.	INSERTION LOSS, dB Above 10dB U Typ.	INSERTION LOSS, dB Above 10dB U Max.	PHASE UNBALANCE Degrees L Max.	PHASE UNBALANCE Degrees M° Max.	PHASE UNBALANCE Degrees U Max.	AMPLITUDE UNBALANCE dB L Max.	AMPLITUDE UNBALANCE dB M° Max.	AMPLITUDE UNBALANCE dB U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
PSC-10-1	1-150	36	23	27	23	23	18	0.3	0.6	0.4	0.8	1.0	1.3	3	6	10	0.2	0.3	0.4	2-74	E10	bs	85.95
ZFSC-10-1	0.5-100	28	20	30	24	27	20	0.5	0.8	0.4	1.0	0.8	1.5	3	6	10	0.2	0.3	0.4	2-74	RR93	—	119.95
ZC10PD-900	800-900			25	20					1.5	2.0				—			0.8		2-120	AB204	—	178.95
ZC10PD-900W*	750-900			30	20					0.4	1.0				—			0.6		2-161	AB204	—	189.95
ZC10PD-26**	2300-2600			35	20					0.7	1.9				15			1.1		—	AB204	—	199.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

pin and coaxial connections see case style outline drawings for pin locations

PORT	SUM	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	NOT USED	GND EXT.	CASE GND
bs	29	7	16	31	24	9	2	26	17	4	5	15	All other pins	All other pins
gr	1	9	13	14	15	16	12	8	4	3	—	—	All other pins	All other pins

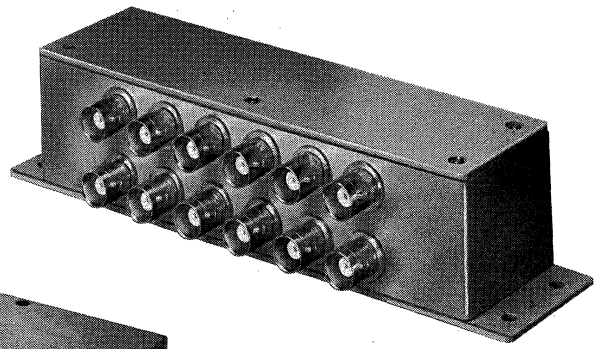
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

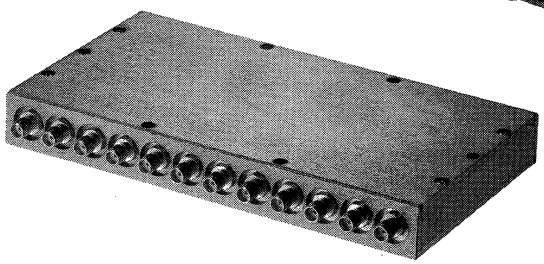
CAPD now available! computer-automated performance data

POWER SPLITTERS/COMBINERS 50 & 75Ω

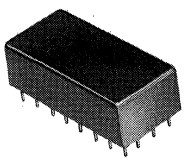
12 WAY-0° 1 to 1700 MHz



ZFSC-12



ZN12PD



PSC-12

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 10.8dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
PSC-12-1	1-200	35	30	27	20	21	18	0.5	0.8	0.8	1.2	1.0	1.4	4	8	16	0.2	0.4	0.7	2-75	E10	bu	88.95
ZN12PD-17	800-1700			30	18					0.45	1.0				14			0.7		--	UU589	—	249.00
ZFSC-12-1	1-200	30	25	35	20	28	20	0.8	1.2	1.1	1.4	1.3	1.6	4	8	16	0.3	0.2	0.3	2-75	R67	—	174.95
ZFSC-12-11	10-300	28	20	33	25	28	20	1.1	1.3	1.1	1.5	1.5	1.8	2	4	6	0.2	0.3	0.4	2-75	R67	—	174.95
■ ZFSC-12-1-75	10-200	35	27	—	—	27	20	0.5	0.8	—	—	0.8	1.3	—	—	—	0.25	—	0.4	2-76	R67	—	179.95
■ ZFSC-12-175	10-500	23	20	24	20	22	18	0.9	1.2	1.0	1.3	1.2	2.0	—	—	—	0.4	0.5	0.8	2-76	R67	—	197.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NOTES:

- ❑ Non-hermetic
- ■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.
- ✪ When only specification for M range given, specification applies to entire frequency range.
- ✣ At low range frequency band (f_L to 10 f_L), linearly derate maximum input power by 13 dB.
- * For adjacent ports, isolation is 28 dB minimum.
  Adjacent ports defined as: (1,3) (5,7) (9,11) (13,15)
  (2,4) (6,8) (10,12) (14,16)

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".

C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:

1a. Matched power rating,

Model ZC16PD	10 Watt
Model ZN12PD	5 Watt
Model JEPS	0.5 Watt
All other models	1 Watt

1b. Internal load dissipation,

Model ZC16PD	2.4 Watt
Model ZN12PD	2 Watt
Model ZC16PD-2185	1.75 Watt
Model JEPS	0.275 Watt
All other models	0.87 Watt

NSN GUIDE

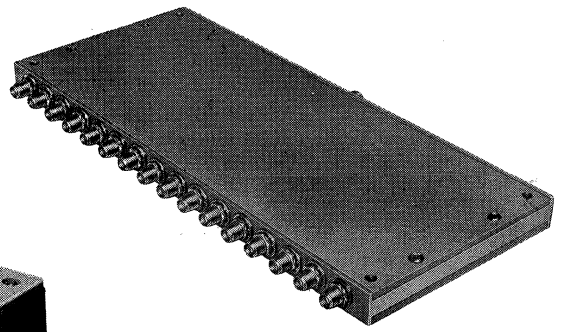
MCL NO.	NSN
ZFSC-16-1(BNC)	5820-01-9321

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

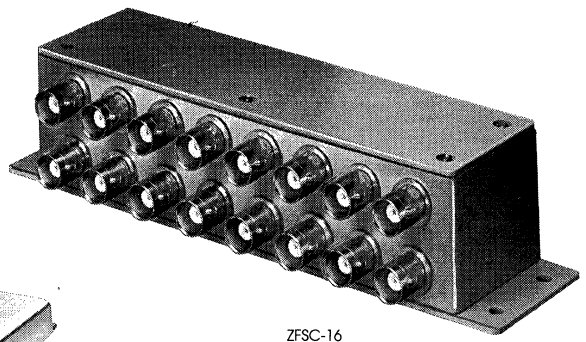
Mini-Circuits®

Surface Mount, Plug-In & Coaxial

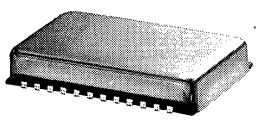
16 WAY-0° 10 kHz to 2.6 GHz



ZC16PD



ZFSC-16



JEPS-16

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M° Typ.	M° Min.	U Typ.	U Min.	INSERTION LOSS, dB Above 12dB L Typ.	L Max.	M° Typ.	M° Max.	U Typ.	U Max.	PHASE UNBALANCE Degrees L Max.	M° Max.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M° Max.	U Max.	VSWR (:1) S Typ.	S Max.	OUT Typ.	OUT Max.	CAPD DATA (see RF/IF Designer's handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
NEW ■	JEPS-16-1W-75	10-800	32	20	23	15	20	15	1.6	3.5	1.9	3.5	2.2	4.0	10	15	30	0.8	1.2	2.1	1.40	—	1.16	—	—	BL372	kf	139.95
	ZFSC-16-1	0.5-125	30	24	25	18	20	15	1.0	1.2	1.1	1.3	1.2	1.4	1	3	5	0.3	0.2	0.5	see				2-78	R30	—	172.95
■	ZFSC-16-1-75	1-150	30	25	30	25	25	20	0.8	1.1	0.7	1.1	1.0	1.3	3	6	10	0.4	0.2	0.4	Performance				2-77	R30	—	182.95
	ZFSC-16-3*	1-30	45	35	45	40	41	35	0.5	0.9	0.5	0.9	0.5	0.9	1	2	3	0.1	0.1	0.1	Data and				2-78	R30	—	172.95
■	ZFSC-16-675	0.01-25	25	20	40	25	25	20	0.8	1.1	0.4	0.8	1.0	1.6	1	3	5	0.1	0.2	0.4					2-77	R30	—	189.95
	ZFSC-16-12	0.1-200	33	20	27	20	26	20	0.6	1.5	0.7	1.0	0.9	1.5	2	6	9	0.4	0.2	0.4	curves				2-79	R30	—	189.95
	ZC16PD-900	800-900			30	20					0.5	1.0							0.5		1.06	1.20	1.06	1.20	2-117	UU179	—	295.00
	ZC16PD-960	890-960			28	20					0.5	1.0							0.5		1.06	1.30	1.06	1.20	2-116	UU179	—	295.00
	ZC16PD-960W	700-1000			26	15					0.5	1.3							0.6		1.10	1.60	1.06	1.30	2-116	UU179	—	265.00
	ZC16PD-1900	1700-1900			30	20					0.5	1.0							0.8		1.15	1.35	1.06	1.30	2-117	UU179	—	349.00
	ZC16PD-1900W	1500-2100			30	15					0.7	1.4							0.8		1.25	1.60	1.15	1.35	2-162	UU179	—	319.00
	ZC16PD-2185	1800-2600			30	16					0.5	1.4				6			0.7		1.15	1.60	1.05	1.30	2-162	UU179	—	319.00

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

pin and coaxial connections see case style outline drawings

PORT	SUM	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	#15	#16	NOT USED	GND EXT.	CASE GND
bu	5	7	8	1	2	31	32	25	26	22	30	19	27	—	—	—	—	11,14,21	4	All other pins
kf	18	2	3	4	5	9	10	11	12	12	14	15	16	20	21	22	23	—	1,6,7,8,17,19,24	—

CAPD now available! computer-automated performance data

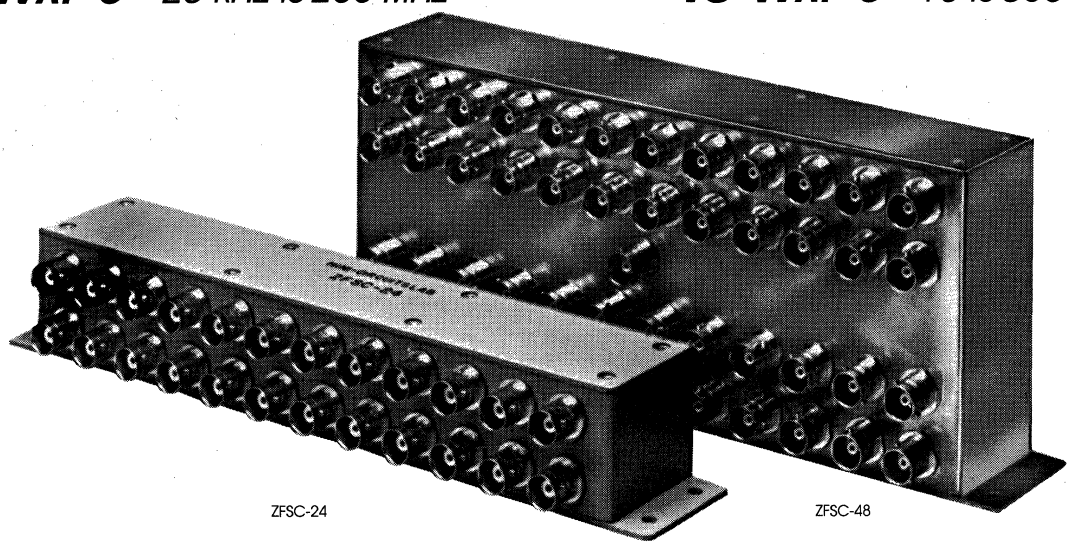
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

POWER SPLITTERS/COMBINERS 50 & 75Ω

24 WAY-0° 25 kHz to 200 MHz

48 WAY-0° 10 to 300 MHz



ZFSC-24 ZFSC-48

MODEL NO.	FREQ. RANGE MHz f_L-f_U	ISOLATION dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	INSERTION LOSS, dB 24 WAY (above 13.8dB) 48 WAY (above 16.8dB) L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	AMPLITUDE UNBALANCE dB L Max.	M Max.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
ZFSC-24-1	0.2-100	25	20	25	20	25	20	1.0	2.0	1.0	2.0	1.0	2.0	0.6	0.4	0.5	2-80	R31	—	264.95
ZFSC-24-11	1-200	33	25	22	20	20	17	0.9	1.7	1.0	1.8	1.3	2.2	0.6	0.8	0.8	2-80	R31	—	274.95
■ ZFSC-24-11-75	1-200	35	25	33	20	27	20	0.6	1.3	0.8	1.5	1.1	2.0	0.6	0.4	0.6	2-161	R31	—	274.95
✣ ZFSC-24-6	0.025-50	30	25	39	28	30	22	0.4	1.0	0.4	1.0	0.6	1.5	0.2	0.3	0.7	2-81	R31	—	274.95
ZFSC-48-1	10-300	30	25	28	20	23	20	1.2	2.0	2.1	2.5	2.8	4.0	0.6	0.7	1.0	2-82	HH68	—	590.00
■ ZFSC-48-1-75	10-300	30	25	28	20	23	20	1.2	2.0	2.1	2.5	2.8	4.0	0.6	0.7	1.0	2-82	HH68	—	590.00

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

NOTES:

■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.

✣ At low range frequency band (f_L to 10 f_L), linearly derate maximum input power by 13 dB.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".

C. Prices and specifications subject to change without notice.

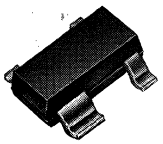
1. Absolute maximum power, voltage and current ratings:
   1a. Matched power rating, 1 Watt
   1b. Internal load dissipation, 0.87 Watt

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

FIXED ATTENUATORS 50 Ω

Mini-Circuits®
Surface Mount

1/2W MINIATURE 1 to 20 dB, DC to 2500 MHz



LAT

MODEL NO.	FREQUENCY RANGE, MHz f_L-f_U	ATTENUATION dB Nom.	FLATNESS, MAX. L	M	U	VSWR max. :1 L	M	U	MAX. INPUT POWER,W 25°C	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (10-49)
LAT-1	DC-2500	1±0.3	0.3	0.4	0.7	1.2	1.3	1.4	0.50	---	MMM168	jk	1.95
LAT-2	DC-2500	2±0.3	0.3	0.4	0.7	1.2	1.3	1.4	0.50	---	MMM168	jk	1.95
LAT-3	DC-2500	3±0.3	0.3	0.4	0.7	1.2	1.3	1.4	0.50	---	MMM168	jk	1.95
LAT-4	DC-2500	4±0.3	0.3	0.4	0.7	1.2	1.3	1.4	0.50	---	MMM168	jk	1.95
LAT-5	DC-2500	5±0.3	0.3	0.4	0.7	1.2	1.3	1.4	0.50	---	MMM168	jk	1.95
LAT-6	DC-2500	6±0.3	0.3	0.4	0.7	1.3	1.4	1.5	0.50	---	MMM168	jk	1.95
LAT-7	DC-2500	7±0.3	0.3	0.4	0.7	1.3	1.4	1.5	0.50	---	MMM168	jk	1.95
LAT-8	DC-2500	8±0.4	0.3	0.5	0.8	1.3	1.4	1.5	0.50	---	MMM168	jk	1.95
LAT-9	DC-2500	9±0.4	0.3	0.5	0.8	1.3	1.4	1.5	0.50	---	MMM168	jk	1.95
LAT-10	DC-2500	10±0.5	0.3	0.5	0.8	1.3	1.4	1.5	0.50	---	MMM168	jk	1.95
LAT-12	DC-2500	12±0.8	0.3	0.5	0.8	1.3	1.4	1.6	0.50	---	MMM168	jk	1.95
LAT-15	DC-2500	15±0.8	0.3	0.5	0.8	1.3	1.4	1.6	0.50	---	MMM168	jk	1.95
LAT-20	DC-2500	20±1.5	0.3	0.5	0.8	1.3	1.4	1.6	0.50	---	MMM168	jk	1.95

L = DC-500 MHz M = DC-1000 MHz U = DC-2500

features

- wideband DC - 2500 MHz frequency coverage.
- excellent VSWR throughout entire band.
- miniature size SOT-143 package
- low cost

pin connections

see case style outline drawings

PORT	jk
INPUT	4
OUTPUT	2
GND	1,3

marking code:

2 digits for nominal attenuation value.
examples: 03 for LAT-3, 20 for LAT-20

NOTES:
A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. RF power at 25°C case temp.: 1/2 Watt.
2. Attenuation and VSWR at 25°C case temp.

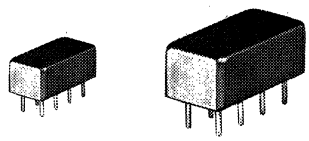
designers kits available

KIT NO.	MODEL TYPE	No. of Units in Kit	DESCRIPTION	PRICE $ per kit
K1-LAT	LAT	36	4 of each 3,6,10, 15, 20 2 of each 1,2,4,5,7,8,9,12	59.95

In Stock... Immediate Delivery Available Tape & Reel
For Custom Versions Of Standard Models Consult Our Applications Dept.

FIXED ATTENUATORS 50 & 75 Ω Plug-In

1/2W, 1W 1 to 40 dB, DC to 2000 MHz



MAT AT

MODEL NO.	FREQUENCY RANGE, MHz f_L-f_U	ATTENUATION dB Nom.	FLATNESS, MAX. L	M	U	VSWR max. L	M	U	POWER,W	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
MAT-1	DC-1500	1±0.2	0.3	0.4	0.5	1.3	1.5	1.7	0.5	6-12	A11	cr	4.45
MAT-2	DC-1500	2±0.2	0.3	0.4	0.8	1.3	1.5	1.7	0.5	6-12	A11	cr	4.45
MAT-3	DC-1500	3±0.2	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-12	A11	cr	4.45
MAT-4	DC-1500	4±0.2	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-13	A11	cr	4.45
MAT-5	DC-1500	5±0.3	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-13	A11	cr	4.45
MAT-6	DC-1500	6±0.3	0.3	0.6	1.0	1.3	1.5	1.7		6-13	A11	cr	4.45
MAT-7	DC-1500	7±0.3	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-13	A11	cr	4.45
MAT-8	DC-1500	8±0.3	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-8	A11	cr	4.45
MAT-9	DC-1500	9±0.4	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-8	A11	cr	4.45
MAT-10	DC-1500	10±0.4	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-8	A11	cr	4.45
MAT-12	DC-1500	12±0.4	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-8	A11	cr	4.45
MAT-15	DC-1500	15±0.4	0.4	0.7	1.1	1.3	1.5	1.7	0.5	6-9	A11	cr	4.45
MAT-20	DC-1500	20±0.5	0.4	0.8	1.3	1.3	1.6	1.8	0.5	6-9	A11	cr	4.45
MAT-25	DC-1500	25±0.5	0.4	0.8	1.3	1.3	1.6	1.8	0.5	6-16	A11	cr	4.45
MAT-30	DC-1000	30±0.5	0.5	1.0	—	1.3	1.6	—	0.5	6-9	A11	cr	4.45
MAT-40	DC-500	40±0.6	1.0	—	—	1.5	—	—	0.5	6-9	A11	cr	4.45
AT-1	DC-1500	1±0.2	0.3	0.4	0.5	1.3	1.5	1.7	1	6-12	A04	cr	3.65
AT-2	DC-1500	2±0.2	0.3	0.4	0.8	1.3	1.5	1.7	1	6-12	A04	cr	3.65
AT-3	DC-1500	3±0.2	0.3	0.6	1.0	1.3	1.5	1.7	1	6-12	A04	cr	3.65
■ AT-3-75	DC-500	3±0.2	0.9	—	—	2.0	—	—	1	6-12	A04	cr	3.65
AT-4	DC-1500	4±0.2	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	A04	cr	3.65
AT-5	DC-1500	5±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	A04	cr	3.65
AT-6	DC-1500	6±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	A04	cr	3.65
■ AT-6-75	DC-500	6±0.3	1.0	—	—	2.0	—	—	1	6-13	A04	cr	3.65
AT-7	DC-1500	7±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	A04	cr	3.65
AT-8	DC-1500	8±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	A04	cr	3.65
AT-9	DC-1500	9±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	A04	cr	3.65
AT-10	DC-1500	10±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	A04	cr	3.65
■ AT-10-75	DC-500	10±0.4	1.0	—	—	2.0	—	—	1	6-8	A04	cr	3.65
AT-12	DC-1500	12±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	A04	cr	3.65
AT-15	DC-1500	15±0.4	0.4	0.7	1.1	1.3	1.5	1.7	1	6-9	A04	cr	3.65
■ AT-15-75	DC-500	15±0.4	0.8	—	—	1.5	—	—	1	6-9	A04	cr	3.65
AT-20	DC-1500	20±0.5	0.4	0.8	1.3	1.3	1.6	1.8	1	6-9	A04	cr	3.65
■ AT-20-75	DC-500	20±0.5	1.1	—	—	2.0	—	—	1	6-9	A04	cr	3.65
AT-25	DC-2000	25±0.5	0.4	0.8	1.3*	1.3	1.6	1.8**	1	6-16	A04	cr	3.65
AT-30	DC-1000	30±0.5	0.5	1.0	—	1.3	1.6	—	1	6-9	A04	cr	3.65
AT-40	DC-500	40±0.6	1.0	—	—	1.5	—	—	1	6-9	A04	cr	3.65

L = DC-500 MHz M = DC-1000 MHz U = DC-f_U

NOTES:

❑ Non-hermetic
■ Denotes 75 ohm models.
* Attenuation Flatness over DC-2000 MHz: 0.75 dB typ.
** VSWR over DC-2000 MHz: 1.45 (typ.)
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
C. Prices and specifications subject to change without notice.
For PAT models:
1. RF power at 25° C case temp.: 1 Watt.
2. Attenuation and VSWR at 25° C case temp.

NSN GUIDE

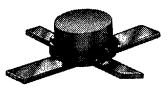
MCL NO.	NSN		
AT-6	5985-01-275-0339	MAT-3	5985-01-274-6609
MAT-1	5985-01-265-8138	MAT-4	5985-01-326-6977
MAT-10	5985-01-294-4719	MAT-5	5985-01-336-3720
MAT-15	5985-01-294-4720	MAT-6	5985-01-295-0261
MAT-2	5985-01-336-3058	MAT-7	5985-01-326-6978
MAT-20	5985-01-294-4721	MAT-9	5985-01-332-4595

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

Mini-Circuits®

Surface Mount □

1W MINIATURE CERAMIC 1 to 30 dB, DC to 7000 MHz



PAT

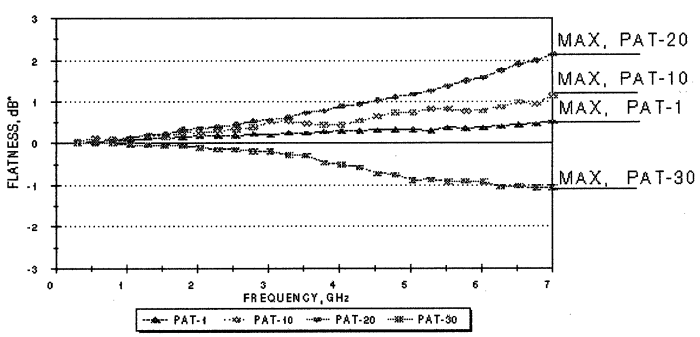
MODEL NO.	FREQUENCY RANGE, MHz f_L-f_U	ATTENUATION dB Nom.	FLATNESS, MAX. L	M	U	VSWR max. L	M	U	POWER,W	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (10-49)
PAT-1	DC-7000	1±0.2	0.3	0.4	0.7	1.2	1.3	1.4	1	6-14	AF320	hl	2.95
PAT-2	DC-7000	2±0.2	0.3	0.5	0.9	1.2	1.3	1.4	1	6-14	AF320	hl	2.95
PAT-3	DC-7000	3±0.3	0.3	0.5	0.9	1.2	1.3	1.4	1	6-14	AF320	hl	2.95
PAT-4	DC-7000	4±0.3	0.3	0.5	0.9	1.2	1.3	1.4	1	6-14	AF320	hl	2.95
PAT-5	DC-7000	5±0.3	0.3	0.5	1.0	1.2	1.3	1.4	1	6-14	AF320	hl	2.95
PAT-6	DC-7000	6±0.3	0.3	0.5	1.1	1.2	1.3	1.4	1	6-15	AF320	hl	2.95
PAT-7	DC-7000	7±0.3	0.4	0.6	1.3	1.3	1.4	1.5	1	6-15	AF320	hl	2.95
PAT-8	DC-7000	8±0.4	0.4	0.6	1.5	1.3	1.4	1.5	1	6-15	AF320	hl	2.95
PAT-9	DC-7000	9±0.4	0.4	0.6	1.7	1.3	1.4	1.5	1	6-15	AF320	hl	2.95
PAT-10	DC-7000	10±0.4	0.4	0.6	1.7	1.3	1.4	1.5	1	6-15	AF320	hl	2.95
PAT-12	DC-7000	12±0.6	0.5	0.6	1.8	1.3	1.4	1.5	1	6-16	AF320	hl	2.95
PAT-15	DC-7000	15±0.6	0.5	0.7	2.4	1.3	1.4	1.5	1	6-16	AF320	hl	2.95
PAT-20	DC-7000	20±1.3	0.5	0.7	2.6	1.4	1.4	1.5	1	6-16	AF320	hl	2.95
PAT-30	DC-7000	30±1.7	0.4	0.9	2.8	1.4	1.4	1.5	1	6-16	AF320	hl	2.95

L = DC-1000 MHz M = DC-2500 MHz U = DC-f_U

features

- low-cost ceramic package.
- wideband DC - 7 GHz frequency coverage.
- excellent VSWR throughout entire band.
- miniature size.

TYPICAL FLATNESS vs. FREQUENCY



* 0 dB on Flatness graph corresponds to actural low-frequency attenuation value.

pin connections

see case style outline drawings

PORT	cr	hl
INPUT	1	1
OUTPUT	8	3
GND	2,3,4,5,6,7	2,4

marking code:

2 digits for nominal attenuation value.
examples: 03 for PAT-3, 20 for PAT-20

designers kits available

KIT NO.	MODEL TYPE	No. of Units in Kit	DESCRIPTION	PRICE $ per kit
K1-PAT	PAT	20	4 of each 3, 6, 10, 15, 20	49.95

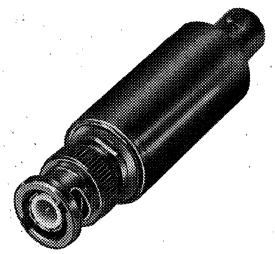
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

Available Tape & Reel

FIXED ATTENUATORS 50 & 75 Ω Coaxial

UP TO 2W 0.5 to 40 dB, DC to 6000 MHz



CAT

MODEL NO.	FREQUENCY RANGE, MHz f_L-f_U	ATTENUATION dB Nom.	FLATNESS, MAX. L	M	U	VSWR max. L	M	U	POWER,W	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
CAT-1	DC-1500	1±0.2	0.3	0.4	0.5	1.3	1.5	1.7	1	6-12	FF55	-	16.95
CAT-2	DC-1500	2±0.2	0.3	0.4	0.8	1.3	1.5	1.7	1	6-12	FF55	-	16.95
CAT-3	DC-1500	3±0.2	0.3	0.6	1.0	1.3	1.5	1.7	1	6-12	FF55	-	16.95
■ CAT-3-75	DC-500	3±0.2	0.9	—	—	2.0	—	—	1	6-12	FF55	-	16.95
CAT-4	DC-1500	4±0.2	0.3	0.6	1.0	1.3	1.5	1.7	1	6-12	FF55	-	16.95
CAT-5	DC-1500	5±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF55	-	16.95
CAT-6	DC-1500	6±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF55	-	16.95
■ CAT-6-75	DC-500	6±0.3	1.0	—	—	2.0	—	—	1	6-13	FF55	-	16.95
CAT-7	DC-1500	7±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF55	-	16.95
CAT-8	DC-1500	8±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF55	-	16.95
CAT-9	DC-1500	9±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF55	-	16.95
CAT-10	DC-1500	10±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	FF55	-	16.95
■ CAT-10-75	DC-500	10±0.4	1.0	—	—	2.0	—	—	1	6-8	FF55	-	16.95
CAT-12	DC-1500	12±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	FF55	-	16.95
CAT-15	DC-1500	15±0.4	0.4	0.7	1.1	1.3	1.5	1.7	1	6-8	FF55	-	16.95
■ CAT-15-75	DC-500	15±0.4	0.8	—	—	1.5	—	—	1	6-9	FF55	-	16.95
CAT-20	DC-1500	20±0.5	0.4	0.8	1.3	1.3	1.6	1.8	1	6-9	FF55	-	16.95
■ CAT-20-75	DC-500	20±0.5	1.1	—	—	2.0	—	—	1	6-9	FF55	-	16.95
CAT-25	DC-2000	25±0.5	0.4	0.8	1.3*	1.3	1.6	2.0**	1	6-16	FF55	-	16.95
CAT-30	DC-1000	30±0.5	0.5	1.0	—	1.3	1.6	—	1	6-9	FF55	-	16.95
CAT-40	DC-500	40±0.6	1.0	—	—	1.5	—	—	1	6-9	FF55	-	16.95

L = DC-500 MHz M = DC-1000 MHz U = DC-f_U

NOTES:

■ Denotes 75 ohm models. For coax connector models 75 ohm BNC connectors are standard.

* Attenuation Flatness over DC-2000 MHz:
CAT-25, NAT-25, 0.75 dB typ.; NAT-1-2W, 0.20 dB typ.;
NAT-2-2W, 0.40 dB typ.; NAT-3-2W, 0.50 dB typ.
NAT-4-2W, 0.8 dB typ.; NAT-5-2W, 0.9 dB typ.; NAT-6-2W, 1.0 dB typ.

** VSWR over DC-2000 MHz:
CAT-25, NAT-25, 1.45 (typ.)
NAT-2W models, 1.25 (typ.)

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".

C. Prices and specifications subject to change without notice.

NSN GUIDE

MCL NO.	NSN		
CAT-3	5985-01-447-0901	NAT-10	5985-01-291-5548
CAT-5	5985-01-299-9258	NAT-30	5985-01-298-0746
CAT-6	5985-01-300-0481	SAT-3	5985-01-418-0247
CAT-10	5985-01-380-3801	SAT-6	5985-01-237-5343
CAT-15	5985-01-299-9257	SAT-10	5985-01-250-4812
CAT-20	5985-01-265-0338	SAT-15	5985-01-418-0250
CAT-30	5985-01-296-0943	SAT-20	5985-01-454-7333
NAT-3	5985-01-298-0747	SAT-30	5985-01-190-6838

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

Mini-Circuits®

SAT

NAT

TAT (Consult factory)

MODEL NO.	FREQUENCY RANGE, MHz f_L-f_U	ATTENUATION dB Nom.	FLATNESS, MAX. L	M	U	VSWR max. L	M	U	POWER,W	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
SAT-0.5	DC-1500	0.5±0.1	0.2	0.3	0.3	1.2	1.2	1.3	1	6-17	FF56	-	20.95
SAT-1	DC-1500	1±0.2	0.3	0.4	0.5	1.3	1.5	1.7	0.5	6-12	FF56	-	20.95
SAT-2	DC-1500	2±0.2	0.3	0.4	0.8	1.3	1.5	1.7	0.5	6-12	FF56	-	20.95
SAT-2.5	DC-1500	2.5±0.2	0.2	0.4	0.7	1.2	1.2	1.3	0.25	6-17	FF56	-	20.95
SAT-3	DC-1500	3±0.2	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-12	FF56	-	20.95
SAT-4	DC-1500	4±0.2	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-12	FF56	-	20.95
SAT-5	DC-1500	5±0.3	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-13	FF56	-	20.95
SAT-6	DC-1500	6±0.3	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-13	FF56	-	20.95
SAT-7	DC-1500	7±0.3	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-13	FF56	-	20.95
SAT-8	DC-1500	8±0.3	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-13	FF56	-	20.95
SAT-9	DC-1500	9±0.4	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-8	FF56	-	20.95
SAT-10	DC-1500	10±0.4	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-8	FF56	-	20.95
SAT-12	DC-1500	12±0.4	0.3	0.6	1.0	1.3	1.5	1.7	0.5	6-8	FF56	-	20.95
SAT-15	DC-1500	15±0.4	0.4	0.7	1.1	1.3	1.5	1.7	0.5	6-8	FF56	-	20.95
SAT-20	DC-1500	20±0.5	0.4	0.8	1.3	1.3	1.6	1.8	0.5	6-9	FF56	-	20.95
SAT-30	DC-1000	30±0.5	0.5	1.0	—	1.3	1.6	—	0.5	6-9	FF56	-	20.95
SAT-40	DC-500	40±0.6	1.0	—	—	1.5	—	—	0.5	6-9	FF56	-	20.95
NAT-1	DC-1500	1±0.2	0.3	0.4	0.5	1.3	1.5	1.7	1	6-12	FF57	-	23.95
NAT-1-2W	DC-2000	1±0.2	0.2	0.3	0.5*	1.3	1.4	1.5**	2	6-17	FF57	-	26.95
NAT-2	DC-1500	2±0.2	0.3	0.4	0.8	1.3	1.5	1.7	1	6--12	FF57	-	23.95
NAT-2-2W	DC-2000	2±0.2	0.2	0.4	0.7*	1.3	1.4	1.5**	2	6-17	FF57	-	26.95
NAT-3	DC-1500	3±0.2	0.3	0.6	1.0	1.3	1.5	1.7	1	6-12	FF57	-	23.95
NAT-3-2W	DC-2000	3±0.2	0.3	0.4	0.7*	1.3	1.4	1.5**	2	6-17	FF57	-	26.95
NAT-4	DC-1500	4±0.2	0.3	0.6	1.0	1.3	1.5	1.7	1	6-12	FF57	-	23.95
NAT-4-2W	DC-2000	4±0.2	0.2	0.5	1.2*	1.3	1.4	1.5**	2	—	FF57	-	26.95
NAT-5	DC-1500	5±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF57	-	23.95
NAT-5-2W	DC-2000	5±0.2	0.2	0.5	1.2*	1.3	1.4	1.5**	2	—	FF57	-	26.95
NAT-6	DC-1500	6±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF57	-	23.95
NAT-6-2W	DC-2000	6±0.2	0.2	0.5	1.5*	1.3	1.4	1.5**	2	—	FF57	-	26.95
NAT-7	DC-1500	7±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF57	-	23.95
NAT-8	DC-1500	8±0.3	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF57	-	23.95
NAT-9	DC-1500	9±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-13	FF57	-	23.95
NAT-10	DC-1500	10±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	FF57	-	23.95
NAT-12	DC-1500	12±0.4	0.3	0.6	1.0	1.3	1.5	1.7	1	6-8	FF57	-	23.95
NAT-15	DC-1500	15±0.4	0.4	0.7	1.1	1.3	1.5	1.7	1	6-8	FF57	-	23.95
NAT-20	DC-1500	20±0.5	0.4	0.8	1.3	1.3	1.6	1.8	1	6-9	FF57	-	23.95
NAT-25	DC-2000	25±0.5	0.4	0.8	1.3*	1.3	1.6	1.8**	1	6-16	FF57	-	23.95
NAT-30	DC-1000	30±0.5	0.5	1.0	—	1.3	1.6	—	1	6-9	FF57	-	23.95
NAT-40	DC-500	40±0.6	1.0	—	—	1.5	—	—	1	6-9	FF57	-	23.95
			L_1	M_1	U_1	L_1	M_1	U_1					
NAT-1-60	DC-6000	1±0.2	0.4	0.8	1.1	1.2	1.5	1.5	1	—	FF57	-	26.95
NAT-2-60	DC-6000	2±0.2	0.4	0.8	1.2	1.2	1.4	1.4	0.9	—	FF57	-	26.95
NAT-3-60	DC-6000	3±0.2	0.4	1.0	1.4	1.2	1.4	1.4	0.65	—	FF57	-	26.95
NAT-4-60	DC-6000	4±0.2	0.4	1.0	1.5	1.2	1.3	1.5	0.5	—	FF57	-	26.95
NAT-5-60	DC-6000	5±0.2	0.4	0.9	1.2	1.2	1.3	1.5	0.5	—	FF57	-	26.95
NAT-6-60	DC-6000	6±0.2	0.4	0.7	0.9	1.15	1.25	1.5	0.5	—	FF57	-	26.95
NAT-7-60	DC-6000	7±0.2	0.3	0.7	0.9	1.2	1.3	1.4	0.45	—	FF57	-	26.95
NAT-8-60	DC-6000	8±0.2	0.2	0.5	1.0	1.2	1.3	1.4	0.35	—	FF57	-	26.95
NAT-9-60	DC-6000	9±0.2	0.2	0.7	1.3	1.2	1.2	1.45	0.225	—	FF57	-	26.95
NAT-10-60	DC-6000	10±0.2	0.3	0.9	1.9	1.2	1.2	1.5	0.225	—	FF57	-	26.95
NAT-12-42	DC-4200	12±0.2	0.3	0.8	1.8	1.2	1.2	1.2	0.25	—	FF57	-	26.95
NAT-15-30	DC-3000	15±0.2	0.3	0.8	1.5	1.2	1.2	1.2	0.2	—	FF57	-	26.95
NAT-20-21	DC-2100	20±0.3	0.3	0.9	1.6	1.15	1.15	1.15	0.2	—	FF57	-	26.95
NAT-25-21	DC-2100	25±0.3	0.4	1.0	1.9	1.2	1.2	1.2	0.175	—	FF57	-	26.95
NAT-30-15	DC-1500	30±0.3	0.5	0.9	1.7	1.15	1.2	1.25	0.15	—	FF57	-	26.95

L = DC-500 MHz M = DC-1000 MHz U = DC-f_U

L_1 = DC-(1/3)f_u M_1 = DC-(2/3)f_u U_1 = DC-f_U

PRECISION FIXED ATTENUATORS 50Ω SMA

★*Designed by Dr. Bruno Weinschel for Mini-Circuits®*

2W 1 to 40 dB, DC to 18 GHz

BW

MODEL NO.	FREQUENCY RANGE, GHz f_L-f_U	ATTENUATION, dB Nom.	ATTENUATION, dB ACCURACY*	VSWR* max. L	VSWR* max. M	VSWR* max. U	POWER, W**	CAPD DATA Page	CASE STYLE Note B	PRICE $ Qty. (1-9)
BW-S1-2W	DC - 18	1	±0.30	1.15	1.20	1.25	2		FF626	37.95
BW-S2-2W	DC - 18	2	±0.30	1.15	1.20	1.25	2		FF626	37.95
BW-S3-2W	DC - 18	3	±0.30	1.15	1.20	1.25	2		FF626	37.95
BW-S4-2W	DC - 18	4	±0.30	1.15	1.20	1.25	2		FF626	37.95
BW-S5-2W	DC - 18	5	±0.30	1.15	1.20	1.25	2		FF626	37.95
BW-S6-2W	DC - 18	6	±0.30	1.15	1.20	1.25	2	see	FF626	37.95
BW-S7-2W	DC - 18	7	±0.30	1.15	1.20	1.25	2		FF626	37.95
BW-S8-2W	DC - 18	8	±0.30	1.15	1.20	1.25	2	facing	FF626	37.95
BW-S9-2W	DC - 18	9	±0.30	1.15	1.20	1.25	2		FF626	37.95
BW-S10-2W	DC - 18	10	±0.30	1.15	1.20	1.25	2	page	FF626	37.95
BW-S12-2W	DC - 18	12	±0.30	1.15	1.20	1.25	2		FF626	37.95
BW-S15-2W	DC - 18	15	±0.50	1.15	1.20	1.25	2		FF627	37.95
BW-S20-2W	DC - 18	20	±0.50	1.15	1.20	1.25	2		FF627	37.95
BW-S30-2W	DC - 18	30	±0.75	1.15	1.20	1.25	2		FF628	37.95
BW-S40-2W	DC - 18	40	±0.75	1.15	1.20	1.25	2		FF629	37.95

L = DC-4 GHz M = 4-8 GHz U = 8-12.4 GHz

features

- precision attenuation
- excellent VSWR, 1.1:1 typ.
- high temperature stability
- sma male and female connectors

applications

- matching
- instrumentation
- test set-ups

Dr. Bruno O. Weinschel
Chief Engineer

Dr. Bruno O. Weinschel, Precision Attenuator Pioneer ★

Dr. Bruno Weinschel has spent a lifetime demonstrating strong leadership and pioneering new developments in the field of microwave measurements and attenuator design. An accomplished inventor/co-inventor of 20 patents, author/co-author of over 52 journal articles, IEEE past President, and recipient of numerous awards, he is the founder of Weinschel, Bruno Associates, a preeminent leader in the industry of passive microwave components.

NOTES:

* At 25°C includes power & frequency variations up to 12.4 GHz. Above 12.4 GHz add 0.5 dB typ. to accuracy and 0.5 typ. to VSWR. Temperature coefficient for attenuation .0004 dB/dBx°C max.

** Average power at 25°C ambient, derate linearly to 0.8 W at 100°C. Peak Power 500W, 5msec pulse width, 1000 Hz PRF.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".

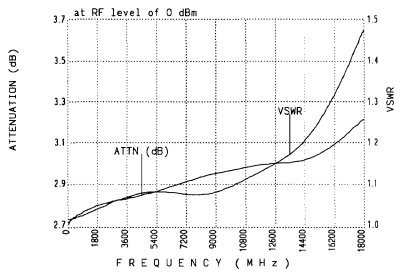
C. Prices and specifications subject to change without notice.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

Mini-Circuits®

BW-S3-2W

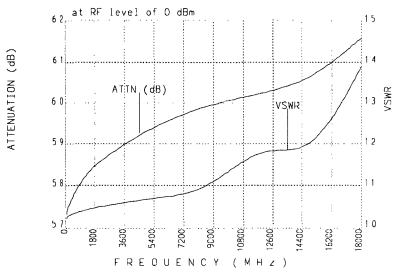
DC to 18000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	VSWR $\bar{X}$	VSWR σ
1.00	2.72	0.02	1.02	0.00
100.00	2.74	0.02	1.02	0.02
1000.00	2.78	0.02	1.03	0.03
1999.90	2.82	0.03	1.05	0.03
5000.00	2.86	0.04	1.10	0.01
7999.90	2.95	0.09	1.07	0.02
9999.90	2.98	0.09	1.10	0.03
12400.10	3.02	0.09	1.15	0.03
15000.00	3.01	0.13	1.21	0.07
18000.00	3.23	0.19	1.48	0.08

BW-S6-2W

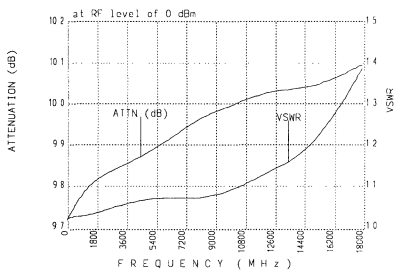
DC to 18000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	VSWR $\bar{X}$	VSWR σ
1.00	5.73	0.00	1.02	0.01
100.00	5.75	0.01	1.03	0.01
1000.00	5.82	0.01	1.04	0.01
1999.90	5.86	0.01	1.05	0.02
5000.00	5.94	0.04	1.07	0.03
7999.90	5.99	0.08	1.08	0.01
9999.90	6.01	0.10	1.14	0.01
12400.10	6.03	0.16	1.20	0.06
15000.00	6.06	0.21	1.17	0.06
18000.00	6.16	0.25	1.39	0.04

BW-S10-2W

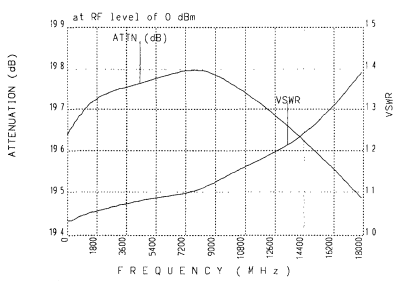
DC to 18000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	VSWR $\bar{X}$	VSWR σ
1.00	9.72	0.01	1.02	0.02
100.00	9.73	0.01	1.03	0.00
1000.00	9.79	0.02	1.03	0.00
1999.90	9.83	0.02	1.04	0.01
5000.00	9.88	0.01	1.08	0.02
7999.90	9.97	0.04	1.07	0.03
9999.90	10.00	0.06	1.09	0.03
12400.10	10.04	0.08	1.14	0.02
15000.00	10.04	0.12	1.19	0.04
18000.00	10.10	0.16	1.39	0.04

BW-S20-2W

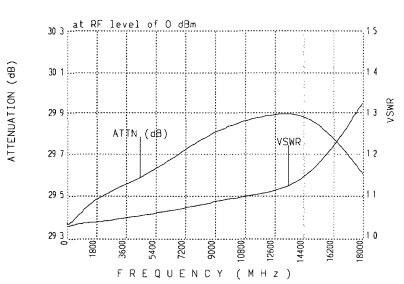
DC to 18000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	VSWR $\bar{X}$	VSWR σ
1.00	19.64	0.03	1.04	0.00
100.00	19.65	0.03	1.03	0.00
1000.00	19.70	0.02	1.05	0.00
1999.90	19.74	0.03	1.06	0.01
5000.00	19.77	0.03	1.09	0.01
7999.90	19.81	0.08	1.10	0.04
9999.90	19.77	0.05	1.15	0.05
12400.10	19.70	0.04	1.19	0.05
15000.00	19.61	0.07	1.25	0.09
18000.00	19.49	0.14	1.39	0.09

BW-S30-2W

DC to 18000 MHz



FREQUENCY (MHz)	ATTENUATION $\bar{X}$ (dB)	ATTENUATION σ (dB)	VSWR $\bar{X}$	VSWR σ
1.00	29.38	0.01	1.03	0.01
100.00	29.36	0.04	1.03	0.01
1000.00	29.44	0.03	1.04	0.01
1999.90	29.51	0.06	1.04	0.02
5000.00	29.61	0.09	1.06	0.01
7999.90	29.78	0.15	1.08	0.04
9999.90	29.86	0.18	1.10	0.04
12400.10	29.91	0.26	1.11	0.04
15000.00	29.92	0.35	1.15	0.07
18000.00	29.62	0.91	1.33	0.08

In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.
Available Tape & Reel

Amplifier Selection Guide

		MODEL NO.	FREQ. (MHz) f_L f_u	GAIN (dB) MIN.	MAX[1] POWER (dBm)	N.F. (dB) TYP.	3rd ORDER I.P. (dBm)	VSWR[2] IN	VSWR[2] OUT	DC POWER V VOLT	DC POWER I (mA)	CASE STYLE	STD. CONN.	OPTION
MONOLITHIC	PIN	ERA-1	DC-8000	9	+11.7	5.3	+26	1.6:1	1.5:1	+3.6	40	VV105		
		ERA-2	DC-6000	12	+12.8	4.7	+26	1.4:1	1.4:1	+3.6	40	VV105		
		ERA-3	DC-3000	17	+12.1	3.8	+23	1.7:1	1.7:1	+3.5	35	VV105		
		ERA-4	DC-4000	11	+17.0	5.5	+32.5	1.6:1	1.4:1	+5.0	65	VV105		
		ERA-5	DC-4000	16	+18.4	4.5	+33	1.2:1	1.3:1	+4.9	65	VV105		
		ERA-6	DC-4000	10	+18.5	8.4	+36.5	1.3:1	1.6:1	+5.5	70	VV105		
		MAR-1	DC-1000	13.0	+1.5	5.5	+14	1.3:1	1.3:1	+5.0	17	VV105		SMT●
		MAR-2	DC-2000	8.5	+4.5	6.5	+17	1.3:1	1.4:1	+5.0	25	VV105		SMT●
		MAR-3▼	DC-2000	8.0	+10	6.0	+23	1.5:1	1.7:1	+5.0	35	VV105		SMT●
		MAR-4	DC-1000	7.0	+12.5	6.5	+25.5	1.6:1	2.0:1	+5.25	50	VV105		SMT●
		MAR-6▼	DC-2000	9.0	+2	3.0	+14.5	1.5:1	1.4:1	+3.5	16	VV105		SMT●
		MAR-7▼	DC-2000	8.5	+5.5	5.0	+19	1.4:1	1.5:1	+4.0	22	VV105		SMT●
		MAR-8	DC-1000	19.0	+12.5	3.3	+27	3.1:1	3.1:1	+7.8	36	VV105		SMT●
		MAV-11	50-1000	9.0	+17.5	3.6	+30	1.5:1	1.7:1	+5.5	60	BBB123		SMT●
	SMT●	ERA-1SM	DC-8000	9.0	+11.3	5.5	+26	1.6:1	1.5:1	+3.6	40	WW107		
		ERA-2SM	DC-6000	12.0	+12.4	4.6	+26	1.5:1	1.5:1	+3.6	40	WW107		
		ERA-3SM	DC-3000	16.0	+11.5	3.8	+23	1.5:1	1.5:1	+3.5	35	WW107		
		ERA-4SM	DC-4000	11	+16.8	5.2	+33	1.6:1	1.3:1	+5.0	65	WW107		
		ERA-5SM	DC-4000	16	+18.4	4.3	+32.5	1.3:1	1.2:1	+4.9	65	WW107		
		ERA-6SM	DC-4000	10	+17.9	8.4	+36	1.3:1	1.6:1	+5.5	70	WW107		
		HELA-10	50-1000	10.5	+30	3.5	+47	1.22:1	1.22:1	+12.0	525	CM624		
		RAM-1	DC-1000	13.0	+1.5	5.5	+14	1.3:1	1.3:1	+5.0	17	AF190		
		RAM-2	DC-2000	8.5	+4.5	6.5	+17	1.2:1	1.4:1	+5.0	25	AF190		
		RAM-3	DC-2000	8.0	+10	6.0	+23	1.6:1	1.7:1	+5.0	35	AF190		
		RAM-4	DC-1000	7.0	+12.5	6.5	+25.5	1.4:1	1.9:1	+5.25	50	AF190		
		RAM-6	DC-2000	9.0	+2	2.8	+14.5	1.4:1	1.3:1	+3.5	16	AF190		
		RAM-7	DC-2000	8.5	+5.5	4.5	+19	2.0:1	1.8:1	+4.0	22	AF190		
		RAM-8	DC-1000	19.0	+12.5	3.0	+27	3.1:1	3.1:1	+7.8	36	AF190		
		VNA-25	500-2500	11.5	+15.5	5.5	+27	1.5:1*	1.6:1	+5.0	85	XX211		
VAR. GAIN	CON	ZFL-1000G	10-1000	17.0	+3	12.0	+13	2.0:1	2.0:1	+15	100	Y39	SMA	—
		ZFL-1000GH	10-1200	24.0	+13	15.0	+25	2.2:1	2.0:1	+15	170	Y39	SMA	—
LOW NOISE (N.F.<4.0 dB)	PIN	MAN-1LN	0.5-500	28.0	+8	2.8	+18	1.8:1	1.8:1	+12	60	A05		
		AMP-76	5-500	26.0	+13.5	3.1	+28	2.0:1	2.0:1	+15	68	PP120		
		AMP-77	5-500	15.0	+16	3.3	+32	2.0:1	2.0:1	+15	56	PP120		
		AMP-75	5-500	19.0	+12	2.4	+28	2.0:1	2.0:1	+15	29	PP120		
		AMP-15	5-1000	13.0	+8	2.8	+22	2.0:1	2.0:1	+15	29	PP120		
		AMP-11-2	5-1000	14.0	+3.5	3.0	+13	2.0:1	2.0:1	+15	12	PP120		
		MAN-1HLN	10-500	10.0	+15	3.7	+30	1.8:1	1.8:1	+12	70	A06		
		TO-0812LN	800-1200	20.0	+8	1.6	+18	2.5:1	2.5:1	+15	70	QQ96		
		TO-1217LN	1200-1700	20.0	+10	1.6	+25	2.5:1	2.5:1	+15	70	QQ96		
		TO-1724LN	1700-2400	20.0	+10	1.6	+22	2.5:1	2.5:1	+15	70	QQ96		
	CON	ZFL-500LN	0.1-500	24.0	+5	2.9	+14	1.5:1	1.6:1	+15	60	Y39	SMA	BNC
		ZFL-1000LN	0.1-1000	20.0	+3	2.9	+14	1.5:1	2.0:1	+15	60	Y39	SMA	—
		ZFL-500HLN	10-500	19.0	+16	3.8	+30	1.5:1	1.5:1	+15	110	Y39	SMA	—
		ZEL-0812LN	800-1200	20.0	+8	1.5	+18	2.5:1	2.5:1	+15	70	EEE132	SMA	—
		ZHL-0812HLN	800-1200	30.0	+26	1.5	+36	2.4:1	2.4:1	+15	725	NN92	SMA	
		ZHL-0812MLN	800-1200	28.0	+20	1.6	+33	1.5:1	1.6:1	+15	300	S32	SMA	—
		ZEL-1217LN	1200-1700	20.0	+10	1.5	+25	2.5:1	2.5:1	+15	70	EEE132	SMA	—
		ZHL-1217HLN	1200-1700	30.0	+26	1.5	+36	2.4:1	2.4:1	+15	725	NN92	SMA	
		ZHL-1217MLN	1200-1700	28.0	+20	1.2	+34	1.5:1	1.6:1	+15	300	S32	SMA	—
		ZEL-1724LN	1700-2400	20.0	+10	1.5	+22	2.5:1	2.5:1	+15	70	EEE132	SMA	—
		ZHL-1724HLN	1700-2400	30.0	+26	1.5	+36	2.4:1	2.4:1	+15	725	NN92	SMA	
		ZHL-1724MLN	1700-2400	28.0	+20	1.3	+32	1.5:1	1.6:1	+15	300	S32	SMA	—
		MAN-2AD	2-1000	9.0	-2	6.5	+14	2.0:1	2.0:1	+15	22	A05		
		MAN-11AD	2-2000	8.0	-3.5	6.5	+14	3.0:1	2.0:1	+15	22	A05		
		MAN-1AD	5-500	16.0	+7	7.2	+20	1.6:1	1.7:1	+12	85	A05		

[1] Minimum output power at 1 dB gain compression
[2] For ERA models, VSWR given as DC-3GHz
● SMT Surface Mount
▼ Alternate package style SOT 143, see VAM series.
* Increase below 1500 MHz

Using the Selection Guide

Locate the Mini-Circuits' amplifier best suited for your particular application quickly with this convenient Selection Guide. Amplifiers are grouped into ten major categories and then listed in the sequence of frequency span.

If your amplifier requirements are not met by the catalog models listed, we encourage you to contact our Application Engineering Department. You will find them courteous and eager to support your needs with their depth of knowledge coupled with our extensive database on engineering and catalog models.

Mini-Circuits® *INTERNET* http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

Mini-Circuits®

		MODEL NO.	FREQ. (MHz) f_L f_U	GAIN (dB) MIN.	MAX[1] POWER (dBm)	N.F. (dB) TYP.	3rd ORDER I.P. (dBm)	VSWR IN	VSWR OUT	DC POWER V VOLT	DC POWER I (mA)	CASE STYLE	STD. CONN.	OPTION
HIGH ISOLATION	PIN	MAN-2AD	2-1000	9.0	-3.5	6.5	+14	2.0:1	2.0:1	+15	22	A05		
		MAN-11AD	2-2000	8.0	-3.5	6.5	+14	3.0:1	2.0:1	+15	22	A05		
		MAN-1AD	5-500	16.0	+7	7.2	+20	1.6:1	1.7:1	+12	85	A05		
	CON	ZFL-2AD	2-1000	9.0	-3.5	6.5	+14	2.0:1	2.0:1	+15	22	Y39	SMA	—
		ZFL-11AD	2-2000	8.0	-3.5	6.5	+14	2.5:1	2.0:1	+15	22	Y39	SMA	—
		ZFL-1HAD	10-500	10.0	+20	7.5	+30	1.3:1	1.35:1	+15	115	SS98	SMA	—
		ZFL-2HAD	50-1000	11.0	+20	5.0	+33	2.0:1	2.0:1	+15	110	SS98	SMA	
		ZHL-1HLD	225-400	23.0	+27	2.5	+40	2.0:1	2.0:1	+24	525	T34	SMA	—
LOW POWER	PIN	MAN-1	0.5-500	28.0	+8	4.5	+18	1.8:1	1.8:1	+12	60	A05		
		MAN-2	0.5-1000	18.0	+9	6.0	+19	1.8:1	1.8:1	+12	85	A05		
		AMP-74	5-500	27.0	+7	5.0	+20	2.0:1	2.0:1	+15	44	PP120		
		AMP-3G	30-3000	8.0	+9.5	3.5	+20	2.6:1	2.5:1	+15	55	PP120		
	CON	ZFL-500	0.05-500	20.0	+9	5.3	+18	1.9:1	1.9:1	+15	60	Y460	SMA	BNC
		ZFL-1000	0.1-1000	17.0	+9	6.0	+18	1.5:1	2.0:1	+15	105	Y460	SMA	—
		ZFL-750	0.2-750	18.0	+9	6.0	+18	1.5:1	2.0:1	+15	90	Y460	SMA	—
		ZJL-7G	20-7000	7.5	+9	5.0	+24	1.5:1	1.5:1	+12	50	BW459	SMA	—
		ZJL-6G	20-6000	10.0	+10	4.5	+24	1.5:1	1.4:1	+12	50	BW459	SMA	—
		ZJL-3G	20-3000	14.0	+8	3.8	+22	1.4:1	1.6:1	+12	45	BW459	SMA	—
MEDIUM POWER	PIN	AMP-2000	10-2000	20.0	+15	5.0	+25	2.0:1	2.0:1	+150	100	QQ96		
	CON	ZHL-6A	.0025-500	21.0	+23	7.5	+34	1.8:1	2.0:1	+24	350	S32	BNC	—
		ZFL-1000H	10-1000	28.0	+20	5.0	+33	2.0:1	2.0:1	+15	150	SS98	SMA	—
		ZFL-1000VH	10-1000	20.0	+25	4.5	+38	2.0:1	2.5:1	+15	320	SS98	SMA	—
		ZFL-1000VH2	10-1000	26.0	+25	5.0	+38	2.0:1	2.5:1	+15	320	SS98	SMA	—
		ZFL-2000	10-2000	20.0	+16	7.0	+25	2.0:1	2.0:1	+15	100	Y39	SMA	—
		ZFL-2500	500-2500	28.0	+15	8.0	+27	2.5:1	2.5:1	+5	220	Y460	SMA	—
		ZFL-2500VH	10-2500	20.0	+24	5.5	+35	1.7:1	2.0:1	+15	300	SS98	SMA	—
		ZHL-1042J	10-4200	25.0	+20	4.5	+30	2.5:1	2.5:1	+15	300	NN92	SMA	—
		ZJL-4G	20-4000	10.0	+11	5.5	+30.5	1.4:1	1.6:1	+12	75	BW459	SMA	—
		ZJL-4HG	20-4000	13.0	+12	4.5	+30.5	1.5:1	1.4:1	+12	75	BW459	SMA	—
		ZJL-5G	20-5000	7.0	+9.5	8.5	+32	1.6:1	1.3:1	+12	80	BW459	SMA	—
		ZKL-2R7	10-2700	20.0	+13	5.0	+30	1.3:1	1.4:1	+12	120	BY493	SMA	—
		ZKL-2R5	10-2500	26.0	+15	5.0	+31	1.4:1	1.4:1	+12	120	BY493	SMA	—
		ZKL-2	10-2000	30.0	+15	4.0	+31	1.4:1	1.4:1	+12	120	BY493	SMA	—
		ZKL-1R5	10-1500	36.0	+15	3.0	+31	1.4:1	1.6:1	+12	115	BY493	SMA	—
		ZRON-8G	2000-8000	20.0	+20	6.0	+30	2.0:1	2.0:1	+15	310	AV243	SMA	—
MEDIUM HIGH POWER	CON	ZHL-32A	.05-130	25.0	+29	10.0	+38	2.0:1	2.0:1	+24	600	S32	BNC	SMA,N
		ZHL-3A	.4-150	24.0	+29.5	11.0	+38	2.0:1	2.0:1	+24	600	S32	BNC	SMA,N
		ZHL-1A	2-500	16.0	+28	11.0	+38	2.0:1	2.0:1	+24	600	S32	BNC	SMA,N
		ZHL-2	10-1000	16.0	+29	9.0	+38	2.0:1	2.0:1	+24	600	T34	BNC	SMA,N
		ZHL-2-8	10-1000	27.0	+29	10.0	+38	2.0:1	2.0:1	+24	600	T34	BNC	SMA,N
		ZHL-2-12	10-1200	24.0	+29	10.0	+38	2.0:1	2.0:1	+24	750	T34	SMA	—
		ZHL-1010-46P3	50-1000	9.5	+26	3.5	+46	1.5:1	1.5:1	+12	525	S32	SMA	—
		ZHL-2010-46P3	50-1000	20.0	+26	3.7	+46	1.5:1	1.5:1	+12	900	S32	SMA	—
		ZHL-3010-46P3	50-1000	30.0	+26	5.5	+46	2.0:1	1.6:1	+12	1000	S32	SMA	—
		ZHL-42W	10-4200	30.0	+28	8.0	+38	2.5:1	2.5:1	+15	880	U36	SMA	—
		ZHL-4240W	10-4200	40.0	+28	8.0	+38	2.5:1	2.5:1	+15	900	U36	SMA	—
		ZHL-42	700-4200	30.0	+28	10.0	+38	2.5:1	2.5:1	+15	880	U36	SMA	—
		ZHL-4240	700-4200	40.0	+28	8.0	+38	2.5:1	2.5:1	+15	900	U36	SMA	—
		ZVE-8G	2000-8000	30.0	+30	4.0	+40	2.0:1	2.0:1	+12	2000	BN333	SMA	—
HIGH POWER	CON	ZHL-03-5WF	60-300	30.0	+36	4.0	+47	1.4:1	1.5:1	+24	2800	CP641	SMA	—
		ZHL-5W-1	1-500	40.0	+37	8.0	+49	2.0:1	2.5:1	+24	3300	DDD131	SMA	—
		ZHL-1-2W	5-500	29.0	+33	12.0	+44	2.0:1	2.0:1	+24	900	T35	BNC	SMA,N
		ZHL-900-10W	480-900	19.0	+38	10.0	+50	2.0:1	2.0:1	+24	5500	DDD131	SMA	—
		ZHL-1000-3W	500-1000	38.0	+35	9.0	+45	2.0:1	2.5:1	+24	2000	DDD131	SMA	—
		ZHL-7-2W	600-800	28.0	+33	12.0	+43	2.0:1	2.0:1	+24	900	T35	BNC	SMA,N
VERY HIGH POWER	CON	LZY-1	20-512	39.0	+44	8.6	+54	2.0:1	9.0:1	+26	7300	BT412	SMA	—
		LZY-2	500-1000	40.0	+43	8.0	+54	2.0:1	3.5:1	+28	8000	BT451	SMA	—
LOW DISTORTION FEED FORWARD	CON	ZHL-1-50P3	50-500	22.0	+30	7.0	+50	1.5:1	1.5:1	+24	1300	U200	SMA	—
		ZHL-2-50P3	50-1000	21.0	+25	8.0	+43	2.0:1	2.0:1	+24	650	U200	SMA	—

See Environmental Specifications on the following page.

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

Environmental Specifications

MODEL NO.	OPERATING TEMP.	AMBIENT	CASE	STORAGE TEMP.	STABILIZATION BAKE (NON-OPER.) 125°C 24 HR.	TEMPERATURE CYCLING (NON-OPER.) -55°C TO 100°C	CONSTANT ACCELERATION (Y1 PLANE) ONLY	BURN-IN (DC. ON) 85°C* 160 HR	SEAL TEST FINE	SEAL TEST GROSS
AMP	-54°C - 85°C		✔	-55°C - 100°C	✔	✔	✔	✔	✔	✔
ERA	-45°C - 85°C		✔	-65°C - 150°C	✔	✔	N.A.	✔	N.A.	N.A.
HELA	-40°C - 110°C		✔	-40°C - 150°C	✔	✔	N.A.	✔	N.A.	N.A.
LZY	-10°C - 50°C	✔		-55°C - 100°C	✔	✔	N.A.	✔	N.A.	N.A.
MAN	-54°C - 85°C		✔	-55°C - 100°C	✔	✔	✔	✔	✔	✔
MAR	-20°C - 85°C		✔	-55°C - 100°C	✔	✔	N.A.	✔	N.A.	N.A.
MAV	-20°C - 85°C		✔	-55°C - 100°C	✔	✔	N.A.	✔	N.A.	N.A.
RAM	-54°C - 125°C		✔	-65°C - 150°C	✔	✔	✔	✔	✔	✔
TO	-54°C - 85°C		✔	-55°C - 100°C	✔	✔	✔	✔	✔	✔
VAM	-20°C - 85°C		✔	-55°C-100°C	✔	✔	N.A.	✔	N.A.	N.A.
VNA	-40°C - 70°C		✔	-55°C - 150°C	✔	✔	N.A.	✔	N.A.	N.A.
ZEL	-54°C - 85°C	✔		-55°C - 100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZFL	-20°C - 71°C	✔		-55°C - 100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZFL-2000	-55°C-100°C	✔		-55°C - 100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZFL-2500	-20°C - 65°C	✔		-55°C - 100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZHL	-20°C - 65°C	✔		-55°C - 100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZHL-HLN	-54°C - 65°C	✔		-55°C - 100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZHL-03-5WF	-10°C-65°C	✔		-55°C - 100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZJL	-40°C-75°C	✔		-55°C - 100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZKL	-40°C - 75°C	✔		-55°C - 100°C	✔	✔	N.A.	✔	N.A.	N.A.
ZRON	0°C - 60°C		✔	-55°C - 125°C	✔	✔	✔	✔	N.A.	✔
ZVE-8G	-55°C - 90°C		✔	-65°C - 150°C	✔	✔	N.A.	✔	N.A.	N.A.

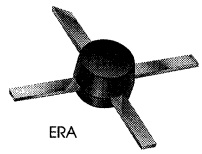
NOTES: Units are designed and manufactured to meet the environmental specifications as indicated.
* Or max. operating temperature, whichever is less.

Mini-Circuits®
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
ISO 9001 CERTIFIED

Mini-Circuits®

MONOLITHIC AMPLIFIERS 50Ω Drop-In & Surface Mount

BROADBAND DC to 8 GHz


ERA

ERA-SM

All specifications at 25°C

MODEL NO.	✪ FREQ. GHz f_L - f_u	GAIN, dB Typical over frequency, GHz 0.1	1	2	3	4	6	8	Min.@ 2 GHz	Flatness DC-2 GHz	MAXIMUM POWER, dBm at 2 GHz* Output (1 dB Comp.) Typ.	Min.	Input (no dmg.)	DYNAMIC RANGE at 2 GHz* NF dB Typ.	IP3 dBm Typ.	VSWR Typ. (:1) In DC-3 GHz	In 3-f_u** GHz	Out DC-3 GHz	Out 3-f_u** GHz	MAXIMUM RATING[3] I mA	P mW	DC POWER at Pin 3 Current (mA)	Volt Typ.	THERMAL RESISTANCE θjc, typ. °C/W	CAPD DATA (see RF/IF Designer handbook)	Case Style Note B	CONNECTION	Price $ Qty. (30)
ERA-1	DC-8	12.2	12.1	11.8	11.5	11.3	11.0	10.2	9	±0.3	11.7	9.7	15	5.3	26	1.6	1.8	1.5	1.9	75	330	40	3.6	455	3-56	VV105	cb	1.37
ERA-2	DC-6	16.2	16.0	15.6	15.1	14.6	14.0	—	12	±0.3	12.8	11	15	4.7	26	1.4	1.4	1.4	1.6	75	330	40	3.6	455	3-56	VV105	cb	1.52
ERA-3	DC-3	22.9	22.2	20.8	19.2	—	—	—	17	±1.1	12.1	9	13	3.8	23	1.7	—	1.7	—	75	330	35	3.5	432	3-56	VV105	cb	1.67
ERA-4	DC-4	13.8	13.7	13.5	13.3	13.0	—	—	11	±0.2	17.0	15	20	5.5	32.5	1.6	1.6	1.4	1.6	120	650	65	5.0	278	3-57	VV105	cb	3.85
ERA-5	DC-4	20.2	19.8	18.8	17.7	16.4	—	—	16	±0.75	18.4	16.5	13	4.5	33	1.2	1.2	1.3	1.5	120	650	65	4.9	278	3-57	VV105	cb	3.85
ERA-6	DC-4	11.1	11.1	11.3	11.5	11.3	—	—	10	±0.2	18.5	16.5	20	8.4	36.5	1.3	1.3	1.6	1.6	120	850	70	5.5	220	3-57	VV105	cb	3.85
ERA-1SM	DC-8	12.3	12.1	11.8	11.2	10.8	10.4	9.2	9	±0.3	11.3	9.3	15	5.5	26	1.6	1.9	1.5	1.9	75	330	40	3.6	460	3-56	WW107	cb	1.42
ERA-2SM	DC-6	16.2	15.8	15.2	14.4	13.6	13.0	—	12	±0.5	12.4	10.5	15	4.6	26	1.5	1.6	1.5	1.7	75	330	40	3.6	460	3-56	WW107	cb	1.57
ERA-3SM	DC-3	22.8	21.8	20.2	18.4	—	—	—	16	±1.3	11.5	9	13	3.8	23	1.5	—	1.5	—	75	330	35	3.5	437	3-56	WW107	cb	1.72
ERA-4SM	DC-4	14.0	13.8	13.5	13.2	12.7	—	—	11	±0.3	16.8	15	20	5.2	33	1.6	1.6	1.3	1.5	120	650	65	5.0	283	3-57	WW107	cb	3.90
ERA-5SM	DC-4	20.2	19.5	18.5	17.3	16.2	—	—	16	±1.0	18.4	16.5	13	4.3	32.5	1.3	1.3	1.2	1.3	120	650	65	4.9	283	3-57	WW107	cb	3.90
ERA-6SM	DC-4	11.2	11.2	11.3	11.4	11.2	—	—	10	±0.2	17.9	16	20	8.4	36	1.3	1.3	1.6	1.5	120	850	70	5.5	225	3-57	WW107	cb	3.90

features

- miniature microwave amplifier
- available in drop-in & surface mount (sm) versions
- frequency range, DC to 8 GHz, usable to 10 GHz
- up to 18.5 dBm typ. (16.5 dBm min) output power

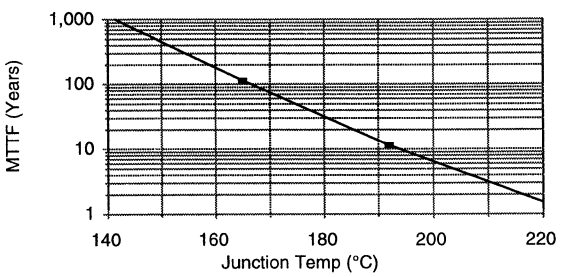
absolute maximum ratings

operating temperature: -45°C to 85°C
storage temperature: -65° to 150°C
device voltage: 3.0V min., 4.1V max. for ERA 1,2,3
4.2V min., 5.5V max. for ERA 4,5
5.0V min., 6.0V max. for ERA-6

marking identification

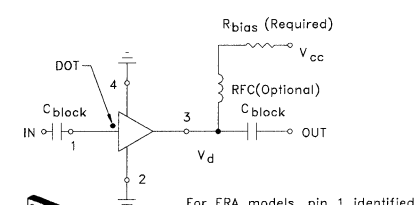
Model	Alphanumeric Code
ERA-1, ERA-1SM	E1
ERA-2, ERA-2SM	E2
ERA-3, ERA-3SM	E3
ERA-4, ERA-4SM	E4
ERA-5, ERA-5SM	E5
ERA-6, ERA-6SM	E6

MTTF vs. JUNCTION TEMP. (ERA)



NOTES:
* at 1 GHz for ERA 4, 5, 6, 4SM, 5SM, 6SM.
** f_u is the upper frequency limit for each model as shown in the table.
✪ Low frequency cutoff determined by external coupling capacitors.
A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
D. For Quality Control Procedures see Table of Contents, Section 0, "Mini-Circuits Guarantees Quality" article. For Environmental Specifications see Amplifier Selection Guide.
1. Model number designated by alphanumeric code marking.
2. ERA-SM models available on tape and reel.
3. Operation at max. rating will severely decrease MTTF (ref to MTTF graph)

Typical Biasing Configuration
ERA



For ERA models, pin 1 identified by dot.

designers kits available

KIT NO.	Model Type	No. of Units in Kit	Description	Price $ per kit
K1-ERA	ERA	30	10 of each 1,2,3	49.95
K2-ERA	ERA	20	10 of each 4,5	69.95
K1-ERASM	ERA-SM	30	10 of each 1SM, 2SM,3SM	49.95
K2-ERASM	ERA-SM	20	10 of each 4SM, 5SM	69.95
K3-ERASM	ERA-SM	30	10 of each 4SM, 5SM, 6SM	99.95

CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

MONOLITHIC AMPLIFIERS 50 Ω

BROADBAND DC to 2.5 GHz

MAR-SM

MAV-SM

up to +17.5 dBm output

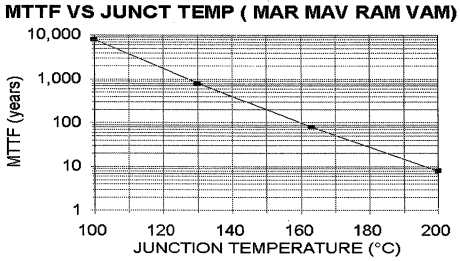
MODEL NO.	✪FREQ. MHz	GAIN, dB Typical (at MHz) 100	1000	2000	note 1 Min.	MAXIMUM POWER, dBm Typ. Output (1 dB Comp.)	Input (no damage)	DYNAMIC RANGE NF dB Typ.	IP3 dBm Typ.	VSWR Typ. In	Out	ABSOLUTE MAXIMUM RATING[7] (25 °C) I (mA)	P (mW)	DC POWER at Pin 3 Current (mA)	Volt Typ.	THERMAL RESISTANCE[6] θjc °C/W	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ (Qty 30)
MAR-1SM	DC-1000	18.5	15.5	—	13.0	+1.5	+13	5.5	+14.0	1.3	1.2	40	200	17	5.00	115	3-22	WW107	cb	1.04
MAR-2SM	DC-2000	12.5	12.0	11.0	8.5	+4.5	+13	6.5	+17.0	1.5	1.4	60	325	25	5.00	105	3-22	WW107	cb	1.17
MAR-3SM	DC-2000	12.5	12.0	10.5	8.0	+10.0	+13	6.0	+23.0	1.5	1.7	70	400	35	5.00	115	3-22	WW107	cb	1.24
MAR-4SM	DC-1000	8.3	8.0	—	7.0	+12.5	+13	7.0	+25.5	1.5	1.9	85	500	50	5.25	100	3-23	WW107	cb	1.34
MAR-6SM	DC-2000	20.0	16.0	11.0	9.0	+2.0	+13	3.0	+14.5	1.7	1.7	50	200	16	3.50	120	3-23	WW107	cb	1.21
MAR-7SM	DC-2000	13.5	12.5	11.0	8.5	+5.5	+13	5.0	+19.0	1.7	1.7	60	275	22	4.00	120	3-23	WW107	cb	1.36
MAR-8SM	DC-1000	32.5	22.5	—	19.0	+12.5	+13	3.3	+27.0	#	#	65	500	36	7.80	140	3-24	WW107	cb	1.32
MAV-11SM	50-1000	12.7	10.5	—	9.0	+17.5	+13	3.6	+30.0	1.5	1.7	80	550	60	5.50	125	3-25	RRR137	cb	1.62

NOTES:
- ☆ Increases below 1500 MHz.
- * RAM models are hermetically sealed.
- ▮ Max. Voltage 7V (DC power at pin 1).
- ❖ Price of RAM models is for 1-9 quantity.
- # Dash-8 models input and output impedances are not 50 ohms, see S-parameter data. Conditionally stable, source and load VSWR<3:1 required. Dash-6 models conditionally stable, source and load VSWR<5:1 required.
- ✪ Low frequency cutoff determined by external coupling capacitors.
- ❄ Specification at 500 MHz.
- ❄❄ Specification at 2500 MHz.
- A. Environmental specifications and re-flow soldering information available in General Information Section.
- B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
- C. Prices and Specifications subject to change without notice.
- 1. Minimum gain at highest frequency. Full temperature range, except room temperature for Dash-4 models.
- 2. Model number designated by color dot or alphanumeric code marking.
- 3. Frequency at which output power, NF and IP3 are specified: 500 MHz for MAR-1SM, MAR-6SM, RAM-1, RAM-6, MAV-11SM, VAM-6, 1000 MHz for all other models.
- 4. Dash-6 models potentially unstable with very high VSWR terminations.
- 6. Thermal resistance θjc is from hottest junction in the device to the mounting surface of the leads.
- 7. Permanent damage may occur if any of these limits are exceeded.

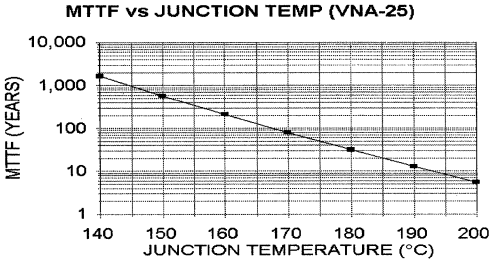
marking identification

Model	Alphanumeric Code	OR	Color Dot
MAR-1SM	A01		Brown
MAR-2SM	A02		Red
MAR-3SM	A03		Orange
MAR-4SM	A04		Yellow
MAR-6SM	A06		White
MAR-7SM	A07		Violet
MAR-8SM	A08		Blue
RAM-1	1 or A01		—
RAM-2	2 or A02		—
RAM-3	3 or A03		—
RAM-4	4 or A04		—
RAM-6	6 or A06		—
RAM-7	7 or A07		—
RAM-8	8 or A08		—
MAV-11SM	A		—
VAM-3	A03		—
VAM-6	A06		—
VAM-7	A07		—

MTTF VS JUNCT TEMP (MAR MAV RAM VAM)



MTTF vs JUNCTION TEMP (VNA-25)



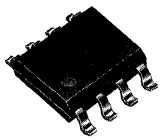
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

Mini-Circuits®

Surface Mount

* RAM

VAM


VNA

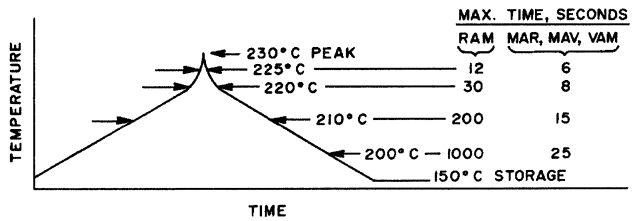
up to +18.2 dBm output

MODEL NO.	⊙FREQ. MHz	GAIN, dB Typical (at MHz) 100	1000	2000	note 1 Min.	MAXIMUM POWER, dBm Typ. Output (1 dB Comp.)	Input (no damage)	DYNAMIC RANGE NF dB Typ.	IP3 dBm Typ.	VSWR Typ. (:1) In	Out	ABSOLUTE MAXIMUM RATING[7] (25 °C) I (mA)	P (mW)	DC POWER at Pin 3 Current (mA)	Volt Typ.	THERMAL RESISTANCE[6] θjc °C/W	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ (Qty 30)
* RAM-1	DC-1000	19.0	15.5	—	13.0	+1.5	+13	5.5	+14.0	1.3	1.3	40	200	17	5.00	150	3-22	AF190	cb	4.95
* RAM-2	DC-2000	12.5	11.8	11.0	8.5	+4.5	+13	6.5	+17.0	1.2	1.4	60	325	25	5.00	145	3-22	AF190	cb	4.95
* RAM-3	DC-2000	12.5	12.0	10.5	8.0	+10.0	+13	6.0	+23.0	1.6	1.7	80	425	35	5.00	150	3-22	AF190	cb	4.95
* RAM-4	DC-1000	8.5	8.0	—	7.0	+12.5	+13	6.5	+25.5	1.4	1.9	100	540	50	5.25	140	3-23	AF190	cb	4.95
* RAM-6	DC-2000	20.0	16.0	11.0	9.0	+2.0	+13	2.8	+14.5	1.4	1.3	50	200	16	3.50	155	3-23	AF190	cb	4.95
* RAM-7	DC-2000	13.5	12.5	11.0	8.5	+5.5	+13	4.5	+19.0	2.0	1.8	60	275	22	4.00	155	3-23	AF190	cb	4.95
* RAM-8	DC-1000	32.5	23.0	—	19.0	+12.5	+13	3.0	+27.0	#	#	65	420	36	7.80	175	3-24	AF190	cb	4.95
VAM-3	DC-2000	11.5	11.0	9.5	7.5	+9.0	+13	6.0	+22.0	1.5	1.7	60	240	35	4.70	500	3-26	MMM168	cb	1.19
VAM-6	DC-2000	19.5	15.0	10.0	8.0	+2.0	+13	3.0	+14.0	1.6	1.5	40	125	16	3.30	505	3-26	MMM168	cb	1.16
VAM-7	DC-2000	13.0	12.0	9.8	7.8	+5.5	+13	5.0	+18.0	1.5	1.5	50	175	22	3.80	505	3-26	MMM168	cb	1.31
VNA-25	500-2500	14.0*	18.0	16.0**	11.5	+18.2	+10	5.5	+27.0	1.5☆	1.6	105	1000	85	5.0	125	3-58	XX211	hj	4.25

features

- cascadable
- excellent repeatability
- wide bandwidth, DC to 2500 MHz
- unconditionally stable, most models
- low cost
- hermetically sealed, RAM models
- low noise figure, 2.8 dB typ
- high output power, up to +18 dBm typ

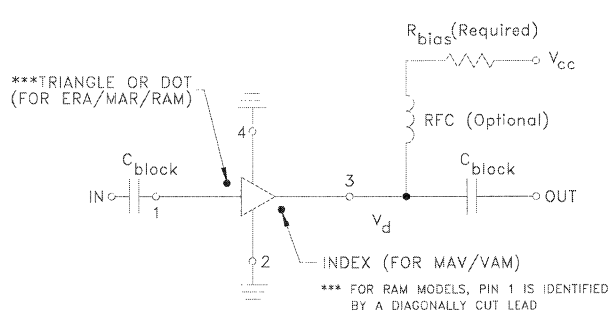
REFLOW - SOLDERING PROFILE



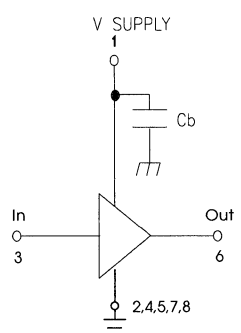
pin connections

PORT	cb	hj
RF IN	1	3
RF OUT	3	6
DC	3	1
GND EXT	2,4	2,4,5,7,8
NOT USED	—	—

Typical Biasing Configuration
ERA/MAR/MAV/RAM/VAM



Biasing Configuration
VNA



NSN GUIDE

MCL NO.	NSN
MAR-1SM	5962-01-414-8635
MAR-3SM	5962-01-423-1569
RAM-6	5996-01-450-5504

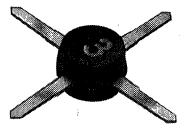
DESIGNERS KITS AVAILABLE
SEE PAGES 16&17

In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

MONOLITHIC AMPLIFIERS 50 Ω Flat-Pack

BROADBAND DC to 2 GHz

MAR



MAV

up to +17.5 dBm output

MODEL NO.	✪FREQ. MHz f_L	f_U	GAIN, dB Typical (at MHz) 100	500	1000	2000	note 1 MIN.	MAXIMUM POWER, dBm Typ. Output (1 dB Comp.)	Input (no damage)	DYNAMIC RANGE NF dB Typ.	IP3 dBm Typ.	VSWR Typ. (:1) In	Out	ABSOLUTE MAXIMUM RATING[7] (25 °C) I (mA)	P (mW)	DC POWER at Pin 3 Current (mA)	Volt Typ.	THERMAL RESISTANCE[6] θjc °C/W	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ (Qty 30)
❑ MAR-1	DC	1000	18.5	17.5	15.5	—	13.0	+1.5	+13	5.5	+14.0	1.3	1.3	40	200	17	5.00	105	3-22	VV105	cb	0.99
❑ MAR-2	DC	2000	12.5	12.3	12.0	11.0	8.5	+4.5	+13	6.5	+17.0	1.3	1.4	60	325	25	5.00	95	3-22	VV105	cb	1.12
❑ MAR-3	DC	2000	12.5	12.2	12.0	10.5	8.0	+10.0	+13	6.0	+23.0	1.5	1.7	70	400	35	5.00	105	3-22	VV105	cb	1.19
❑ MAR-4	DC	1000	8.3	8.2	8.0	—	7.0	+12.5	+13	6.5	+25.5	1.6	2.0	85	500	50	5.25	90	3-23	VV105	cb	1.29
❑ MAR-6	DC	2000	20.0	18.5	16.0	11.0	9.0	+2.0	+13	3.0	+14.5	1.5	1.4	50	200	16	3.50	110	3-23	VV105	cb	1.16
❑ MAR-7	DC	2000	13.5	13.1	12.5	11.0	8.5	+5.5	+13	5.0	+19.0	1.4	1.5	60	275	22	4.00	110	3-23	VV105	cb	1.31
❑ MAR-8	DC	1000	32.5	28.0	22.5	—	19.0	+12.5	+13	3.3	+27.0	#	#	65	500	36	7.80	130	3-24	VV105	cb	1.27
❑ MAV-11	50	1000	12.7	12.0	10.5	—	9.0	+17.5	+13	3.6	+30.0	1.5	1.7	80	550	60	5.50	115	3-25	BBB123	cb	1.57

TYPICAL BIASING CONFIGURATION AND REFLOW SOLDERING PROFILE
SEE PREVIOUS PAGE

features

- cascadable
- excellent repeatability
- wide bandwidth DC-2000 MHz
- unconditionally stable, except MAR-6, MAR-8
- low cost, MAR, MAV models
- low noise figure, 2.8 to 3.6 dB typ. MAR-6, MAR-8, MAV-11
- high output power, +17 dBm typ., MAV-11

marking identification

Model	Alphanumeric Code	OR	Color Dot
MAR-1	A01		Brown
MAR-2	A02		Red
MAR-3	A03		Orange
MAR-4	A04		Yellow
MAR-6	A06		White
MAR-7	A07		Violet
MAR-8	A08		Blue
MAV-11	A		—

DESIGNERS KITS AVAILABLE
SEE PAGES 16&17

NOTES:

❑ Non-hermetic
\# Dash-8 models input and output impedances are not 50 ohms, see S-parameter data. Conditionally stable, source and load VSWR<3:1 required. Dash-6 models conditionally stable, source and load VSWR<5:1 required.
✪ Low frequency cutoff determined by external coupling capacitors.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
C. Prices and specifications subject to change without notice.
D. For Quality Control Procedures see Table of Contents, Section 0, "Mini-Circuits Guarantees Quality" article. For Environmental Specifications see Amplifier Selection Guide.
1. Minimum gain at highest frequency. Full temperature range, except room temperature for Dash-4 models.
2. Model number designated by color dot or alphanumeric code marking.
3. Frequency at which output power, NF and IP3 are specified: 500MHz for MAR-1, MAR-6, MAV-11, 1000MHz for all other models.
4. Dash-6 models potentially unstable with very high VSWR terminations.
6. Thermal resistance θjc is from hottest junction of the device to the mounting surface of the leads.
7. Permanent damage may occur if any of these limits are exceeded.

NSN GUIDE

MCL NO.	NSN
MAR-2	5962-01-417-4110
MAR-3	5962-01-339-2933
MAR-4	5962-01-414-8631
MAR-6	5962-01-416-1462
MAR-8	5998-01-360-6957
MAV-11	5998-01-360-6958

pin connections

PORT	cb
RF IN	1
RF OUT	3
DC	3
CASE GND	2,4
NOT USED	—

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

Mini-Circuits®

MONOLITHIC AMPLIFIERS 50 or 75Ω Surface Mount

HIGH IP3 50 to 1000 MHz

HELA

All specifications at 25°C

	MODEL NO.	FREQ. MHz f_L f_U	GAIN* dB Min.	Typ.	Max.	Typ. Flatness	MAXIMUM POWER dBm Output (1 dB Comp.) Typ.	Min.	Input (no damage)	DYNAMIC RANGE NF dB Typ.	IP3 dBm Typ.	VSWR Typ. (:1) In	Out	DC POWER Volt (V)	Current (mA)	THERMAL RESISTANCE** θjc °C/W	CAPD DATA (see RF/IF Designer Handbook) Page	CASE STYLE Note B	CONNECTION	Price $ Qty (1-9)
NEW	HELA-10	50-1000	10★	12	13	±0.4	30	26	20	3.5	47	1.22	1.22	12	525	6	—	CM624	kl	19.95

features

- very high IP3, 49 dBm typ at 150 MHz & 45 dBm typ at 800 MHz
- excellent flatness, ±0.4 dB typ.
- very high IP2, 88 dBm typ.
- low noise figure, 3.5 dB typ.

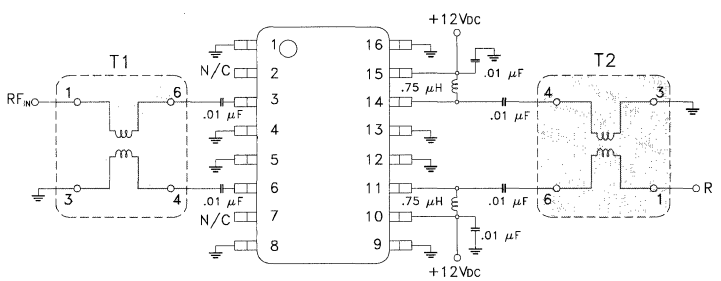
applications

- cellular
- instrumentation
- CATV

absolute maximum ratings

heat slug temperature: 110°C max.
storage temperature: -40°C to 150°
dc voltage: 13V
dc power: 7.15W

Application Schematic Diagram



NOTE: For unbalanced input and output, use balanced to unbalanced transformers, MCL P/N ADTL1-18-75 (75Ω), MCL P/N ADTL1-12 (50Ω) and connect as shown above.

Assembly Guideline

Reflow solder the slug to the ground plane; PC board layouts for 75 ohm (B14-TB-16) and for 50 ohm (B14-TB-17) are available upon request. Please contact Applications Department or consult our website

NOTES:

* Includes transformer losses at input & output.
** Thermal resistance is from juction to heat slug.
★ 9.5 dB min., 800-1000 MHz.
A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
D. For Quality Control Procedures see Table of Contents, Section 0, "Mini-Circuits Guarantees Quality" article. For Environmental Specifications see Amplifier Selection Guide.

pin connections

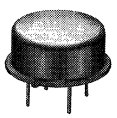
PORT	kl
RF IN	3,6
RF OUT	11,14
DC	10,15
GND EXT.	1,4,5,8,9,12,13,16
NOT USED	2,7

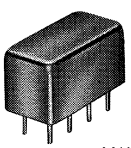
In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

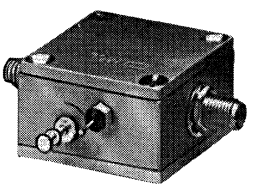
Available Tape & Reel

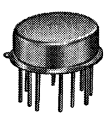
LOW-NOISE AMPLIFIERS 50 Ω

BROADBAND, LINEAR 0.1 to 2400 MHz


AMP


MAN


ZFL


TO

up to +16 dBm output

MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	NF dB Typ.	GAIN, dB Min.	Flatness m	Flatness Max.	MAXIMUM POWER, dBm Output (1 dB Comp.)	MAXIMUM POWER, dBm Input (no damage)	INTERCEPT POINT, dBm IP3 Typ.	VSWR Typ. In	VSWR Typ. Out	DC POWER Volt V.	DC POWER Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	CASE STYLE Note B	CONNECTION	Price $ Qty (1-9)
AMP-11-2	5-1000		3	14	±1.0	±1.0	-3.5	+13	+13	2:1	2:1	15	12	3-27	PP120	cd	44.95
AMP-15	5-1000		2.8	13	±0.6	±1.2	+8	+13	+22	2:1	2:1	15	29	3-27	PP120	cd	49.95
AMP-75	5-500		2.4	19	±0.4	±1.0	+12	+13	+28	2:1	2:1	15	29	3-27	PP120	cd	49.95
AMP-76	5-500		3.1	26	±0.7	±1.0	+13.5	+6	+28	2:1	2:1	15	68	3-35	PP120	cd	78.95
AMP-77	5-500		3.3	15	±0.4	±1.0	+16	+13	+32	2:1	2:1	15	56	3-28	PP120	cd	55.95
MAN-1LN**	0.5-500		3.0	28	±0.5	±1.4	+7	+15	+18	1.8:1	1.8:1	12	60	3-28	A05	cc	19.95
MAN-1HLN	10-500		3.7	10	±0.5	±0.8	+15	+15	+30	1.8:1	1.8:1	12	70	3-28	A06	cc	19.95
ZFL-500HLN	10-500		3.8	19	—	±0.4	+16	+15	+30	2:1	2:1	15	110	3-29	Y460	-	99.95
ZFL-500LN*	0.1-500		2.9	24	—	±0.5	+5	+5	+14	1.5:1	1.6:1	15	60	3-29	Y460	-	79.95
ZFL-1000LN	0.1-1000		2.9	20	—	±0.5	+3	+5	+14	1.5:1	2:1	15	60	3-29	Y460	-	89.95

m = mid range ($2 f_L$ to $f_U/2$)

features

- ideal for printed-circuit designs (MAN & AMP series)
- smooth response over entire band, no external resonances
- low impedance, less susceptible to EMI
- easy to use, 50 ohm input/output
- all models are cascadable

NOTES:

* VSWR 1.6:1 maximum from 0.1 to 0.2 MHz. Also available with BNC connectors.
** Below 5 MHz, 1 dB compression point decreases to 6.5 dBm.
△ Available only with SMA connectors
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
C. Prices and specifications subject to change without notice.
D. For Quality Control Procedures see Table of Contents, Section 0, "Mini-Circuits Guarantees Quality" article. For Environmental Specifications see Amplifier Selection Guide.
1. Absolute maximum power, voltage and current rating:
   1a. AMP models, 17V DC.
   1b. MAN models, 12.5V DC.
2. With no load at output, derates maximum input power (no damage) by 10 dB.
3. ZEL and TO models, NF specified at room temperature, increases to 2 dB typical at +85 deg.C.
4. ZHL models, NF specified at room temperature, increases to 2.3 dB maximum at +65 deg.C.

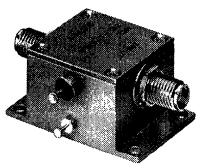
NSN GUIDE

MCL NO.	NSN
AMP-15	5895-01-350-9550
AMP-75	5895-01-350-9551
AMP-77	5895-01-350-9549
ZFL-1000LN	5996-01-412-3031

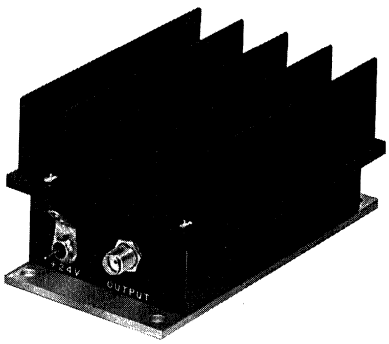
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

Mini-Circuits®

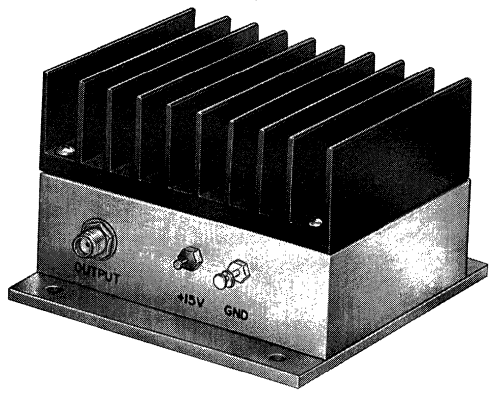
Plug-In & Coaxial



ZEL



ZHL-case S32



ZHL-case NN92

up to +26 dBm output

MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	NF dB Max.	GAIN, dB Min.	GAIN, dB Flatness Max.	MAXIMUM POWER, dBm Output (1 dB Comp.)	MAXIMUM POWER, dBm Input (no damage)	INTERCEPT POINT, dBm IP3 Typ.	VSWR Typ. In	VSWR Typ. Out	DC POWER Volt V.	DC POWER Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	CASE STYLE Note B	CONNECTION	Price $ Qty (1-9)
TO-0812LN	800	1200	1.6	20	±1.0	+8	+13	+18	2.5:1	2.5:1	15	70	3-30	QQ96	ce	199.00
TO-1217LN	1200	1700	1.6	20	±1.0	+10	+13	+25	2.5:1	2.5:1	15	70	3-30	QQ96	ce	199.00
TO-1724LN	1700	2400	1.6	20	±1.0	+10	+13	+22	2.5:1	2.5:1	15	70	3-30	QQ96	ce	199.00
△ ZEL-0812LN	800	1200	1.5	20	±1.0	+8	+13	+18	2.5:1	2.5:1	15	70	3-31	EEE132	-	274.95
△ ZEL-1217LN	1200	1700	1.5	20	±1.0	+10	+13	+25	2.5:1	2.5:1	15	70	3-31	EEE132	-	274.95
△ ZEL-1724LN	1700	2400	1.5	20	±1.0	+10	+13	+22	2.5:1	2.5:1	15	70	3-31	EEE132	-	274.95
NEW △ ZHL-0812MLN	800	1200	1.6	28	±1.0	+22	0	+33	1.5:1	1.6:1	15	300	—	S32	-	295.00
NEW △ ZHL-1217MLN	1200	1700	1.2	28	±1.0	+23	0	+34	1.5:1	1.6:1	15	300	—	S32	-	295.00
NEW △ ZHL-1724MLN	1700	2400	1.3	28	±1.0	+22	0	+32	1.5:1	1.6:1	15	300	—	S32	-	295.50
△ ZHL-0812HLN	800	1200	1.5	30	±1.0	+26	+10	+36	2.4:1	2.4:1	15	725	3-32	NN92	-	399.50
△ ZHL-1217HLN	1200	1700	1.5	30	±1.0	+26	+10	+36	2.4:1	2.4:1	15	725	3-32	NN92	-	399.50
△ ZHL-1724HLN	1700	2400	1.5	30	±1.0	+26	+10	+36	2.4:1	2.4:1	15	725	3-32	NN92	-	399.50

features

- very low noise
- high dynamic range (ZHL-HLN series)
- ideal for printed-circuit designs (TO series)
- smooth response over entire band, no external resonance
- easy to use, 50 ohms input/output
- all models are cascadable

pin connections

PORT	cc	cd	ce
RF IN	1	2	5
RF OUT	8	4	11
DC	5	1	2
CASE GND	2,3,4,6	3	1,3,4,6,7,8,9,10,12
NOT USED	7	—	—

CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

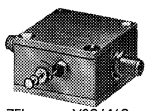
AMPLIFIERS BROADBAND, LINEAR

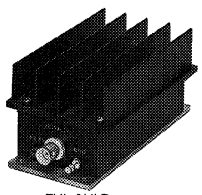
Plug-In & Coaxial

AMP-case QQ96

AMP-case PP120

MAN


ZFL-case Y39/460


ZHL-1HLD

VARIABLE GAIN *10 to 1200 MHz*

up to 20 mW (+13 dBm) output

MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	GAIN, dB Min.	GAIN, dB Flatness Max.	GAIN, dB Control range	MAXIMUM POWER, dBm Output (1 dB Comp.)	MAXIMUM POWER, dBm Input (no damage)	DYNAMIC RANGE NF dB Typ.	DYNAMIC RANGE IP3 dBm Typ.	VSWR In	VSWR Out	DC POWER Volt V.	DC POWER Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
ZFL-1000GH *	10-1200		24	±1.5	30**	+13	+10	15	+25	2.2:1	2:1	15	170	3-33	Y39	-	219.00
ZFL-1000G *	10-1000		17	±1.5	30**	+3	+10	12	+13	2:1	2:1	15	100	3-33	Y39	-	199.00

* ZFL-1000GH and ZFL-1000G, all specifications at 0 Volts control voltage.
** Response time (10% to 90%) 25µsec., control voltage 0 to 5 volts.

HIGH ISOLATION *2 to 2000 MHz*

up to 500 mW (+27 dBm) output

MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	GAIN, dB Min.	GAIN, dB Flatness Max. m	GAIN, dB Flatness Max. Total Range	MAX. POWER, dBm Output (1 dB Comp.) L_W	MAX. POWER, dBm Output (1 dB Comp.) U	MAX. POWER, dBm Input (no damage)	DYNAMIC RANGE NF dB Typ.	DYNAMIC RANGE IP3 dBm Typ.	VSWR (Typ.) In	VSWR (Typ.) Out	ACTIVE DIRECTIVITY* dB L_W Typ.	ACTIVE DIRECTIVITY* dB L_W Min.	ACTIVE DIRECTIVITY* dB U Typ.	ACTIVE DIRECTIVITY* dB U Min.	DC POWER Volt V.	DC POWER Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
MAN-1AD	5-500		16	±0.5	±1.0	+7	+6	+15	7.2	+20	1.6:1	1.7:1	35	25	30	20	12	85	3-34	A05	cc	26.45
MAN-11AD	2-2000		8	±0.5	±1.5	-2	-3.5(α)	+10	6.5	+14	3.0:1	2.0:1	21	14	16	12	15	22	3-34	A06	cc	31.95
MAN-2AD	2-1000		9	±0.4	±0.7	-2	-3.5	+10	6.5	+14	2.0:1	2.0:1	24	19	19	14	15	22	3-34	A06	cc	23.95
ZFL-11AD	2-2000		8	±0.5	±1.3	-2	-3.5(α)	+10	6.5	+14	2.5:1	2.0:1	21	14	16	12	15	22	3-34	Y39	-	91.95
ZFL-2AD	2-1000		9	±0.4	±0.5	-2	-3.5	+10	6.5	+14	2.0:1	2.0:1	24	19	19	14	15	22	3-34	Y39	-	83.95
ZFL-1HAD**	10-500		10	—	±1.0	+20	+20	+17	7.5	+30	1.3:1	1.35:1	30	20	25	18	15	115	3-35	SS98	-	210.00
ZFL-2HAD	50-1000		11	±0.7	±1.0	+20	+20	+15	5.0	+33	2.0:1	2.0:1	30	20	21	15	15	110	3-49	SS98	-	264.95
△ ZHL-1HLD	225-400		23	—	±1.0	+27	+27	+10	2.5	+40	2.0:1	2.0:1	34	28	34	28	24	525	3-35	T34	-	395.00

L_W = low range (f_L to $f_U/2$) m = mid range ($2f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

* Active Directivity (dB) = Isolation (dB) - Gain (dB)
** Input VSWR of ZFL-1HAD in 10-20 MHz band increases to 1.45:1 at -55 deg.C. Below 50 MHz, NF increases to 11 dB typ at 10 MHz.
(α) Above 1 GHz, -5 dBm min.

NOTES:
✤ Hermetically sealed with field replaceable connectors.
✣ Max. voltage Vdc
▲ Available only with BNC connectors
△ Available only with SMA connectors
▼ SMA standard: Also available with BNC or type N connectors, please consult factory.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
C. Prices and specifications subject to change without notice.
D. For Quality Control Procedures see Table of Contents, Section 0, "Mini-Circuits Guarantees Quality" article. For Environmental Specifications see Amplifier Selection Guide.
1. Absolute maximum power, voltage and current rating:
   1a. AMP models, 17V DC
   1b. MAN models, 12.5V DC
   1c. ZHL models, 28V DC (except ZHL-1HAD, 17V DC)
   1d. ZFL models, 17V DC (except ZFL-AD, 16V DC)
   1e. ZJL, ZKL models, 13V DC
2. With no load output, derate maximum input power (no damage) by 10 dB.

NSN GUIDE

MCL NO.	NSN
ZFL-1000H	5996-01-299-5588
ZFL-1000VH	5996-01-454-6938
ZFL-2000	5996-01-220-2213
ZFL-2000B	5996-01-220-2213
ZHL-6A	5996-01-330-3533

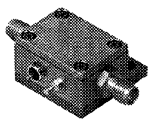
pin connections

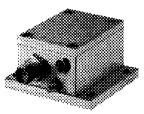
PORT	cc	cd	ce
RF IN	1	2	5
RF OUT	8	4	11
DC	5	1	2
CASE GND	2,3,4,6	3	1,3,4,6,7 8,9,10,12
NOT USED	7	—	—

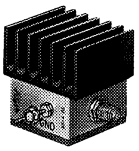
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

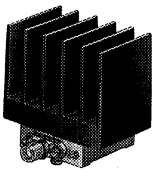
Mini-Circuits®

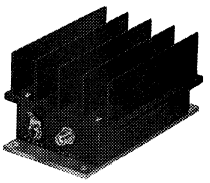
50Ω

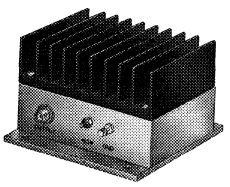

ZJL


ZKL


ZFL-case SS98


✤ ZRON


ZHL-A


ZHL-1042J

LOW POWER 50 kHz to 7000 MHz

up to 16 mW (+12 dBm) output

MODEL NO.	FREQ. MHz f_L	f_U	GAIN, dB Typ.	Min.	Flatness Typ.(1)	Max.	MAXIMUM POWER, dBm Output (1 dB Comp.) L_w	U	Input (no damage)	DYNAMIC RANGE(1) NF dB Typ.	IP3 dBm Typ.	VSWR (Typ.) In	Out	DC POWER Volt V.	Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTOR	Price $ Qty (1-9)
ZJL-7G	20-7000		10	7.5	±1.0	--	+8	+9	+15	5.0	+24	1.5:1	1.5:1	12	50	3-50	BW459	-	99.95
ZJL-6G	20-6000		13	10	±1.6	--	+9	+10	+15	4.5	+24	1.5:1	1.4:1	12	50	3-50	BW459	-	114.95
ZJL-3G	20-3000		19	14	±2.2	--	+8	+8	+13	3.8	+22	1.4:1	1.6:1	12	45	3-51	BW459	-	114.95
▼ ZFL-500	0.05-500		--	20	--	±1.0	--	+9	+5	5.3	+18	1.9:1	1.9:1	15	80	3-37	Y460	-	69.95
ZFL-750	0.2-750		--	18	--	±0.5	--	+9 ***	+5	6.0	+18	1.5:1	2:1	15	90	3-37	Y460	-	74.95
ZFL-1000	0.1-1000		--	17	--	±0.6	--	+9 *	+5	6.0	+18	1.5:1	2:1*	15	105	3-37	Y460	-	79.95
AMP-3G	30-3000		--	8	--	±0.75	+9.5	+9.5	+13	3.5**	+20	2.6:1	2.5:1	15	55	3-38	PP120	cd	89.95
AMP-74	5-500		--	27	--	±1.0	+7.0	+7.0	+13	5.0	+20	2:1	2:1	15	44	3-36	PP120	cd	54.95
MAN-1	0.5-500		--	28	--	±1.4	+8	+8	+15	4.5	+18	1.8:1	1.8:1	12	60	3-36	A05	cc	15.95
MAN-2	0.5-1000		--	18	--	±1.5	+9	+7	+15	6.0	+19	1.8:1	1.8:1	12	85	3-36	A05	cc	19.95

L_w = low range (f_L to $f_U/2$) U = upper range ($f_U/2$ to f_U)

*ZFL-1000 output VSWR 2.8:1 maximum over 750-1000 MHz; 1 dB compression +7 dBm at 500-1000 MHz ***+7 dBm from 500 to 750 MHz.
**NF increases with decreasing frequency, 5 dB typical at 300 MHz, and 10 dB typical at 30 MHz. (1)ZJL models: Flatness specified to 0.75 f_U, dynamic range at 2 GHz.

MEDIUM POWER 2.5 kHz to 8000 MHz

up to 320 mW (+25 dBm) output

	MODEL NO.	FREQ. MHz f_L	f_U	GAIN, dB Typ.	Min.	Flatness Typ.(1)	Max.	MAXIMUM POWER, dBm Output (1 dB Comp.)	Input (no damage)	DYNAMIC RANGE(1) NF dB Typ.	IP3 dBm Typ.	VSWR (Typ.) In	Out	DC POWER Volt V.✤	Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTOR	Price $ Qty (1-9)
	AMP-2000	10-2000		--	20	--	±1.5	+15	+5	5	+25	2:1	2:1	15	100	3-38	QQ96	ce	139.95
	ZFL-2000	10-2000		--	20	--	±1.5	+16*	+5	7	+25	2:1	2:1	15	120	3-40	Y39	-	219.00
	ZFL-2500	500-2500		--	28	--	±1.5	+15	+5	8	+27	2.5:1	2.5:1	5	220	3-54	Y460	-	99.95
	ZFL-2500VH	10-2500		--	20	--	±1.5	+23	+10	5.5	+35	1.7:1•	2:1•	15	300	3-54	SS98	-	264.95
	ZFL-1000H	10-1000		--	28	--	±1.0	+20	+5	5	+33	2:1	2:1	15	160	3-39	SS98	-	219.00
	ZFL-1000VH	10-1000		--	20	--	±1.0	+25	+15	4.5	+38	2:1**	2.5:1	15	320	3-39	SS98	-	229.00
NEW	ZFL-1000VH2	10-1000		28	26	--	±1.0	+25	+15	5.0	+38	2:1	2.5:1	15	320	3-39	SS98	-	249.00
	✤ ZRON-8G	2000-8000		--	20	--	±1.5★	+20	+10	6	+30	2:1	2:1	15	310	3-55	AV243	-	495.00
	▲ ZHL-6A	.0025-500		--	21		±1.0	+22	+10	7.5***	+34	1.8:1	2:1***	24	350	3-41	S32	-	199.00
	ZHL-1042J	10-4200		--	25	--	±1.5	+20	+10	6	+30	2.5:1	2.5:1	15	330	3-40	NN92	-	495.00
								L_w	U										
	ZJL-4G	20-4000		12.4	10.0	±0.25	--	+13.5	+11	+20	5.5	+30.5	1.4:1	1.6:1	12	75	3-51	BW459	-	129.95
	ZJL-4HG	20-4000		17.0	13.0	±1.5	--	+15.0	+12	+13	4.5	+30.5	1.5:1	1.4:1	12	75	3-49	BW459	-	129.95
	ZJL-5G	20-5000		9.0	7.0	±0.55	--	+15.0	+9.5	+20	8.5	+32	1.6:1	1.3:1	12	80	--	BW459	-	129.95
	ZKL-2R7	10-2700		24.0	20.0	--	±0.7	+13	+13	+13	5.0	+30	1.3:1	1.4:1	12	120	3-53	BY493	-	149.95
	ZKL-2R5	10-2500		30.0	26.0	--	±1.5	+15	+15	+13	5.0	+31	1.4:1	1.4:1	12	120	3-53	BY493	-	149.95
	ZKL-2	10-2000		33.5	30.0	--	±1.0	+15	+15	+13	4.0	+31	1.4:1	1.4:1	12	120	3-52	BY493	-	149.95
	ZKL-1R5	10-1500		40.0	36.0	--	±1.2	+15	+15	+13	3.0	+31	1.4:1	1.6:1	12	115	3-52	BY493	-	149.95

L_w = low range (f_L to $f_U/2$) U = upper range ($f_U/2$ to f_U)

* +15 dBm below 1000 MHz
** Input VSWR 2:1 max, increasing below 20 MHz to 2.25:1 max at 10 MHz.
*** NF specified above 10 MHz and output VSWR 2.8:1 below 30 MHz
• Max. VSWR In 2.0:1, Out 2.5:1
★ Measured at 25°C.
(1) ZJL models: Flatness specified to 0.75 f_U, dynamic range at 2 GHz.

CAPD now available! computer-automated performance data

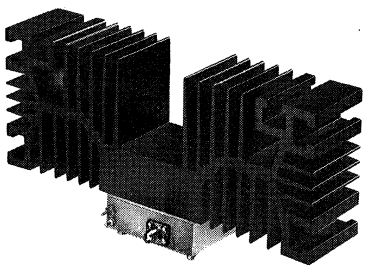
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

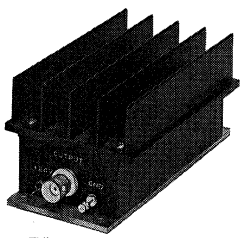
AMPLIFIERS

Coaxial

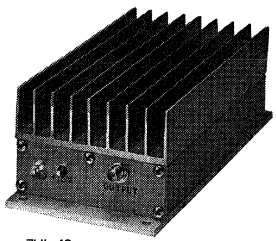
MEDIUM HIGH POWER 50 kHz to 8 GHz



✤ ZVE



ZHL



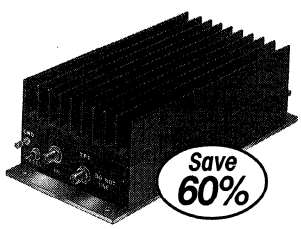
ZHL-42

up to 1W (+30 dBm) output

	MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	GAIN, dB Min.	GAIN, dB Flatness Max.	MAXIMUM POWER, dBm Output (1 dB Comp.)	MAXIMUM POWER, dBm Input (no damage)	DYNAMIC RANGE NF dB Typ.	DYNAMIC RANGE IP3 dBm Typ.	VSWR In	VSWR Out	DC POWER Volt V	DC POWER Current (A)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
NEW △ ☆	ZHL-1010-46P3	50	1000	9.5	±0.6	+29	+22	3.5	46	1.5:1	1.5:1	12	525	—	S32	—	149.95
NEW △ ☆	ZHL-2010-46P3	50	1000	20	±0.8	+28	+12	3.7	46	1.5:1	1.5:1	12	900	—	S32	—	149.95
NEW △ ☆	ZHL-3010-46P3	50	1000	30	±1.0	+29	+12	5.5	40	2.0:1	1.0:1	12	1000	—	S32	—	149.95
✤	ZVE-8G	2000	8000	30	±2.0	+30☆	+20	4	40	2:1	2:1	12	2.0	3-55	BN333	—	1095.00
	ZHL-1A	2	500	16	±1.0	+28	+20	11	+38	2:1	2.1	24	0.60	3-41	S32	—	229.00
	ZHL-2	10	1000	16	±1.0	+29	+15	9	+38	2:1	2:1	24	0.60	3-43	T34	—	349.00
	ZHL-2-8	10	1000	27	±1.0	+29	+5	10	+38	2:1	2:1	24	0.60	3-43	T34	—	525.00
△	ZHL-2-12	10	1200	24	±1.0	+29*	+10	10	+38	2:1	2:1	24	0.75	3-43	T34	—	625.00
	ZHL-3A	0.4	150	24	±1.0 ★	+29.5	+10	11	+38	2:1	2:1	24	0.60	3-42	S32	—	229.00
	ZHL-32A	0.05	130	25	±1.0 ★	+29	+10	10	+38	2:1	2:1	24	0.60	3-42	S32	—	229.00
	ZHL-42	700	4200	30	±1.0 ★	+28	+5	10	+38	2.5:1	2.5:1	15	0.88	3-44	U36	—	895.00
	ZHL-4240	700	4200	40	±1.5 ★	+28	-5	8	+38	2.5:1	2.5:1	15	0.90	3-45	U36	—	1395.00
	ZHL-42W	10	4200	30	±1.5	+28**	0	8***	+38	2.5:1	2.5:1	15	0.88	3-44	U36	—	1095.00
	ZHL-4240W	10	4200	40	±1.5	+28**	-5	8***	+38	2.5:1	2.5:1	15	0.90	3-45	U36	—	1495.00

* +28.5 dBm maximum at 1000-1200 MHz
** +27 dBm at 10-700 MHz
*** Below 100 MHz NF increases to 15 dB at 10 MHz

☆ At +25°C, +29 dBm typ. at 90°C case
★ Measured at 25°C.



ZHL-50P3

feed-forward, low-distortion

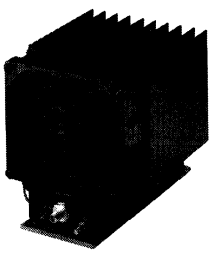
MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	GAIN, dB Min.	GAIN, dB Flatness Max.	MAX. POWER, dBm Output (1 dB Comp.)	MAX. POWER, dBm Input (no damage)	DYNAMIC RANGE NF dB Typ.	DYNAMIC RANGE Intercept Point dBm, Min 2nd** order In-Band	DYNAMIC RANGE Intercept Point dBm, Min 3rd* order	VSWR In/Out	DC POWER Volt V.	DC POWER Current (A)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
ZHL-1-50P3	50	500	22	±1.0	+27***	+15	7	+70	+50	1.5:1	24	1.30	3-47	U200	—	~~695.00~~ 278.00★
ZHL-2-50P3	50	1000	21	±1.0	+25	+15	8	+63	+43	2.0:1	24	0.65	3-47	U200	—	~~895.00~~ 358.00★

★ ***WHILE SUPPLIES LAST***
* IP3 measured at +15 dBm output each fundamental tone, at room temperature.
** IP2 +50 dBm typical for out band products.
*** +30 dBm at 50-250 MHz.

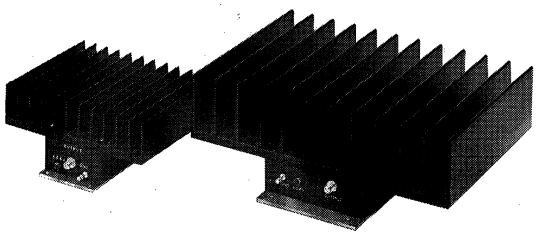
Mini-Circuits®

50 Ω

HIGH POWER 1 to 1000 MHz



ZHL-WF



ZHL-2W

ZHL-3W
ZHL-5W
ZHL-10W

up to 5W (+37 dBm) output

	MODEL NO.	FREQ. MHz f_L f_U	GAIN, dB Min.	Flatness Max.	MAXIMUM POWER, dBm Output (1 dB Comp.)	Input (no damage)	DYNAMIC RANGE NF dB Typ.	IP3 dBm Typ.	VSWR In	VSWR Out	DC POWER Volt V	DC POWER Current (A)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
NEW	ZHL-03-5WF	60-300	30	±1.0	+36	+10	4	+47	1.4:1	1.5:1	24	2.8	--	CP641	—	495.00
	ZHL-1-2W	5-500	29	±1.0	+33	+10	12	+44	2:1	2:1	24	0.9	3-46	T35	—	525.00
	ZHL-7-2W	600-800	28	±1.0	+33	+10	12	+43	2:1	2:1	24	0.9	3-46	T35	—	590.00
	ZHL-1000-3W	500-1000	38	±1.0*	+35**	0	9	+45	2:1	2.5:1	24	2.0	3-46	DDD338	—	695.00
	ZHL-5W-1	1-500	40	±1.5	+37	0	9	+49	2:1	2.5:1	24	3.3	3-48	DDD131	—	995.00
	ZHL-900-10W	480-900	19	±1.0	+38	+25	10	+50	2:1	2:1	24	5.5	3-48	DDD338	—	1995.00

* 1.5 dB over temperature range -20 to +65 deg. C.
** +37 dBm typical

NOTES:
- ☆ High IP3, very high IP2, 68-83 dBm typ.
- ✤ Hermetically sealed with field replaceable connectors.
- △ Available only with SMA connectors
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
- C. Prices and specifications subject to change without notice.
- D. For Quality Control Procedures see Table of Contents, Section 0, "Mini-Circuits Guarantees Quality" article. For Environmental Specifications see Amplifier Selection Guide.
- 1. With no load output, derate maximum input power (no damage) by 10 dB, by 15 dB for ZHL-5W-1.

NSN GUIDE

MCL NO.	NSN
ZHL-1A	6130-01-088-2322
ZHL-1A(BNC)	5895-01-123-0792
ZHL-1A(SMA)	5895-01-201-4500
ZHL-2-12	5996-01-400-0753
ZHL-3A	5895-01-194-1718
ZHL-32A	5895-01-238-7973
ZHL-42(SMA)	5895-01-253-2397
ZHL-1042J	5996-01-412-3038
ZHL-4240	5895-01-263-5871
ZHL-5W-1	5825-01-339-2539

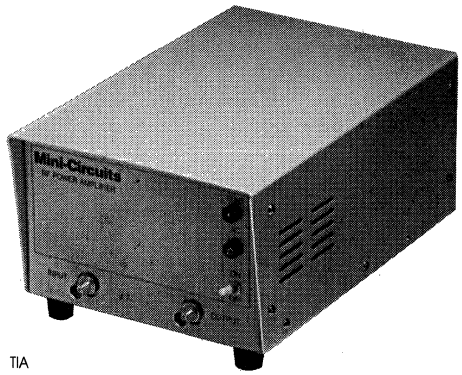
CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

AMPLIFIERS *RF Instrument* *50 Ω*

HIGH POWER *0.5 to 1000 MHz*



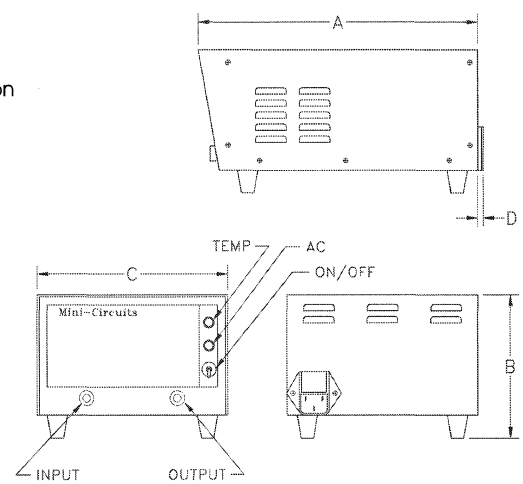
TIA

up to 10W (+40 dBm) output

MODEL NO.	FREQ. MHz f_L	f_U	GAIN, dB Min.	Flatness Max.	MAXIMUM POWER, dBm Output (1 dB Comp.) Typ.	Min.	Input Max. (no damage)	DYNAMIC RANGE NF dB Typ.	IP3 dBm Typ.	VSWR In	Out	AC POWER Volt (Note 1)	Freq. Hz	VA max.	CAPD DATA (see RF/IF Designer handbook) Page	Case Style	CONNECTION	Price $ Qty (1-9)
TIA-900-10	100	900	28	±2.5	+42	+40	+25	13	51	2.5:1	2.5:1	110	50/60	475	3-17	AP176	—	3,695.
TIA-1000-4	100	1000	19	±1.5	+39	+36	+25	12	48	2.5:1	2.5:1	110	50/60	400	3-17	AP176	—	1,995.
TIA-1000-1R8	0.50	1000	35	±2.0	+35	+32	+7	8*	45	1.9:1	2.5:1	110	50/60	140	3-17	AP175	—	1,495.

features

- Wide bandwidth, 0.5-1000 MHz
- Instrument model, with built-in power supply, 110/220V operation
- High Power Output, (at 3.5 dB compression)
  45 dBm TYPICAL FOR TIA-900-10
  42 dBm TYPICAL FOR TIA-1000-4
  37 dBm TYPICAL FOR TIA-1000-1R8
- High Gain, 38 dB TYPICAL FOR TIA-1000-1R8
  34 dB TYPICAL FOR TIA-900-10
- High Reverse Isolation, 80 dB TYPICAL FOR TIA-900-10
  AND TIA-1000-1R8
  55 dB TYPICAL FOR TIA-1000-4
- 100% Burn-In at +25°C, 48 hours
- Thermally self-protected, led indicator



NOTES:

* NF above 400 MHz. At low frequency, NF increases to 16 dB Typ.

C. Prices and Specifications subject to change without notice.

D. For Quality Control Procedures see Table of Contents, Section 0, see "Mini-Circuits Guarantees Quality" article.

1. Add dash 2 (-2) to model no. for 220V operation.
2. Gain and maximum output power specified at 25°C±5°C., over temperature, specifications degrade approximately 1dB, gain flatness ±2.5dB maximum for TIA-10001R8 and TIA-1000-4.
3. With no load, max. input (no damage) reduce by 10 dB.
4. VSWR specified at:
   350-900 MHz FOR TIA-900-10
   350-1000 MHz FOR TIA-1000-4
   340-1000 MHz FOR TIA-1000-1R8
5. Operating temperature: 0°C to +55°C.
   Storage temperature: -40°C to +70°C.
6. All TIA models are protected under U.S. patent 5, 101, 171.

Outline drawing and dimensions.

Case No.		A	B	C	D	wt. grams.	NOTES
AP175	inch	9.8	5.0	6.7	0.2	3500	A10,D7,G1,G2
	mm	248.9	127.0	170.2	5.1		
AP176	inch	19.5	6.0	12.5	0.2	9500	A10,D7,G1,G2
	mm	495.3	152.4	317.5	5.1		

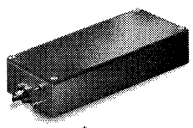
A10. Case material: aluminum alloy. Finish: grey paint.
D7. Connectors: BNC only.
G1. Keep area adjacent to fan and louvers clear to permit air flow to pass. Caution: Do not insert anything especially conductors or fingers into case opening. Physical injury, shock or death may occur.
G.2 Configured for either 110 volt or 220 volt AC operation; specify when ordering.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

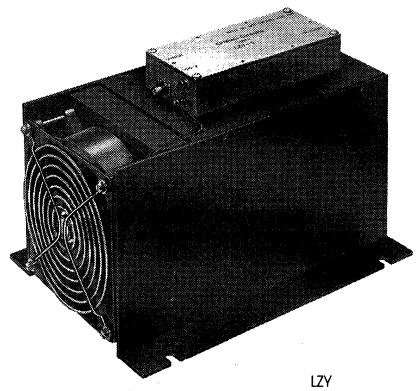
Mini-Circuits®

Self-Cooled

VERY HIGH POWER 50W, 20 to 1000MHz



LZY-X*



LZY

up to 50W (+47 dBm) output

MODEL NO.	FREQ. MHz	GAIN, dB		POWER, dBm			DYNAMIC RANGE		VSWR		DC POWER		CAPD DATA (see RF/IF Designer handbook)	Case Style	CONNECTOR	Price $
	f_L f_U	Min.	Flatness Max.	Min. Output (1 dB Comp.)	Max. Output (Typ.)	Max. Input (no damage)	NF dB Typ.	IP3 dBm Typ.	In	Out	Volt V.	Max Current** (A)	Page	Note B		Qty (1-9)
LZY-1	20 - 512	39	±1.5	+44	+47	+10	8.6*	54	2.0:1	❄	+26	7.3	3-19	BT412	—	1995.00
LZY-2	500 -1000	40	±1.5	+43	+45	+10	8.0	54	2.0:1	3.5:1	+28	8.0	3-19	BT451	—	2195.00

* To order without heat sink and fan, add suffix -X to model number. Alternative heat sinking and heat removal must be provided by customer to ensure proper performance. See application note AN-60-004 for LZY-1, AN-60-005 for LZY-2 . Deduct $100 from price list.

features

- saturated power 50W typ. (LZY-1) and 32W typ. (LZY-2)
- high power with low distortion, -32 dBc typ. (LZY-1) and -45 dBc typ. (LZY-2) harmonics at 20 watts
- wide bandwidth, usable 10 - 525 MHz and 475 - 1050 MHz
- high gain, 42 dB typ. (LZY-1) and 47 dB typ. (LZY-2)
- unconditionally stable
- self protected against excessive drive, high case temp., reverse polarity and shorting/ unshorting transients at dc input
- electronic shutoff by grounding the shut-off terminal, reduces output by 50 dB. Open circuiting terminal restores full power within 100 μ sec.
- cool operation with integral fan, 15° C typ. rise
- graceful degradation, +20 to +30V DC
- can withstand short and open circuit at output for 2 minutes while delivering 20 watts

NOTES:

* 80-512 MHz, at 20 MHz 11.6 dB typ.
** At 25W output for LZY-1 and 20W for LZY-2; includes fan
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
D. For Quality Control Procedures see Table of Contents, Section 0, "Mini-Circuits Guarantees Quality" article. For environmental Specifications see Amplifier Selection Guide.
1. Absolute max. dc voltage: +30V
2. Operating air-ambient temp. for specified performance: -10°C to 50°C
3. Max. storage temp.: -55°C to 100°C
❄ VSWR 9:1 typ. up to 450 MHz, all specifications for 50 ohm load.

CAPD now available! computer-automated performance data

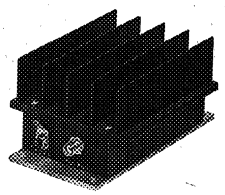
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

PULSE AMPLIFIERS

Coaxial

INVERTING & NON-INVERTING *up to 200 mW, 2.5 KHz to 700 MHz*



ZPUL

Up to 200 mW

MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	GAIN, dB Min.	GAIN, dB Flatness Max.	RISE/FALL TIME ns Max	PULSE WIDTH* µs, Max.	POLARITY	MAXIMUM POWER, dBm Output (1 dB Comp.)	MAXIMUM POWER, dBm Input (no damage)	DYNAMIC RANGE NF** dB Typ.	DYNAMIC RANGE Intercept 3rd order Typ.	VSWR Typ. In	VSWR Typ. Out	DC POWER Volt V.	DC POWER Current (mA)	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style ▲ Note B	CONNECTION	Price $ Qty (1-9)
ZPUL-21	0.0025	700	21	±1	1.5	6	Inverting	22	+10	7.3	34	2:1	2:1	24	350	3-21	S32	—	249.00
ZPUL-30P	0.0025	700	29	±1	1.5	6	Non-inverting	22	+10	7.2	34	2:1	2:1	24	400	3-21	S32	—	295.00

L_w = low range (f_L to $f_U/2$) m = mid range ($2f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

* pulse width for less than 10% droop
** NF tested above 10 MHz

features

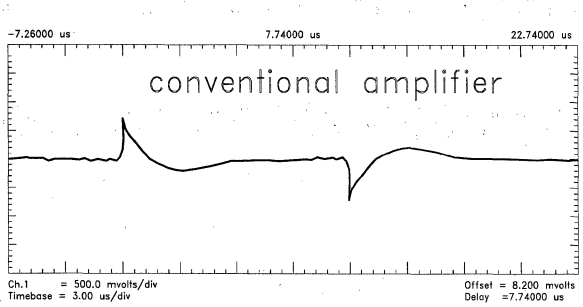
- wide bandwidth 2.5 KHz to 700 MHz, useable to 1 GHz
- excellent flatness ±0.6 dB typical
- can handle wide pulse width & (15 µs typ.) with excellent rise/fall time (1.1 ns typ.)
- inverting (ZPUL-21) & non-inverting (ZPUL-30P) configurations
- delay time, 1.5 ns typical

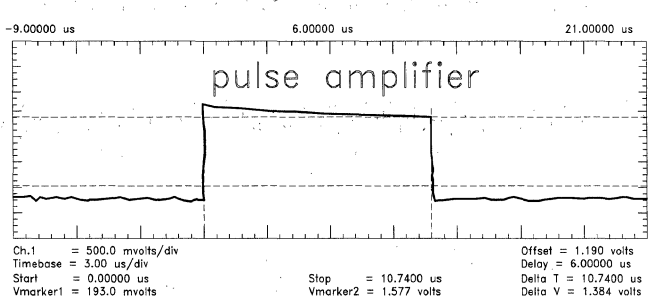
applications

- computers
- digital communication
- medical test set-ups

NOTES:
▲ Available only with BNC connectors
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and specifications subject to change without notice.
D. For Quality Control Procedures see Table of Contents, Section 0, see "Mini-Circuits Guarantees Quality" article.
1. Operating temperature: -20°C to 65°C
Storage temperature: -55°C to 100°C

typical amplifier response to a pulse input

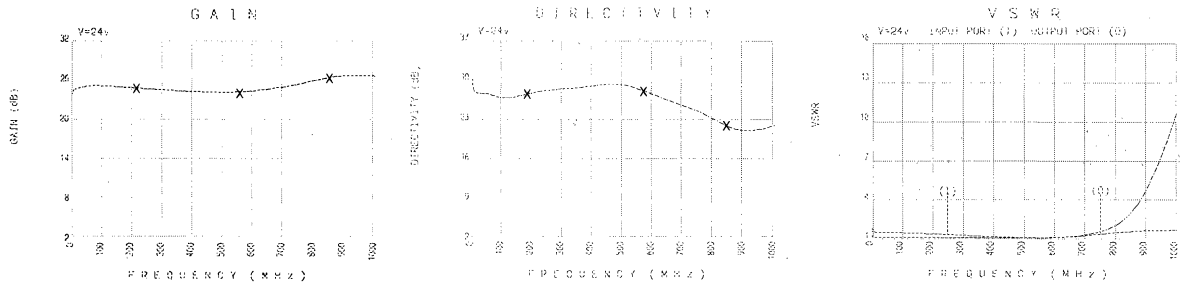




Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

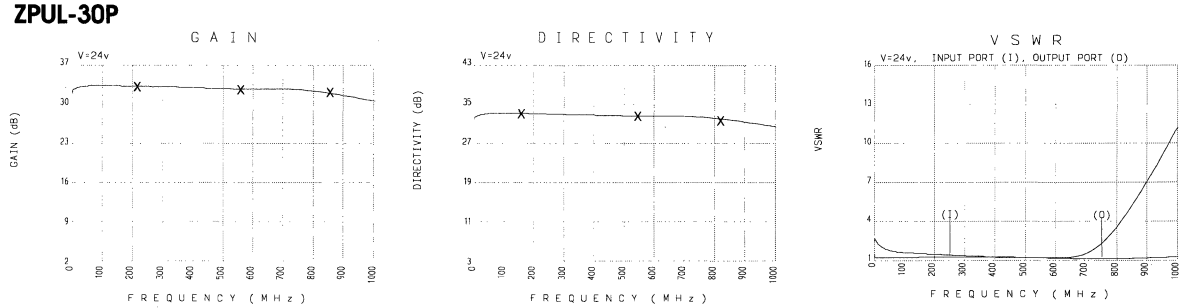
Mini-Circuits®

ZPUL-21



FREQUENCY (MHz)	GAIN (dB)	DIRECTIVITY (dB)	VSWR (:1) IN	VSWR (:1) OUT	N.F. (dB)		Pout (@1dB COMPR) (MHz)	Pout (@1dB COMPR) (dBm)
0.002	24.14	30.72	1.85	1.40	10.00	7.37	0.002	24.63
0.012	24.47	29.52	1.61	1.20	106.00	7.15	0.012	24.76
0.050	24.42	29.95	1.58	1.18	202.00	7.20	0.050	24.70
1.008	24.43	28.89	1.58	1.17	298.00	7.27	1.008	24.82
10.078	24.92	27.56	1.57	1.17	418.00	7.29	8.930	25.50
50.000	25.41	27.85	1.54	1.18	466.00	7.26	50.000	25.58
98.875	25.40	26.60	1.52	1.18	514.00	7.23	98.875	25.44
167.875	25.17	27.34	1.48	1.17	562.00	7.22	176.500	25.30
251.250	24.92	28.45	1.39	1.15	610.00	7.18	300.125	24.91
366.250	24.56	28.65	1.26	1.10	658.00	7.17	349.000	24.64
501.375	24.29	30.00	1.09	1.11	706.00	7.12	501.375	24.34
645.125	24.76	26.40	1.18	1.17	754.00	7.05	661.750	24.14
763.000	25.71	24.64	1.45	1.50	802.00	6.97	817.625	23.06
883.750	27.09	20.40	1.70	3.10	898.00	6.77	944.125	20.65
1001.625	26.82	22.14	1.73	10.56	970.00	6.67	1073.500	14.21

ZPUL-30P



FREQUENCY (MHz)	GAIN (dB)	DIRECTIVITY (dB)	VSWR (:1) IN	VSWR (:1) OUT	N.F. (dB)		Pout (@1dB COMPR) (MHz)	Pout (@1dB COMPR) (dBm)
0.002	32.16	32.16	1.53	2.50	10.00	7.41	0.003	24.26
0.010	32.60	32.60	1.32	2.57	97.00	7.16	0.050	24.67
0.050	32.49	32.49	1.30	2.72	126.00	7.16	1.026	24.83
0.118	32.47	32.47	1.31	2.77	155.00	7.15	9.866	25.30
1.106	32.51	32.51	1.30	2.80	213.00	7.17	50.000	25.61
10.172	32.98	32.98	1.29	2.27	271.00	7.20	98.875	25.51
50.000	33.45	33.45	1.30	1.74	329.00	7.23	133.375	25.36
98.875	33.48	33.48	1.31	1.66	416.00	7.24	297.250	24.96
167.875	33.35	33.35	1.31	1.58	503.00	7.23	377.750	24.42
248.375	33.28	33.28	1.32	1.48	561.00	7.21	501.375	24.38
366.250	33.13	33.13	1.32	1.34	619.00	7.20	541.625	24.06
501.375	32.91	32.91	1.29	1.30	706.00	7.16	625.000	23.98
604.785	32.81	32.81	1.25	1.26	793.00	7.20	708.375	23.89
763.000	33.01	33.01	1.11	1.30	909.00	7.29	872.250	23.46
1001.625	30.68	30.68	1.35	11.38	996.00	7.24	952.750	20.75

CAPD now available! computer-automated performance data

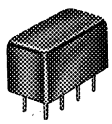
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

ATTENUATORS/SWITCHES 50 & 75Ω Plug-In

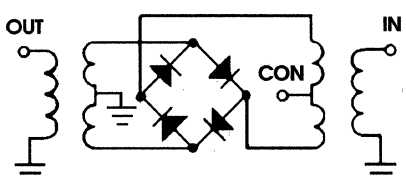
BI-PHASE 1 MHz to 2 GHz

TFAS


PAS
GAS

MODEL NO.	FREQUENCY MHz IN f_L-f_U	CON	INSERTION LOSS dB (±20 mA) Mid-Band m Typ.	Mid-Band m Max.	Total Range Typ.	Total Range Max.	MAX. INPUT POWER dBm (±20 mA) 1 dB comp.	no damage	IN-OUT ISOLATION dB (0 mA) L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	BI-PHASE X (±20 mA) Typ. Δ AMP (dB) m	Δ AMP (dB) Total Range	Phase(deg) Deviation From 180° m	Phase(deg) Deviation From 180° Total Range	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
PAS-1*	5-450	DC-0.05	3.5	4.0	3.5	4.7	20	29	65	50	45	35	35	25	0.1	0.1	0.5	1.2	4-10	A01	cf	33.95
PAS-2*	10-1000	DC-0.05	4.0	6.0	6.5	8.5	20	29	50	40	40	30	35	25	0.1	0.3	0.5	1.0	4-10	A01	cg	47.95
PAS-3*	1-200	DC-0.05	1.4	2.0	1.6	2.5	15	29	65	50	50	40	50	35	0.1	0.1	0.5	1.0	4-11	A01	cf	34.95
PAS-2000**	100-2000	DC-0.5	4.2	6.5	5.4	7.5	19✲	25	30	22	—	—	26	20	0.3	0.4	5.0	8.0	4-11	A05	ch	24.95
❑ TFAS-1*	2-400	DC-0.05	1.4	2.0	1.6	3.0	20✣	25	65	45	45	33	35	25	0.1	0.1	1.0	2.0	4-12	B02	cm	13.95
❑ TFAS-2**	10-1000	DC-0.5	3.7	4.5	5.0	8.0	17★	25	50	30	42	20	31	20	0.1	0.2	2.0	3.0	4-12	B02	cm	17.95
❑ TFAS-860**	500-1000	DC-0.5	—	—	1.5	5.4	14	25	30	(typ.)		20	(min.)		—	0.3	—	4.0	4-13	B02	cm	19.95
❑ GAS-1**	5-450	DC-0.05	3.3	4	3.5	5.0	20	25	60	48	45	35	35	25	0.10	0.1	1.0	1.5	4-10	A05	cf	13.95
❑ GAS-2**	10-1000	DC-0.05	4.3	6	5.2	8.5	20	25	55	40	35	25	28	20	0.10	0.3	1.5	3.0	4-10	A05	cg	15.95
❑ GAS-3**	5-200	DC-0.05	1.2	2	1.4	2.5	20	25	50	45	45	35	40	30	0.10	0.1	0.5	1.0	4-11	A05	cf	14.95

L = low range (f_L to 10 f_L) M = mid range (10f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)

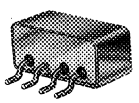


NOTES:
- * Recommended for electronic attenuator
- ** Recommended for bi-phase modulator
- ✱ RAS-1 not available in tape & reel.
- ■ Denotes 75 Ohm model.
- ❑ Non-hermetic
- ✲ +15 dBm from 100-800 MHz
- ✣ +15 dBm from 2-10 MHz
- ★ +13 dBm from 10-500 MHz
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
- C. Prices and specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings:
  1a. Control current, 30mA
  1b. Max. Power at room temperature
- 2. Performance specifications apply for input power up to 10 dB below stated 1dB compression;
  example: +5dBm in 2-10MHz range for TFAS-1, TFAS-1SM

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

Mini-Circuits®

Surface Mount


TFAS-SM

SYAS

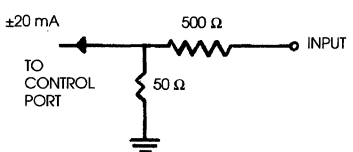
RAS

LRAS

	MODEL NO.	FREQUENCY MHz IN f_L-f_U	CON	INSERTION LOSS dB (±20 mA) Mid-Band m Typ.	Max.	Total Range Typ.	Max.	MAX. INPUT POWER dBm (±20 mA) 1 dB comp.	no damage	IN-OUT ISOLATION dB (0 mA) L Typ.	Min.	M Typ.	Min.	U Typ.	Min.	BI-PHASE X (±20 mA) Typ. Δ AMP (dB) m	Total Range	Phase(deg) Deviation From 180° m	Total Range	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	TFAS-1SM*	2-400	DC-0.05	1.4	2.0	1.6	3.0	20✣	25	65	45	45	33	35	25	0.1	0.1	1.0	2.0	4-12	NNN150	cm	13.95
	TFAS-2SM**	10-1000	DC-0.5	3.7	4.5	5.0	8.0	17★	25	50	30	42	20	31	20	0.1	0.2	2.0	3.0	4-12	NNN150	cm	17.95
	TFAS-860SM**	500-1000	DC-0.5	—	—	1.5	5.4	14	25	30	(typ.)		20	(min.)		—	0.3	—	4.0	4-13	NNN150	cm	19.95
	SYAS-1*	2-400	DC-0.05	1.4	2.0	1.6	3.0	20✣	25	65	45	45	33	35	25	0.1	0.1	1.0	2.0	4-12	TTT167	ck	9.95
	SYAS-2**	10-1000	DC-0.05	4.0	6.0	4.5	7.0	17★	25	59	40	42	28	28	20	0.1	0.3	2.0	3.0	4-12	TTT167	ck	13.95
	SYAS-860**	600-1000	DC-0.5	—	—	2.7	5.7	14	25	25	(typ.)		18	(min.)		—	0.5	—	4.0	4-13	TTT166	ck	15.95
✱	RAS-1**	2-400	DC-0.05	1.4	2.0	1.6	3.2	20✱	25	65	45	45	28	32	22	0.10	0.1	1.0	2.0	4-12	TT241	ge	7.95
■	RAS-2-75**	10-1000	DC-0.05	4.1	6.0	4.5	7.5	20	25	58	40	42	28	39	20	0.15	0.3	1.5	3.0	4-12	TT240	cj	9.95
■	LRAS-2-75**	10-1000	DC-0.05	4.1	6.0	4.5	7.5	20	25	58	40	42	28	39	20	0.15	0.3	1.5	3.0	4-14	QQQ130	cj	9.95

L = low range (f_L to 10 f_L) M = mid range (10f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)

suggested control port biasing configuration



pin and coaxial connections

see case style outline drawings for pin locations

PORT	cf	cg	ch	cj	ck	cm	ge
INPUT	1	1	1	4	1	1	4
OUTPUT	8	8	8	1	2	4	1
CONTROL	3,4 ^	3,4 ^	3	5	3	2	5
GND EXT.	2,5,6,7	2,5,6,7	2,5,6,7	2,3,6	4,5,6	3	2,3,6
CASE GND	2	2,5,6,7	2,5,6,7	—	—	3	—
NOT USED	—	—	4	—	—	—	—

^ Pins must be connected together externally.

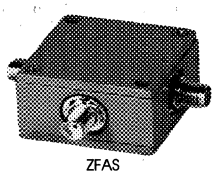
NSN GUIDE

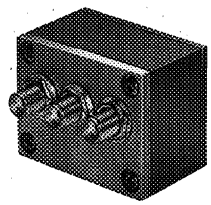
MCL NO.	NSN
PAS-1	5985-01-282-2105
PAS-2	5985-01-192-0100
PAS-3	5895-01-067-3035

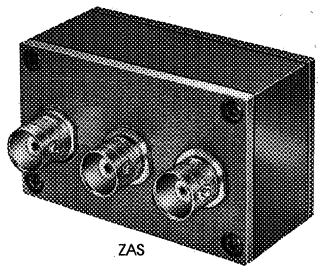
In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

ATTENUATORS/SWITCHES *Coaxial*

BI-PHASE *1 MHz to 2 GHz*


ZFAS

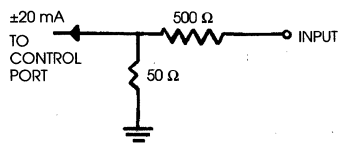

ZMAS

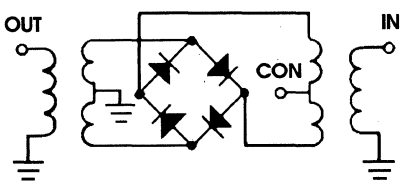

ZAS

MODEL NO.	FREQUENCY MHz IN f_L-f_U	CON	INSERTION LOSS dB (±20 mA) m Mid-Band Typ.	m Mid-Band Max.	Total Range Typ.	Total Range Max.	MAX. INPUT POWER dBm (±20 mA) 1 dB comp.	no damage	IN-OUT ISOLATION dB (0 mA) L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	BI-PHASE $\overline{X}$ (±20 mA) Typ. Δ AMP (dB) m	Δ AMP (dB) Total Range	Phase(deg) Deviation From 180° m	Phase(deg) Deviation From 180° Total Range	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
ZMAS-1*	5-450	DC-0.05	3.5	4	3.5	4.7	20	30	65	50	55	45	35	25	0.10	0.1	0.5	1.2	4-10	M21	cp	66.95
ZMAS-3*	1-200	DC-0.05	1.4	2	1.6	2.5	15	30	65	50	50	40	50	35	0.10	0.1	0.5	1.0	4-11	M21	cp	67.95
ZAS-1*	5-450	DC-0.05	3.5	4	3.5	4.7	20	30	65	50	55	45	35	25	0.10	0.1	0.5	1.2	4-10	M22	cp	59.95
ZAS-3*	1-200	DC-0.05	1.4	2	1.6	2.5	15	30	65	50	50	40	50	35	0.10	0.1	0.5	1.0	4-11	M22	cp	59.95
△ ZFAS-2000**	100-2000	DC-0.5	4.2	6.5	5.4	7.5	19✲	25	30	22	—	—	26	20	0.3	0.4	5.0	8.0	4-11	K18	cn	64.95

L = low range (f_L to 10 f_L) M = mid range (10f_L to f_U/2) U = upper range (f_U/2 to f_U)
m = mid band (2f_L to f_U/2)

suggested control port biasing configuration





NSN GUIDE

MCL NO.	NSN
ZAS-3B	5985-01-267-2832
ZMAS-1	5985-01-140-4291

NOTES:
- * Recommended for electronic attenuator
- ** Recommended for bi-phase modulator
- △ Available only with SMA connectors.
- ✲ +15 dBm from 100-800 MHz
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
- C. Prices and specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current ratings: 1a. Control current, 30mA
- 2. Performance specifications apply for input power up to 10 dB below stated 1dB compression.

coaxial connections

see case style outline drawings

PORT	cn	cp
INPUT	2	3
OUTPUT	1	1
CONTROL	3	2
GND EXT.	—	—
CASE GND	—	—
NOT USED	—	—

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

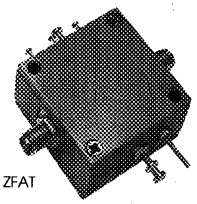
DIGITAL STEP ATTENUATORS

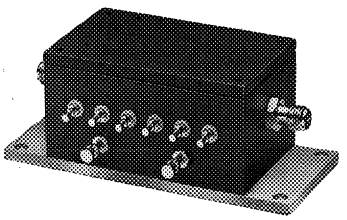
Mini-Circuits®

50Ω Precision

TTL CONTROL, PIN DIODE 10 MHz to 1 GHz

TOAT


ZFAT


ZSAT

MODEL NO.	FREQ. MHz f_L	FREQ. MHz f_U	PRIMARY ATTENUATION STEPS (dB) @TTL CONTROL PORT #1	#2	#3	ATTENUATION (dB) LOGIC STATE* (1,1,1)** Nom.	(0,0,0) Max.	VSWR L	M	U	CAPD DATA (see RF/IF Designer Handbook) Page	Case Style Note B	CONNECTION	Price $ Qty. (1-9)
TOAT-R512	10	1000	0.5±0.18	1±0.25	2±0.25	3.5	4.0	1.6	1.4	1.5	5-6	QQ96	cq	59.95
TOAT-124	10	1000	1±0.25	2±0.25	4±0.3	7.0	4.0	1.6	1.4	1.5	5-7	QQ96	cq	59.95
TOAT-3610	10	1000	3±0.3	6±0.4	10±0.4	19.0	4.0	1.6	1.4	1.5	5-8	QQ96	cq	59.95
TOAT-4816	10	1000	4±0.4	8±0.4	16±0.5	28.0	4.0	1.6	1.4	1.5	5-9	QQ96	cq	59.95
TOAT-51020	10	1000	5±0.4	10±0.4	20±0.5	35.0	4.0	1.6	1.4	1.5	5-10	QQ96	cq	59.95
ZFAT-R512	10	1000	0.5±0.18	1±0.25	2±0.25	3.5	4.0	1.6	1.4	1.5	5-6	SSS173	-	89.95
ZFAT-124	10	1000	1±0.25	2±0.25	4±0.3	7.0	4.0	1.6	1.4	1.5	5-7	SSS173	-	89.95
ZFAT-3610	10	1000	3±0.3	6±0.4	10±0.4	19.0	4.0	1.6	1.4	1.5	5-8	SSS173	-	89.95
ZFAT-4816	10	1000	4±0.4	8±0.4	16±0.5	28.0	4.0	1.6	1.4	1.5	5-9	SSS173	-	89.95
ZFAT-51020	10	1000	5±0.4	10±0.4	20±0.5	35.0	4.0	1.6	1.4	1.5	5-10	SSS173	-	89.95
			SIX CONTROL PORTS											
ZSAT-31R5	10	1000	(1) 0.5±0.18 (4) 4±0.3	(2) 1±0.25 (5) 8±0.4	(3) 2±0.25 (6)16±0.5	31.5	7.0	1.7	1.5	1.6	5-5	AR214	-	119.00

L = 10 to 100 MHz M = 100 to 500 MHz U = 500 to 1000 MHz

features

- wide frequency band, 10-1000 MHz
- excellent step accuracy, 0.2 dB typ.
- excellent VSWR, 1.3 typ.
- low DC current, 6 mA typ.
- operates over -55° to 100 °C
- small case, 0.6" dia., TO-8

Additional Specifications

DC Voltage +5V
DC current 12mA max.
Switching Time (50% TTL to within specified accuracy of the next-selected attenuation step, and to within 0.1 dB of steady-state Thru-Loss) 10 µs typ., 15µs max.
TTL input High Threshold 2V min.
TTL input Low Threshold 0.8V max.
TTL Toggle Rate: 50 kHz typ.
1dB compression: 0 dBm (10-100MHz)
+10dBm (100-1000MHz)
For ZSAT-31R5:
1dB compression: +10 dBm (10-100 MHz)
+15 dBm (100-1000 MHz)

Logic function:

TTL High activates associated in-line attenuation
TTL Low bypasses this attenuation

NSN GUIDE

MCL NO.	NSN
TOAT-124	5985-01-416-9021
TOAT-51020	5985-01-416-9020

pin connections

see case style outline drawing

PORT	cq
RF IN	4
RF OUT	11
TTL CONTROL #1	2
TTL CONTROL #2	3
TTL CONTROL #3	1
+5V DC	12
CASE GND	5,6,7,8,9,10

NOTES:
* For ZSAT-31R5: Total attenuation (1,1,1,1,1,1)
Thru-Loss (0,0,0,0,0,0)
** Total attenuation above thru-loss.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current rating:
1a. Input power, 15 dBm
1b. DC voltage, 5.5 Volts
1c. TTL, 5.5 Volts
1d. Storage temperature -55°C to +125°C for TOAT models.
2. Step accuracy is specified for basic steps. For combination of steps accuracy is additive.
3. Thru-loss is minimum insertion loss with all attenuation elements bypassed (All TTL controls state are Low).
4. For optimum operation of TOAT models, ensure the device case is properly connected to the ground plane (of PC board).

CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

DIRECTIONAL COUPLERS 50 & 75Ω Surface Mount

6 to 25 dB COUPLING 2 MHz to 2600 MHz

ADC

D

	MODEL NO.	FREQ. RANGE MHz f_L-f_U	COUPLING dB Nom.	Flatness	MAINLINE LOSS dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	DIRECTIVITY dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	VSWR (:1) Typ.	POWER INPUT, W L Max.	POWER INPUT, W MU Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (10-49)
NEW	ADC-6-1R	5-200	6.2±0.3	±0.3	1.6	2.0	1.7	2.0	1.7	2.1	35	22	25	18	17	13	1.33	.5	.5	—	CD542	hz	7.95
NEW	ADC-10-1R	5-900	10.5±0.5	±0.5	0.7	1.2	0.8	1.2	0.9	1.5	40	25	30	20	18	12	1.3	1	1	—	CD542	hz	7.95
NEW ■	ADC-8-4-75	5-1000	7.9±0.5	±0.5	1.55	2.6	1.6	2.2	2.0	2.7	18	14	17	14	16	10	1.2	1	1	—	CD542	kd	6.95
NEW	ADC-10-4	5-1000	10.5±0.5	±0.75	0.8	1.3	0.8	1.2	1.0	1.5	40	23	40	20	25	15	1.2	1	1	—	CD542	kd	6.95
NEW ■	ADC-10-4-75	5-1000	10.5±0.5	±0.5	0.85	1.4	0.9	1.4	1.0	1.4	40	20	18	12	12	8	1.2	1	1	—	CD542	kd	6.95
NEW	ADC-15-4	5-1000	15.5±0.5	±0.5	0.6	1.0	0.6	1.0	0.8	1.2	23	20	24	20	28	17	1.2	1	1	—	CD542	kd	6.95
NEW ■	ADC-15-4-75	5-1000	15.5±0.5	±0.5	0.7	1.2	0.7	1.0	0.8	1.2	23	18	20	14	16	11	1.2	1	1	—	CD542	kd	6.95
NEW ■	ADC-18-4-75	20-1000	17.4±0.5	±0.5	0.4	0.8	0.4	1.0	0.5	1.2	17	14	18	14	17	12	1.15	1	1	—	CD542	kd	6.95
NEW	ADC-20-4	5-1000	20.0±0.5	±0.8	0.4	0.8	0.5	1.0	0.7	1.3	20	18	21	17	21	15	1.1	1	1	—	CD542	kd	6.95
NEW ■	ADC-20-4-75	5-1000	19.7±0.5	±0.5	0.5	0.8	0.5	1.0	0.6	1.2	22	18	23	15	20	13	1.15	1	1	—	CD542	kd	6.95
	D20C	0.81 - 0.96	19.4±1.4	—			0.3	0.5					13	7			1.1	1	1	—	CA531	jn	0.99
	D19G	1.42 - 1.66	18.2±1.2	—			0.2	0.4					19	11			1.1	1	1	—	CA531	jn	0.99
	D18P	1.71 - 1.99	18.0±1.8	—			0.3	0.5					15	10			1.2	1	1	—	CA531	jn	0.99
	D17I	2.30 - 2.60	17.5±1.3	—			0.5	0.8					14	9			1.3	1	1	—	CA531	jn	0.99

L = low range (f_L to $10f_L$) M = mid range ($10 f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

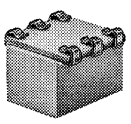
features

- **ADC, extremely flat bandwide coupling**
- ADC circuit patent pending
- ADC low height 0.11" max.
- ADC water wash capability
- excellent solderability
- low insertion loss
- wideband frequency
- JDC models, solder plated leads for strain relief & excellent solderability.

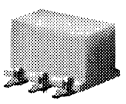
applications

- communications
- cable tv
- level detecting
- signal sampling
- reflective power measurements

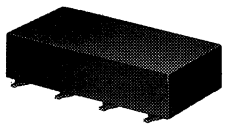
Mini-Circuits®



JDC



LRDC



SCDC

MODEL NO.	FREQ. RANGE MHz f_L-f_U	COUPLING dB Nom.	Flatness	MAINLINE LOSS dB L Typ.	L Max.	M° Typ.	M° Max.	U Typ.	U Max.	DIRECTIVITY dB L Typ.	L Min.	M° Typ.	M° Min.	U Typ.	U Min.	VSWR (:1) Typ.	POWER INPUT, W L Max.	POWER INPUT, W MU Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
JDC-6-1	5-400	6.5±0.5	±0.5	1.6	2.0	1.7	2.4	2.0	2.4	35	30	25	20	20	15	1.25	.5	.5	7-23	BH292	hz	14.95
JDC-10-2	5-750	10.0±0.5	±0.6	1.0	1.5	1.0	1.5	1.0	1.5	20	15	20	17	20	16	1.13	1	1	7-23	BH292	hz	14.95
JDC-10-4	5-1000	10.5±0.5	±0.6	1.0	1.5	1.0	1.5	1.3	1.8	23	18	23	18	24	15	1.15	1	1	---	BH292	hz	14.95
■ JDC-10-4-75	10-1000	10.5±0.5	±0.5	1.2	1.6	1.4	1.7	1.6	2.0	27	18	25	18	28	18	1.3	1	1	---	BH292	hz	14.95
■ JDC-20-3-75	2-250	19.2±0.5	±0.5	0.4	0.8	0.3	0.7	0.4	0.7	24	16	30	20	20	15	1.1	.5	1	---	BH292	hz	14.95
JDC-20-1W	50-750	19.5±0.5	±0.5			0.5	0.9					22	15			1.2	.5	.5	---	BH292	hz	14.95
■ JDC20-1W-75	50-750	19.5±0.5	±0.5	0.5	0.9	0.5	0.7	0.5	0.9	25	18	23	15	20	15	1.2	.5	.5	7-28	BH292	hz	14.95
JDC-20-2	400-900	20.5±1.0	±1.0			0.2	0.6					19	13			1.15	2	2	7-23	BH292	hz	14.95
◆ LRDC-10-1	5-500	10.7±0.5	±0.5	0.9	1.4	0.9	1.4	1.2	1.9	31	25	30	20	25	16	1.2	1	1	7-24	QQQ130	cz	15.95
◆ LRDC-20-2	300-1100	20.5±1.0	±1.3			0.25	0.6					22	10			1.2	2	2	7-20	QQQ130	cz	15.95
◆■ LRDC-10-1-75	5-600	10.7±0.5	±0.5	1.1	1.5	1.0	1.4	1.2	1.8	19	15	21	17	21	16	1.3	1	1	7-28	QQQ130	cz	11.95
◆■ LRDC-10-2-75	30-1000	10.0±0.5	±0.6	1.0	1.5	1.1	1.5	1.3	1.8	21	17	22	17	19	15	1.3	1	1	7-27	QQQ130	cz	13.95
◆■ LRDC-10-2W-75	30-1200	10.0±0.5	±0.8	1.0	1.5	1.1	1.6	1.3	2.0	21	17	22	17	18	15	1.3	1	1	7-27	QQQ130	cz	15.95
◆■ LRDC-12-1-75	5-600	12.2±0.5	±0.6	0.4	0.8	0.5	1.0	0.8	1.5	20	17	21	18	20	12	1.3	1	1	7-27	QQQ130	cz	11.95
SCDC-11-2	500-1100	11.3±0.5	±0.6			1.1	1.8					20	10			1.4	2	2	7-18	YY161	cx	11.95
SCDC-25-2	500-1100	25.5±0.75	±0.8			0.5	1.0					22	10			1.4	2	2	7-18	YY161	cx	13.95

L = low range (f_L to $10f_L$) M = mid range ($10 f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

NOTES:

◆ For aqueous washable units add suffix J to L model number. See outline QQQ569. Footprint for L models and L models suffix J are the same.

■ Denotes 75 ohm models.

✪ When specification for only M range given, specification applies to entire frequency range.

A. Environmental specifications and re-flow soldering information available in General Information Section.

B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".

C. Prices and Specifications subject to change without notice.

1. Mainline Loss includes theoretical power loss at coupled port.

pin connections

See case style outline drawing for pin locations

PORT	cx	cz	hz	jn	kd*
INPUT	1	6	1	4	1
OUTPUT	2	1	6	6	6
COUPLED (forward)	5	4	3	3	3
NOT USED (isolate)	3,6	3*	4	---	5
TERMINATION	---	---	---	---	4
GND	4,7,8	2,5	2,5	1,2,5	2

*external resistor required

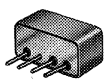
In Stock... Immediate Delivery

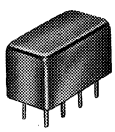
For Custom Versions Of Standard Models Consult Our Applications Dept.

Available Tape & Reel

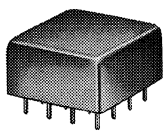
DIRECTIONAL COUPLERS 50 & 75Ω

6 to 30 dB COUPLING 5 kHz to 2000 MHz


TDC


PDC

TODC


P4DC
PDC-20A-5

MODEL NO.	FREQ. RANGE MHz f_L-f_U	COUPLING dB Nom.	Flatness	MAINLINE LOSS dB L Typ.	L Max.	M° Typ.	M° Max.	U Typ.	U Max.	DIRECTIVITY dB L Typ.	L Min.	M° Typ.	M° Min.	U Typ.	U Min.	VSWR (:1) Typ.	POWER INPUT, W L Max.	POWER INPUT, W MU Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONFIGURATION	PRICE $ Qty. (1-9)
TDC-6-1	10-400	6.3±0.4	±0.4	2.0	2.4	2.0	2.4	2.0	2.5	36	30	30	25	20	15	1.5	1	2	7-8	B02	cw	23.95
TDC-10-1	1-400	10.0±0.5	±0.5	1.2	1.5	1.0	1.3	1.2	1.5	35	25	30	20	20	15	1.5	1	2	7-8	B02	cw	17.95
TDC-10-2	5-1000	11±0.5	±0.6	1.4	1.8	1.5	1.8	1.6	2.0	50	35	25	20	20	15	1.5	0.5	0.5	7-8	B02	cw	25.95
PDC-10-1	0.5-500	11.5±0.5	±0.6	0.85	1.3	0.65	1.0	0.85	1.3	32	25	32	25	22	15	1.2	1.5	3	7-9	A01	cu	13.45
✦ PDC-10-1BD	1-400	11.5±0.5	±0.5	0.6	0.9	0.8	1.1	0.9	1.3	55	35	35	20	22	15	1.2	2.0	4	7-19	A01	cv	11.45
✣ PDC-10-2	250-1000	10.5±0.5	±0.6	1.4	1.6	—	—	1.6	2.0	30	23	—	—	25	15	1.5	—	5	7-9	A01	cu	34.45
PDC-10-5	1-2000	10.5±0.5	±1.0	1.2	1.9	1.3	1.9	2.0	2.5	38	25	30	18	22	18	1.3	0.5	0.5	7-9	A01	cu	40.95
PDC-10-6	0.005-20	11±0.5	±0.5	0.4	1.2	0.4	0.8	0.4	1.0	40	30	40	30	35	25	1.3	1.5	3	7-10	A01	cu	23.95
PDC-10-21**	1-1000	11±0.5	±0.5	1.2	1.7	1.2	1.7	1.6	2	40	30	25	20	25	20	1.3	1	2	7-10	A01	cu	32.95
PDC-10-22	5-750	11±0.5	±0.5	1.1	1.6	1.2	1.7	1.6	1.9	35	30	25	20	25	20	1.25	1	2	7-10	A01	cu	23.95
PDC-10-54	10-1500	10.5±0.5	±0.7	1.2	1.8	1.3	1.9	1.6	2.3	35	25	28	23	28	23	1.3	0.5	0.5	7-11	A01	cu	35.95
PDC-15-6	0.01-35	15±0.5	±0.5	0.3	0.6	0.2	0.4	0.3	0.6	38	30	35	25	28	20	1.15	2	4	7-11	A01	cu	23.95
PDC-15-21	1-500	14.7±0.5	±0.6	0.7	1.1	0.7	1.1	0.8	1.2	35	30	35	30	30	23	1.4	1	2	7-11	A01	cu	23.95
PDC-20-1*	25-400	21±0.75	±0.5	0.2	0.25	0.3	0.35	0.35	0.5	25	20	35	25	25	20	1.25	3	5	7-12	A01	cu	23.95
✦ PDC-20-1BD	0.5-200	19.2±0.5	±0.5	0.3	0.7	0.3	0.5	0.4	0.6	40	30	35	20	22	18	1.1	3	5	7-19	A01	cv	16.95
PDC-20-1W	10-700	19.2±0.5	±0.5	0.25	0.5	0.4	0.7	0.7	1.1	34	30	27	23	23	20	1.4	1	2	7-12	A01	cu	23.95
PDC-20-3	0.2-250	19.5±0.5	±0.5	0.35	0.6	0.25	0.5	0.35	0.6	36	30	33	25	25	20	1.2	1.5	4	7-12	A01	cu	15.95
✦ PDC-20-3BD	0.2-250	19.5±0.5	±0.5	0.3	1.0	0.25	0.9	0.35	0.7	47	25	40	25	30	20	1.1	1.5	4	7-19	A01	cv	17.95
PDC-20A-5	0.1-2000	20.0±0.5	±1.0	0.6	1.5	0.6	1.5	1.9	2.9	34	20	25	15	20	10	1.5	0.5	2	7-15	C145	cy	44.95
■ PDC-10-1-75	1-250	10.5±0.5	±0.75	1.1	1.5	1.1	1.5	1.1	1.5	30	20	30	20	30	20	2.0	2	4	7-16	A01	cu	14.95
■ PDC-10-6-75	0.2-100	10.0±0.5	±0.2	1.2	1.6	0.9	1.2	0.9	1.3	50	30	40	25	37	25	1.5	1	2	7-16	A01	cu	23.95
■ PDC-15-6-75	0.02-35	14.5±0.5	±0.5	0.3	0.7	0.3	0.7	0.3	0.7	35	20	35	20	35	20	1.3	1.5	4	7-16	A01	cu	25.95
■ PDC-20-3-75	1-150	19.5±0.5	±0.75	0.35	0.8	0.35	0.8	0.35	0.8	25	20	25	20	25	20	2.0	2	4	7-17	A01	cu	14.95
■ PDC-20-6-75	0.05-40	20.4±0.3	±0.25	0.1	0.25	0.1	0.2	0.1	0.3	45	35	35	20	25	18	1.2	1.5	3	7-17	A01	cu	23.95
TODC-10-1	10-400	11.3±0.5	±0.5	1.2	1.5	1.0	1.3	1.2	1.5	35	25	30	20	25	20	1.5	0.5	1	7-13	QQ96	ct	17.95
✷ P4DC-30A-2	5-1000	30.5±0.5	±1	0.7	1.2	0.7	1.2	0.8	1.5	30	15	32	20	20	10	1.15	1	2	7-22	C07	da	34.95

L = low range (f_L to $10f_L$) M = mid range ($10 f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

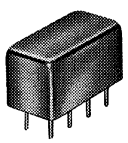
NOTES:
- * L = 25-50 MHz, M = 50-300 MHz, U = 300-400 MHz
- ** Upper range coupling ±0.75 dB
- • L = 30-100 MHz, M = 100-200 MHz, Operating Temperature +50°C
- •• L = 40-100 MHz, M = 100-200 MHz
- ✦ Bi-directional
- ✣ $L = f_L$-$2f_L$
- ✷ 4-coupled ports, Isolation between coupled ports, 25 dB minimum.
- ✪ When only specification for M range given, specification applies to entire frequency range.
- △ Available only with SMA connectors
- ■ Denotes 75 Ohm models
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
- C. Prices and specifications subject to change without notice.
- 1. Mainline Loss includes theoretical power loss at coupled port.
- 2. For PDC-HP models, external heat sinking is recommended to reduce case temperature.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

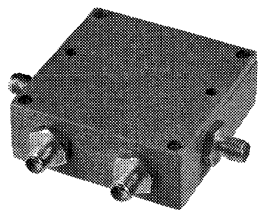
Mini-Circuits®

Plug-In & Coaxial

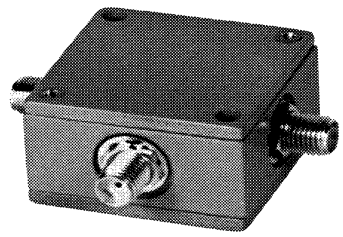
20 dB COUPLING up to 25W 30 to 2400 MHz



PDC



ZABDC20



ZFDC

MODEL NO.	FREQ. RANGE MHz f_L-f_U	COUPLING dB Nom.	Flatness	MAINLINE LOSS dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	DIRECTIVITY dB L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	VSWR (:1) Typ.	POWER INPUT, W L Max.	POWER INPUT, W MU Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
PDC20-400HP••	40-400	21.5±0.5	±0.6	0.1	0.3	0.2	0.4	0.2	0.5	30	20	30	20	27	18	1.1	10	10	7-25	A01	gh	49.95
PDC20-900HP	800-900	20.2±0.6	±0.5			0.25	0.5					24	20			1.1	5	5	7-25	A01	cu	39.95
PDC20-970HP	860-970	20.2±0.6	±0.5			0.25	0.5					24	20			1.1	5	5	7-25	A01	cu	39.95
✦ ZABDC20-2400	1500-2400	19.5±1.0	±1.0			0.3	0.5					25	18			1.2	10	10	---	DD477	jp	89.95
✦ ZFDC-20-1H•	30-400	20.5±0.5	±0.4	0.15	0.4	0.15	0.4	0.3	0.4	30	25	30	25	30	23	1.2	25	25	7-13	J17	de	58.95
△✦ ZFBDC20-900HP	800-900	20.7±0.6	±0.6			0.1	0.4					28	20			1.1	10	10	7-26	J17	gj	79.95
△✦ ZFBDC20-970HP	860-970	20.4±0.6	±0.6			0.1	0.4					28	20			1.1	10	10	7-26	J17	gj	79.95

L = low range (f_L to $10f_L$) M = mid range ($10 f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

features

- high power operation
- very low insertion loss
- excellent directivity
- excellent VSWR, 1.1:1 typical
- wide bandwidth, 30-400 MHz model ZFDC-20-1H and 40-400 MHz model PDC20-400HP
- cellular application, models PDC-HP ZFDC-HP
- communications applications, ZABDC20-2400

pin and coax connections

see case style outline drawing

Port	ct	cu	cv	cw	cy	da	de	gh	gj	jp
Input	5	1	1	1	14	8	S	1	2	1
Output	8	4	4	2	8	12	1	2	3	4
Coupled (forward)	2	3	3	4	5	2,1,13,14*	3	5	1	2
Coupled (reverse)	—	—	6	—	—	—	2	—	S	3
Not Used	11	6	—	—	—	—	—	—	—	—
Case GND	All other pins	2,5,7,8	2,5,7,8	3	All other pins	All other pins	—	3,4,6,7,8	—	—
							—	—	—	—

* 4-coupled ports #1, #2, #3, #4 consecutively

NSN GUIDE

MCL NO.	NSN	MIL-C 15370/18*
PDC-10-1	5985-01-178-4406	002
PDC-10-1-75	5985-01-294-3796	
PDC-10-2		008
PDC-10-5	5895-01-389-9497	
PDC-10-21	5985-01-130-0177	003
PDC-10-22	5985-01-190-7738	
PDC-10-54	5895-01-394-6080	
PDC-15-6	5985-01-147-0160	009
PDC-20-3	5985-01-076-8477	001
TDC-10-1	5905-01-226-3428	

* units are not QPL listed.

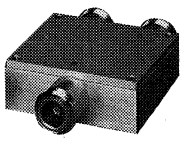
CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

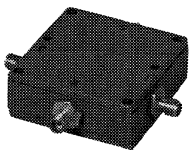
For Custom Versions Of Standard Models Consult Our Applications Dept.

DIRECTIONAL COUPLERS 50 & 75Ω Coaxial

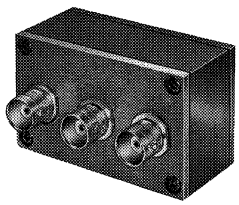
6 to 30 dB COUPLING 5 kHz to 2000 MHz



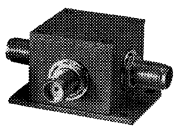
ZADC - case F14



ZADC - case CC51



ZDC



ZEDC

MODEL NO.	FREQ. RANGE MHz f_L-f_U	COUPLING dB Nom.	Flatness	MAINLINE LOSS dB L Typ.	L Max.	M○ Typ.	M○ Max.	U Typ.	U Max.	DIRECTIVITY dB L Typ.	L Min.	M○ Typ.	M○ Min.	U Typ.	U Min.	VSWR (:1) Typ.	POWER INPUT, W L Max.	MU Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
■ ZADC-10-4-75	10-1000	10.7±0.5	±0.5	1.18	1.9	1.28	1.9	1.32	1.9	27	20	22	15	18	13	1.17	1	1	—	F14	jz	54.95
ZADC-10-10	800-1000	10±0.6	±1.0			.85	1.2					22	17			1.16	—	5	—	CC51	kc	49.95
ZADC-20-10	800-1000	20±0.6	±1.2			0.4	0.7					21	17			1.18	—	5	—	CC51	kc	49.95
ZADC-30-10	800-1000	30±0.6	±1.4			0.4	0.7					21	16			1.15	—	5	—	CC51	kc	49.95
ZDC-10-1	0.5-500	11.5±0.5	±0.6	0.85	1.3	0.65	1.0	0.85	1.3	32	25	32	25	22	15	1.2	1.5	3	7-9	M22	dd	44.95
✤ ZDC-10-2	250-1000	10.5±0.5	±0.5	1.1	1.4	—	—	1.6	1.9	40	25	—	—	20	15	1.5	—	4	7-9	M22	dd	51.95
ZDC-15-2	0.5-250	15±0.5	±0.5	0.8	1.2	0.7	1.0	0.9	1.2	32	28	32	28	32	28	1.4	1.5	3	7-20	M22	dd	51.95
ZDC-15-6	.01-35	**15±0.5**	**±0.5**	0.3	0.6	0.2	0.4	0.3	0.6	38	30	35	25	28	20	1.15	2	4	7-11	M22	dd	51.95
ZDC-20-1*	25-400	**20± 0.5**	**±0.5**	0.2	0.25	0.3	0.35	0.35	0.5	25	20	35	25	25	20	1.25	3	5	7-12	M22	dd	51.95
ZDC-20-3	0.2-250	**19.5±0.5**	**±0.5**	0.35	0.6	0.25	0.5	0.35	0.6	36	30	33	25	25	20	1.2	1.5	4	7-12	M22	dd	44.95
■ ZDC-10-1-75	1-250	10.5±0.5	±0.75	1.1	1.5	1.1	1.5	1.1	1.5	30	20	30	20	30	20	2	2	4	7-16	M22	dd	44.95
■ ZDC-15-6-75	.02-35	14.5±0.5	±0.6	0.3	0.6	0.2	0.4	0.4	0.6	35	30	35	25	28	20	1.5	2	4	7-16	M22	dd	52.95
■ ZDC-20-3-75	1-150	19.5±0.5	±0.75	0.35	0.8	0.35	0.8	0.35	0.8	25	20	25	20	25	20	2	2	4	7-17	M22	dd	45.95
■ ZDC-2375	50-100	10.5±0.3	±0.2	—	—	—	—	1.1	1.3	—	—	—	—	35	30	1.3	—	4	7-17	M22	dd	52.95
■ ZDC-20-3-75-1	55-90	18.6±0.5	±0.3	0.4	0.6	0.4	0.6	0.4	0.6	35	30	35	30	35	30	1.2	—	4	7-22	M22	dd	52.95
ZEDC-10-2B	1-1000	11±0.5	±0.75	1.3	1.8	1.5	1.8	1.5	1.8	35	30	30	20	18	13	1.3	1.5	3	7-15	V37	db	64.95
ZEDC-15-2B	1-1000	15±0.5	±0.5	0.5	1.4	0.8	1.2	1.0	1.4	35	30	30	25	25	15	1.15	1.5	3	7-15	V37	db	64.95

L = low range (f_L to $10f_L$) M = mid range ($10 f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

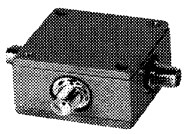
NOTES:
- * L = 25-50 MHz, M = 50-300 MHz, U = 300-400 MHz
- ** Upper range coupling ±0.75 dB
- *** Above 1000 MHz, coupling flatness ±1 dB.
- ✤ $L = f_L$-$2f_L$
- ✪ When only specification for M range given, specification applies to entire frequency range.
- △ Available only with SMA connectors
- ■ Denotes 75 Ohm model, for coax connector models 75 Ohm BNC connectors are standard.
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
- C. Prices and specifications subject to change without notice.
- 1. Mainline Loss includes theoretical power loss at coupled port.

NSN GUIDE

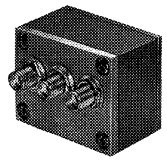
MCL NO.	NSN
ZDC-10-1B	5985-01-391-5675
ZDC-10-1(BNC)	5985-01-125 3467
ZDC-20-1	5985-01-178-4405
ZDC-20-3(BNC)	5985-01-096-5007
ZDC-20-3B	5985-01-264-9105
ZEDC-10-2	5985-01-251-2669
ZEDC-15-2B	5985-01-337-9981
ZFDC-10-1	5985-01-230-6676
ZFDC-10-1(SMA)	5985-01-179-5122
ZFDC-10-1B	5985-01-135-9780
ZFDC-10-2	5985-01-208-5694
ZFDC-10-21	5985-01-253-0600
ZFDC-10-5(SMA)	5985-01-417-0065
ZFDC-10-6B	5985-01-314-4176
ZFDC-15-5	5985-01-298 0144
ZFDC-15-6	5985-01-330-6792
ZFDC-20-2	5985-01-230-6676
ZFDC-20-3(BNC)	5985-01-146-0478
ZFDC-20-3(TNC)	5985-01-226-7882
ZFDC-20-3(SMA)	6130-01-383-9709
ZFDC-20 4	5985-01-266-9992
ZFDC-20-5(BNC)	5985-01-097-2192
ZMDC-10-1	4935-01-227-6945
ZMDC-10-1B	4935-01-227-6945
ZMDC-20-3	5985-01-193-8515

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

Mini-Circuits®



ZFDC



ZMDC

MODEL NO.	FREQ. RANGE MHz f_L-f_U	COUPLING dB Nom.	Flatness	MAINLINE LOSS dB L Typ.	L Max.	M° Typ.	M° Max.	U Typ.	U Max.	DIRECTIVITY dB L Typ.	L Min.	M° Typ.	M° Min.	U Typ.	U Min.	VSWR (:1) Typ.	POWER INPUT, W L Max.	MU Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
ZFDC-10-1	1-500	10.5±0.25	±0.6	1.0	1.3	0.8	1.1	1.0	1.3	32	25	33	25	22	15	1.2	1.5	3	7-9	K18	db	44.95
ZFDC-10-2	10-1000	10.75±0.5	±0.5	1.5	2.0	1.2	1.8	1.5	2.0	35	28	30	25	27	20	1.5	1.5	3	7-14	K18	db	51.95
ZFDC-10-5	1-2000	10.8±0.5	±1.0	1.2	1.9	1.2	1.8	1.8	2.5	38	25	30	18	22	18	1.3	0.5	0.5	7-9	K18	db	84.95
ZFDC-10-6	0.005-20	11±0.5	±0.5	0.4	1.2	0.4	0.8	0.4	1.0	40	30	40	30	35	25	1.3	1.5	3	7-10	K18	db	52.95
ZFDC-10-21**	1-1000	11±0.5	±0.5	1.2	1.7	1.2	1.7	1.6	2.0	40	30	25	20	25	20	1.2	1	2	7-10	K18	db	54.95
■ ZFDC-10-1-75	1-400	10.5±0.5	±0.5	1.0	1.4	1.1	1.5	1.1	1.6	46	30	44	28	34	20	1.3	2	4	7-21	K18	db	45.95
■ ZFDC-10-21-75	10-750	11±0.5	±0.75	1.5	1.8	1.5	1.9	1.7	2.1	36	30	30	20	26	20	1.4	1	2	7-21	K18	db	54.95
ZFDC-10-22	1-750	11±0.5	±0.5	1.1	1.9	1.2	1.7	1.4	1.9	35	30	25	20	25	20	1.25	1	2	7-10	K18	db	49.95
ZFDC-15-5	1-2000	15.5±0.5	±1.0	1.2	1.8	1.2	1.8	1.3	2.3	30	20	25	20	18	11	1.3	0.5	2	7-14	K18	dc	71.95
ZFDC-15-6	0.03-35	15±0.5	±0.5	0.3	0.6	0.2	0.4	0.3	0.6	38	30	35	25	28	20	1.15	2	4	7-11	K18	db	49.95
■ ZFDC-15-6-75	0.02-35	14.5±0.5	±0.5	0.3	0.7	0.3	0.7	0.3	0.7	35	20	35	20	35	20	1.3	1.5	4	7-16	K18	db	49.95
ZFDC-15-10	800-1000	15±1.0	±1.0			0.3	0.7					23	17			1.2	—	5	—	K18	db	44.95
ZFDC-20-3	0.2-250	19.5±0.5	±0.25	0.35	0.6	0.25	0.5	0.35	0.6	36	25	33	25	25	20	1.2	1.5	4	7-12	K18	db	44.95
■ ZFDC-20-3-75	10-250	19.3±0.5	±0.3	0.25	0.4	0.3	0.5	0.4	0.6	29	25	29	25	28	24	1.2	1	2	7-21	K18	db	49.95
ZFDC-20-4	1-1000	19.5±0.5	±0.5	0.4	1.2	0.4	0.8	0.8	1.5	36	28	27	20	23	18	1.1	.5	2	7-14	K18	dc	64.95
△ ZFDC-20-4L	10-1000	20.2±0.5	±0.5	0.2	0.5	0.3	0.7	0.7	1.2	40	20	30	16	20	14	1.1	1	1	7-26	K18	db	64.95
■ ZFDC-20-5-75	100-1500	20.5±0.5	±0.75	0.9	1.3	0.9	1.2	1.1	1.5	30	20	25	18	22	13	1.3	1	1	—	K18	db	64.95
ZFDC-20-5***	0.1-2000	19.5±0.5	±0.5	0.3	1	0.7	1.4	1.5	2.3	30	20	27	20	22	10	1.2	.5	2	7-20	K18	dc	84.95
△ ZFDC-20-50***	20-2000	19.5±0.5	±0.8	0.8	1.3	0.7	1.3	1.0	1.6	30	20	25	20	22	10	1.25	1	1	7-24	K18	dc	64.95
■ ZFDC-3375	0.2-200	30.5±0.5	±0.6	0.5	0.8	0.6	0.9	0.7	1.0	30	25	25	20	19	15	1.6	.5	2	7-12	K18	db	45.95
ZMDC-10-1	0.5-500	11.5±0.5	±0.6	0.85	1.3	0.65	1.0	0.85	1.3	32	25	32	25	22	15	1.2	1.5	3	7-9	M21	dd	49.95
✤ ZMDC-10-2	250-1000	10.5±0.5	±0.5	1.1	1.4	—	—	1.6	1.9	40	30	—	—	20	15	1.5	—	5	7-9	M21	dd	59.95
ZMDC-15-6	0.1-35	15±0.5	±0.5	0.4	0.6	0.2	0.4	0.4	0.6	38	30	35	25	28	20	1.15	2	4	7-11	M21	dd	59.95
ZMDC-20-1*	25-400	21±0.75	±0.5	0.2	0.25	0.3	0.35	0.35	0.5	25	20	35	25	25	20	1.25	3	5	7-12	M21	dd	59.95
ZMDC-20-3	0.2-250	19.5±0.5	±0.5	0.35	0.5	0.35	0.5	0.35	0.6	36	30	33	25	25	20	1.2	1.5	4	7-12	M21	dd	49.95
ZMDC-30-1	0.1-250	30±0.5	±0.5	0.4	0.6	0.5	0.8	0.55	0.85	23	18	20	15	17	10	1.5	1.0	3	7-13	M21	dd	49.95

L = low range (f_L to $10f_L$) M = mid range ($10\ f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

coaxial connections

see case style outline drawings

Port	db	dc	dd	de	jz	kc
Input	1	3	3	S	1	1
Output	2	1	2	1	2	3
Coupled (forward)	3	2	1	3	S	2
Coupled (reverse)	—	—	—	2	—	—
Not Used	—	—	—	—	—	—
Case GND	—	—	—	—	—	—

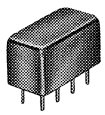
CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

FILTERS 50 & 75 Ω Plug-In

LOW PASS DC to 1000 MHz



PLP

MODEL NO.	PASSBAND, MHz (loss < 1dB)	fco, MHz Nom. (loss 3dB)	STOP BAND, MHz (loss > 20dB)	STOP BAND, MHz (loss > 40dB)	VSWR, Passband Typ.	VSWR, Stopband Typ.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
PLP-1.9**	DC-1.9	2.5	3.4-4.7	4.7-200	1.7:1	18:1	8-34	A01	cr	13.95
PLP-2.5**	DC-2.5	2.75	3.8-5.0	5.0-200	1.7:1	18:1	8-34	A01	cr	14.95
PLP-5	DC-5	6	8-10	10-200	1.7:1	18:1	8-12	A01	cr	11.45
■ PLP-7-75	DC-7	8	11-15	15-200	1.7:1	18:1	8-35	A01	cr	12.95
PLP-10.7	DC-11	14	19-24	24-200	1.7:1	18:1	8-12	A01	cr	11.45
■ PLP-10.7-75	DC-11	14	19-24	24-200	1.7:1	18:1	8-35	A01	cr	12.95
PLP-15	DC-15	17	23-32	32-200	1.7:1	18:1	8-35	A01	cr	11.45
■ PLP-15-75	DC-15	17	23-32	32-200	1.7:1	18:1	8-35	A01	cr	12.95
PLP-21.4	DC-22	24.5	32-41	41-200	1.7:1	18:1	8-12	A01	cr	11.45
■ PLP-21.4-75	DC-22	24.5	32-41	41-200	1.7:1	18:1	8-36	A01	cr	12.95
PLP-30	DC-32	35	47-61	61-200	1.7:1	18:1	8-13	A01	cr	11.45
■ PLP-30-75	DC-32	35	47-61	61-200	1.7:1	18:1	8-36	A01	cr	12.95
PLP-50	DC-48	55	70-90	90-200	1.7:1	18:1	8-13	A01	cr	11.45
■ PLP-50-75	DC-48	55	70-90	90-200	1.7:1	18:1	8-36	A01	cr	12.95
PLP-70	DC-60	67	90-117	117-300	1.7:1	18:1	8-13	A01	cr	11.45
PLP-90	DC-81	90	121-157	157-400	1.7:1	18:1	8-14	A01	cr	11.45
PLP-100	DC-98	108	146-189	189-400	1.7:1	18:1	8-14	A01	cr	11.45
■ PLP-100-75	DC-98	108	146-189	189-400	1.7:1	18:1	8-37	A01	cr	12.95
PLP-150	DC-140	155	210-300	300-600	1.7:1	18:1	8-14	A01	cr	11.45
PLP-200	DC-190	210	290-390	390-800	1.7:1	18:1	8-15	A01	cr	11.45
PLP-250	DC-225	250	320-400	400-1200	1.7:1	18:1	8-15	A01	cr	11.45
PLP-300	DC-270	297	410-550	550-1200	1.7:1	18:1	8-15	A01	cr	11.45
PLP-450	DC-400	440	580-750	750-1800	1.7:1	18:1	8-16	A01	cr	11.45
PLP-550	DC-520	570	750-920	920-2000	1.7:1	18:1	8-16	A01	cr	11.45
PLP-600	DC-580	640	840-1120	1120-2000	1.7:1	18:1	8-16	A01	cr	11.45
■ PLP-600-75	DC-580	640	840-1120	1120-2000	1.7:1	18:1	8-37	A01	cr	12.95
PLP-750	DC-700	770	1000-1300	1300-2000	1.7:1	18:1	8-17	A01	cr	11.45
PLP-800	DC-720	800	1080-1400	1400-2000	1.7:1	18:1	8-17	A01	cr	11.45
PLP-850	DC-780	850	1100-1400	1400-2000	1.7:1	18:1	8-17	A01	cr	11.45
■ PLP-850-75	DC-750	850	1150-1490	1490-2000	1.7:1	18:1	8-37	A01	cr	12.95
PLP-1000	DC-900	990	1340-1750	1750-2000	1.7:1	18:1	8-18	A01	cr	11.45
PLP-1200	DC-1000	1200	1620-2100	2100-2500	1.7:1	18:1	8-18	A01	cr	11.45

NOTES:
* 35 dB for SCLF-380, SCLF-420 and SCLF-550 models
** 1db compression at +13dbm input power
■ Denotes 75 ohm model.
❑ Non-hermetic
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current rating:
1a. RF power, 0.5 Watt

NSN GUIDE

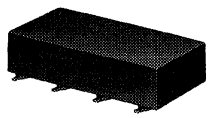
MCL NO.	NSN
PLP-30	5915-01-355-9433
PLP-100	5915-01-332-1091
PLP-150	5915-01-389-3575
PLP-300	5915-01-450-7011
PLP-450	5915-01-389-8302

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

Mini-Circuits®

Surface Mount

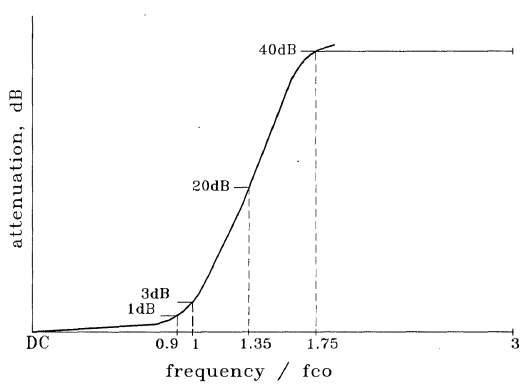
LOW PASS DC to 1000 MHz



SCLF

MODEL NO.	PASSBAND, MHz (loss < 1dB)	fco, MHz Nom. (loss 3dB)	STOP BAND, MHz (loss > 20dB)	STOP BAND, MHz (loss > 40dB)	VSWR, Passband Typ.	VSWR, Stopband Typ.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ (Note 2) Qty. (1-9)
SCLF-5	DC-5.0	5.8	8-10	10-200	1.7:1	18:1	8-38	YY161	cr	14.95
SCLF-8	DC-8.0	9.2	12.5-16.5	16.5-200	1.7:1	18:1	8-38	YY161	cr	12.95
SCLF-10.7	DC-11	14	19-24	24-200	1.7:1	18:1	8-38	YY161	cr	12.95
SCLF-21.4	DC-22	24.5	32-41	41-200	1.7:1	18:1	8-19	YY161	cr	11.45
SCLF-25	DC-25	28	36-47	47-200	1.7:1	18:1	8-39	YY161	cr	11.45
SCLF-30	DC-30	35	47-61	61-200	1.7:1	18:1	8-19	YY161	cr	11.45
SCLF-45	DC-45	55	70-90	90-200	1.7:1	18:1	8-19	YY161	cr	11.45
SCLF-95	DC-95	108	146-189	189-400	1.7:1	18:1	8-39	YY161	cr	11.45
SCLF-135	DC-135	155	210-300	300-600	1.7:1	18:1	8-20	YY161	cr	11.45
SCLF-190	DC-190	210	290-390	390-800	1.7:1	18:1	8-20	YY161	cr	11.45
SCLF-225	DC-225	250	340-440	440-1200	1.7:1	18:1	8-39	YY161	cr	11.45
SCLF-380	DC-380	440	580-750	750-1800*	1.7:1	18:1	8-21	YY161	cr	11.45
SCLF-420	DC-420	570	750-920	920-2000*	1.7:1	18:1	8-21	YY161	cr	11.45
SCLF-550	DC-550	605	800-1050	1050-2000*	1.7:1	18:1	8-40	YY161	cr	12.95
SCLF-700	DC-700	770	1000-1300	1300-2000	1.7:1	18:1	8-40	YY161	cr	12.95
SCLF-1000	DC-1000	1200	1620-2100	2100-2500	1.7:1	18:1	8-40	YY161	cr	12.95

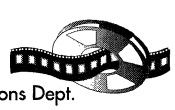
LOW PASS
TYPICAL FREQUENCY RESPONSE



pin connections
see case style outline drawings

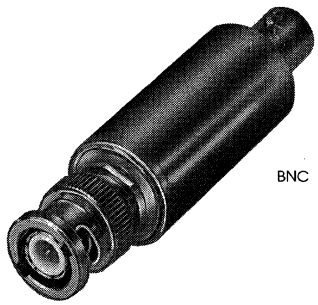
PORT	cr
INPUT	1
OUTPUT	8
GND	2,3,4,5,6,7

In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.



FILTERS 50Ω Coaxial

LOW PASS DC to 2700 MHz



BLP

MODEL NO.	PASSBAND, MHz (loss < 1dB)	fco, MHz Nom. (loss 3dB)	STOP BAND, MHz (loss > 20dB)	STOP BAND, MHz (loss > 40dB)	VSWR, Passband Typ.	VSWR, Stopband Typ.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ (Note 2) Qty. (1-9)
BLP-1.9**	DC-1.9	2.5	3.4-4.7	4.7-200	1.7:1	18:1	8-34	FF55	—	34.95
BLP-2.5**	DC-2.5	2.75	3.8-5.0	5.0-200	1.7:1	18:1	8-34	FF55	—	35.95
BLP-5	DC-5	6	8-10	10-200	1.7:1	18:1	8-12	FF55	—	32.95
■ BLP-7-75	DC-7	8	11-15	15-200	1.7:1	18:1	8-35	FF55	—	33.95
BLP-10.7	DC-11	14	19-24	24-200	1.7:1	18:1	8-12	FF55	—	32.95
■ BLP-10.7-75	DC-11	14	19-24	24-200	1.7:1	18:1	8-35	FF55	—	33.95
BLP-15	DC-15	17	23-32	32-200	1.7:1	18:1	8-34	FF55	—	32.95
■ BLP-15-75	DC-15	17	23-32	32-200	1.7:1	18:1	8-35	FF55	—	33.95
BLP-21.4	DC-22	24.5	32-41	41-200	1.7:1	18:1	8-12	FF55	—	32.95
■ BLP-21.4-75	DC-22	24.5	32-41	41-200	1.7:1	18:1	8-36	FF55	—	33.95
BLP-30	DC-32	35	47-61	61-200	1.7:1	18:1	8-13	FF55	—	32.95
■ BLP-30-75	DC-32	35	47-61	61-200	1.7:1	18:1	8-36	FF55	—	33.95
BLP-50	DC-48	55	70-90	90-200	1.7:1	18:1	8-13	FF55	—	32.95
■ BLP-50-75	DC-48	55	70-90	90-200	1.7:1	18:1	8-36	FF55	—	33.95
BLP-70	DC-60	67	90-117	117-300	1.7:1	18:1	8-13	FF55	—	32.95
BLP-90	DC-81	90	121-157	157-400	1.7:1	18:1	8-14	FF55	—	32.95
BLP-100	DC-98	108	146-189	189-400	1.7:1	18:1	8-14	FF55	—	32.95
■ BLP-100-75	DC-98	108	146-189	189-400	1.7:1	18:1	8-37	FF55	—	33.95
BLP-150	DC-140	155	210-300	300-600	1.7:1	18:1	8-14	FF55	—	32.95
BLP-200	DC-190	210	290-390	390-800	1.7:1	18:1	8-15	FF55	—	32.95
BLP-250	DC-225	250	320-400	400-1200	1.7:1	18:1	8-15	FF55	—	32.95
BLP-300	DC-270	297	410-550	550-1200	1.7:1	18:1	8-15	FF55	—	32.95
BLP-450	DC-400	440	580-750	750-1800	1.7:1	18:1	8-16	FF55	—	32.95
BLP-550	DC-520	570	750-920	920-2000	1.7:1	18:1	8-16	FF55	—	32.95
BLP-600	DC-580	640	840-1120	1120-2000	1.7:1	18:1	8-16	FF55	—	32.95
■ BLP-600-75	DC-580	640	840-1120	1120-2000	1.7:1	18:1	8-37	FF55	—	33.95
BLP-750	DC-700	770	1000-1300	1300-2000	1.7:1	18:1	8-17	FF55	—	32.95
BLP-800	DC-720	800	1080-1400	1400-2000	1.7:1	18:1	8-17	FF55	—	32.95
BLP-850	DC-780	850	1100-1400	1400-2000	1.7:1	18:1	8-17	FF55	—	32.95
■ BLP-850-75	DC-750	850	1150-1490	1490-2000	1.7:1	18:1	8-37	FF55	—	33.95
BLP-1000	DC-900	990	1340-1750	1750-2000	1.7:1	18:1	8-18	FF55	—	32.95
BLP-1200	DC-1000	1200	1620-2100	2100-2500	1.7:1	18:1	8-18	FF55	—	32.95

NOTES:

** 1dB compression at +13 dBm input power

■ Denotes 75 ohm model, for coax connector models 75 ohm BNC connectors are standard.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".

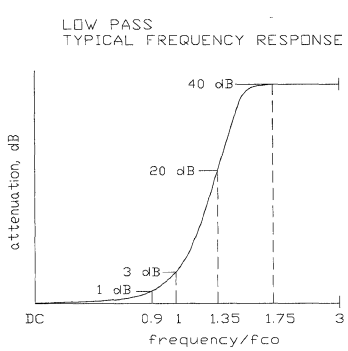
C. Prices and specifications subject to change without notice.

1. Absolute maximum power, voltage and current rating: 1a. RF power, 0.5 Watt

2. Models are available with male/female coax connectors, for other configurations and inter-series versions consult factory. See section 0, case styles and outline drawings.

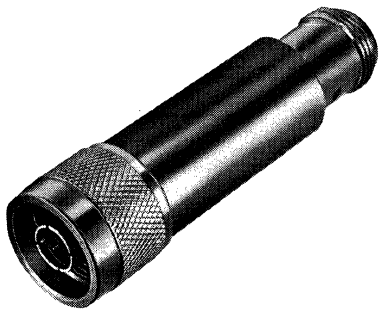
NSN GUIDE

MCL NO.	NSN
BLP-5	5915-01-454-6890
SLP-30	5915-01-327-4692
SLP-21.4	5915-01-414-9165



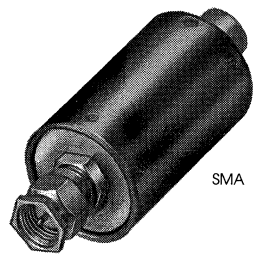
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

Mini-Circuits®



TYPE N

NLP



SMA

SLP

MODEL NO.	PASSBAND, MHz (loss < 1dB)	fco, MHz Nom. (loss 3dB)	STOP BAND, MHz (loss > 20dB)	STOP BAND, MHz (loss > 40dB)	VSWR, Passband Typ.	VSWR, Stopband Typ.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ (Note 2) Qty. (1-9)
NLP-1.9**	DC-1.9	2.5	3.4-4.7	4.7-200	1.7:1	18:1	8-34	FF57	—	37.95
NLP-2.5**	DC-2.5	2.75	3.8-5.0	5.0-200	1.7:1	18:1	8-34	FF57	—	38.95
NLP-5	DC-5	6	8-10	10-200	1.7:1	18:1	8-12	FF57	—	35.95
NLP-10.7	DC-11	14	19-24	24-200	1.7:1	18:1	8-12	FF57	—	35.95
NLP-15	DC-15	17	23-32	32-200	1.7:1	18:1	8-34	FF57	—	35.95
NLP-21.4	DC-22	24.5	32-41	41-200	1.7:1	18:1	8-12	FF57	—	35.95
NLP-30	DC-32	35	47-61	61-200	1.7:1	18:1	8-13	FF57	—	35.95
NLP-50	DC-48	55	70-90	90-200	1.7:1	18:1	8-13	FF57	—	35.95
NLP-70	DC-60	67	90-117	117-300	1.7:1	18:1	8-13	FF57	—	35.95
NLP-90	DC-81	90	121-157	157-400	1.7:1	18:1	8-14	FF57	—	35.95
NLP-100	DC-98	108	146-189	189-400	1.7:1	18:1	8-14	FF57	—	35.95
NLP-150	DC-140	155	210-300	300-600	1.7:1	18:1	8-14	FF57	—	35.95
NLP-200	DC-190	210	290-390	390-800	1.7:1	18:1	8-15	FF57	—	35.95
NLP-250	DC-225	250	320-400	400-1200	1.7:1	18:1	8-15	FF57	—	35.95
NLP-300	DC-270	297	410-550	550-1200	1.7:1	18:1	8-15	FF57	—	35.95
NLP-450	DC-400	440	580-750	750-1800	1.7:1	18:1	8-16	FF57	—	35.95
NLP-550	DC-520	570	750-920	920-2000	1.7:1	18:1	8-16	FF57	—	35.95
NLP-600	DC-580	640	840-1120	1120-2000	1.7:1	18:1	8-16	FF57	—	35.95
NLP-750	DC-700	770	1000-1300	1300-2000	1.7:1	18:1	8-17	FF57	—	35.95
NLP-800	DC-720	800	1080-1400	1400-2000	1.7:1	18:1	8-17	FF57	—	35.95
NLP-850	DC-780	850	1100-1400	1400-2000	1.7:1	18:1	8-17	FF57	—	35.95
NLP-1000	DC-900	990	1340-1750	1750-2000	1.7:1	18:1	8-18	FF57	—	35.95
NLP-1200	DC-1000	1200	1620-2100	2100-2500	1.7:1	18:1	8-18	FF57	—	35.95
NLP-1750	DC-1500	1750	2400-3000	3000-6000	1.3:1	18:1	—	FF57	—	37.95
NLP-2400	DC-2200	2400	3150-4000	4000-6000	1.3:1	18:1	—	FF57	—	37.95
NLP-2950	DC-2700	2950	3700-4500	4500-6000	1.3:1	18:1	—	FF57	—	37.95
SLP-1.9**	DC-1.9	2.5	3.4-4.7	4.7-200	1.7:1	18:1	8-34	FF99	—	36.95
SLP-2.5**	DC-2.5	2.75	3.8-5.0	5.0-200	1.7:1	18:1	8-34	FF99	—	37.95
SLP-5	DC-5	6	8-10	10-200	1.7:1	18:1	8-12	FF99	—	34.95
SLP-10.7	DC-11	14	19-24	24-200	1.7:1	18:1	8-12	FF99	—	34.95
SLP-15	DC-15	17	23-32	32-200	1.7:1	18:1	8-34	FF99	—	34.95
SLP-21.4	DC-22	24.5	32-41	41-200	1.7:1	18:1	8-12	FF99	—	34.95
SLP-30	DC-32	35	47-61	61-200	1.7:1	18:1	8-13	FF99	—	34.95
SLP-50	DC-48	55	70-90	90-200	1.7:1	18:1	8-13	FF99	—	34.95
SLP-70	DC-60	67	90-117	117-300	1.7:1	18:1	8-13	FF99	—	34.95
SLP-90	DC-81	90	121-157	157-400	1.7:1	18:1	8-14	FF99	—	34.95
SLP-100	DC-98	108	146-189	189-400	1.7:1	18:1	8-14	FF99	—	34.95
SLP-150	DC-140	155	210-300	300-600	1.7:1	18:1	8-14	FF99	—	34.95
SLP-200	DC-190	210	290-390	390-800	1.7:1	18:1	8-15	FF99	—	34.95
SLP-250	DC-225	250	320-400	400-1200	1.7:1	18:1	8-15	FF99	—	34.95
SLP-300	DC-270	297	410-550	550-1200	1.7:1	18:1	8-15	FF99	—	34.95
SLP-450	DC-400	440	580-750	750-1800	1.7:1	18:1	8-16	FF99	—	34.95
SLP-550	DC-520	570	750-920	920-2000	1.7:1	18:1	8-16	FF99	—	34.95
SLP-600	DC-580	640	840-1120	1120-2000	1.7:1	18:1	8-16	FF99	—	34.95
SLP-750	DC-700	770	1000-1300	1300-2000	1.7:1	18:1	8-17	FF99	—	34.95
SLP-800	DC-720	800	1080-1400	1400-2000	1.7:1	18:1	8-17	FF99	—	34.95
SLP-850	DC-780	850	1100-1400	1400-2000	1.7:1	18:1	8-17	FF99	—	34.95
SLP-1000	DC-900	990	1340-1750	1750-2000	1.7:1	18:1	8-18	FF99	—	34.95
SLP-1200	DC-1000	1200	1620-2100	2100-2500	1.7:1	18:1	8-18	FF99	—	34.95
SLP-1650	DC-1400	1650	2300-2900	2900-6000	1.3:1	18:1	—	FF99	—	36.95
SLP-2400	DC-2200	2400	3150-4000	4000-6000	1.3:1	18:1	—	FF99	—	36.95
SLP-2950	DC-2700	2950	3700-4500	4500-6000	1.3:1	18:1	—	FF99	—	36.95

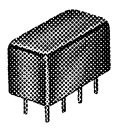
CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

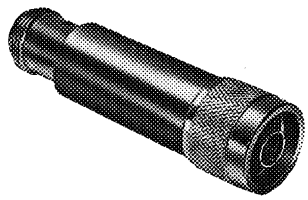
For Custom Versions Of Standard Models Consult Our Applications Dept.

FILTERS 50 Ω Plug-In & Coaxial

BANDPASS 10.7 to 70 MHz



PIF
PBP
PBLP



NIF
NBP
NBLP

constant impedance

MODEL NO.	CENTER FREQ. MHz	PASSBAND, MHz (loss < 1dB)	STOP BANDS (loss > 10dB) at MHz	STOP BANDS (loss > 20dB) at MHz	VSWR, 1.3:1, Typ. TOTAL BAND, MHz	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection*	PRICE $ (note 2a) Qty. (1-9)
_IF-21.4	21.4	18-25	4.9 & 85	1.3 & 150	DC-220	8-22	▽	cs	14.95
_IF-30	30	25-35	7 & 120	1.9 & 210	DC-330	8-22	▽	cs	14.95
_IF-40	42	35-49	10 & 168	2.6 & 300	DC-400	8-22	▽	cs	14.95
_IF-50	50	41-58	11.5 & 200	3.1 & 350	DC-440	8-23	▽	cs	14.95
_IF-60	60	50-70	14 & 240	3.8 & 400	DC-500	8-23	▽	cs	14.95
_IF-70	70	58-82	16 & 280	4.4 & 490	DC-550	8-23	▽	cs	14.95

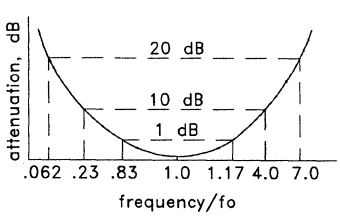
For connector selection, add prefix letter P, B, N or S to _IF where applicable (see note 2)

elliptic response

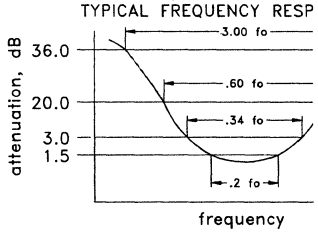
MODEL NO.	CENTER FREQ. MHz	PASSBAND I.L. 1.5 dB MAX. (MHz)	3 dB BANDWIDTH TYPICAL (MHz)	STOP BANDS I.L. > 20 dB at MHz	STOP BANDS I.L. > 35 dB at MHz	PASSBAND VSWR MAX.	STOP BAND VSWR TYPICAL	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection*	PRICE $ (note 2b) Qty. (1-9)
_BP-10.7	10.7	9.5-11.5	8.9-12.7	7.5 & 15	0.6 & 50-1000	1.7:1	16:1	8-24	▽	cr	18.95
_BP-21.4	21.4	19.2-23.6	17.9-25.3	15.5 & 29	3.0 & 80-1000	1.7:1	16:1	8-24	▽	cr	18.95
_BP-30	30	27.0-33.0	25-35	22 & 40	3.2 & 99-1000	1.7:1	16:1	8-24	▽	cr	18.95
_BP-60	60	55.0-67.0	49.8-70.5	44 & 79	4.6 & 190-1000	1.7:1	16:1	8-25	▽	cr	18.95
_BP-70	70	63.0-77.0	58.0-82.0	51 & 94	6.0 & 193-1000	1.7:1	16:1	8-25	▽	cr	18.95

For connector selection, add prefix letter P, B, N or S to _BP where applicable (see note 2)

BANDPASS, CONSTANT IMPEDANCE
TYPICAL FREQUENCY RESPONSE



BANDPASS, ELLIPTICAL
TYPICAL FREQUENCY RESP

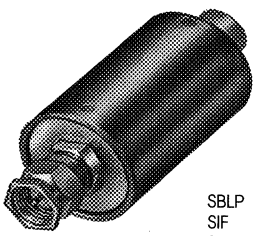


Mini-Circuits®

Coaxial

LOW PASS, FLAT TIME DELAY DC to 1.87 GHz

BBLP
BIF
BBP



SBLP
SIF
SBP

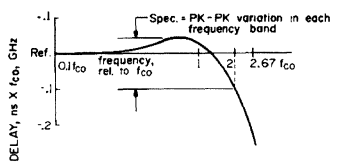
MODEL NO.	PASSBAND, MHz (loss < 1.2 dB) Min.	fco, MHz (loss 3dB) Nom.	STOP BAND, MHz loss > 10dB	STOP BAND, MHz loss > 20dB	VSWR DC-0.2fco X̄	VSWR DC-0.6fco X̄	GROUP DELAY VARIATION, ns DC-fco X̄	GROUP DELAY VARIATION, ns DC-2fco X̄	GROUP DELAY VARIATION, ns DC-2.67fco X̄	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ (Note 2c) Qty. (1-9)
_BLP-39	DC-23	39	78-117	117	1.3:1	2.3:1	0.70	4.0	5.00	8-31	▽	cr	19.95
_BLP-117	DC-65	117	234-312	312	1.3:1	2.4:1	0.35	1.4	1.90	8-31	▽	cr	19.95
_BLP-156	DC-94	156	312-416	416	1.3:1	1.1:1	0.30	1.1	1.50	8-31	▽	cr	19.95
_BLP-200	DC-120	200	400-534	534	1.6:1	1.9:1	0.40	1.3	1.60	8-32	▽	cr	19.95
_BLP-300	DC-180	300	600-801	801	1.25:1	2.2:1	0.20	0.6	0.80	8-32	▽	cr	19.95
_BLP-467	DC-280	467	934-1246	1246	1.25:1	2.2:1	0.15	0.4	0.55	8-32	▽	cr	19.95
▼ _BLP-933	DC-560	933	1866-2490	2490	1.3:1	2.2:1	0.09	0.2	0.28	8-33	▽	--	38.95
▼ _BLP-1870	DC-850	1870	3740-5000	5000	1.45:1	2.9:1	0.05	0.1	0.15	8-33	▽	--	38.95

For connector selection, add prefix letter P, B, N, or S to _BLP where applicable (see note 2)

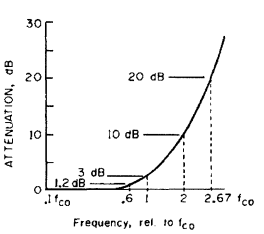
features

- Flat group delay for low pulse distortion.
- Delay and selectivity are both controlled by design.
- Wide selection of cutoff frequencies, 48-to-1 range. Custom Fco values are available.
- Choice of pin package or connectorized models.

TYPICAL GROUP DELAY



TYPICAL FREQUENCY RESPONSE
Insertion Loss



NOTES:

* Connection for plug-in models (PIF, PBP, PBLP)
▼ _BLP-933 AND _BLP-1870 available only with N and SMA connectors.
▽ Four different case styles available:
For plug-in models, case style A01
SMA connector models, case style FF99
BNC connector models, case style FF55
N-type connector models, case style FF57
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current rating:
1a. RF power, 0.5 Watt
2. 2a. Price for PIF-series only, SIF $38.95, BIF $36.95, NIF $39.95
2b Price for PBP-series only, SBP $42.95, BBP $40.95, NBP $43.95
2c. Price for PBLP-series only, SBLP $38.95, BBLP $36.95, NBLP $39.95
3. Models are available with male/ female coax connectors, for other configurations and inter-series versions consult factory. See section 0, case styles and outline drawings.
4. All filters, except pin units (PIF, PBP and PBLP), are non-hermetic.

pin connections

see case style outline drawings

PORT	cr	cs
INPUT	1	1
OUTPUT	8	6
GND	2,3,4,5,6,7	2,3,4,5,7,8

CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

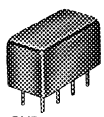
For Custom Versions Of Standard Models Consult Our Applications Dept.

FILTERS 50 Ω Surface Mount❑

HIGH PASS 16.5 MHz to 2.2 GHz

SURFACE MOUNT

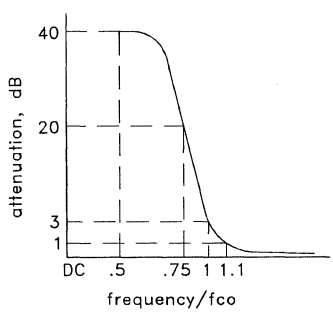
SCHF



PHP

MODEL NO.	STOP BAND, MHz (loss > 40dB)	STOP BAND, MHz (loss > 20dB)	fco, MHz Nom. (loss 3dB)	PASSBAND, MHz (loss < 1dB)	VSWR, Stopband Typ.	VSWR, Passband Typ.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
SCHF-17	DC-9	9-13	16.5	18-200	18:1	1.25:1	—	YY161	cr	15.95
SCHF-25	DC-13	13-19	25	27.5-200	18:1	1.3:1	8-41	YY161	cr	14.95
SCHF-300	DC-145	145-190	245	290-1200	18:1	1.5:1	8-41	YY161	cr	14.95
PHP-25	DC-13	13-19	25	27.5-200	18:1	1.7:1	8-26	A01	cr	16.95
PHP-50	DC-20	20-26	37	41-200	17:1	1.5:1	8-26	A01	cr	14.95
PHP-100	DC-40	40-55	82	90-400	17:1	1.5:1	8-26	A01	cr	14.95
PHP-150	DC-70	70-95	120	133-600	17:1	1.8:1	8-27	A01	cr	14.95
PHP-175	DC-70	70-105	140	160-800	17:1	1.5:1	8-27	A01	cr	14.95
PHP-200	DC-90	90-116	164	185-800	17:1	1.6:1	8-27	A01	cr	14.95
PHP-250	DC-100	100-150	205	225-1200	17:1	1.3:1	8-28	A01	cr	14.95
PHP-300	DC-145	145-170	245	*290-1200	17:1	1.7:1	8-28	A01	cr	14.95
PHP-400	DC-210	210-290	360	395-1600	17:1	1.7:1	8-28	A01	cr	14.95
PHP-500	DC-280	280-365	454	500-1600	17:1	1.9:1	8-29	A01	cr	14.95
PHP-600	DC-350	350-440	545	600-1600	17:1	2.0:1	8-29	A01	cr	14.95
PHP-700	DC-400	400-520	640	700-1800	17:1	1.6:1	8-29	A01	cr	14.95
PHP-800	DC-445	445-570	710	780-2000	17:1	2.1:1	8-30	A01	cr	14.95
PHP-900	DC-520	520-660	820	910-2100	17:1	1.8:1	8-30	A01	cr	14.95
PHP-1000	DC-550	550-720	900	1000-2200	17:1	1.9:1	8-30	A01	cr	14.95

HIGH PASS
TYPICAL FREQUENCY RESPONSE



NOTES:

* Insertion loss 1.5 dB maximum
❑ Non-hermetic
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current rating:
   1a. RF power, 0.5 Watt
2. Models are available with male/female coax connectors, for other configurations and inter-series versions consult factory. See section 0, case styles and outline drawings.

pin connections

see case style outline drawings

PORT	cr
INPUT	1
OUTPUT	8
GND	2,3,4,5,6,7

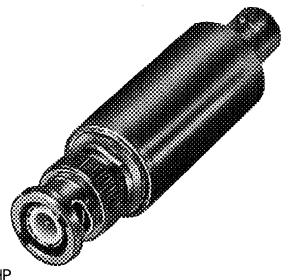
NSN GUIDE

MCL NO.	NSN
BHP-25	5915-01-425-7519
SHP-200	5915-01-360-0677

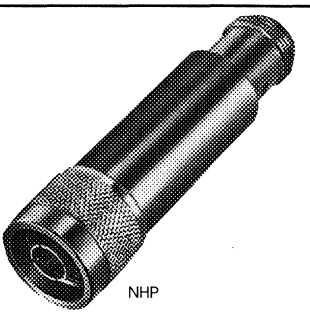
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

Mini-Circuits®

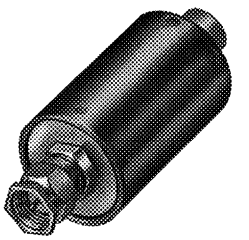
Plug-In & Coaxial



BHP



NHP



SHP

MODEL NO.	STOP BAND, MHz (loss > 40dB)	STOP BAND, MHz (loss > 20dB)	fco, MHz Nom. (loss 3dB)	PASSBAND, MHz (loss < 1dB)	VSWR, Stopband Typ.	VSWR, Passband Typ.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
BHP-25	DC-13	13- 19	25	27.5-200	18:1	1.7:1	8-26	FF55	-	38.95
BHP-50	DC-20	20- 26	37	41-200	17:1	1.5:1	8-26	FF55	-	36.95
BHP-100	DC-40	40- 55	82	90-400	17:1	1.5:1	8-26	FF55	-	36.95
BHP-150	DC-70	70- 95	120	133-600	17:1	1.8:1	8-27	FF55	-	36.95
BHP-175	DC-70	70-105	140	160-800	17:1	1.5:1	8-27	FF55	-	36.95
BHP-200	DC-90	90-116	164	185-800	17:1	1.6:1	8-27	FF55	-	36.95
BHP-250	DC-100	100-150	205	225-1200	17:1	1.3:1	8-28	FF55	-	36.95
BHP-300	DC-145	145-190	245	*290-1200	17:1	1.7:1	8-28	FF55	-	36.95
BHP-400	DC-210	210-290	360	395-1600	17:1	1.7:1	8-28	FF55	-	36.95
BHP-500	DC-280	280-365	454	500-1600	17:1	1.9:1	8-29	FF55	-	36.95
BHP-600	DC-350	350-440	545	600-1600	17:1	2.0:1	8-29	FF55	-	36.95
BHP-700	DC-400	400-520	640	700-1800	17:1	1.6:1	8-29	FF55	-	36.95
BHP-800	DC-445	445-570	710	780-2000	17:1	2.1:1	8-30	FF55	-	36.95
BHP-900	DC-520	520-660	820	910-2100	17:1	1.8:1	8-30	FF55	-	36.95
BHP-1000	DC-550	550-720	900	1000-2200	17:1	1.9:1	8-30	FF55	-	36.95
NHP-25	DC-13	13- 19	25	27.5-200	18:1	1.7:1	8-26	FF57	-	39.95
NHP-50	DC-20	20- 26	37	41-200	17:1	1.5:1	8-26	FF57	-	39.95
NHP-100	DC-40	40- 55	82	90-400	17:1	1.5:1	8-26	FF57	-	39.95
NHP-150	DC-70	70- 95	120	133-600	17:1	1.8:1	8-27	FF57	-	39.95
NHP-175	DC-70	70-105	140	160-800	17:1	1.5:1	8-27	FF57	-	39.95
NHP-200	DC-90	90-116	164	185-800	17:1	1.6:1	8-27	FF57	-	39.95
NHP-250	DC-100	100-150	205	225-1200	17:1	1.3:1	8-28	FF57	-	39.95
NHP-300	DC-145	145-190	245	*290-1200	17:1	1.7:1	8-28	FF57	-	39.95
NHP-400	DC-210	210-290	360	395-1600	17:1	1.7:1	8-28	FF57	-	39.95
NHP-500	DC-280	280-365	454	500-1600	17:1	1.9:1	8-29	FF57	-	39.95
NHP-600	DC-350	350-440	545	600-1600	17:1	2.0:1	8-29	FF57	-	39.95
NHP-700	DC-400	400-520	640	700-1800	17:1	1.6:1	8-29	FF57	-	39.95
NHP-800	DC-445	445-570	710	780-2000	17:1	2.1:1	8-30	FF57	-	39.95
NHP-900	DC-520	520-660	820	910-2100	17:1	1.8:1	8-30	FF57	-	39.95
NHP-1000	DC-550	550-720	900	1000-2200	17:1	1.9:1	8-30	FF57	-	39.95
SHP-25	DC-13	13- 19	25	27.5-200	18:1	1.7:1	8-26	FF99	-	38.95
SHP-50	DC-20	20- 26	37	41-200	17:1	1.5:1	8-26	FF99	-	38.95
SHP-100	DC-40	40- 55	82	90-400	17:1	1.5:1	8-26	FF99	-	38.95
SHP-150	DC-70	70- 95	120	133-600	17:1	1.8:1	8-27	FF99	-	38.95
SHP-175	DC-70	70-105	140	160-800	17:1	1.5:1	8-27	FF99	-	38.95
SHP-200	DC-90	90-116	164	185-800	17:1	1.6:1	8-27	FF99	-	38.95
SHP-250	DC-100	100-150	205	225-1200	17:1	1.3:1	8-28	FF99	-	38.95
SHP-300	DC-145	145-190	245	*290-1200	17:1	1.7:1	8-28	FF99	-	38.95
SHP-400	DC-210	210-290	360	395-1600	17:1	1.7:1	8-28	FF99	-	38.95
SHP-500	DC-280	280-365	454	500-1600	17:1	1.9:1	8-29	FF99	-	38.95
SHP-600	DC-350	350-440	545	600-1600	17:1	2.0:1	8-29	FF99	-	38.95
SHP-700	DC-400	400-520	640	700-1800	17:1	1.6:1	8-29	FF99	-	38.95
SHP-800	DC-445	445-570	710	780-2000	17:1	2.1:1	8-30	FF99	-	38.95
SHP-900	DC-520	520-660	820	910-2100	17:1	1.8:1	8-30	FF99	-	38.95
SHP-1000	DC-550	550-720	900	1000-2200	17:1	1.9:1	8-30	FF99	-	38.95

CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

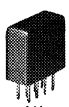
FREQUENCY DOUBLERS 50Ω Surface Mount

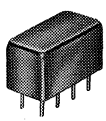
HIGH HARMONIC REJECTION 5 kHz to 3000 MHz

SURFACE MOUNT

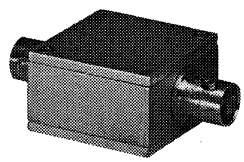
SYK

SK


AK


RK

FD


FK

MODEL NO.	FREQUENCY MHz Input	Output	RF INPUT PWR. dBm Min.	Max.	CONVERSION LOSS dB Input freq.	Typ.	Max.	*HARMONIC OUTPUT, dB F1 Typ.	Min.	F3 Typ.	Min.	F4 Typ.	Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
SYK-2R	10-1000	20-2000	12	16	10-500	10.5	14.0	35	25	42	25	20	10	—	TT167	gc	29.95
					500-1000	11.5	16.0	32	20	37	20	20	10				
SK-2	1-500	2-1000	1	10	1-100	13.0	15.0	40	30	50	40	16	12	9-6	B02	df	26.45
					100-300	13.5	15.5	25	20	40	30	16	12				
					300-500	14.0	17.5	20	15	30	25	16	12				
AK-2	1-500	2-1000	1	10	1-100	13.0	15.0	40	30	50	40	16	12	9-6	A03	dg	20.95
					100-300	13.5	15.5	25	20	40	30	16	12				
					300-500	14.0	17.5	20	15	30	25	16	12				
AK-3000	70-1500	140-3000	12	15	70-1000	10.5	14.0	31	20	40	25	14	10	9-8	A03	ga	59.95
					1000-1500	11.5	16.0	22	15	30	20	30	14				
RK-2	5-500	10-1000	1	15	5-100	13.0	16.0	40	30	50	40	16	12	9-6	A01	dg	17.95
					100-300	13.5	15.5	25	20	40	30	16	12				
					300-500	14.0	16.5	20	15	30	25	16	12				
RK-3	0.05-150	0.1-300	0	13	0.05-50	11.0	13.0	40	30	45	30	16	12	9-6	A01	dh	15.95
					50-150	11.5	15.0	35	20	40	20	16	12				
RK-5	10-800	20-1600	10	20	10-100	13.0	15.0	20	12	25	20	15	12	9-7	A01	dg	49.95
					100-400	12.5	16.0	20	12	30	20	15	12				
					400-800	13.0	16.0	20	12	25	18	15	10				
RK-6	0.005-25	0.01-50	0	10	0.005-1	11.0	13.0	40	30	45	30	16	12	9-8	A01	dj	25.95
					1-25	11.5	15.0	35	20	40	20	16	12				
RK-3000	70-1500	140-3000	12	15	70-1000	11.0	14.0	31	20	40	25	15	10	9-8	A01	ga	54.95
					1000-1500	12.0	17.5	22	15	30	20	30	14				
FD-2	5-500	10-1000	1	15	5-100	13.0	16.0	40	30	50	40	16	12	9-6	FF55	-	40.95
					100-300	13.5	15.5	25	20	40	30	16	12				
					300-500	14.0	16.5	20	15	30	25	16	12				
FK-5	10-1000	20-2000	10**	20	10-600	13.0	15.0	20	10	16	20	15	10	9-7	H16	-	69.95
					600-1000	14.0	17.0	20	10	25	20	25	15				
△ FK-3000	70-1500	140-3000	12	15	70-1000	11.0	14.0	31	20	40	25	15	10	9-8	H16	-	79.95
					1000-1500	12.0	17.5	22	15	30	20	30	14				

NSN GUIDE

MCL NO.	NSN		
AK-2	5895-01-131-4569	RK-2	5895-01-268-7337
FD-2	5895-00-087-7925	RK-3	5895-01-143-3726
FK-5	5985-01-204-9746	RK-3-TX	5895-01-160-8656
MK-3BR	5895-01-332-8582	RK-6	5895-01-450-3793
		SK-2	6625-01-247-8425

pin connections

see case style outline drawings for pin locations

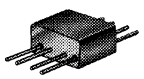
PORT	df	dg	dh	dj	dk	ga	gc
INPUT	1,2 ^	1,3,4 ^	1,3,4 ^	1,3,4 ^	4	1	2
OUTPUT	4	8	8	8	8	8	1
GND EXT.	3	2,5,6,7	2,5,6,7	2,5,6,7	1,2,3,5,6,7	2,3,4,5,6,7	4
CASE GND	3	2,5,6,7	2	—	1,2,3,5,6,7	2,3,4,5,6,7	4
NOT USED	—	—	—	—	—	—	3

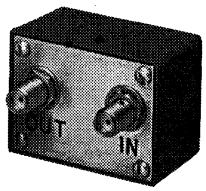
^ pins must be connected together externally

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

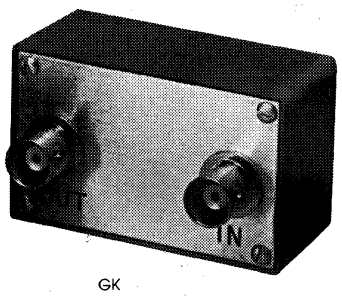
Mini-Circuits®

Drop-In, Plug-In & Coaxial


LK



MK



GK

MODEL NO.	FREQUENCY MHz		RF INPUT PWR. dBm		CONVERSION LOSS dB			*HARMONIC OUTPUT, dB						CAPD DATA (see RF/IF Designer handbook)	CASE STYLE	CONNECTION	PRICE $
								F1		F3		F4					
	Input	Output	Min.	Max.	Input freq.	Typ.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Page	Note B		Qty. (1-9)
LK-3000	70-1500	140-3000	12	15	70-1000	10.5	14.0	31	20	40	25	15	10	9-8	BB48	dk	64.95
					1000-1500	11.5	16.0	22	15	35	20	20	14				
MK-2	5-500	10-1000	1	15	5-100	13.0	16.0	40	30	50	40	16	12	9-6	L19	-	52.95
					100-300	13.5	15.5	25	20	40	30	16	12				
					300-500	14.0	16.5	20	15	30	25	16	12				
MK-3	0.05-150	0.1-300	0	13	0.05-50	11.0	13.0	40	30	45	30	16	12	9-6	L19	-	47.95
					50-150	11.5	15.0	35	20	40	20	16	12				
MK-5	10-1000	20-2000	10**	20	10-600	13.0	15.0	20	10	26	20	15	10	9-7	L19	-	76.95
					600-1000	14.0	17.0	20	10	25	20	25	15				
GK-2	5-500	10-1000	1	15	5-100	13.0	16.0	40	30	50	40	16	12	9-6	L20	-	45.95
					100-300	13.5	15.5	25	20	40	30	16	12				
					300-500	14.0	16.5	20	15	30	25	16	12				
GK-3	0.05-150	0.1-300	0	13	0.05-50	11.0	13.0	40	30	45	30	16	12	9-6	L20	-	43.95
					50-150	11.5	15.0	35	20	40	20	16	12				
GK-5	10-1000	20-2000	10**	20	10-600	13.0	15.0	20	10	26	20	15	10	9-7	L20	-	67.95
					600-1000	14.0	17.0	20	15	25	20	25	15				

NOTES:
- ❑ Non-hermetic
- * Harmonic output below power level of F2
- ** Minimum input power +13 dBm above 700 MHz
- △ Available only with SMA connectors
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (section 0).
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
- C. Prices and Specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current rating:
  1a. RF Input power, 200mW
  1b. FD-2 input is at Male BNC.

In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

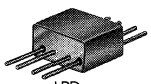
PHASE DETECTORS

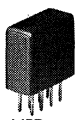
Surface Mount❑ Plug-In & Coaxial

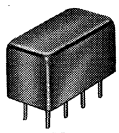
HIGH OUTPUT *1000 mV DC output, 1 to 400 MHz*

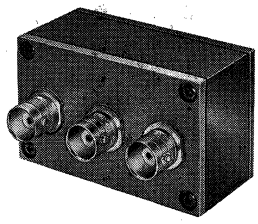
SURFACE MOUNT

SYPD

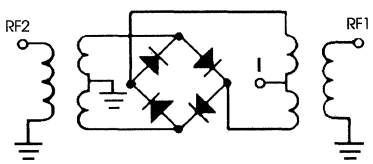

LPD


MPD


RPD


ZRPD

MODEL NO.	FREQUENCY MHz RF1 RF2		I	POWER IN RF1 RF2 (dBm)	SCALE FACTOR mV/degree	IMPEDANCE (ohms) OUTPUT LOAD I	ISOLATION (dB) RF1-RF2 Min.	OUTPUT POLARITY RF1/RF2 in-phase	DC OUTPUT (mV) Note 2 MAX. Typ.	MAX. Min.	OFFSET Typ.	OFFSET Max.	FIGURE-OF-MERIT M Typ.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
SYPD-1	1-100	DC-50		7	8	500	40	neg.	1000	700	0.2	1	143	12-5	TTT167	ec	14.95
SYPD-2	10-200	DC-50		7	8	500	40	neg.	1000	700	0.3	1	143	12-6	TTT167	ec	18.95
LPD-1	1-100	DC-50		7	8	500	40	neg.	1000	700	0.2	1	143	12-5	BB48	eb	26.45
MPD-1	1-100	DC-50		7	8	500	40	neg.	1000	700	0.2	1	143	12-5	A11	ea	21.45
MPD-2	10-200	DC-50		7	8	500	40	neg.	1000	700	0.3	1	143	12-6	A11	ea	24.95
MPD-21	50-400	DC-50		7	7	500	40*	neg.	800	500	0.5	1	120	12-5	A11	ea	26.95
RPD-1	1-100	DC-50		7	8	500	40	neg.	1000	700	0.2	1	143	12-5	A01	ea	18.45
RPD-2	5-150	DC-50		7	8	500	40	neg.	1000	700	0.3	1	143	12-6	A01	ea	20.95
ZRPD-1	1-100	DC-50		7	8	500	40	neg.	1000	700	0.2	1	143	12-5	M22	gg	57.95



NSN GUIDE

MCL NO.	NSN
MPD-1	6625-01-294-7152
MPD-21	5895-01-389-3572
RPD-1	5895-01-250-8525

NOTES:

❑ Non-hermetic
* 30 dB from 200 to 400 MHz
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current rating:
   1a. RF Input power, 50mW
   1b. Peak IF current, 20mA
2. For LPD-1, MPD-1, RPD-1 & ZRPD-1 DC output decreases to 550 mV over 1-10 MHz as temperature decreases to -55°C

pin connections

see case style outline drawings for pin locations

PORT	ea	eb	ec	gg
RF REF (RF2)	8	8	2	1
RF IN (RF1)	1	5	1	3
DC OUT (I)	3,4	4	3	2
GND EXT.	2,5,6,7	1,2,3,6,7	4,5,6	—
CASE GND	2	1,2,3,6,7	—	—

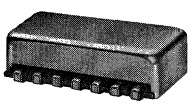
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

Mini-Circuits®

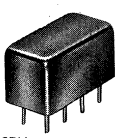
PHASE SHIFTER *Plug-In & Surface Mount*❑

180° VOLTAGE VARIABLE *13 to 446 MHz*

SURFACE MOUNT



JSPHS



SPH

MODEL NO.	FREQUENCY MHz	PHASE RANGE (DEGREES)	INSERTION LOSS (dB) Typ.	INSERTION LOSS (dB) Max.	CONTROL VOLTAGE (V)	CONTROL BANDWIDTH Typ.	VSWR Typ.	VSWR Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
JSPHS-446	366-446	180	1.2	2.5	0-12	DC-50 KHz	1.2	1.7	see below	BK276	jb	32.95
SPH-16	13-16	180	1.2	2.5	0-7	DC-50 KHz	1.2	1.7		A01	jh	29.95

features

- JSPHS, J-lead surface mount
- SPH, plug-in hermetically sealed
- good vswr, 20% bandwidth
- low voltage bias control, JSPHS, 10V, SPH, 7V
- low insertion loss, 1.2 dB typ.

JSPHS-446

CONTROL VOLTAGE (V)	PHASE SHIFT* (Deg.) 366 MHz	406 MHz	446 MHz	VSWR 366 MHz	406 MHz	446 MHz	INSERTION LOSS (dB) 366 MHz	406 MHz	446 MHz
0.5	0.05	0.03	0.01	1.17	1.09	1.37	1.10	1.02	1.10
1	7.65	5.43	4.14	1.21	1.06	1.34	1.17	1.04	1.08
3	57.73	41.01	29.01	1.44	1.19	1.16	1.67	1.37	1.22
5	137.57	112.81	84.75	1.38	1.44	1.32	1.68	1.84	1.70
7	186.22	174.91	151.47	1.10	1.21	1.29	1.17	1.49	1.79
9	205.93	203.06	189.91	1.10	1.22	1.25	1.02	1.25	1.52
10	211.22	210.59	200.96	1.12	1.25	1.29	0.99	1.19	1.44

* Normalized at control voltage=0.5V

NOTES:

❑ Non-hermetic

A. Environmental specifications and re-flow soldering information available in General Information Section.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".

C. Prices and Specifications subject to change without notice.

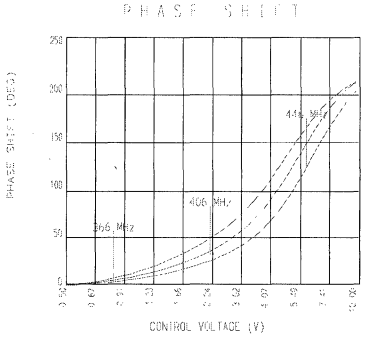
1. Absolute maximum power, voltage and current ratings:
   1a. Max. RF input power; +20 dBm
   1b. Max. control voltage: 20V

pin connections

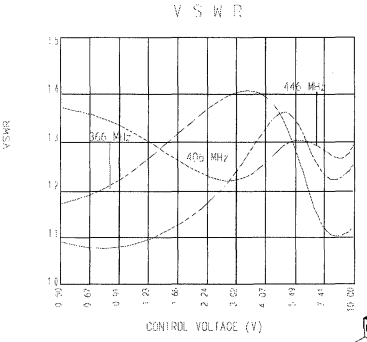
see case style outline drawings

PORT	jb	jh
IN	14	1
OUT	8	7
BIAS	1,7	4,6
GND	all other pins	all other pins

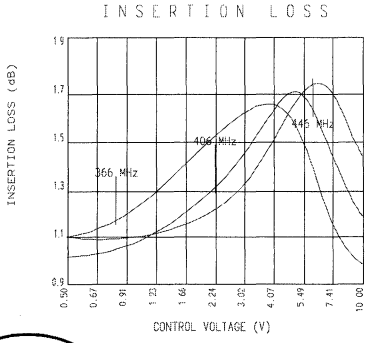
JSPHS-446



JSPHS-446



JSPHS-446



CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

MODULATORS 50 Ω Surface Mount❑

BPSK 500 to 1000 MHz

SURFACE MOUNT

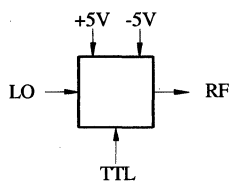
JCBM

180° phase shift, ttl input

MODEL NO.	FREQUENCY (MHz) RF(signal)/ LO(carrier) f_L	f_U	Baseband Min.	Typ.	INSERTION LOSS (dB) Typ.	Max.	DIFF. BETWEEN STATES AMPLITUDE (dB) Typ.	Max.	PHASE (DEG.) REL. TO 180 DEG Typ.	Max.	SUPPLY CURRENT AT ± 5.0V (mA) Typ.	Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
JCBM-1000DR	500	1000	DC	20	2.7	4.0	0.2	0.6	±1	±6	12	20	11-23	BG291	hw	19.95

features

- shielded surface mount metal case
- solder plated J-leads for excellent solderability and strain relief
- cellular applications, radar and communication systems
- small size 0.8 X 0.87 X 0.25 inch
- low insertion loss, 2.7 dB typ
- low phase shift error, ±1 degree typ
- constant amplitude, ±0.2 dB typ between states
- fast switching, 50% TTL to 90% RF 25 ns typ.



BPSK Modulator Block Diagram

NOTES:

❑ Non-hermetic
1. Absolute maximum power, voltage and current rating:
   1a. LO power, 250 mW
   1b. Supply voltages ±4.8V to 5.8V; TTL < positive supply voltage
2. 1dB compression: 19 dBm typ.
3. TTL HIGH: threshold 2.0V min; current 5 mA max. at 5V
   TTL LOW: threshold 0.8V max; current (into device) 0.2 mA max

pin connections

see case style outline drawing

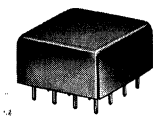
PORT	hw
LO(carrier)	8
RF(signal)	1
BASEBAND	14
+5V	12
-5V	3
GND EXT.	all others

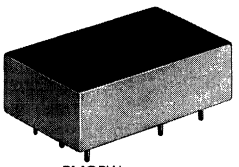
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

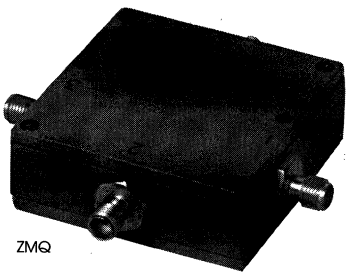
Mini-Circuits®

Plug-In & Coaxial

QPSK 30 to 1050 MHz


QMC


PMQPW
PMQ

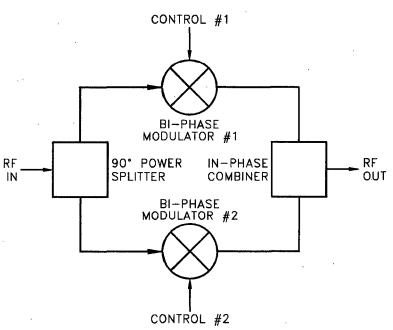

ZMQ

wideband 360° in 90° steps

MODEL NO.	FREQ. (MHz)	INSERTION LOSS dB Typ.	INSERTION LOSS dB Max.	AMPLITUDE UNBAL., dB Typ.	AMPLITUDE UNBAL., dB Max.	PHASE UNBAL., Deg (±) Typ.	PHASE UNBAL., Deg (±) Max.	1 dB COMPRESSION dBm Typ.	VSWR, Typ. IN	VSWR, Typ. OUT	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
QMC-100	50-100	5.6	7.5	0.2	0.8	3	6	4	1.5:1	1.9:1	11-14	C07	dq	128.95
QMC-170	90-170	5.6	7.5	0.3	0.8	3	6	4	1.3:1	1.5:1	11-15	C07	dq	128.95
QMC-1050	800-1050	5.5	7.5	0.5	1.0	3	7	4	2.0:1	2.0:1	11-15	C07	dr	119.95
PMQ-94	47-94	5.5	7.0	0.4	1.2	3	5	4	1.7:1	1.7:1	11-12	AAA118	ds	119.95
PMQ-330	200-330	5.8	8.0	0.4	1.5	3	6	4	1.5:1	1.5:1	11-12	AAA118	ds	119.95
PMQ-440	240-440	5.9	8.0	0.5	1.8	3	7	4	1.5:1	1.5:1	11-13	AAA118	ds	119.95
PMQPW-150*	30-150	6.0	10.5	0.4	0.9	3	8	4	2:1	2:1	11-13	AAA118	ds	172.95
PMQPW-250*	50-250	6.5	10.5	0.5	1.2	3	8	4	1.7:1	1.4:1	11-14	AAA118	ds	172.95
△ ZMQ-1050	800-1050	5.5	7.5	0.5	1.0	3	7	4	2.0:1	2.0:1	11-15	HHH141	du	169.95

features

- octave & multi-octave bandwidth
- good phase & amplitude balance
- hermetically sealed metallic enclosure with plug-in version.
- capable of meeting MIL-M-28837 requirements



pin and coaxial connections

see case style outline drawings for pin locations

PORT	dq	dr	ds	du
RF IN	13	13	8	3
RF OUT	1	2	4	1
CONTROL-1	5	4	2	4
CONTROL-2	8	1	6	2
NOT USED	2	9,12,16	—	—
GND EXT.	3,4,6,7,9,10, 11,12,14,15,16	3,5,6,7,8, 10,11,14,15	1,3,5,7	—
CASE GND	3,4,6,7,10, 11,14,15	3,5,6,7,8, 10,11,14,15	1,3,5,7	—

PHASE SHIFT VS. CONTROL CURRENT

CONT-1 (mA)	CONT-2 (mA)	PHASE SHIFT (Deg.)
+20	+20	0 (REF)
+20	-20	90
-20	-20	180
-20	+20	270

NOTES:

* Protected under patent No. 4,673,898
△ Available only with SMA connectors
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current rating: 1a. Input power, 100mW; 1b. Control current, 40mA
2. All specifications at control current ±20mA
3. Control ports drive with 50 ohms source

CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

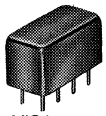
For Custom Versions Of Standard Models Consult Our Applications Dept.

MODULATORS

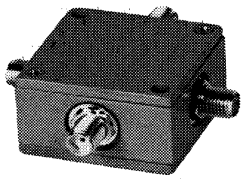
Plug-In & Coaxial

I&Q 9 MHz to 1880 MHz

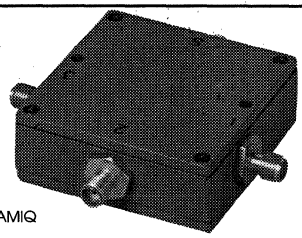
MIQY
MIQC



MIQA



ZFMIQ



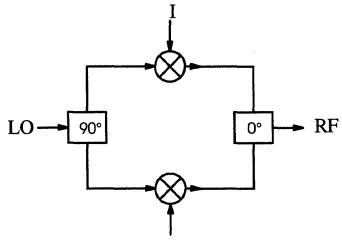
ZAMIQ

high rejection of carrier and sideband

MODEL NO.	FREQUENCY (MHz) RF(signal)/ LO(carrier) f_L	f_U	I & Q Min.	Max.	CONVERSION LOSS (dB) $\bar{x}$	σ	Max.	CARRIER REJECTION (-dBc) Typ.	Min.	SIDEBAND REJECTION (-dBc) Typ.	Min.	HARMONIC SUPPRESSION (-dBc) 3xI/Q Typ.	Min.	5xI/Q Typ.	Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
MIQA-10M	9	11	DC	2	5.8	0.20	7.0	41	30	40	30	58	48	68	58	11-10	A06	dv	49.95
MIQA-21M	20	23	DC	3	6.2	0.14	7.0	50	40	40	30	48	40	65	55	11-10	A06	gd	39.95
MIQA-70M	66	73	DC	5	6.2	0.10	7.0	38	30	38	30	48	45	58	55	11-16	A06	dv	39.95
MIQA-70ML	66	73	DC	5	5.7	0.10	6.5	38	30	38	30	48	43	58	55	11-26	A06	dv	49.95
MIQA-91M	86	95	DC	5	5.5	0.10	6.5	38	30	38	30	48	45	58	55	11-22	A06	dv	49.95
MIQA-100M	95	105	DC	5	5.5	0.10	6.5	38	30	38	30	48	45	58	55	11-22	A06	dv	49.95
MIQA-108M	103	113	DC	5	5.5	0.10	6.5	38	30	38	30	48	43	58	55	11-23	A06	dv	49.95
MIQA-195M	185	205	DC	5	5.6	0.10	6.5	38	30	38	30	48	45	58	55	11-23	A06	dv	49.95
MIQC-38M	34	38	DC	4	5.6	0.10	7.0	48	38	37	30	54	40	65	55	11-11	C07	gu	49.95
MIQC-88M	52	88	DC	5	5.7	0.10	7.5	41	35	34	30	52	40	66	50	11-16	C07	dx	49.95
MIQC-176M	104	176	DC	5	5.5	0.10	7.0	38	30	36	30	47	35	70	50	11-21	C07	dx	54.95
MIQC-895M	868	895	DC	5	8.0	0.10	10.5	40	30	40	30	52	35	58	50	11-21	C07	dw	99.95
MIQC-1785M	1710	1785	DC	5	9.0	0.30	10.5	35	25	35	25	40	33	65	50	11-11	C07	dx	99.95
MIQC-1880M	1805	1880	DC	5	9.0	0.30	10.5	35	25	35	25	40	33	65	50	11-25	C07	dx	99.95
△ ZAMIQ-895M	868	895	DC	5	8.0	0.10	10.5	40	30	40	30	52	35	58	50	11-17	HHH141	gv	149.95
△ ZFMIQ-10M	9	11	DC	2	5.8	0.20	7.0	41	30	40	30	58	45	68	58	11-10	J17	dz	89.95
△ ZFMIQ-70ML	66	73	DC	5	5.7	0.1	6.5	38	30	38	30	48	43	58	55	11-22	J17	dz	89.95
△ ZFMIQ-91M	86	95	DC	5	5.5	0.17	6.5	38	30	38	30	48	45	58	55	11-22	J17	dz	89.95
△ ZFMIQ-100M	95	105	DC	5	5.5	0.17	6.5	38	30	38	30	48	45	58	55	11-22	J17	dz	89.95
△ ZFMIQ-108M	103	113	DC	5	5.8	0.12	6.5	38	30	38	30	48	43	58	55	11-19	J17	dz	89.95
																			Qty. (1-49)
❑ MIQY-70M	67	73	DC	5	5.8	0.20	7.0	40	35	36	30	47	40	60	50	11-16	C07	dy	19.95
❑ MIQY-140M	137	143	DC	5	5.8	0.20	7.0	34	30	36	30	45	35	60	50	11-26	C07	dy	19.95

NOTES:

- $\bar{x}$ Average of conversion loss at center of mid-band frequency ($f_L+f_U/4$)
- σ Standard deviation
- ❑ Non-hermetic
- △ Available only with SMA connectors
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
- C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current rating:
   1a. LO power, 50mW
   1b. I&Q current, 40mA
2. Operating LO power: 10 ± 1dBm
3. 1dB compression: 0dBm typical
4. Conversion Loss = (I+Q) power, dBm - RF power, dBm
5. Carrier and sideband rejections measured at -5dBm I/Q power.
6. Q=I-90° for MIQA-70M
   Q=I+90° for all other models

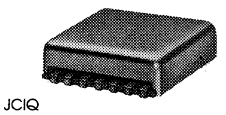


Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

Mini-Circuits®

Surface Mount

I&Q 52 MHz to 176 MHz



JCIQ

high rejection of carrier and sideband

MODEL NO.	FREQUENCY (MHz) RF(signal)/ LO(carrier) f_L	f_U	I & Q Min.	Max.	CONVERSION $\bar{x}$	σ	Max.	CARRIER REJECTION (-dBc) Typ.	Min.	SIDEBAND REJECTION (-dBc) Typ.	Min.	HARMONIC SUPPRESSION (-dBc) 3xI/Q Typ.	Min.	5xI/Q Typ.	Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
JCIQ-88M	52	88	DC	5	5.6	0.1	7.0	40	32	35	30	45	35	65	50	11-24	BG291	hs	49.95
JCIQ-176M	104	176	DC	5	5.6	0.1	7.0	35	30	35	30	45	35	65	50	11-24	BG291	hs	54.95

features

- shielded surface mount metal case
- solder plated J-leads for excellent solderability and strain relief
- cellular applications, radar and communication systems
- small size 0.8 X 0.87 X 0.25 inch
- good carrier and sideband rejections
- excellent 3rd and 5th order harmonic suppression
- all MIQA and MIQC models, metal case and hermetically sealed

pin and coaxial connections

see case style outline drawings

PORT	dv	dw	dx	dy	dz	gd	gu	gv	hs
LO (carrier)	1	13	13	13	1	1	13	1	2
RF (signal)	8	2	1	1	3	8	1	3	9
I (0°)(ref.)	7	4	8	8	S	7	8	4	4
Q (90°)*	4	1	5	5	2	4	5	2	11
ISOLATED**	—	9,12,16	—	10,11	—	—	10,11	—	--
50W TERM. EXT.	2	—	—	—	—	—	—	—	--
NOT USED	—	—	—	—	—	2	—	—	--
GND EXT.	3,5,6	3,5,6,7,8, 10,11,14,15	2,3,4,6,7,9,10, 11,12,14,15,16	2,3,4,6,7,9, 12,14,15,16	—	3,5,6	2,3,4,6,7,9, 12,14,15,16	—	1,3,5,6,7,8,10 12,13,14
CASE GND	3,5,6	3,5,6,7,8, 10,11,14,15	3,4,6,7,10,11, 14,15	2,3,4,6,7,9, 12,14,15,16	—	3,5,6	3,4,6,7, 14,15	—	--

* For I&Q modulators: Q(90°) for lower sideband suppression.

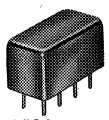
** For MIQY, MIQC-38M external variable capacitors can be connected at pins 10 & 11 to ground for improvement of sideband rejection.

In Stock... Immediate Delivery

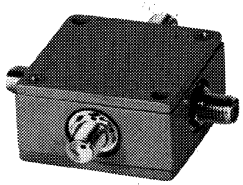
For Custom Versions Of Standard Models Consult Our Applications Dept.

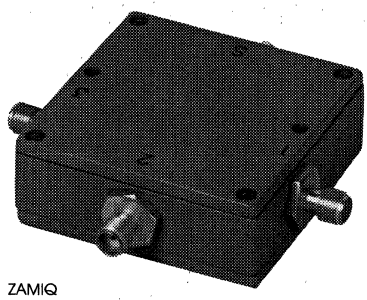
DEMODULATORS 50 Ω Plug-In & Coaxial

I&Q 1.15 to 895 MHz


MIQA

MIQY
MIQC

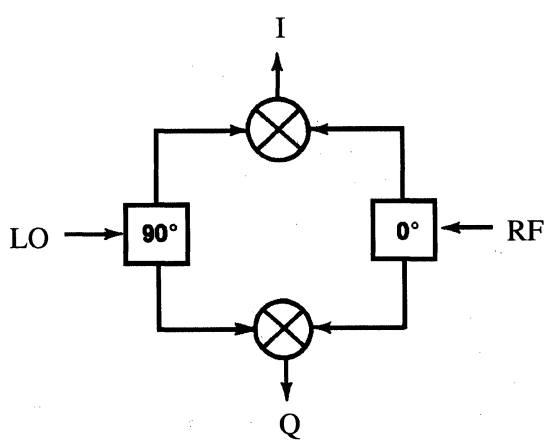

ZFMIQ


ZAMIQ

MODEL NO.	FREQUENCY (MHz) RF(signal)/ LO(carrier) f_L	f_U	I & Q Min.	Max.	CONVERSION LOSS (dB) $\bar{x}$	σ	Max.	AMPLITUDE UNBALANCE (dB) Typ.	Max.	PHASE UNBALANCE (Deg.) Typ.	Max.	HARMONIC SUPPRESSION (-dBc) 3xI/Q Typ.	Min.	5xI/Q Typ.	Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
MIQA-10D	9	11	DC	2	6.0	0.10	7.0	0.15	0.3	1.0	3.0	50	35	65	55	11-20	A06	dv	49.95
MIQA-21D	20	23	DC	3	6.1	0.15	7.0	0.15	0.6	0.7	3.0	64	35	67	50	11-26	A06	gd	49.95
MIQA-70D	66	73	DC	3	6.2	0.10	7.0	0.15	0.5	0.7	3.0	56	45	58	55	11-26	A06	dv	49.95
MIQC-38D	34	38	DC	4	5.5	0.10	7.0	0.10	0.6	0.5	3.0	60	40	65	55	11-27	CO7	gu	49.95
MIQC-60WD	20	60	DC	5	5.3	0.10	7.0	0.15	0.6	1.0	5.0	55	45	67	55	11-27	C07	dx	79.95
MIQC-895D	868	895	DC	5	8.0	0.20	10.5	0.15	0.3	1.5	4.0	40	35	55	50	11-20	C07	dw	99.95
△ ZFMIQ-10D	9	11	DC	2	6.0	0.10	7.0	0.15	0.3	1.0	3.0	50	35	65	55	11-26	J17	dz	89.95
△ ZFMIQ-70D	66	73	DC	2	6.2	0.10	7.0	0.15	0.5	0.7	3.0	56	45	58	55	11-26	J17	dz	89.95
△ ZAMIQ-895D	868	895	DC	5	8.0	0.20	10.5	0.15	0.3	1.5	4.0	52	35	58	50	11-20	HHH141	gv	149.95 Qty. (1-49)
❑ MIQY-1.25D	1.15	1.35	DC	0.2	5.0	0.10	6.0	0.15	0.4	1.0	3.0	59	40	67	55	11-30	C07	gu	29.95
❑ MIQY-70D	67	73	DC	5	5.5	0.25	7.0	0.10	0.6	0.5	3.0	52	40	66	50	11-21	C07	dy	19.95
❑ MIQY-140D	137	143	DC	5	5.5	0.25	7.0	0.10	0.6	0.5	3.0	47	35	70	50	11-21	C07	dy	19.95

NOTES:

- $\bar{x}$ Average of conversion loss at center of mid-band frequency $(f_L+f_U/4)$
- σ Standard deviation
- ❑ Non-hermetic
- △ Available only with SMA connectors
- A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
- B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".
- C. Prices and specifications subject to change without notice.
- 1. Absolute maximum power, voltage and current rating: 1a. LO/RF power, 50mW. 1b. I&Q current, 40mA
- 2. Operating LO power: 10 ± 0.5dBm
- 3. 1dB compression at +4dBm RF input
- 4. DC offset 1mV typical
- 5. Conversion Loss = RF power, dBm - (I+Q) power, dBm



I&Q Demodulation Block Diagram

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

Mini-Circuits®

Surface Mount ❑

I&Q 104 MHz to 1880 MHz

JCIQ

MODEL NO.	FREQUENCY (MHz) RF(signal)/ LO(carrier) f_L	f_u	I & Q Min.	Max.	CONVERSION LOSS (dB) $\bar{x}$	σ	Max.	AMPLITUDE UNBALANCE (dB) Typ.	Max.	PHASE UNBALANCE (Deg.) Typ.	Max.	HARMONIC SUPPRESSION (-dBc) 3xI/Q Typ.	Min.	5xI/Q Typ.	Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
JCIQ-176D	104	176	DC	5	5.5	0.1	7.0	0.15	0.6	2	5	52	40	65	50	11-28	BG291	hs	54.95
JCIQ-895D	868	895	DC	5	8.6	0.1	10.5	0.2	0.6	1	4	45	35	65	50	11-28	BG291	hs	99.95
JCIQ-1785D	1710	1785	DC	5	8	0.2	10.5	0.2	0.6	2	5	50	35	65	50	11-29	BG291	hs	99.95
JCIQ-1880D	1805	1880	DC	5	8	0.2	10.5	0.2	0.6	2	5	50	35	65	50	11-29	BG291	hs	99.95

features

- shielded surface mount metal case
- solder plated J-leads for excellent solderability and strain relief
- cellular applications, radar and communication systems
- good amplitude and phase unbalance
- excellent 3rd and 5th order harmonic suppression
- small size 0.8 X 0.87 X 0.25 inch

pin and coaxial connections

see case style outline drawings

PORT	dv	dw	dx	dy	dz	gd	gu	gv	hs
LO (carrier)	1	13	13	13	1	1	13	1	2
RF (signal)	8	2	1	1	3	8	1	3	9
I (0°)(ref.)	7	4	8	8	S	7	8	4	4
Q (90°)*	4	1	5	5	2	4	5	2	11
ISOLATED**	—	9,12,16	—	10,11	—	—	10,11	—	--
50W TERM. EXT.	2	—	—	—	—	—	—	—	--
NOT USED	—	—	—	—	—	2	—	—	--
GND EXT.	3,5,6	3,5,6,7,8, 10,11,14,15	2,3,4,6,7,9,10, 11,12,14,15,16	2,3,4,6,7,9, 12,14,15,16	—	3,5,6	2,3,4,6,7,9, 12,14,15,16	—	1,3,5,6,7,8,10 12,13,14
CASE GND	3,5,6	3,5,6,7,8, 10,11,14,15	3,4,6,7,10,11, 14,15	2,3,4,6,7,9, 12,14,15,16	—	3,5,6	3,4,6,7, 14,15	—	--

For I&Q demodulators:

Models MIQA-70D and ZFMIQ-70D: Q= +90° for LO>RF
Q= -90° for LO<RF

All other models: Q=+90° for LO<RF
Q=-90° for LO>RF

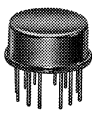
** For MIQY, MIQC-38D, external variable capacitors can be connected at pins 10 & 11 to ground for improvement of phase unbalance.

In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

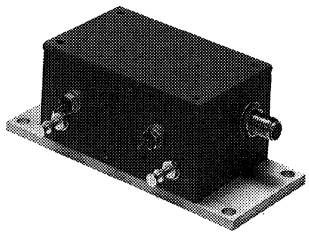
Available Tape & Reel

SWITCHES PIN DIODE 50Ω

SPDT/SP4T TTL Drivers 10 to 3000 MHz



TOSW



ZSDR

MODEL NO.	TYPE	FREQUENCY MHz	INSERTION LOSS dB				IN-OUT ISOLATION, dB						CAPD DATA (see RF/IF Designer handbook)	CASE STYLE	CONNECTION	PRICE $
			low-band		upper band		frequency band									
			lw		U		L		M		U					
		$f_L - f_U$	Typ.	Max.	Typ.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Page	Note B		Qty. (1-9)
TOSW-230	SPDT	10-3000	1.3	1.9	1.8	2.7	60	40	40	28	35	22	13-12	QQ96	ee	49.95
TOSW-425	SP4T	10-2500	1.1	1.7	1.5	2.5	60	40	40	30	35	22	13-12	QQ96	ed	69.95
Δ ZSDR-230	SPDT	10-3000	1.3	1.9	1.8	2.7	60	40	40	28	35	22	13-12	CCC127	-	89.95
Δ ZSDR-425	SP4T	10-2500	1.1	1.7	1.5	2.5	60	40	40	30	35	22	13-12	GGG126	-	109.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to $f_U/2$) U = upper range ($f_U/2$ to f_U)

lw = low band (f_L to $f_U/2$)

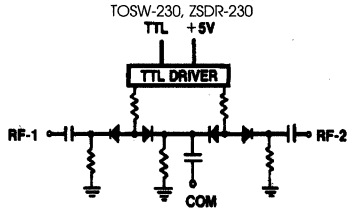
ADDITIONAL SPECIFICATIONS

VSWR ("ON" STATE): 1.3 TYP., 1.9 MAX.
SWITCHING TIME (μSEC): 2.0 TYP., 4.0 MAX.
SUPPLY VOLTAGE: +5V

TTL INPUT HIGH THRESHOLD 2 VOLTS MIN.
TTL INPUT LOW THRESHOLD 0.8 VOLTS MAX.

control logic

TOSW-230, ZSDR-230

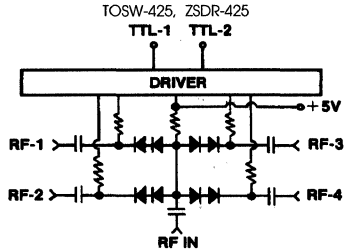


TTL LOGIC

TTL 1:	RF-1/OFF	RF-2/ON
TTL 0:	RF-1/ON	RF-2/OFF

control logic

TOSW-425, ZSDR-425



TTL LOGIC

	TTL-1	TTL-2
RF-1	1	0
RF-2	1	1
RF-3	0	1
RF-4	0	0

NOTES:

** Video leakage or break through is defined as leakage of TTL switching signal to RF output ports.
△ Available only with SMA connectors.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum RF power and control current

Models (all)	Power, dBm L	M	U	Supply Current (mA)	Control Current (mA)
TOSW	+20	+28	+30	10	--
ZSDR	+20	+28	+30	10	--
PSW	+20	+20	+20	--	5
ZMSW	+20	+20	+20	--	5

2. 1 dB Compression point: all models

Frequency, MHz	RF Power, dBm
10 to 100	+6 increase to +19 dBm
above 100	+19 min.

pin and coaxial connections

see case style outline drawings

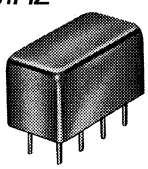
PORT	ed	ee
RF IN	8	8
RF OUT 1	4	5
RF OUT 2	6	11
RF OUT 3	10	—
RF OUT 4	12	—
TTL-1	2	3
TTL-2	3	—
+5V	1	1
-5V	—	—
GND EXT.	5,7,9,11	2,4,6,7,9, 10,12
CASE GND	5,7,9,11	2,4,6,7,9, 10,12

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

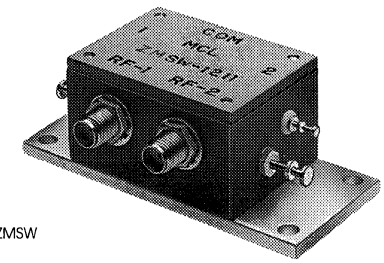
Mini-Circuits®

Plug-In & Coaxial

SPST/SPDT 10 to 2500 MHz



PSW



ZMSW

MODEL NO.	TYPE	FREQUENCY MHz f_L - f_U	INSERTION LOSS dB low-band lw Typ.	lw Max.	upper band U Typ.	U Max.	IN-OUT ISOLATION, dB frequency band L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
PSW-1211	SPDT	10-2500	1.1	1.9	1.9	2.7	50	40	35	28	28	22	13-13	A06	ep	32.95
ZMSW-1111	SPST	10-2500	1.1	1.9	1.9	2.7	50	45	35	28	28	22	13-13	JJ77	eq	69.95
ZMSW-1211	SPDT	10-2500	1.1	1.9	1.9	2.7	50	45	35	28	28	22	13-13	JJ77	er	69.95

L = low range (f_L to 10 f_L)

M = mid range (10 f_L to f_U/2)
lw = low band (f_L to f_U/2)

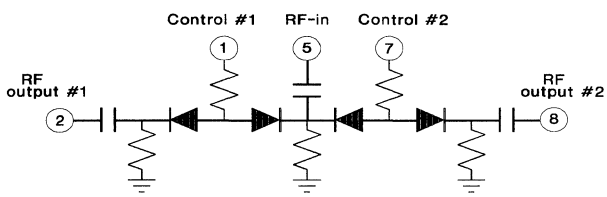
U = upper range (f_U/2 to f_U)

ADDITIONAL SPECIFICATIONS:

VSWR 1.7 max. ("on" state)
Switching time: 4μ sec. max.
Rise time: 2μ sec typical
Control voltage +5V on condition, 0V off condition
1 dB compression for all pin diode switches from 10 to 200 MHz
increase from 6 to 19 dBm. Above 200 MHz, 19 dBm min.

control logic

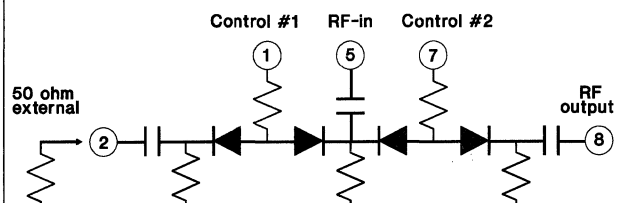
PSW-1211, ZMSW-12111



	LOGIC Control #1 (pin 1)	Control#2 (pin 7)	RF 2 (pin 8)	RF 1 (pin 2)
State 1:	0V	+5V	ON	OFF
State 2:	+5V	0V	OFF	ON

control logic

PSW-1211 as absorptive SPST



	LOGIC Control #1 (pin 1)	Control#2 (pin 7)	RF 2 (pin 8)
State 1:	0V	+5V	ON
State 2:	+5V	0V	OFF(50Ω)

pin and coaxial connections

see case style outline drawings

PORT	ep(SPST)	ep(SPDT)	eq	er
RF IN	5	5	com	com
RF OUT 1	8	2	—	RF-1
RF OUT 2	—	8	RF-1	RF-2
CONTROL 1	1	1	—	1
CONTROL 2	7	7	2	2
50-OHM TERM.	2	—	1	—
GND EXT.	3,4,6	3,4,6	—	—
CASE GND	3,6	3,6	—	—

NSN GUIDE

MCL NO.	NSN
PSW-1211	5985-01-328-8006

CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

SWITCHES GaAs 50Ω Surface Mount❑

SP4T WITH TTL Drivers DC to 3 GHz

GSWA

MODEL NO.	FREQ. GHz	ABSORPTIVE	REFLECTIVE	INSERTION LOSS, dB FREQUENCY BAND A Typ.	A Max.	B Typ.	B Max.	C Typ.	C Max.	1dB COMPRESSION, dBm FREQUENCY BAND A Typ.	A Min.	B Typ.	B Min.	C Typ.	C Min.	◇IN-OUT ISOLATION, dB FREQUENCY BAND A Typ.	A Min.	B Typ.	B Min.	C Typ.	C Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
GSWA-4-30DR	DC-3	●		1.25	1.8	2.0	3.0	2.75	3.9	22	—	28	—	28	—	50	40	37	32	31	26	13-17	AN213	hb	19.95

A = DC to 500MHz B = 500MHz to 2000MHz C = 2000MHz to 3000MHz

features

- excellent repeatability, specification limits 4.5σ typical from mean.
- high isolation, 80 dB typical at 5 MHz.
- low video break thru, 30 mVP-P typical.
- very fast switching, 3 nsec typical (SPDT).
- low DC power consumption, 120mW typical.

pin and coaxial connections

see case style outline drawings for pin locations

PORT	eg	ej	em	hb
RF IN	3	S	2	1
RF OUT 1	2	3	3	25
RF OUT 2	1	2	—	21
RF OUT 3	—	—	—	9
RF OUT 4	—	—	—	5
CONTROL 1	—	4	1	15,16,13,14
CONTROL 2	—	1	S	—
TTL-1	4			
TTL-2	—			
+5V	+5 VDC			12
-5V	-5 VDC			18
NOT USED				—
GND EXT.				all other pins

control logic, all models

Model Series	Control Ports 1	2	3	4	RF outputs 1	2	3	4
GSWA	Low	High	High	High	On	Off	Off	Off
	High	Low	High	High	Off	On	Off	Off
	High	High	Low	High	Off	Off	On	Off
	High	High	High	Low	Off	Off	Off	On
ZFSW, ZFSWA	-v	0	—	—	On	Off	—	—
	0	-v	—	—	Off	On	—	—
ZFSWHA	-v	0	—	—	On	—	—	—
	0	-v	—	—	Off	—	—	—
ZYSW, ZYSWA	Low	—	—	—	On	Off	—	—
	High	—	—	—	Off	On	—	—

NOTES:

** Video leakage or break through is defined as leakage of TTL switching signal to RF output ports.

△ Available with SMA connectors
Moisture Resistance of models on this page is not guaranteed.

❑ Non-hermetic

A. Environmental specifications and re-flow soldering information available in General Information Section.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case styles & outline drawings".

C. Prices and Specifications subject to change without notice.

1. Absolute maximum RF power ratings.

Models	Power, dBm DC-100	100-500	500-2000	2000-3000	3000-5000
GSWA-4-30DR					
Steady state control:	+20	+24	+30	+30	--
As modulator:	+8	+14	+20	+20	--
ZFSW-2-46	+24	+27	+30	+30	+30
ZFSWA-2-46	+24	+24	+27	+27	+27
ZYSW-2-50DR	+22	+22	+22	+24	+24
ZYSWA-2-50DR	+20	+20	+20	+20	+20
ZFSWHA-120					
Steady state control:	+23	+30	+33	--	--
As modulator:	+14.5	+20	+27	--	--

* In modulator service, unrestricted switching is permitted with RF applied

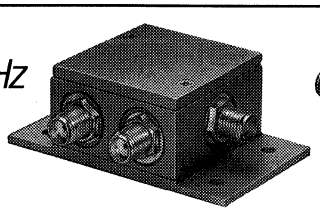
2. For reflective switches ZFSW, ZYSW models, OFF state of RF output is low impedance.

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

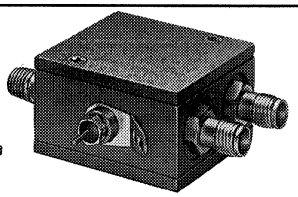
Mini-Circuits®

Coaxial

SPDT With/ Without TTL Drivers DC to 5 GHz



ZFSWA
ZFSW

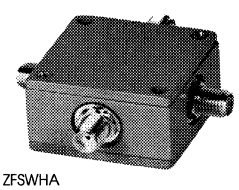


ZYSWA
ZYSW

MODEL NO.	FREQ. GHz	ABSORPTIVE	REFLECTIVE	INSERTION LOSS, dB FREQUENCY BAND A Typ.	A Max.	B Typ.	B Max.	C Typ.	C Max.	1dB COMPRESSION, dBm FREQUENCY BAND A Typ.	A Min.	B Typ.	B Min.	C Typ.	C Min.	⊙IN-OUT ISOLATION, dB FREQUENCY BAND A Typ.	A Min.	B Typ.	B Min.	C Typ.	C Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
△ ZFSW-2-46	DC-4.6		●	0.9	1.1	1.0	1.3	1.3	1.7	10	—	17	—	27	—	60	50	45	40	30	23	13-15	G144	ej	79.95
△ ZFSWA-2-46	DC-4.6	●		0.8	1.1	0.9	1.3	1.5	2.6	10	—	17	—	27	—	60	45	50	40	30	25	13-15	G144	ej	89.95
△ ZYSW-2-50DR	DC-5		●	0.9	1.5	1.3	1.7	2.1	—	20	15	20	19	24.0	20	50	41	40	26	20	—	13-14	ZZ121	eg	59.95
△ ZYSWA-2-50DR	DC-5	●		1.1	1.5	1.4	1.9	1.9	—	18	13	20	17	22.5	20	42	38	31	27	20	19	13-14	ZZ121	eg	69.95

ZFSW, ZFSWA: A = DC to 200MHz B = 200MHz to 1000MHz C = 1000MHz to 4600MHz
ZYSW, ZYSWA: A = DC to 500MHz B = 500MHz to 2000MHz C = 2000MHz to 5000MHz

SPST High Isolation DC to 2 GHz



ZFSWHA

MODEL NO.	FREQ. GHz	ABSORPTIVE	INSERTION LOSS, dB FREQUENCY BAND A Typ.	A Max.	B Typ.	B Max.	1dB COMPRESSION, dBm FREQUENCY BAND A Typ.	B Typ.	IN-OUT ISOLATION, dB FREQUENCY BAND A Typ.	A Min.	B Typ.	B Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
△ ZFSWHA-1-20	DC-2.0	●	0.8	1.2	1.3	1.7	19	26	75	60	65	58	13-11	J17	em	74.95

A = DC to 200MHz B = 200MHz to 2000MHz

additional specifications, all models

Model Series	ZFSW, ZFSWA	ZFSWHA	ZYSW, ZYSWA	GSWA
Control Voltage Low Threshold, max. High Threshold, min.	-8/0 for compression spec, -8 to -5/0 for all other specs		0/5.5, max. 0.8 3.5	0/ 5.5 0.8 3.5
Control Current, mA	2.5 typ. at -8V	0.2 max to -8V	High V: 2 typ., 5 max. Low V:0.2 max.	High V: 0.2 max Low V: 0.02 max
Positive Supply V.	none	none	5±0.5	+5±0.5
Negative Supply V.	none	none	-5±0.5	-5±0.25
VSWR(:1)	1.3 typ.	DC-0.2GHz / 0.2-2GHz ON, all ports 1.25 max / 1.5 max OFF, Input 1.25 max. / 1.5 max. OFF, Output 1.4 max. / 1.5 max.	1.4 typ., 2.0 max. DC to 3 GHz 2.5 max. 3 to 5 GHz	1.28 typ., ON 1.24 typ., OFF DC-2GHz
Rise/ Fall time (10% - 90%), ns Switching time, 50% of Control to 90% RF (Turn-on), ns 10% RF (Turn-off), ns	2 typ.	3 typ., 5 max. 7 typ., 10 max. 3 typ., 10 max.	6 typ., 12 max. 20 typ., 40 max.	25 typ. 45 typ.
**Video Leakage, mVp-p 0/-5V Control	30 typ.	30 typ., 50 max.	30 typ.	30 typ.
Temperature, °C	operating storage	-55 to 100 -55 to 150	-55 to 85 -55 to 100	-30 to 85 -55 to 100
MTBF, hrs @85°C case				30X10⁶

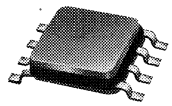
CAPD now available! computer-automated performance data

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

SWITCHES GaAs

SPDT DC to 4.6 GHz



KSW
*KSWA
*KSWHA

MODEL NO.	FREQ. GHz	ABSORPTIVE	REFLECTIVE	INSERTION LOSS, dB FREQUENCY BAND A Typ.	A Max.	B Typ.	B Max.	C Typ.	C Max.	1dB COMPRESSION, dBm FREQUENCY BAND A Typ.	B Typ.	C Typ.	IN-OUT ISOLATION, dB FREQUENCY BAND A Typ.	A Min.	B Typ.	B Min.	C Typ.	C Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
KSW-2-46	DC-4.6		●	0.9	1.1	1.0	1.3	1.3	1.7	10	17	27	60	50	45	40	30	23	13-15	XX112	eh	36.95
* KSWA-2-46	DC-4.6	●		0.8	1.1	0.9	1.3	1.5	2.6	10	17	27	60	45	50	40	30	25	13-15	XX112	eh	58.95

A = DC to 200MHz B = 200MHz to 1000MHz C = 1000MHz to 4600MHz

SPST DC to 2 GHz High Isolation

* KSWHA-1-20	DC-2.0	●		0.8	1.2	1.3	1.7	—	—	19	26	—	75	60	65	58	—	—	13-16	XX112	ek	34.95

A = DC to 200MHz B = 200MHz to 2000MHz

additional specifications

Model Series	KSW	KSWA	KSWHA		MSW	MSWA	MSWT				RSW	
Control Voltage	-8/0 for compression spec, -8 to -5/0 for all other specs										0/+5V	
Control Current, mA	2.5 typ. at -8V		0.2 max to -8V		0.2 max to -8V, 0.02 max at 0 to -0.2V						.165 typ.	
				DC-0.2GHz	0.2-2GHz	DC-1GHz	1-2GHz	DC-.1GHz	.1-.5GHz	.5-1GHz	1-2GHz	
VSWR	1.3 typ.		ON, all ports	1.25 max	1.5 max	1.2 typ.	1.4 typ.	1.2	1.25	1.4	1.4	1.3 typ.
			OFF, Input	1.25 max.	1.5 max.			1.45	1.65	1.8	1.9	1.7 max.
			OFF, Output	1.4 max.	1.5 max.							
Rise/ Fall time (10% - 90%), ns	2 typ.		3 typ., 5 max.			2 typ.	3 typ.	2 typ.				10 typ.
Switching time, 50% of Control to												
90% RF (Turn-on), ns			7 typ., 10 max.			4 typ.	5.5 typ.	4 typ.				20 typ.
10% RF (Turn-off), ns			3 typ., 10 max.			4 typ.	3 typ.	4 typ.				20 typ.
**Video Leakage, mVp-p	30 typ.		30 typ., 50 max.			15 typ.	8 typ.	15 typ.				50 typ.
0/-5V Control												
Temperature, °C operating	-55 to 100					-40 to 85						-40 to 85
storage	-55 to 150					-55 to 100						-65 to 150
MTBF, hrs @100°C case	7X10⁶		11X10⁶									

NOTES:
* KSWA and KSWHA models are hermetically sealed.
** Video leakage or break through is defined as leakage of TTL switching signal to RF output ports.
A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings for KSW, KSWA models:
1a. RF power input, +30 dBm except below 500 MHz +27 dBm;
1b. Control voltage -10 V maximum.
2. Absolute maximum power, voltage & current ratings: MSW, MSWA MSWT models:

2a. RF power input, (25°C)		DC-100	100-500	500-2000	MHz
MSW-2-20:	Steady state 0/-8V control,	+23	+27	+31	dBm
	As modulator	+11	+17	+21	dBm
MSWA-2-20:	Steady state 0/-8V control,	+24	+27	+33	dBm
	As modulator	+12	+17	+23	dBm
MSWT-4-20:	Steady state 0/-8V control	+24	+27	+33	dBm
	modulator application	+12	+17	+23	dBm

2b. Control current, 500µA (Occurs at -9V to -12V typical)
3. Absolute maximum power, voltage and current ratings for KSWHA-1-20:

3a. RF power input, (Above 20°C derate power linearty to zero at 150°C.)	DC-20	20-500	500-2000	MHz
Steady state 0/-8V control,	+23	+30	+33	dBm
As modulator *	+14.5	+20	+27	dBm

* In modulator service, unrestricted switching is permitted with RF applied.
3b. Control current, 500µA (Occurs at -9V to -12V typical)
4. Absolute maximum power, voltage and current ratings for RSW-2-25P:
4a. RF power input, +30 dBm (> 500 MHz)
4b. Control Voltage, +7V
4c. Supply Voltage, +7V DC.
5. For reflective switches, KSW, MSW, RSW models, OFF state of RF output is low impedance.

NSN GUIDE

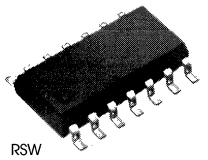
MCL NO.	NSN
KSW-2-46	5985-01-393-7219
KSWA-2-46	5985-01-369-4224

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

Mini-Circuits®

Surface Mount

SPDT DC to 2.5 GHz



MODEL NO.	FREQ. GHz f_L - f_U	ABSORPTIVE	REFLECTIVE	INSERTION LOSS, dB FREQUENCY BAND A Typ.	A Max.	B Typ.	B Max.	C Typ.	C Max.	D Typ.	D Max.	E Typ.	E Max.	1dB COMP, dBm FREQUENCY BAND A Typ.	B Typ.	C Typ.	D Typ.	IN-OUT ISOLATION, dB FREQUENCY BAND A Typ.	A Min.	B Typ.	B Min.	C Typ.	C Min.	D Typ.	D Min.	E Typ.	E Min.	CAPD DATA (see RF/IF Designer hand. book) Page	CASE STYLE Note B	connection	PRICE $ Qty. (10)
MSW-2-20	DC-2.0		●	0.30	0.6	0.4	0.7	0.50	1.0	0.75	1.3	--	--	22	23	24	25	55	50	43	36	34	28	24	20	--	--	13-18	XX211	et	2.95
MSWA-2-20	DC-2.0	●		0.65	0.9	0.9	1.2	0.95	1.3	1.20	1.5	--	--	20	24	27	29	60	50	45	37	40	32	30	25	--	--	13-17	XX211	es	3.45
NEW RSW-2-25P	DC-2.5		●	0.5	0.9	0.6	1.0	0.7	1.1	1.0	1.5	1.2	1.8	26	27	29	28	75	55	55	45	49	45	48	44	42	33	--	CL620	ke	3.95

A=DC to 100 MHz B=100 MHz to 500 MHz C=500 MHz to 1000 MHz D=1000MHz to 2000MHz E=2000MHz to 2500MHz

TRANSFER DC to 2 GHz Low Video Leakage

		path	ISOLATION, dB																									
MSWT-4-20	DC-2.0	Tx-J1/J2	0.9	1.2	1.1	1.5	1.25	1.8	1.45	2.2	18	25	28	29	51	44	34	27	26	21	19	15	13-18	XX211	eu	3.95
		J1/J2-Rx	1.1	1.4	1.3	1.7	1.5	2.0	1.6	2.2	16	18	20	22	52	46	37	31	29	24	21	17				
		Tx-Rx													60	53	41	36	34	27	28	21				

A=DC to 100MHz B=100MHz to 500MHz C=500MHz to 1000MHz D=1000MHz to 2000MHz

control logic

Model Series	Control Ports 1	2	3	4	RF outputs 1	2
KSW, KSWA	-v	0	—	—	On	Off
MSW, MSWA	0	-v	—	—	Off	On
KSWHA	-v	0	—	—	On	—
	0	-v	—	—	Off	—
RSW	0	+5	—	—	On	Off
	+5	0	—	—	Off	On
MSWT					"On" Path (other paths are "OFF")	
	0	-v	-v	-v	Tx-J2	
	-v	0	-v	-v	Tx-J1	
	-v	-v	0	-v	Rx-J1	
	-v	-v	-v	0	Rx-J2	
	0	-v	0	-v	Tx-J2 & Rx-J1	
	-v	0	-v	0	Tx-J1 & Rx-J2	

pin connections

see case style outline drawings

PORT	eh	ek	es	et	ke
RF IN	2	1	2	1	4
RF OUT 1	5	5	8	6	14
RF OUT 2	8	—	5	3	8
+5V	—	—	—	—	2
CONTROL 1	3	2	3	5	12
CONTROL 2	1	3	1	4	10
GND EXT.	4,6,7	4,6,7,8	4,6,7	2,7,8	1,3,5,6 7,9,11,13

PORT	eu
Tx	2
Rx	6
J1	4
J2	8
CONTROL 1	1
CONTROL 2	3
CONTROL 3	5
CONTROL 4	7

Application Note for Model MSWT-4-20 Transmit-Receive Switch:

The functional schematic diagram for a diversity application of the switch is shown in Figure 1, with the required external components including 4 independent drivers at the control ports. When operation as a transfer switch is desired only 2 drivers are needed, one connected to the V1 and V3 ports together, and the other connected to the V2 and V4 ports. In either case, two DC return paths are needed for the control voltages, represented by the ground symbols in the diagram. These returns must be via oppositely situated RF ports (Tx and Rx or J1 and J2), and can be furnished incidentally by the user's RF terminating devices themselves. However, if those devices are AC-coupled (that is, they contain DC blocking capacitors), then the shunt resistors shown in the diagram are needed. The resistors should be installed either at the Tx and Rx ports (connection shown as solid), or at J1 and J2 (shown dotted), with equal effect. If one external RF device has a DC return to ground, for example, then only one resistor is needed; it must be installed at the opposite RF port of the switch. The resistance of each of the external DC returns should be 20K ohms or less, for proper ON/OFF FETs.

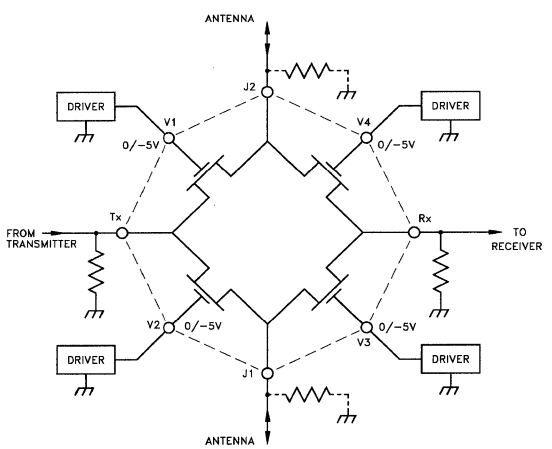


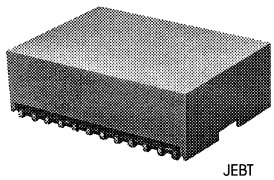
Figure 1. FUNCTIONAL SCHEMATIC DIAGRAM (Transmit-Receive application)

In Stock... Immediate Delivery
For Custom Versions Of Standard Models Consult Our Applications Dept.

BIAS-TEES

50 Ω Surface Mount❑

HIGH CURRENT 100 kHz to 6000 MHz



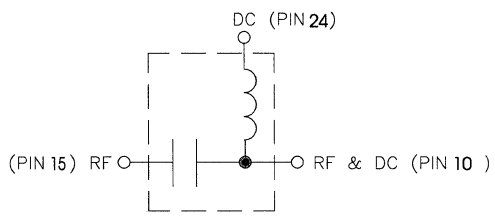
JEBT

MODEL NO.	FREQ. RANGE MHz f_L-f_U	INSERTION LOSS*, dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	ISOLATION*, dB (RF-DC, RF&DC-DC) L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
JEBT-4R2G	10-4200	0.15	0.6	0.6	1.2	0.6	1.6	32	20	40	20	40	20	10-6	BL301	hr	39.95
JEBT-6G	10-6000	0.15	0.6	0.7	1.4	1.3	2.9	32	20	40	20	40	17	10-6	BL301	hr	59.95
JEBT-4R2GW	0.1-4200	0.15	0.8	0.6	1.2	0.6	1.6	25	15	40	20	40	20	10-6	BL301	hr	59.95
JEBT-6GW	0.1-6000	0.15	0.8	0.7	1.4	1.3	2.9	25	15	40	20	30	17	10-6	BL301	hr	69.95

L = low range (f_L to $10f_L$) M = mid range ($10 f_L$ to $f_U/2$) U = upper range ($f_U/2$ to f_U)

features

- wide band coverage 0.1 to 6000 MHz
- low insertion loss 0.6 dB typ.
- good isolation 40dB typ.
- small size (JEBT) 1.26 X 0.94 X 0.39 inch
- feedthrough version (FT) available for coaxial models



NOTES:

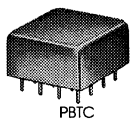
❑ Non-hermetic
✪ When only specification for M range given, specification applies to entire frequency range.
* Insertion loss and isolation are guaranteed up to 20 dBm-RF power and 200 mA DC current.
** VSWR measured with open and short at DC port.
✣ Insertion loss 1 dB Max. and isolation 7 dB Min. 0.1 to 0.3 MHz.
▼ Connectors: SMA-F at "RF", and SMA-M at "RF & DC" port. For DC port, ZFBT available with SMA-F and for ZFBT-FT available with feedthrough terminal.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).
B. Case mounted options, case finishes are given in section 0, see "Case styles & Outline Drawings".
C. Prices and specifications subject to change without notice.
1. Absolute maximum power, voltage and current ratings:
   1a. max. input current: 500 mA
   1b. max. RF power: 30 dBm
   1c. max. voltage at DC port: 30V; JEBT series, 25V.
2. DC resistance from DC to RF & DC port: 4.5 ohm typical.

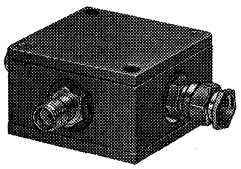
Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

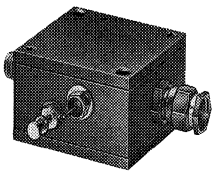
Mini-Circuits®

Plug-In & Coaxial

WIDEBAND 0.1 to 6000 MHz


PBTC


ZFBT▼

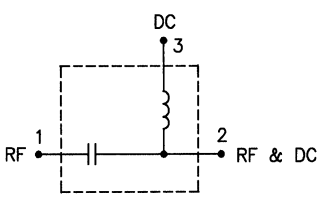

ZFBT-FT▼

MODEL NO.	FREQ. MHz f_L-f_U	INSERTION LOSS*, dB L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	ISOLATION*, dB (RF port to DC port) (RF&DC port to DC port) L Typ.	L Min.	M Typ.	M Min.	U Typ.	U Min.	VSWR** (:1) L Typ.	L Max.	M Typ.	M Max.	U Typ.	U Max.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE ▼ Note B	CONNECTION	PRICE $ Qty. (1-9)
PBTC-1G	10-1000	0.15	0.7	0.3	0.7	0.3	1.0	27	20	33	20	30	20	1.06	1.2	1.06	1.2	1.1	1.38	10-6	CO7	hh	25.95
PBTC-3G	10-3000	0.15	0.7	0.3	1.5	1.0	2.5	27	20	30	20	35	20	1.06	1.2	1.13	1.66	1.6	1.7	10-6	CO7	hh	35.95
✣ PBTC-1GW	0.1-1000	0.15	0.8	0.3	0.7	0.3	1.0	25	15	33	20	30	20	1.06	1.6	1.06	1.2	1.1	1.38	10-6	CO7	hh	35.95
✣ PBTC-3GW	0.1-3000	0.15	0.8	0.3	1.5	1.0	2.5	25	15	30	20	35	20	1.06	1.6	1.13	1.66	1.6	1.7	10-6	CO7	hh	46.95
ZFBT-4R2G	10-4200	0.15	0.6	0.6	1.2	0.6	1.6	32	20	40	20	50	20	1.06	1.2	1.13	1.3	1.13	1.3	10-6	K18	gf	59.95
ZFBT-4R2G-FT	10-4200	0.15	0.6	0.6	1.2	0.6	1.6							1.06	1.2	1.13	1.3	1.13	1.3	10-6	Y39	hf	59.95
ZFBT-6G	10-6000	0.15	0.6	0.6	1.4	1.0	2.2	32	20	40	20	30	17	1.06	1.2	1.13	1.3	1.13	1.5	10-6	K18	gf	79.95
ZFBT-6G-FT	10-6000	0.15	0.6	0.6	1.4	1.0	2.2							1.06	1.2	1.13	1.3	1.13	1.5	10-6	Y39	hf	79.95
✣ ZFBT-4R2GW	0.1-4200	0.15	0.8	0.6	1.2	0.6	1.6	25	15	40	20	50	20	1.06	1.6	1.13	1.3	1.13	1.3	10-6	K18	gf	79.95
✣ ZFBT-4R2GW-FT	0.1-4200	0.15	0.8	0.6	1.2	0.6	1.6							1.06	1.6	1.13	1.3	1.13	1.3	10-6	Y39	hf	79.95
✣ ZFBT-6GW	0.1-6000	0.15	0.8	0.6	1.4	1.0	2.2	25	15	40	20	30	17	1.06	1.6	1.13	1.3	1.13	1.5	10-6	K18	gf	89.95
✣ ZFBT-6GW-FT	0.1-6000	0.15	0.8	0.6	1.4	1.0	2.2							1.06	1.6	1.13	1.3	1.13	1.5	10-6	Y39	hf	89.95

L = low range (f_L to 10 f_L) M = mid range (10 f_L to f_U/2) U = upper range (f_U/2 to f_U)

applications

- biasing amplifiers
- biasing of laser diodes
- DC return
- DC blocking
- good for digital & analog applications.



pin & coaxial connections

PORT	gf	hf	hh	hr
RF	1	in	9	15
RF & DC	2	out	12	10
DC	3	+15	3	24
GND	--	—	all other pins	all other pins

CAPD now available! computer-automated performance data

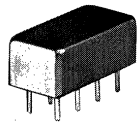
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

VOLTAGE CONTROLLED OSCILLATORS

Plug-In

LINEAR TUNING *15 to 2120 MHz*



POS

MODEL NO.	FREQ. MHz Min.	FREQ. MHz Max.	POWER OUTPUT dBm Typ.	TUNE VOLTAGE V Min.	TUNE VOLTAGE V Max.	PHASE NOISE dBc/ Hz SSB @ offset frequencies: Typ. 1 kHz	10 kHz	100 kHz	1 MHz	PULLING MHz pk-pk @12 dBr Typ.	PUSHING MHz/V Typ.	TUNING SENSITIVITY MHz/V Typ.	HARMONICS dBc Typ.	HARMONICS dBc Max.	3 dB MOD. BAND-WIDTH kHz Typ.	POWER SUPPLY Voltage V	POWER SUPPLY CURRENT mA Max.	CAPD DATA Page	Case Style Note B	CONNECTION	Price $ Qty (5-49)
POS-25	15	25	+7	1	11	-86	-105	-125	-145	0.06	0.04	1 - 4	-26	-15	60	12	20	15-30	A06	hx	16.95
POS-50	25	50	+8.5	1	16	-88	-110	-130	-150	0.06	0.04	2.0 - 2.6	-19	-12	100	12	20	15-31	A06	hx	11.95
POS-75	37.5	75	+8	1	16	-87	-110	-130	-150	0.15	0.11	3.1 - 3.8	-27	-16	100	12	20	15-31	A06	hx	11.95
POS-100	50	100	+8.3	1	16	-83	-107	-130	-150	0.6	0.2	4.2 - 4.8	-23	-18	100	12	20	15-32	A06	hx	11.95
POS-150	75	150	+9.5	1	16	-80	-103	-127	-147	0.8	0.3	5.8 - 6.7	-23	-17	100	12	20	15-33	A06	hx	11.95
POS-200	100	200	+10	1	16	-80	-102	-122	-142	1.0	0.2	7.1 - 8.6	-24	-20	100	12	20	15-34	A06	hx	11.95
POS-300	150	280	+10	1	16	-78	-100	-120	-140	1.8	0.3	9.5 - 13	-30	-20	100	12	20	15-35	A06	hx	13.95
POS-400	200	380	+9.5	1	16	-76	-98	-120	-140	1.8	0.3	13.7 - 16.9	-28	-20	100	12	20	15-36	A06	hx	13.95
POS-535	300	525	+8.8	1	16	-70	-93	-116	-139	2.0	0.4	10.5 - 24	-26	-20	100	12	20	15-37	A06	hx	13.95
POS-765	485	765	+9.5	1	16	-61	-85	-108	-129	5.0	0.4	18 - 27	-21	-17	100	12	22	15-38	A06	hx	14.95
POS-900W	500	900	+7	1	20	-75	-95	-115	-135	2.0	0.3	16 - 40	-26	-20	100	12	25	15-39	A06	hx	16.95
POS-1000W	500	1000	+7	1	16	-73	-93	-113	-133	6.0	1.5	30 - 42	-26	-20	100	12	20	---	A06	hx	19.95
POS-1025	685	1025	+9	1	16	-65	-84	-104	-124	5.0	0.6	21 - 36	-23	-18	100	12	22	15-40	A06	hx	16.95
POS-1060	750	1060	+12	1	20	-65	-90	-112	-132	50	3.0	18 - 32	-11	---	1000	8	30	15-41	A06	hx	14.95
POS-1400	975	1400	+13	1	20	-65	-95	-115	-135	36	1.5	21-43	-11	---	1000	8	30	15-42	A06	hx	14.95
POS-2000	1370	2000	+10	1	20	-70	-95	-115	-135	28	1.5	30-50	-11	---	1000	8	30	15-43	A06	hx	14.95
NEW POS-2120W	1060	2120	+8	.5	20	-59	-89	-115	-135	27	2.5	35-120	-11	---	1000	12	28	---	A06	hx	21.95

features

- Octave bandwidth range (typ.)
- Linear tuning
- Low phase noise
- Excellent harmonic suppression
- Output suitable for LO drive to mixers
- Low power consumption, typically 190 mW (most models)
- Usable with +15V supply for higher power output, typically 2 dB
- Useful in digital cordless phones, cellular up-and-down converters, CATV distribution and set top converters, wideband frequency synthesizers, test instruments, signal generators and agile communications systems

NOTES:

A. General Quality Control Procedures, Environmental specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute Maximum Supply Voltage (V_{cc}) & Tuning Voltage (V_{tune}):

Model	(V_{cc})	(V_{tune})	Model	(V_{cc})	(V_{tune})
POS-25	+15V	+12V	POS-535	+16V	+18V
POS-50	+16V	+17V	POS-765	+16V	+18V
POS-75	+16V	+18V	POS-900W	+15V	+25V
POS-100	+16V	+18V	POS-1000W	+15V	+20V
POS-200	+16V	+18V	POS-1025	+16V	+18V
POS-150	+16V	+18V	POS-1060	+10V	+22V
POS-200	+16V	+18V	POS-1400	+10V	+22V
POS-300	+16V	+18V	POS-2000	+10V	+22V
POS-400	+16V	+18V	POS-2120W	+15V	+25V

2. Operating Temperature: -55°C to +85°C

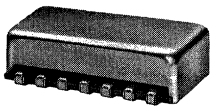
DESIGNERS KITS AVAILABLE			
KIT NO.	NO. of Units in Kit	Description	Price $ per Kit
K-POS1	10	1 of each: POS-50, 75, 100, 150, 200, 300, 400, 535, 765, 1025	124.95
K-POS2	7	1 of each: POS-50, 100, 200, 400, 535, 765, 1025	79.95
K-POS3	6	2 of each: POS-1060, 1400, 2000	79.95
K-JTOS1	10	1 of each: JTOS-50, 75, 100, 150, 200, 300, 400, 535, 765, 1025	149.95
K-JTOS2	7	1 of each: JTOS-50, 100, 200, 400, 535, 765, 1025	99.95
K-JTOS3	6	2 of each: JTOS-1300, 1650, 1910	114.95

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

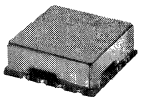
Mini-Circuits®

Surface Mount

12.5 to 3000 MHz



JTOS



ROS

MODEL NO.	FREQ. MHz	POWER OUTPUT dBm	TUNE VOLTAGE V		PHASE NOISE dBc/ Hz SSB @ offset frequencies: Typ.				PULLING MHz pk-pk @12 dBr	PUSHING MHz/V	TUNING SENSITIVITY MHz/V	HARMONICS dBc		3 dB MOD. BAND-WIDTH kHz	POWER SUPPLY		CAPD DATA	Case Style	CONNECTION	Price $
					1 kHz	10 kHz	100 kHz	1 MHz							Voltage V	CURRENT mA Max.		Note B		Qty (5-49)
	Min. Max.	Typ.	Min.	Max.					Typ.	Typ.	Typ.	Typ.	Max.	Typ.			Page			
JTOS-25	12.5-25	+8.0	1	11	-95	-115	-135	-155	0.03	0.02	1.0-4.0	-26	-13	130	12	20	15-30	BK377	jc	18.95
JTOS-50	25-47	+8.5	1	15	-88	-108	-127	-147	0.06	0.04	2.0-2.6	-19	-12	50	12	20	15-31	BK377	jc	13.95
JTOS-75	37.5-75	+8.0	1	16	-89	-110	-130	-140	0.15	0.11	2.8-4.0	-27	-20	125	12	20	15-31	BK377	jc	13.95
JTOS-100	50-100	+8.3	1	16	-83	-108	-128	-140	0.6	0.2	3.7-4.8	-35	-20	100	12	18	15-32	BK377	jc	13.95
JTOS-150	75-150	+9.5	1	16	-82	-106	-127	-147	0.8	0.3	5.8-6.7	-23	-17	112	12	20	15-33	BK377	jc	13.95
JTOS-200	100-200	+10.0	1	16	-84	-105	-124	-145	1.0	0.2	6-10	-25	-20	110	12	20	15-34	BK377	jc	13.95
JTOS-300	150-280	+9.0	1	16	-82	-102	-122	-142	1.0	0.2	9-14	-28	-20	120	12	20	15-35	BK377	jc	15.95
JTOS-400	200-380	+9.0	1	16	-82	-102	-122	-142	1.4	0.4	10.5-17.1	-25	-20	130	12	20	15-36	BK377	jc	15.95
JTOS-535	300-525	+9.5	1	16	-75	-97	-117	-137	2.0	0.5	10-24	-28	-20	115	12	20	15-37	BK377	jc	15.95
JTOS-765	485-765	+8.0	1	16	-75	-98	-118	-138	2.0	0.5	20-30	-30	-20	100	12	20	15-38	BK377	jc	16.95
JTOS-1025	685-1025	+8.6	1	16	-70	-94	-114	-134	5.0	0.6	21-36	-28	-20	100	12	22	15-40	BK377	jc	18.95
JTOS-1300	900-1300	+7.0	1	20	-70	-95	-115	-135	12	1.0	25-45	-28	-17	1000	12	30	15-44	BK377	jc	18.95
JTOS-1650	1200-1650	+7.0	1	13	-70	-95	-115	-135	15	1.5	50-90	-20	-14	1000	12	30	15-45	BK377	jc	19.95
JTOS-1000W	500-1000	+7.0	1	18	-73	-94	-114	-134	5.0	1.0	30-40	-26	-20	100	12	25	--	BK377	jc	21.95
JTOS-1910	1625-1910	+10.0	1	12	-65	-92	-112	-132	40	4.0	30-60	-13	-8	1000	12	20	15-46	BK377	jc	19.95
JTOS-2000	1370-2000	+12.0	1	22	-70	-95	-115	-135	40	1.5	30-50	-11	-8	1000	8	30	--	BK377	jc	19.95
JTOS-3000	2300-3000	+10.0	0.5	12	-60	-90	-110	-130	50	5.0	50-150	-22	-12	20000	5	25	--	BK377	jc	20.95
NEW ROS-1410V	850-1410	+7.0	0.5	11	-73	-99	-119	-138	15	1	50-80	-8	--	1000	5	25	--	CK605	kg	19.95

features

- wide frequency range
- linear tuning characteristics
- excellent harmonic suppression
- low phase noise

NOTES:

A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute Maximum Supply Voltage (V_{cc}) & Tuning Voltage (V_{tune}):

Model	(V_{cc})	(V_{tune})	Model	(V_{cc})	(V_{tune})
JTOS-25	+15V	+12V	JTOS-765	+16V	+18V
JTOS-50	+16V	+17V	JTOS-1000W	+15V	+25V
JTOS-75	+16V	+18V	JTOS-1025	+16V	+18V
JTOS-100	+16V	+18V	JTOS-1300	+15V	+22V
JTOS-150	+16V	+18V	JTOS-1650	+15V	+15V
JTOS-200	+16V	+18V	JTOS-1910	+15V	+15V
JTOS-300	+16V	+18V	JTOS-2000	+10V	+25V
JTOS-400	+16V	+18V	JTOS-3000	+7V	+15V
JTOS-535	+16V	+18V	ROS-1410V	+6V	+13V

2. Operating Temperature: -55°C to +85°C.

pin connections

see case style outline drawings

PORT	jc	hx	kg
RF OUT	13	2	10
V-CC	2	1	14
V-TUNE	5	8	2
GND EXT	1,3,4,6,7,8,9, 10,11,12,14	3,4,5,6,7	1,3,4,5,6,7,8,9 11,12,13,15,16

In Stock... Immediate Delivery

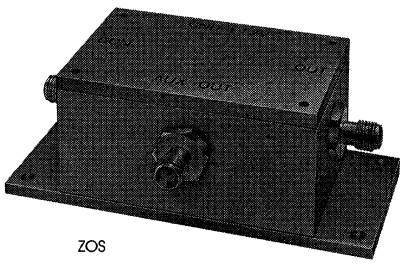
For Custom Versions Of Standard Models Consult Our Applications Dept.

Available Tape & Reel

VOLTAGE CONTROLLED OSCILLATORS

Coaxial

DUAL OUTPUT 25 to 1025 MHz



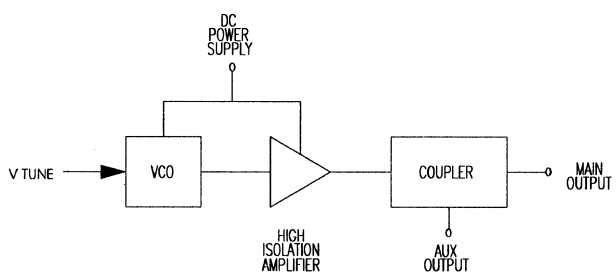
ZOS

MODEL NO.	FREQ. MHz Min.	FREQ. MHz Max.	POWER OUTPUT dBm Typ. Main	POWER OUTPUT dBm Typ. Aux.	TUNING VOLTAGE V Min.	TUNING VOLTAGE V Max.	PHASE NOISE dBc/ Hz SSB at offset frequencies: Typ. 10 kHz	100 kHz	1MHz	PULLING MHz pk-pk (Open/Short) Typ.	PUSHING MHz/V Typ.	TUNING SENSITIVITY MHz/V Typ.	HARMONICS dBc Typ.	HARMONICS dBc Max.	POWER SUPPLY VOLTAGE V	POWER SUPPLY CURRENT mA Max.	CAPD DATA (see RF/IF Designer handbook) Page	Case Style Note B	Price $ Qty (1-9)
ZOS-50	25	50	+9	-12	1	16	-107	-126	-141	0.012	0.08	2.5	-22	-12	12	140	15-47	BR386	119.95
ZOS-75	37.5	75	+9	-12	1	16	-110	-128	-142	0.016	0.15	3.5	-26	-20	12	140	15-47	BR386	119.95
ZOS-100	50	100	+9	-12	1	16	-111	-131	-143	0.026	0.25	4.5	-29	-20	12	140	15-47	BR386	119.95
ZOS-150	75	150	+9	-12	1	16	-107	-127	-142	0.017	0.39	5.8	-26	-20	12	140	15-47	BR386	119.95
ZOS-200	100	200	+10	-11	1	16	-106	-126	-141	0.015	0.42	7.7	-25	-20	12	140	15-47	BR386	119.95
ZOS-300	150	280	+9	-13	1	16	-103	-123	-142	0.017	0.50	11	-27	-20	12	140	15-47	BR386	119.95
ZOS-400	200	380	+10	-13	1	16	-100	-120	-136	0.021	0.50	15	-24	-18	12	140	15-47	BR386	119.95
ZOS-535	300	525	+9	-13	1	16	-96	-118	-131	0.018	0.50	18	-27	-20	12	140	15-47	BR386	119.95
ZOS-765	485	765	+8.5	-14	1	16	-96	-117	-132	0.033	0.72	22	-27	-17	12	140	15-47	BR386	119.95
ZOS-1025	685	1025	+8	-13	1	16	-92	-112	-136	0.051	1.00	30	-25	-18	12	140	15-47	BR386	119.95

features

- octave bandwidth
- linear tuning
- excellent harmonic suppression
- auxiliary output for frequency monitoring/phase locked loops
- main & auxiliary ports have excellent isolation from main oscillator (50 dB typ.)
- load insensitive
- at 12 dBr, pulling comparable to short term stability

schematic



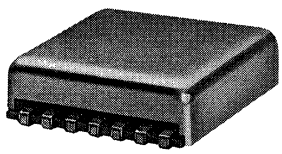
NOTES:

A. General Quality Control Procedures, Environmental specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Tuning Voltage 1 to 16V (1 to 15V for ZOS-50 required to cover frequency range.
   1a. Absolute Max. Supply Voltage (V_{cc}): +16V
   1b. Absolute Max. Tuning Voltage (V_{tune}): +18V, (+17V for ZOS-50)
2. 3 dB modulation bandwidth: 100 kHz
3. Operating Temperature: -55°C to +85°C

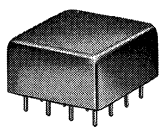
Mini-Circuits®

Surface Mount□ & Plug-In

Low Noise *118 to 1114 MHz*



JCOS



POSA

MODEL NO.	FREQ. MHz Min.	Max.	POWER OUTPUT dBm Typ.	TUNING VOLTAGE V Min.	Max.	PHASE NOISE dBc/ Hz SSB at offset frequencies: Typ. 100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	PULLING MHz pk-pk @12 dBr Typ.	PUSHING MHz/V Typ.	TUNING SENSITIVITY MHz/V Typ.	HARMONICS dBc Typ.	Max.	POWER SUPPLY VOLTAGE V	CURRENT mA Max.	CAPD DATA (see RF/IF Designer handbook) Page	Case Style Note B	CONNECTION	Price $ Qty (1-9)
JCOS-820WLN	780	860	+9	0	20	-60	-90	-112	-132	-150	4.5	0.3	8	-13	-8	9	25	15-59	BG419	jd	49.95
JCOS-820BLN	807	832	+3	1	14	-57	-88	-112	-132	-151	0.4	0.4	6	-24	-20	10	25	15-59	BG419	jd	49.95
JCOS-1100LN	1079	1114	+8.5	0	20	-60	-88	-110	-130	-150	7.5	0.5	4.5	-15	-10	8	25	15-59	BG419	jd	49.95
POSA-138	118	138	+5	1	16	-72	-100	-125	-145	-163	0.07	0.03	2.3	-40	-30	12	25	—	C07	jr	46.95
POSA-158	138	158	+5	1	16	-72	-100	-125	-145	-163	0.07	0.03	2.4	-40	-25	12	25	—	C07	jr	46.95

features

- linear tuning
- excellent phase noise performance
- excellent aircraft band performance, POSA models
- load insensitive (most models)
- excellent harmonic suppression (most models)

NOTES:

□ Non-hermetic

A. General Quality Control Procedures, Environmental specifications, Hi-Rel and MIL description are given in General Information (Section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".

C. Prices and Specifications subject to change without notice.

1. Absolute Maximum Ratings:
   - 1a. Absolute Max. Supply Voltage (V_{cc}): +15V JCOS
   - 1b. Absolute Max. Tuning Voltage (V_{tune}): +24V JCOS
   - 1c. Operating Temperature: -55°C to +85°C

2. 3 dB Modulation Bandwidth, 2 MHz typ.

pin connections

see case style outline drawings for pin locations

PORT	jd	jr
RF OUT	7	9
V-CC	8	12
V-TUNE	1	3
GND EXT	2,3,4,5,6,9 10,11,12,13,14	1,2,4,5,6,7,8,10,11 13,14,15,16

CAPD now available! computer-automated performance data

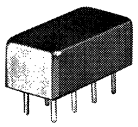
In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

VOLTAGE CONTROLLED OSCILLATORS

Plug-In

5V TUNING FOR PLL IC's *24 to 755 MHz*



POS

MODEL NO.	FREQ. MHz Min.	Max.	POWER OUTPUT dBm Typ.	PHASE NOISE, typ. dBc/Hz SSB @ offset frequencies: 10 kHz	100 kHz	PULLING MHz pk-pk @ 12 dBr Typ.	PUSHING MHz/V Typ.	TUNING SENSITIVITY MHz/V Typ.	HARMONICS dBc Typ.	Max.	POWER SUPPLY VOLTAGE V	CURRENT mA Max.	CAPD DATA Page	Case Style Note B	CONNECTION	Price $ Qty (5-49)
POS-50P	24	29	+10	-110	-130	0.06	0.04	2 - 2.5	-18	-12	12	20	15-48	A06	hx	12.95
POS-75P	35	43	+9	-110	-130	0.15	0.11	2.5 - 4	-25	-20	12	20	15-49	A06	hx	12.95
POS-100P	48	59	+9	-107	-130	0.6	0.2	3.5 - 5	-30	-18	12	20	15-50	A06	hx	12.95
POS-150P	72	91	+10	-103	-127	0.8	0.3	6 - 9	-25	-17	12	20	15-51	A06	hx	12.95
POS-200P	95	120	+10	-102	-122	1.0	0.2	7 - 10	-30	-20	12	20	15-52	A06	hx	12.95
POS-300P	148	174	+10	-100	-120	1.8	0.3	10 - 14	-27	-20	12	20	15-53	A06	hx	14.95
POS-400P	194	220	+10.5	-98	-120	1.8	0.3	13 - 18	-25	-20	12	20	15-54	A06	hx	14.95
POS-535P	278	325	+10	-93	-116	2.0	0.4	17 - 22	-30	-20	12	20	15-55	A06	hx	14.95
POS-765P	486	510	+9.5	-85	-108	5.0	0.4	20 - 30	-26	-20	12	22	15-56	A06	hx	15.95
POS-1025P	680	755	+8.5	-84	-104	5.0	0.6	30 - 40	-24	-18	12	22	15-57	A06	hx	17.95

features

- 5V tuning voltage range, suitable for PLL & synthesizer IC's such as National Semiconductor™, Motorola™, GEC Plessey™, etc.
- Linear tuning
- Low phase noise, characterized at 10 KHz and 100 KHz offsets
- Excellent harmonic suppression
- Output suitable for LO drive to mixers
- Low power consumption, typically 190 mW (most models)
- Usable with +15V supply for higher power output, typically 2 dB
- Useful for PLL synthesizer in digital cordless phones, cellular up-and-down converters, CATV distribution and set top converters, test instruments, signal generators and agile communications systems

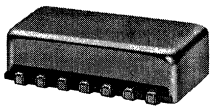
NOTES:

A. General Quality Control Procedures, Environmental specifications, Hi-Rel, MIL and TX description are given in General Information (Section 0).
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Tuning Voltage required to cover frequency range: 0.5 to 5V
   1a. Absolute Max. Supply Voltage (V_{cc}): +16V
   1b. Absolute Max. Tuning Voltage (V_{tune}): +7V
2. 3 dB modulation bandwidth: 50 KHz typ for POS-50P and 100 kHz typ for all others
3. Operating Temperature: -55°C to +85°C

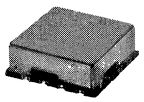
Mini-Circuits®

Surface Mount

24 to 2600 MHz



JTOS



ROS

MODEL NO.	FREQ. MHz	POWER OUTPUT dBm	PHASE NOISE dBc/ Hz SSB at offset frequencies: Typ.				PULLING MHz pk-pk @12 dBr	PUSHING MHz/V	TUNING SENSITIVITY MHz/V	HARMONICS dBc		3 dB MODULATION BANDWIDTH KHz	POWER SUPPLY		CAPD DATA	Case Style	CONNECTION	Price $
			1 kHz	10 kHz	100 kHz	1 MHz							VOLTAGE V	CURRENT mA Max.				
	Min. Max.	Typ.					Typ.	Typ.	Typ.	Typ.	Max.	Typ.			Page	Note B		Qty (5-49)
JTOS-50P	24 - 29	+9.5	-88	-108	-127	-147	0.06	0.04	2 - 2.5	-14	-12	50	12	20	15-48	BK377	jc	14.95
JTOS-75P	35 - 43	+9	-89	-110	-130	-140	0.15	0.11	2.5 - 4	-25	-20	125	12	20	15-49	BK377	jc	14.95
JTOS-100P	48 - 59	+9	-83	-108	-128	-140	0.6	0.2	3.5 - 4	-30	-20	100	12	18	15-50	BK377	jc	14.95
JTOS-150P	72 - 91	+9.5	-82	-106	-127	-147	0.8	0.3	6 - 9	-30	-17	112	12	20	15-51	BK377	jc	14.95
JTOS-200P	95 - 120	+8.8	-84	-105	-124	-145	1.0	0.2	7 - 10	-30	-20	110	12	20	15-52	BK377	jc	14.95
JTOS-300P	148 - 174	+10	-82	-102	-122	-142	1.0	0.2	10 - 14	-27	-20	120	12	20	15-53	BK377	jc	16.95
JTOS-400P	194 - 220	+11	-82	-102	-122	-142	1.4	0.4	13 - 18	-25	-20	130	12	20	15-54	BK377	jc	16.95
JTOS-535P	278 - 325	+9.5	-75	-97	-117	-137	2.0	0.5	17 - 22	-30	-20	115	12	20	15-55	BK377	jc	16.95
JTOS-765P	486 - 510	+9	-75	-98	-118	-138	2.0	0.5	20 - 30	-30	-20	100	12	20	15-56	BK377	jc	17.95
JTOS-1025P	680 - 755	+9	-70	-94	-114	-134	5.0	0.6	30 - 40	-27	-20	100	12	22	15-57	BK377	jc	19.95
JTOS-2200P	2000-2200	+6	-65	-92	-112	-132	15	5.0	70 - 120	-15	-12	10000	5	25	---	BK377	jc	21.95
JTOS-3000P	2300-2600	+11	-65	-92	-112	-132	50	5.0	120 - 160	-22	-12	20000	5	25	---	BK377	jc	21.95
NEW ROS-285PV	245-285	+3	-80	-100	-120	-140	2.0	0.2	10 - 20	-20	-10	100	5	20	---	CK605	kg	17.95
NEW ROS-900PV	810-900	+1	-80	-102	-122	-142	3.0	2.0	26 - 30	-25	-16	1000	4.5	12	---	CK605	kg	19.95
NEW ROS-960PV	890-960	0	-80	-102	-122	-142	2.0	0.2	25 - 28	-27	-18	1000	5	12	---	CK605	kg	19.95
NEW ROS-1600PV	1520-1600	+7	-75	-100	-120	-140	10	3.0	25 - 38	-26	-16	1000	5	25	---	CK605	kg	18.95

TUNING VOLTAGE TO COVER FREQUENCY RANGE 0.5V TO 5V

features

- 5V tuning voltage range, suitable for PLL & synthesizer IC's such as National Semiconductor™, Motorola™, GEC Plessey™, etc.
- Linear tuning
- Excellent harmonic suppression
- Low phase noise
- Useful for PLL synthesizer in digital cordless phones, cellular up-and-down converters, CATV distribution and set top converters, test instruments, signal generators and agile communications systems

NOTES:

A. Environmental specifications and re-flow soldering information available in General Information Section.
B. Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
1. Absolute Maximum Supply Voltage (V_{cc})& Tuning Voltage (V_{tune}):

Model	(V_{cc})	(V_{tune})	Model	(V_{cc})	(V_{tune})
JTOS-25P	+16V	+17V	JTOS-765P	+16V	+7V
JTOS-50P	+16V	+17V	JTOS-1025P	+16V	+7V
JTOS-75P	+16V	+17V	JTOS-2200P	+7V	+7V
JTOS-100P	+16V	+17V	JTOS-3000P	+7V	+7V
JTOS-150P	+16V	+17V	ROS-285PV	+8V	+10V
JTOS-200P	+16V	+17V	ROS-900PV	+6V	+6V
JTOS-300P	+16V	+17V	ROS-960PV	+6V	+6V
JTOS-400P	+16V	+17V	ROS-1600PV	+6V	+6V
JTOS-535P	+16V	+17V			

2. Operating Temperature: -55°C to +85°C

pin connections

see case style outline drawings

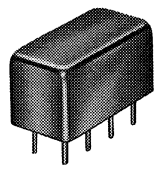
PORT	hx	jc	kg
RF OUT	2	13	10
V-CC	1	2	14
V-TUNE	8	5	2
GND EXT	3,4,5,6,7	1,3,4,6,7,8,9, 10,11,12,14	1,3,4,5,6,7,8,9 11,12,13,15,16

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

LIMITERS BROADBAND *Plug-In*

6 to 20 dBm 10 kHz to 900 MHz Minimum Δ Phase



PLS

MODEL NO.	FREQUENCY MHz F_L F_U	INPUT dBm Min.	INPUT dBm Max.	*OUTPUT dBm Typ.	CONTROL CURRENT (mA) Typ.	LIMITING Input range, Δ Output/Δ 1dB Input dBm	amp, dB	phase, deg.	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	connection	PRICE $ Qty. (1-9)
PLS-1	0.1 - 150	6	20	-- 4.0	3	6 to 10 10 to 16 16 to 20	0.10 0.15 0.15	0.8 0.8 0.7	10-3	A01	dm	22.95
PLS-2	100 - 900	3	15	-- 5.0	5	3 to 8 8 to 12 12 to 15	0.20 0.40 0.40	2.0 2.0 2.0	10-3	A01	dn	22.95
PLS-6	0.01 - 1	6	20	-- 0.5	5	6 to 10 10 to 16 16 to 20	0.20 0.10 0.20	1.0 1.0 1.5	10-2	A01	dp	35.95

pin connections

see case style outline drawings

PORT	dm	dn	dp
INPUT	1	1	1
OUTPUT	8	8	8
CONTROL	3,4 ^	3,4 ^	3,4
GND EXT.	2,5,6,7	2,5,6,7	2,5,6,7
CASE GND	2	2,5,6,7	—

^ pins must be connected together externally

NSN GUIDE

MCL NO.	NSN
PLS-1	5895-01-105-7820
PLS-2	5895-01-390-0151
PLS-6	5820-01-249-8320

NOTES:

* Typical output level at typical control current, level may be changed by varying current.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".

C. Prices and specifications subject to change without notice.

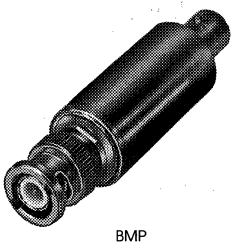
1. Absolute maximum power, voltage and current rating:
   1a. RF input power, 100mW
   1b. Control current, 10mA

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010

MATCHING PAD *Coaxial*

Mini-Circuits®

MINIMUM LOSS *DC to 2000 MHz, 50 to 75Ω*



BMP

MODEL NO.	FREQUENCY RANGE, MHz		ATTENUATION dB				VSWR max.			CAPD DATA (see RF/IF Designer handbook)	CASE STYLE	CONNECTOR	PRICE $
				Flatness max.									
	f_L	f_U	Nom.	L	M	U	L	M	U	Page	Note B		Qty. (1-9)
BMP-5075	DC	2000	5.7±0.1	0.2	0.3	0.4	1.06:1	1.22:1	1.4:1	6-11	FF55	75ΩM-BNC 50ΩF-BNC	24.95
BMP-5075R	DC	2000	5.7±0.1	0.2	0.3	0.4	1.06:1	1.22:1	1.4:1	6-11	FF55	75ΩF-BNC 50ΩM-BNC	24.95

L=DC to 100MHz M=100MHz to 1000MHz U=1000MHz to 2000MHz

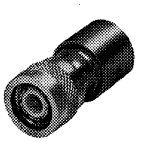
features

- minimum loss pad for resistive matching of 75 ohm impedance to 50 ohms and vice versa
- excellent VSWR 1.15:1 Typical

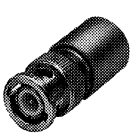
TERMINATIONS *50&75Ω Coaxial*

DC to 20 GHz

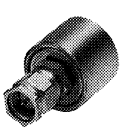
NTRM



TTRM (Consult Factory)



BTRM



STRM

ROSE

ANNE

	MODEL NO.	IMPEDANCE OHMS	FREQUENCY RANGE GHz	RETURN LOSS, dB, MIN.								CAPD DATA (see RF/IF Designer handbook)	CASE STYLE	CONNECTOR	PRICE $
				DC-.5 GHz	DC-1 GHz	DC-2 GHz	DC-4 GHz	DC-6 GHz	DC-8 GHz	4-10 GHz	10-20 GHz	Page	Note B		Qty. (1-9)
	BTRM-50	50	DC-2	35	30	21	—	—	—	—	—	6-10	LL85	M-BNC	8.25
■	BTRM-75	75	DC-1	30	20	—	—	—	—	—	—	6-10	LL85	M-BNC, 75Ω	9.95
	STRM-50	50	DC-2	35	30	21	—	—	—	—	—	6-10	LL86	M-SMA	9.45
	NTRM-50	50	DC-2	35	30	21	—	—	—	—	—	6-10	LL87	M-TYPE N	9.45
	NTRM-50G	50	DC-6	36	32	28	20	18	—	—	—	—	LL87	M-TYPE N	11.95
NEW	ROSE-50	50	DC-6	—	—	30	25(typ)	20(typ)	—	—	—	—	LL604	SMB-PLUG	9.95
	ANNE-50	50	DC-20	—	—	—	40(typ)	—	25	30(typ)	20(typ)	—	LL561	M-SMA	11.95

NOTES:

■ Denotes 75 ohm model, for coax connector models 75 ohm BNC connectors are standard.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in General Information (Section 0).

B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".

C. Prices and Specifications subject to change without notice.

1. Absolute maximum power, voltage and current ratings:
1a. RF input power, 0.25 Watt for matching pads and terminations (0.35 Watt for NTRM-50G; 0.50 Watt for ANNE-50, ROSE-50)

NSN GUIDE

MCL NO.	NSN
BTRM-50	6625-01-325-7972
BTRM-75	5985-01-328-7420
STRM-50	5985-01-454-7197

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

Available Tape & Reel

RF TRANSFORMERS WIDEBAND 12.5 to 1250 Ω

4 kHz to 1400 MHz

SURFACE MOUNT

ADT

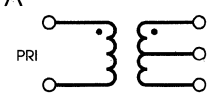
JTX

T-KK81
TT-KK81

TX

TC

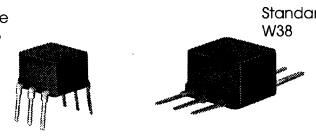
A*



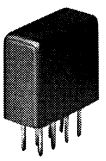
	MODEL NO.	Ω RATIO Note D	FREQUENCY MHz	INSERTION LOSS* 3 dB MHz	2 dB MHz	1 dB MHz	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
NEW	ADT2-1T	2	0.4-450	0.4-450	0.6-400	1-200	—	CD542	kt	3.65***
NEW	ADT3-1T	3	1-500	—	1-500	2-300	—	CD542	kt	3.45***
NEW	ADT4-1WT	4	2-775	2-775	3-600	6-250	—	CD542	ks	2.95***
NEW	ADT9-1T	9	1-250	—	1-250	2-150	—	CD542	ks	3.95***
NEW	ADT16-1T	16	1.5-160	1.5-160	3-105	5-65	—	CD542	ks	4.25***
NEW	JTX-2-10T	2	50-1000	—	—	50-1000	—	BH292	ks	6.95***
NEW	JTX-4-10T	4	50-1000	—	—	50-1000	—	BH292	ks	6.95***
	T1-1T-KK81	1	0.08-200	0.08-200	0.15-150	.2-80	14-8	KK81	ev	4.45
	T1-6T-KK81	1	.015-300	.015-300	.021-150	.03-50	14-8	KK81	ev	6.95
	T2-1T-KK81	2	.07-200	.07-200	.1-100	.5-50	14-8	KK81	ev	4.95
	T2.5-6T-KK81	2.5	.01-100	.01-100	.02-50	.50-20	14-8	KK81	ev	4.95
	T3-1T-KK81	3	.05-250	.05-200	.1-200	.5-70	14-8	KK81	ev	4.95
	T4-1-KK81	4	.2-350	.2-350	.35-300	2-100	14-9	KK81	ev	3.25
	T4-6T-KK81	4	.02-250	.02-250	.05-150	0.1-100	14-9	KK81	ev	5.65
	T5-1T-KK81	5	.3-300	.3-300	.6-200	5-100	14-9	KK81	ev	4.95
	T8-1T-KK81	8	.3-140	.3-140	.7-90	1-60	14-9	KK81	ev	7.95
	T13-1T-KK81	13	.3-120	.3-120	.7-80	5-20	14-9	KK81	ev	4.95
	T16-6T-KK81	16	.03-75	.03-75	.06-30	.1-20	14-10	KK81	ev	5.65
	T4-1H-KK81	4	10-350	10-350	15-300	25-200	14-10	KK81	ev	5.95
	TX16-R3T	16	40-300	40-300	60-220	70-150	14-24	TT240	ev	4.95
	TC2-1T	2	3-300	—	—	3-300	—	AT224	ha	4.95
NEW	TC3-1T	3	5-300	—	—	5-300	—	AT224	ha	4.95
NEW	TC4-1T	4	.5-300	—	.5-300	1.5-100	—	AT224	ha	4.95
	TC4-1W	4	3-800	3-800	5-400	10-100	14-24	AT224	ha	4.95
	TC4-14	4	200-1400	200-1400	300-1300	800-1100	14-24	AT224	gs	5.45
	TC8-1	8	2-500	2-500	5-400	10-100	14-24	AT224	gs	5.45
NEW	TC9-1	9	2-200	2-200	3-100	5-40	—	AT224	ha	5.45
	T1-1T	1	0.08-200	0.08-200	0.15-150	.2-80	14-8	▽	ev	4.45
	T1-6T	1	.015-300	.015-300	.021-150	.03-50	14-8	▽	ev	6.95
	T2-1T	2	.07-200	.07-200	.1-100	.5-50	14-8	▽	ev	4.95
	T2.5-6T	2.5	.01-100	.01-100	.02-50	.50-20	14-8	▽	ev	4.95
	T3-1T	3	.05-250	.05-200	.1-200	.5-70	14-8	▽	ev	4.95
	T4-1	4	.2-350	.2-350	.35-300	2-100	14-9	▽	ev	3.25
	T4-6T	4	.02-250	.02-250	.05-150	0.1-100	14-9	▽	ev	5.65
	T5-1T	5	.3-300	.3-300	.6-200	5-100	14-9	▽	ev	4.95
	T8-1T	8	.3-140	.3-140	.7-90	1-60	14-9	▽	ev	7.95
	T13-1T	13	.3-120	.3-120	.7-80	5-20	14-9	▽	ev	4.95
	T16-6T	16	.03-75	.03-75	.06-30	.1-20	14-10	▽	ev	5.65
	T4-1H	4	10-350	10-350	15-300	25-200	14-10	▽	ev	5.95
	TMO1-1T	1	.05-200	.05-200	.08-150	.2-80	14-10	A11	ew	7.95
	TMO2-1T	2	.07-200	.07-200	.1-100	.5-50	14-10	A11	ew	8.45
	TMO2.5-6T	2.5	.01-100	.01-100	.02-50	.05-20	14-10	A03	ew	8.45
	TMO3-1T	3	.05-250	.05-250	.1-200	.5-70	14-11	A03	ew	7.95
	TMO4-1	4	.2-350	.2-350	.35-300	2-100	14-11	A11	ew	6.25
	TMO5-1T	5	.3-300	.3-300	.6-200	5-100	14-11	A11	ew	8.45
	TMO13-1T	13	.3-120	.3-120	.7-80	5-20	14-11	A11	ew	8.45

Mini-Circuits®

Surface Mount❑ & Plug-In



T,TT



TMO, TTMO

		MODEL NO.	Ω RATIO Note D	FREQUENCY MHz	INSERTION LOSS✲ 3 dB MHz	2 dB MHz	1 dB MHz	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
B*	NEW	ADTT1-1	1	0.3-300	0.3-300	0.4-200	0.5-90	—	CD542	kr	3.95***
	✣	TT1-6-KK81	1	.004-300	.004-300	.02-200	.1-50	14-12	KK81	ex	6.95
		TT1.5-1-KK81	1.5	.075-500	.075-500	.2-100	1-50	14-12	KK81	ex	5.95
		TT2.5-6-KK81	2.5	.01-50	.01-50	.025-25	.05-10	14-12	KK81	ex	6.45
		TT4-1-KK81	3	.05-200	.05-200	.2-50	1-30	14-12	KK81	ex	5.95
		TT4-1A-KK81	4	0.1-300	0.1-300	0.2-250	0.3-180	14-12	KK81	ex	6.95
		TT16-1-KK81	16	0.1-45	0.1-45	0.14-35	1-20	14-13	KK81	ex	9.95
		TT25-1-KK81	25	.02-30	.02-30	.05-20	.1-10	14-13	KK81	ex	9.95
	✣	TT1-6	1	.004-300	.004-300	.02-200	.1-50	14-12	▽	ex	6.95
		TT1.5-1	1.5	.075-500	.075-500	.2-100	1-50	14-12	▽	ex	5.95
		TT2.5-6	2.5	.01-50	.01-50	.025-25	.05-10	14-12	▽	ex	6.45
		TT4-1	3	.05-200	.05-200	.2-50	1-30	14-12	▽	ex	5.95
		TT4-1A	4	0.1-300	0.1-300	0.2-250	0.3-180	14-12	▽	ex	6.95
		TT16-1	16	0.1-45	0.1-45	0.14-35	1-20	14-13	▽	ex	9.95
		TT25-1	25	.02-30	.02-30	.05-20	.1-10	14-13	▽	ex	9.95
		TTMO25-1	25	.02-30	.02-30	.05-20	.1-10	14-13	A03	ey	11.95
		TTMO1-1	1	.005-100	.005-100	.01-75	.05-40	14-13	A03	ey	11.45
		TTMO4-1A	4	0.1-300	0.1-300	0.2-250	0.3-180	14-13	A03	ey	13.95

PRI SEC

NOTES:

* FOR A AND B CONFIGURATIONS:
Typical Amplitude Unbalance: 0.1 dB over 1 dB frequency range; 0.5 dB over entire frequency range.
Typical Phase Unbalance: 1.0° over 1 dB frequency range; 5.0° over entire frequency range.

✲ Insertion loss referenced to mid-band loss

✣ Insertion loss is specified with input at pin 4 and output at pin1 with pins 6 & 3 grounded and pins 2 & 5 open.

❑ Non-hermetic

▽ Two case styles available: Plug-in case style X65; Radial lead case style W38.

*** Price for quantities 10-49.

A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.

B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".

C. Prices and Specifications subject to change without notice.

D. Impedance ratio= secondary/primary

1. Absolute power, voltage and current ratings:
   1a. RF input power: 0.25 Watt
   1b. DC current, 30mA
2. For ADT, JTX, TC,T,TT, and TX series, operating temperature range is -20°C to +85°C.

pin connections

see case style outline drawings for pin locations

PORT	ev	ew	ex	ey	gs	ha	kr	ks	kt
PRIMARY DOT	4	1	4	1	6	6	3	3	3
PRIMARY	6	5	6	5	4	4	1	1	1
PRIMARY CT	—	—	5	3	—	—	2	—	—
SECONDARY DOT	3	2	3	2	3	1	4	4	6
SECONDARY	1	6	1	6	1	3	6	6	4
SECONDARY CT	2	4	2	4	2	2	5	5	5
GND EXT.	—	—	—	—	—	—	—	—	—
CASE GND	—	7,8	—	7.8	—	—	—	—	—
NOT USED	5	3	—	—	—	—	—	2	2

NSN GUIDE

MCL NO.	NSN
T1-1T	5950-01-153-0668
T1-1T-KK81	5950-01-431-4604
T1-1T-X65	5950-01-340-7040
T1-6T	5950-01-258-2173
T2-1T-KK81	5950-01-347-0311
T3-1T	5950-01-153-0298
T4-1	5950-01-024-7626
T4-1-X65	5950-01-349-3181
T4-1H-X65	5950-01-328-8975
T16-6T	5950-01-336-0939
TT1-6-X65	5950-01-272-2298
TT4-1A	5950-01-331-7777
TMO1-1T	5950-01-326-2772
TMO2.5-6T	5950-01-215-8697
TMO3-1T	5950-01-168-7512
TMO5-1T	5950-01-183-0779
TMO-13-1T	5950-01-168-7512
TTMO25-1	5950-01-415-7145

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

RF TRANSFORMERS WIDEBAND 12.5 to 1800 Ω

5 kHz to 2200 MHz

SURFACE MOUNT

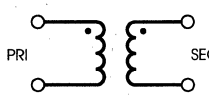
ADT

T-KK81
TT-KK81

TC

TX

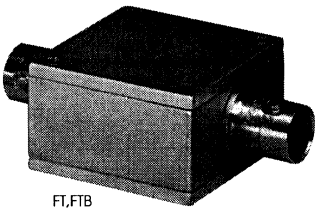
C



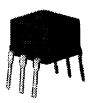
		MODEL NO.	Ω RATIO Note D	FREQUENCY MHz	INSERTION LOSS* 3 dB MHz	2 dB MHz	1 dB MHz	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
	NEW	ADT1-1	1	0.15-400	0.15-400	0.2-200	0.3-100	-	CD542	kq	2.95***
		T1-1-KK81	1	.15-400	.15-400	.35-200	2-50	14-14	KK81	ez	3.25
		T1.18-3-KK81	1.18	0.01-250	0.01-250	0.02-200	0.03-50	14-14	KK81	ez	5.65
		T1-6-KK81	1	.01-150	.01-150	.02-100	.05-50	14-14	KK81	ez	5.65
		T1.5-1-KK81	1.5	.1-300	.1-300	.2-150	.5-80	14-14	KK81	ez	4.45
		T1.5-6-KK81	1.5	.02-100	.02-100	.05-50	0.1-25	14-14	KK81	ez	5.65
		T2-1-2W-KK81	2	5-120	—	—	5-120	-	KK81	ez	5.95
		T2.5-6-KK81	2.5	.01-100	.01-100	.02-50	.05-20	14-15	KK81	ez	4.45
		T4-1-2W-KK81	4	10-250	—	—	10-250	-	KK81	ez	5.95
		T4-6-KK81	4	.02-200	.02-200	.05-150	.1-100	14-15	KK81	ez	5.65
		T9-1-KK81	9	.15-200	.15-200	.3-150	2-40	14-15	KK81	ez	3.95
		T16-1-KK81	16	.3-120	.3-120	.7-80	5-20	14-15	KK81	ez	4.45
		T36-1-KK81	36	.03-20	.03-20	.05-10	.1-5	14-15	KK81	ez	6.95
		T1-1H-KK81	1	8-300	8-300	10-200	25-100	14-16	KK81	ez	5.95
		T9-1H-KK81	9	2-90	2-90	3-75	6-50	14-16	KK81	ez	6.45
		T16-1H-KK81	16	7-85	7-85	10-65	15-40	14-16	KK81	ez	6.45
		TC1-1	1	1.5-500	1.5-500	2.5-400	5-350	14-23	AT224	hd	4.95
	★	TC1-15	1	800-1500	—	350-1500	800-1500	14-23	AT224	gw	4.95
		TX1-1	1	0.3-400	0.3-400	0.6-200	2-50	14-14	TT240	ez	3.50
		TX1-R5	1	0.8-500	0.8-500	1.2-350	3.2-180	14-23	TT240	ez	3.75
		TX1.5-1	1.5	0.25-300	0.25-300	0.3-150	0.5-80	14-14	TT240	ez	4.70
		TX16-1	16	0.4-120	0.4-120	0.7-80	5-20	14-15	TT240	ez	4.70
		TX9-1	9	1-200	1-200	1.5-160	3-70	--	TT240	ez	4.70
		T1-1	1	.15-400	.15-400	.35-200	2-50	14-14	▽	ez	3.25
		T1.18-3	1.18	0.01-250	0.01-250	0.02-200	0.03-50	14-14	▽	ez	5.65
		T1-6	1	.01-150	.01-150	.02-100	.05-50	14-14	▽	ez	5.65
		T1.5-1	1.5	.1-300	.1-300	.2-150	.5-80	14-14	▽	ez	4.45
		T1.5-6	1.5	.02-100	.02-100	.05-50	0.1-25	14-14	▽	ez	5.65
		T2-1-2W	2	5-120	—	—	5-120	14-23	▽	ez	5.95
		T2.5-6	2.5	.01-100	.01-100	.02-50	.05-20	14-15	▽	ez	4.45
		T4-1-2W	4	10-250	—	—	10-250	14-23	▽	ez	5.95
		T4-6	4	.02-200	.02-200	.05-150	.1-100	14-15	▽	ez	5.65
		T9-1	9	.15-200	.15-200	.3-150	2-40	14-15	▽	ez	3.95
		T16-1	16	.3-120	.3-120	.7-80	5-20	14-15	▽	ez	4.45
		T36-1	36	.03-20	.03-20	.05-10	.1-5	14-15	▽	ez	6.95
		TO-75	1	10-500	—	10-500	40-250	14-16	PP94	fa	6.95
		T1-1H	1	8-300	8-300	10-200	25-100	14-16	▽	ez	5.95
		T9-1H	9	2-90	2-90	3-75	6-50	14-16	▽	ez	6.45
		T16-1H	16	7-85	7-85	10-65	15-40	14-16	▽	ez	6.45
		TMO1-02	1	1-800	1-800	2-500	—	14-16	A11	fc	9.45
		TMO1-1	1	.15-400	.15-400	.35-200	2-50	14-17	A11	fb	6.25
		TMO1.5-1	1.5	.1-300	.1-300	.2-150	.5-80	14-17	A11	fb	8.45
		TMO2.5-6	2.5	.01-100	.01-100	.02-50	.05-20	14-17	A03	fb	7.95
		TMO4-6	4	.02-200	.02-200	.05-150	.1-100	14-17	A03	fb	7.95
		TMO6-1	6	.3-200	.3-200	.5-150	5-50	14-17	A11	fb	7.95
		TMO9-1	9	.15-200	.15-200	.3-150	2-40	14-18	A11	fb	7.95
		TMO16-1	16	.3-120	.3-120	.7-80	5-20	14-18	A11	fb	7.95

Mini-Circuits®

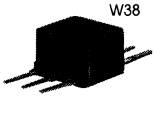
Surface Mount, Plug-In & Coaxial

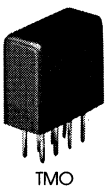

FT,FTB

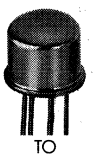
Style X65


T,TT

Standard W38




TMO


TO

		MODEL NO.	Ω RATIO Note D	FREQUENCY MHz	INSERTION LOSS* 3 dB MHz	2 dB MHz	1 dB MHz	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
D		TC4-11	4	2-1100	—	2-1100	5-700	—	AT224	kp	4.95
	NEW	TC1.5-1	1.5	.5-2200	.5-2200	1-2000	2-1100	—	AT224	jt	4.95
		T2-1-KK81	2	.050-600	.050-600	.1-400	.5-200	14-19	KK81	fd	3.95
		T3-1-KK81	3	.5-800	.5-800	2-400	—	14-19	KK81	fd	4.45
		T4-2-KK81	4	.2-600	.2-600	.5-500	2-250	14-19	KK81	fd	3.95
		T8-1-KK81	8	.15-250	.15-250	.25-200	2-100	14-19	KK81	fd	3.95
		T14-1-KK81	14	.2-150	.2-150	.5-100	2-50	14-19	KK81	fd	4.95
		T2-1	2	.050-600	.050-600	.1-400	.5-200	14-19	▽	fd	3.95
		T3-1	3	.5-800	.5-800	2-400	—	14-19	▽	fd	4.45
		T4-2	4	.2-600	.2-600	.5-500	2-250	14-19	▽	fd	3.95
		T8-1	8	.15-250	.15-250	.25-200	2-100	14-19	▽	fd	3.95
		T14-1	14	.2-150	.2-150	.5-100	2-50	14-19	▽	fd	4.95
		TMO2-1	2	.050-600	.050-600	.1-400	.5-200	14-20	A11	fe	7.95
		TMO3-1	3	1.5-800	1.5-800	2-400	—	14-20	A11	fe	8.45
		TMO4-2	4	.2-600	.2-600	.5-500	2-250	14-20	A11	fe	7.95
		TMO8-1	8	.15-250	.15-250	.25-200	2-100	14-20	A11	fe	7.95
		TMO14-1	14	.2-150	.2-150	.5-100	2-50	14-20	A11	fe	8.45
		FT1.22-1	1.22	.005-100	.005-100	.01-50	.05-25	14-21	H16	—	35.95
		FT1.5-1	1.5	.1-400	.1-400	.5-200	1-100	14-21	H16	—	35.95
E		FTB1-1	1	.2-500	.2-500	.5-300	1-100	14-18	H16	—	36.95
		FTB1-6	1	.01-125	.01-125	.05-50	.1-25	14-18	H16	—	36.95
	■	FTB1-1-75	1	.5-500	.5-500	5-300	10-100	14-18	H16	—	36.95

NOTES:

▽ Two case styles available: Plug-in case style X65; Radial lead case style W38.
* Insertion loss referenced to mid-band loss
★ Not DC isolated, insertion loss is measured with input at pin 1, output at pin 6, and pin 3, 4 are grounded.
■ Denotes 75 ohm model, for coax connector models 75 ohm BNC connectors are standard.
❐ Non-hermetic
*** Price for quantities 10-49.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
D. Impedance ratio= secondary/primary
1. Absolute power, voltage and current ratings:
   1a. RF input power: All models 0.25 Watt
   1b. DC current, 30mA
2. For ADT,TC, T, and TX series, operating temperature range is -20°C to +85°C.

pin connections

see case style outline drawings

PORT	ez	fa	fb	fc	fd	fe	gw	hd	jt	kp	kq
PRIMARY DOT	4	1	1	1	6	1	1	6	6	6	3
PRIMARY	6	2	5	3	3	6	6	4	4	3	1
PRIMARY CT	—	—	—	—	—	—	—	—	—	—	—
SECONDARY DOT	3	4	2	2	1	2	3	1	1	1	4
SECONDARY	1	3	6	4	3	6	4	3	4	3	6
SECONDARY CT	—	—	—	—	—	—	—	—	—	—	—
CASE EXT.	—	—	—	—	3	6	—	—	—	—	—
CASE GND	—	—	7,8	7,8	—	7,8	—	—	—	—	—
NOT USED	2,5	—	3,4	5,6	2,4,5	3,4,5	—	2	2,3	—	2,5

NSN GUIDE

MCL NO.	NSN
T1-1-KK81	5950-01-347-0310
FTB1-1-75	5950-01-132-8034
FTB1-6	5950-01-225-8773
FT1.5-1	5950-01-325-4686
T1-1	5950-01-128-3745
T1-1-X65	5950-01-327-5916
T1-1H	5950-01-409-2785
T2-1	5950-01-106-1218
T4-2	5950-01-361-1794
T9-1	5950-01-105-8153
T16-1	5950-01-094-7439
T16-1-X65	5950-01-272-2297
TMO1-1	5950-01-213-3735
TMO2-1	5950-01-183-6414
TMO2.5-6	5950-01-215-4038
TMO4-2	5950-01-091-3553
TMO4-6	5950-01-132-8102
TMO6-1	5950-01-364-7803
TMO8-1	5950-01-442-8008
TMO9-1	5950-01-141-0174
TMO16-1	5950-01-138-4593

In Stock... Immediate Delivery

For Custom Versions Of Standard Models Consult Our Applications Dept.

Available Tape & Reel

RF TRANSFORMERS WIDEBAND

Surface Mount❑ & Plug-in

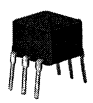
10 kHz to 1800 MHz

SURFACE MOUNT

ADT

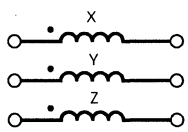
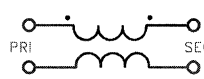
T-KK81
TT-KK81

Style X65



Standard W38

T,TT

		MODEL NO.	Ω RATIO Note D	FREQUENCY MHz	INSERTION LOSS* 3 dB MHz	2 dB MHz	1 dB MHz	CAPD DATA (see RF/IF Designer handbook) Page	CASE STYLE Note B	CONNECTION	PRICE $ Qty. (1-9)
F		T-622-KK81	1:1:1	0.1-200	0.1-200	0.5-100	5-80	14-22	KK81	ff	3.25
		T-626-KK81	1:1:1	0.01-10	0.01-10	0.02-5	.04-2	14-22	KK81	ff	3.95
		T2-613-1-KK81	1:1:2	0.07-200	0.07-200	0.1-100	0.5-50	14-22	KK81	fg	1.95
		T-622	1:1:1	0.1-200	0.1-200	0.5-100	5-80	14-22	▽	ff	3.25
		T-626	1:1:1	0.01-10	0.01-10	0.02-5	.04-2	14-22	▽	ff	3.95
		T2-613-1	1:1:2	0.07-200	0 07-200	0.1-100	0.5-50	14-22	▽	fg	1.95
G		**NEW** ADTL1-12	1	20 -1200	—	20-1200	50-1000	—	CD542	kn	2.95***
		NEW ■ ADTL1-18-75	1	5 -1800	—	5-1800	25-1200	—	CD542	kn	2.95***

NOTES:

■ Denotes 75 ohm model.
▽ Two case styles available: Plug-in case style X65; Radial lead case style W38.
✲ Insertion loss referenced to mid-band loss
❑ Non-hermetic.
*** Price for quantities 10-49.
A. General Quality Control Procedures, Environmental Specifications, Hi-Rel and MIL description are given in section 0, see "Mini-Circuits Guarantees Quality" article.
B. Connector types and case mounted options, case finishes are given in section 0, see "Case Styles & Outline Drawings".
C. Prices and Specifications subject to change without notice.
D. Impedance ratio= secondary/primary
1. Absolute power, voltage and current ratings:
   1a. RF input power: For ADTL, 2 Watt; All other models 0.25 Watt
   1b. DC current, 30mA
2. For TC, T, TT and ADTL series, operating temperature range is -20°C to +85°C.

pin connections

see case style outline drawings

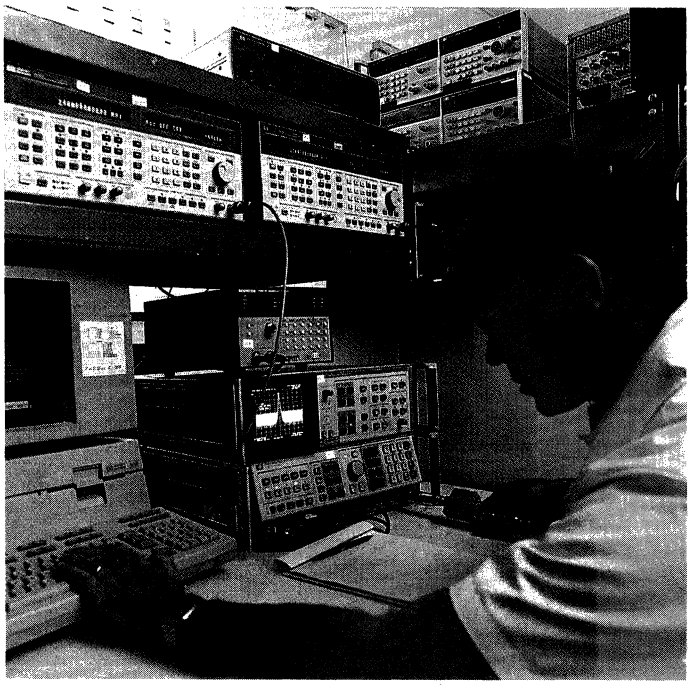
PORT	ff	fg	kn
PRIMARY DOT	X1 Y2 Z3	X1 Y5 Z3	1
PRIMARY	X6 Y5 Z4	X2 Y6 Z4	3
PRIMARY CT	—	—	—
SECONDARY DOT	—	—	6
SECONDARY	—	—	4
SECONDARY CT	—	—	—
CASE EXT.	—	—	—
CASE GND	—	—	—
NOT USED	—	—	2,5

Mini-Circuits®
INTERNET http://www.minicircuits.com
P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661
Distribution Centers NORTH AMERICA 800-654-7949 • 417-335-5935 • Fax 417-335-5945 • EUROPE 44-1252-835094 • Fax 44-1252-837010
ISO 9001 CERTIFIED

QUICK RESPONSE
TO SUPPORT YOUR APPLICATIONS

...guides the customer through decision making on spec requirements...

...offer test procedures and statistical data...



Our team of dedicated Applications engineers are prepared to respond courteously, promptly, knowledgeably and patiently to questions and challenges posed by customers.

Although Mini-Circuits offers a wide variety of over 1,000 signal processing components listed in the Designer's Guide, there is often a need to meet a spec somewhat different than one listed for a standard catalog item. In such instances, here is how our Applications engineer proceeds:

1) Customers will be asked to review a Specifications Check List for the component requested. This sheet guides the customer through decision making on spec requirements and the most critical parameters for the intended application.

2) Our Applications engineer will work with our Design Engineering team to check the feasibility of designing a new product to meet the specific spec; of course, if modification of an existing product is possible, this approach can slash development time and costs.

3) If the design is indeed feasible, samples will be fabricated and tested to insure they meet the intended design goals, then shipped to the customer for final evaluation in the intended application.

Here is a brief summary of services available from our Applications Support team:

•Respond to technical questions regarding specs and performance of catalog components and applications of our products.

• Although our published Computer Automated Performance Data (CAPD) is very comprehensive, we strongly urge our customers to request more detailed data when their application needs dictate a closer look at specific measurement points. Our enormous database on catalog and custom models is offered, at no extra charge, to eliminate any need for guesswork.

•Analyze customer specifications and recommend, wherever possible, a catalog component that provides the optimum cost/performance selection.

•Discuss in detail MIL-specs that may appear confusing to customers first encountering them. What they mean, definitions of terms, and how to be in conformance are explained.

•Correlate customer's test requirements with those of our Computer Test department.

•Review customer's environmental requirements and suggest, where applicable, cost-effective solutions.

•After determining critical parameters dictated for a customer's requirement, offer test procedures and statistical data to most effectively focus on those parameters.

•Keep customers aware of our latest new products during discussions of applications and new system designs.

•Interface with customers requesting Return Merchandise Approval (RMA). Quite often a courteous and thorough discussion relating to a component's failure to meet specs may be traced to improper test setup, poor matching, or other problems at the customer site. Suggested solutions often negate the need to return the product.

•Respond to customers requests for literature. Quickly send catalogs, notes, computerized test data, statistical data or new product data.

We encourage our customers to take full advantage of our Applications Support group's expertise. Contact us with any questions you may have, problems we may be able to solve for you, and assistance on recommending products in our catalog line or developing new designs for your next generation system. We promise a prompt, courteous, and perceptive response.

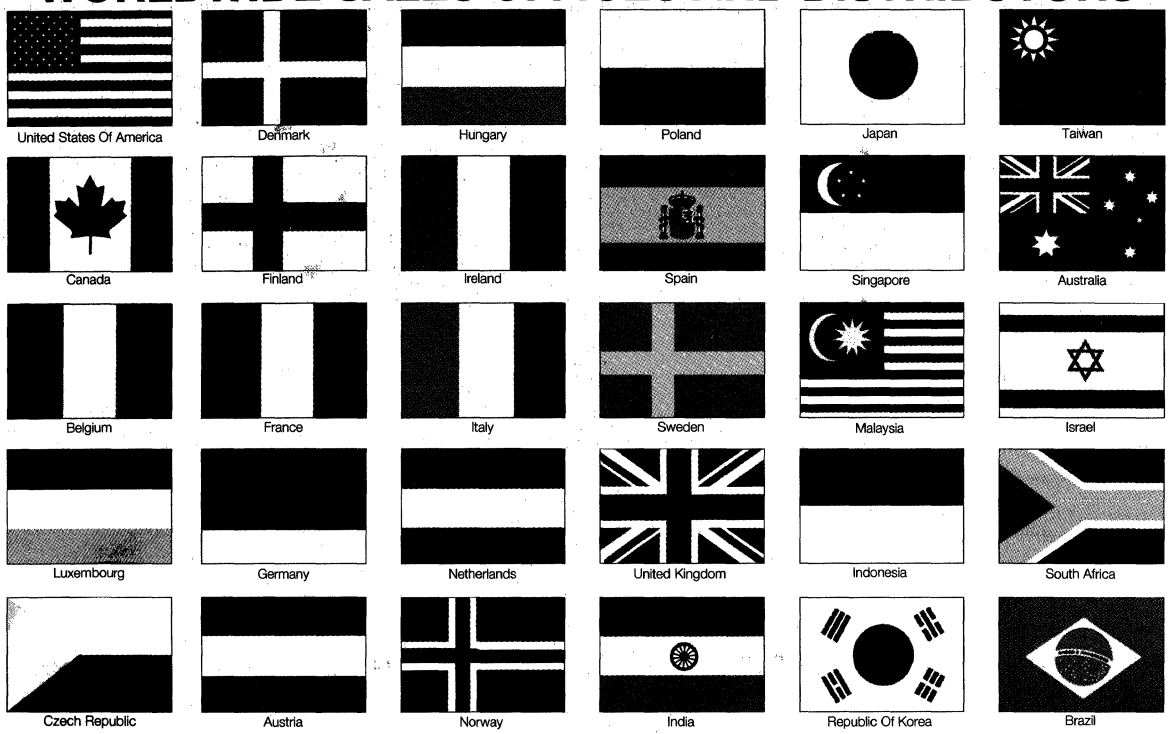
Mini-Circuits®

P.O Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718)332-4661 ***INTERNET*** http://www. minicircuits. com

For detailed specs on all Mini-Circuits products refer to • 760-pg. HANDBOOK • INTERNET • THOMAS REGISTER • MICROWAVE PRODUCT DATA DIRECTORY • EEM

ISO 9001 CERTIFIED

WORLDWIDE SALES OFFICES AND DISTRIBUTORS



NORTH AMERICAN AND INTERNATIONAL REPRESENTATIVES

MID WEST
Cain-Forlaw Co., Inc.
Palatine, IL 60067
(847) 202-9898

Ft. Wayne, IN 46804
(219) 436-4466

Merriam, KS 66202
(913) 789-9896

Burnsville, MN 55337
(612) 882-4090

Reynoldsburg, OH 43068
(614) 861-9500
cfc@starnetinc.com

NEW ENGLAND
Advanced Technology Marketing Inc.
Chelmsford, MA 01824
(978) 458-0200
atm@atmink.com

NEW JERSEY-SOUTH E. PENNSYLVANIA, DELAWARE
Amplitude Technical Sales
Doylestown, PA 18901
(215) 340-0123
joed@ampsales.com

NEW JERSEY-NORTH NEW YORK-METRO
Spectrum Sales, Inc.
Syosset, NY 11791
(516) 921-5750
sales@spectrumsales.com

NEW YORK-UPSTATE
Robtron, Inc.
Skaneateles, NY 13152
(315) 685-5731
robtron@compuserve.com

NORTHWEST
Cain-Sweet Co.
Aloha, OR 97006
(503) 591-0647

Bellevue, WA 98004
(425) 562-6028
sales@cainsweet.com

SOUTHEAST
Beacon Electronics Associates
Huntsville, AL 35802
(205) 881-5031

Longwood, FL 32779
(407) 788-1155

Atlanta, GA 30328
(404) 256-9640

Raleigh, NC 27607
(919) 787-0330

MARYLAND, VIRGINIA, WEST VIRGINIA, WASHINGTON DC.
Vienna, VA 22182
(703) 903-6500
info@beaconmail.com

SOUTHWEST
Beacon Electronics Associates
Round Rock, TX 78681
(512) 244-6675

Richardson, TX 75080
(972) 437-1505
cshields@beaconmail.com

WEST
N & S DAKOTA, MONTANA, NEW MEXICO, UTAH, EASTERN NEVADA
IRT
(800) 654-7949
rm@minicircuits.com

ARIZONA
Thorson Desert States Inc.
Scottsdale, AZ 85260
(602) 998-2444
tdsiaz@aol.com

CALIFORNIA-NORTH
Disman-Bakner
Mountain View, CA 94043
(650) 969-3010
sales@dbsales.com

CALIFORNIA-SOUTH
Youngewirth & Olenick
Tustin, CA 92680
(714) 838-5144
contactus@yando.com

COLORADO
GLX. Inc.
Englewood, CO 80112
(303) 771-3230
glxa@aol.com

CANADA
Cain-Sweet Co.
(800) 676-2118
sales@cainsweet.com

Burnaby, British Columbia
V3J 1R6 Canada
(604) 420-6886

Calgary, Alberta
T2E 6K9 Canada
(403) 250-7288

Etobicoke, Ontario
M9C 5M1 Canada
(416) 695-1444

Ottawa, Ontario
K2B 1A5, Canada
(613) 820-2666

Dollard Des Ormeaux, Quebec
H9B 2N4, Canada
(514) 421-0848

●●Giga-Tron Assoc. Ltd.
Ottawa, Ontario
K2E 7T7 Canada
(613) 225-4090
sales@gigatron.com

EUROPE

BELGIUM, LUXEMBOURG
▲Mini-Circuits Europe

CZECH REPUBLIC
▲Mini-Circuits Europe

DENMARK
Betech Components
DK-5540 Ullerslev, Denmark
45 6535 1446

FINLAND
Integrated Electronics
SF-00440 Helsinki, Finland
358 9 586 1770
lassi@ieoy.fi

FRANCE
Elexience
91371 Verrieres-le-Buisson Cedex, France
33 1 69 53 8000
tmo@elexience.fr

GERMANY
Municom Gmbh
D-83278 Traunstein, Germany
49 8611 66770
info@municom.de

GERMANY, AUSTRIA
●●Industrial Electronics
D-65760 Eschborn, Germany
49 6196 927900

HUNGARY
▲Mini-Circuits Europe

IRELAND
▲Mini-Circuits Europe

ITALY
Microelit S.P.A.
20146 Milan. Italy
3902 4817900

00141 Rome, Italy
3906 86894323
microeli@mbox.vol.it

NETHERLANDS
▲Mini-Circuits Europe

NORWAY
Datamatik, AS
N-1067 Oslo 10, Norway
47 22 30 17 30
datamatik@datamatik.no

POLAND
▲Mini-Circuits Europe

SPAIN
Ibercom S.A.
28709 Madrid, Spain
34 91 654 1856
ibercom2@mad.servicom.es

08014 Barcelona, Spain
34 1 349 14 745

SWEDEN
Nordimar
S-182 05 Djursholm, Sweden
46 8 753 3760
info@nordimar.se

●●IE Komponenter AB
S-161 11 Bromma, Sweden
46 8 80 4685
maggan@iekomp.se

UNITED KINGDOM
▲Mini-Circuits Europe

ASIA

JAPAN
M-RF Co. Ltd.
Kandaizumi, Tokyo, Japan
81 3 5821 3623
mrftokyo@a2.mbn.or.jp

Minamimori, 530, Japan
81 6 6313 7180
mrfosaka@a2.mbn.or.jp

●●Mini-Circuits Yokohama
Yokohama, 223 Japan
81 4 5545 1673

INDIA
Chithra Int'l
Bangalore 560038, India
91 80 556 8310

SINGAPORE, MALAYSIA
INDONESIA
Precision Technologies
Singapore 159552
65 2 734 573
pretech@singnet.com.sg

SOUTH KOREA
R.F. High Tec Inc.
Seoul, Korea 139-052
82 2 999 4601/5
rfhitec@rfhitec.co.kr

TAIWAN
Ameleks Corp.
Taipei, Taiwan ROC
886 2 275 86958
ameleks@ms9.hinet.net

AUSTRALIA
Clarke & Severn Electronics
Hornsby NSW Australia 2077
61 29482 1944
sales@clarke.com.au

MIDEAST
ISRAEL
Vitel Ltd.
Ramat-Hasharon, Israel
972 3 5490541
vitel_rf@inter.net.il

SOUTH AFRICA
ECS Electromagnetics
Midrand, S. Africa
27 11 805 4272
ecs@jhbmail.co.za

●●Distributor Only

NORTH AMERICAN DISTRIBUTION CENTER
Mini-Circuits P.O. BOX 7128 Branson, MO 65615
(800) 654-7949 (417) 335-5935 Fax (417) 335-5945
sales@minicircuits.com

Industrial Accounts:
Dept. D
(800) 654-7949 Ext. 605

Small-Order Accounts:
Dept. F
(800) 214-6428 Ext. 606

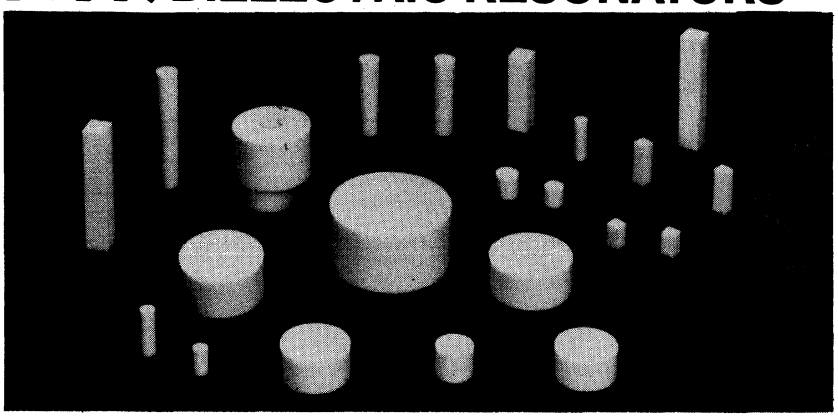
Mini-Circuits®

▲ DISTRIBUTION CENTER/LOCAL REP.
Mini-Circuits Europe Dale House, Wharf Road
Frimley Green, Camberley, Surrey GU16 6LF, England
Phone 44 1252-835094 Fax 44 1252-837010
postmaster@uk.minicircuits.com

TECHNICAL CERAMICS

NGK SPARK PLUGS (U.S.A.), INC.
CHICAGO OFFICE Telephone: (847) 824-1133, Fax: (847) 390-6482, 1200 Business Center Dr., Suite 300, Mount Prospect, IL 60056
75 Main St., Milburn, NJ 07041 Telephone: (201) 376-6070
CALIFORNIA OFFICE Telephone: (408) 727-5180, 3255-2 Scott Blvd., Suite 101, Santa Clara, CA 95054

NTK DIELECTRIC RESONATORS



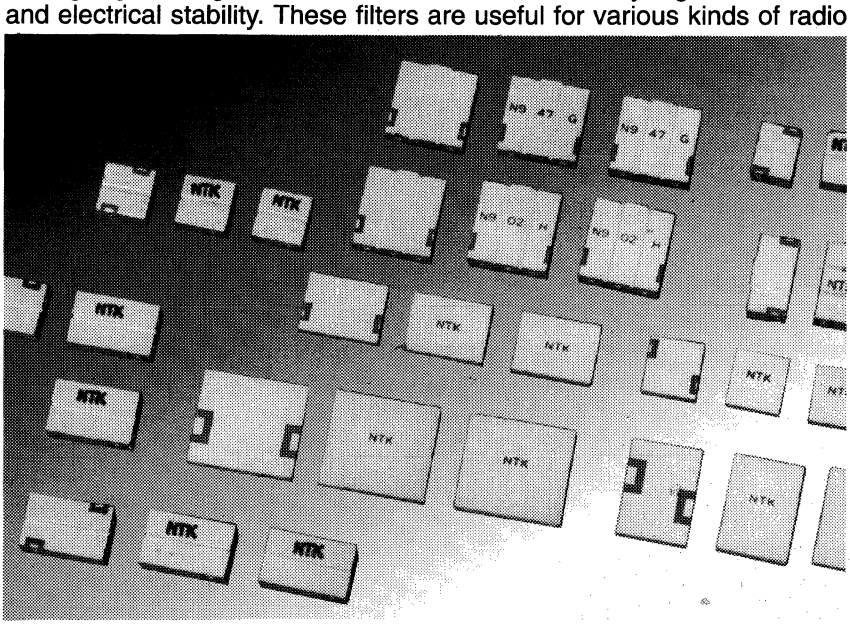
FEATURES
- High Q
- Broad range of dielectric constant
- Optional T.C.'s
- Optional T.C. tolerances

APPLICATIONS
- DRO
- Filter

Characteristics Notation	A	F	T	C	E	L	KP-99B
Relative dielectric constant K	12.6	34	80	21	44	93	9.8
Temp. coeff. of freq. π f(ppm/°C)	+10	-10 ~ +10	+10	0	+0.5	+8.0	-60
Q(=1/tanδ) (Measurement frequency)	18000 (13GHz)	16000 (4GHz)	1500 (2.7 GHz)	12,000 (6GHz)	10,600 (4GHz)	1350 (2.7GHz)	13700 (8GHz)
Volume resistivity (Ω•cm) (25°C)	1.1×10^{14}	1.1×10^{13}	7.6×10^{13}	—	—	—	—
Linear expansion coeff. (ppm/°C) (30-400°C)	7.6	9.5	10.0	11.3	10.1	—	—
Density (g/cm^3)	3.93	4.5	5.454	3.8	4.7	5.7	3.9
Bending strength (kg/cm^2)	3900	1500	2000	2030	2320	—	3000
Thermal conductivity (cal/cm-sec.°C)	0.06	0.0044	0.0067	0.02	0.0068	—	0.080
Water absorption (%)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

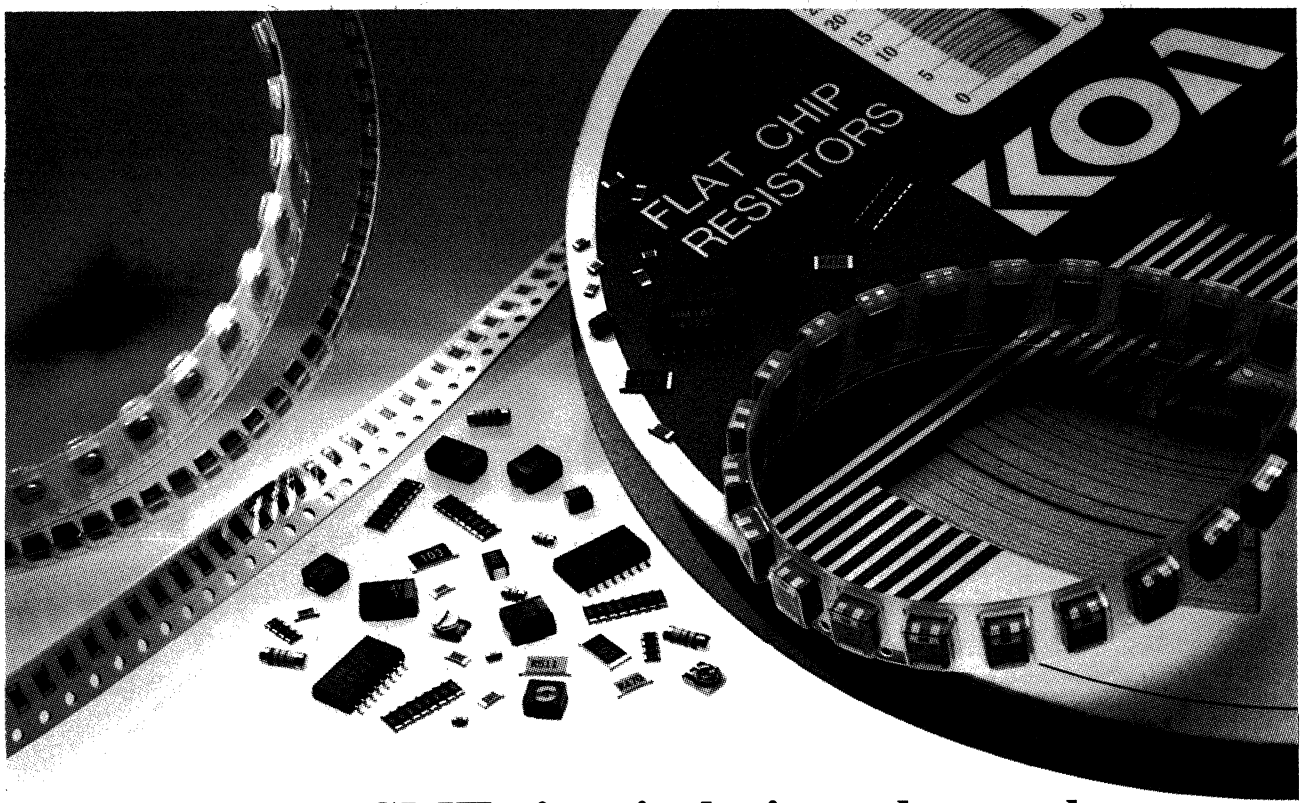
NTK DIELECTRIC FILTERS (MiFiL)

NTK new dielectric filters consist of the original complex construction having high Q, high dielectric constant and extremely high mechanical and electrical stability. These filters are useful for various kinds of radio communication equipment to achieve compact, high performance, and high reliability.



FEATURES
- Compact and light.
- Low loss and high attenuation.
- Excellent temperature stability.
- Long term stability.
- Surface Mountable (SMD).

APPLICATIONS
- Auto mobile telephone.
- Low loss and high attenuation.
- Portable telephone.
- Land mobile telephone.
- Personal transceiver.
- BS system.

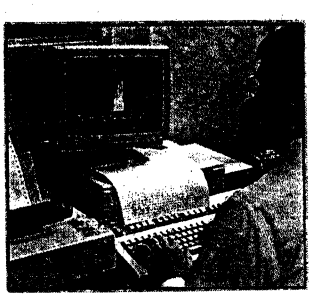


When SMT circuit designs demand, high reliability, more stability, smaller sizes and higher wattages at a competitive price... call KOA now!

KOA Speer has state-of-the-art SMT components to meet stringent applications. When your circuit designs require resistive components with high reliability, more stability, smaller sizes and higher wattages with proven performance, KOA has the answer.

The latest techniques in SPC (statistical process control) and TQC (total quality control) are used to insure consistent high quality SMT products.

Certified product programs, in-house testing, Engineering and R&D programs at KOA are consistently improving product designs and performance. For instance, KOA has recently upgraded wattages on SMT chip resistors. Engineering support is available.



KOA offers a full line of Flat Chip Resistors, Chip Inductors, Tantalum Chip Capacitors, MELF Resistors, Resistor Trimmers and SOM Resistor Networks, available at competitive prices.

Call today for information and free catalog.

KOA

SPEER ELECTRONICS, INC.

P.O. Box 547 Bradford, PA 16701, Phone: 1-800-450-0573

See pages A•1915-A•1921 (resistors), A•1074-A•1076 (capacitors), A•1232-A•1234 (inductors).

RESISTORS

Manufacturer	Starting EEM Page No.	Bulk Ceramic	Carbon Comp.	Film			Wire-wound	Foil	Fuse	Chip	Net-works	Features								Varistors
												Power								
				Metal-lized	Non-metal-lized	Car-bon						>2W to <5W	5W to 15W	>15W	Preci-sion	High Voltage >500V	Non-induc-tive	Flame Retard-ant	Fused	
Amitron, Inc.	A•1858			√*						√§*	√	√	√	√		√	√	√		
Bourns, Inc.	A•1859	√§		√§			√§			√§	√§									
Brel Precision Components	A•1893	√§		√§	√§		√§			√§	√§				√§					
Caddock Electronics, Inc.	A•1862			√§*	√§*				√	√§	√§	√§*	√§*	√*	√§*	√*	√§*	√	√	
Cesiwid Inc.	A•1890	√										√	√	√		√	√			
CTS Corp.	A•1894										√§									
EBG, Inc.	A•1896			√*	√*						√*	√*	√*	√*	√*	√*	√*	√*		
Electro-Films, Inc.	A•1898			√§*						√§*	√§*				√§*					
Huntington Electric Inc.	A•1902						√					√	√	√	√	√	√	√		√
Hy Meg Corp.	A•1904	√			√						√	√	√		√	√	√	√		
International Manufacturing Services Inc.	A•1906									√		√			√		√			
IRC, Inc.	A•1908	√§	√	√§*	√§*	√*	√§*		√§	√§*	√§*	√*	√*	√*	√§*	√*	√*	√*	√*	
Isotek Corporation	A•1910						√	√§				√§	√	√	√§		√§	√§		
K & M Electronics, Inc.	A•1914	√		√										√	√	√				
KOA Speer Electronics, Inc.	A•1915	√		√		√	√		√	√	√	√	√	√	√	√		√		
KRL-Bantry Components, Inc.	A•1922						√		√		√	√	√	√	√		√	√		
Maida Development Company	A•1928	√																		
Mills Resistor Company	A•1933						√				√	√	√	√	√		√	√	√	
Milwaukee Resistor Corp.	A•1934						√						√	√			√			
Mini-Systems, Inc.	A•1939			√§*	√§*					√§*	√§*	√§*	√§*		√§*					
Ohmcraft, Inc.	A•1940				√		√	√	√	√	√	√	√		√	√	√	√		
Ohmite Manufacturing	A•1943	√	√	√	√	√	√					√	√	√	√	√	√	√	√	
Paccom Electronics	A•1944			√	√	√	√			√	√	√	√		√		√	√		√
Pacific Resistor Company	A•1946						√		√	√	√	√	√	√	√	√	√	√	√	
Precision Resistive Products, Inc.	A•1950			√			√			√	√	√			√		√			
Precision Resistor Company, Inc.	A•1952											√§*	√§*		√§*	√§*	√§*	√§*		
RCD Components, Inc.	A•1954	√	√§	√§*	√§*	√§	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	
RFE International	A•1955	√§		√	√	√	√§	√§	√	√§	√§	√§	√	√	√	√	√§	√§	√	√§
Riedon, Inc.	A•1956						√		√			√	√	√	√		√	√		
Samsung Electro-Mechanics	A•1957									√§*	√§*									
State of the Art, Inc.	A•1958									√§*	√§*	√§	√§	√§	√§	√§				
Tad Components Inc.	A•1963									√§	√§				√§					
Tepro of Florida	A•1964			√§	√§	√	√§*		√	√	√	√	√	√	√	√	√	√	√	
Victoreen, Inc.	A•1967			√						√	√	√	√	√	√	√	√	√		
Vishay Angstrohm	A•1974			√*											√*					
Vishay Dale Electronics	A•1972						√					√	√	√	√		√	√	√	
Vishay Foil Resistors	A•1975							√§*		√§	√§*	√	√	√	√§		√§	√§		
Vishay Techno	A•1986			√§*		√				√	√*	√§	√§	√§	√§	√§	√§	√§	√§	
Vishay Thin Film	A•1988			√§*						√§*	√§*	√§	√§	√§	√§*	√§	√§	√§*		
Vishay Ultronix	A•1996						√*					√	√		√*	√				
Ward Leonard Resisitors	A•1998						√					√	√	√	√	√	√	√		
Wilbrecht Electronics	A•2006							√		√	√				√		√	√		
World Products Inc.	A•2007	√		√						√		√	√	√	√	√		√		√

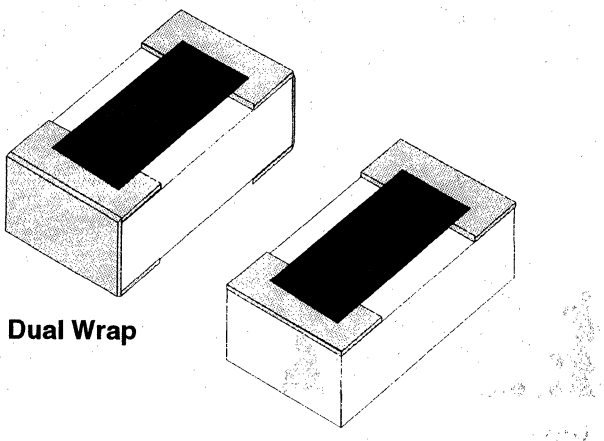
* MIL Spec. § Surface Mount.

AMITRON
85 Flagship Drive
North Andover, MA 01845
Email: sales@amitron.com
Tel: (978) 686-1882 x37
Fax: (978) 686-0622
http://www.amitron.com

See our pages in Sections A•3130 and A•3450

THICK FILM CHIP RESISTORS

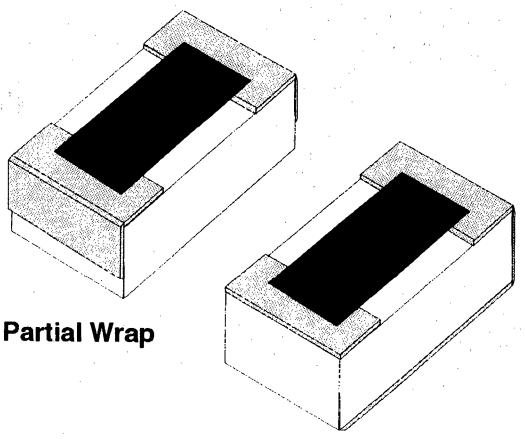
Standard Chip Resistors



Dual Wrap

No Wrap

RF/Microwave Chip Resistors



Partial Wrap

Half Wrap

PART NUMBERING SYSTEM

INSPECTION/SCREENING
L - Commercial (Sample Visual & Electrical)
R - Standard (100% Visual, Sample Electrical)
H - High Rel (100% Visual & Electrical)
C - Custom (per supplied specification)
M - Mil-R-55342

SIZE CODE
See Table

RESISTANCE OR ATTENUATION VALUE
Four digit code with first three digits as significant figures and fourth digit as number of zeroes to follow.
For values less than 100 ohms, an 'R' should be used in place of the deciamal point.

TERMINATION MATERIAL
G - Gold
L - Palladium/Silver
J - Tin/Lead over Nickel
K - Gold over Nickel
H - Platinum/Gold

R	2	B	3217-	4701	J	5	J	0

STYLE
1- No Wrap 3- Single Wrap
2- Dual Wrap 4- Partial Wrap
P- Pi Attenuator

BASE MATERIAL*
(ALUMINA) THICKNESS
A - 0.010 D - 0.025
B - 0.015 E - 0.030
C - 0.020 F - 0.040
* BeO Available

RESISTOR TOLERANCE
F - 1% G - 2%
J - 5% K - 10%
M - 20%

TCR
2 - 50ppm
3 - 100ppm
4 - 200ppm
5 - 300ppm

OPTIONS
0 - none
N - Untrimmed
T - Solder tinned

MECHANICAL CHARACTERISTICS

METRIC SIZE CODE	LENGTH (+.005, -.003)	WIDTH (±.003)	MAXIMUM THICKNESS	END BAND (±.003)
0805	.030	.020	.020	.010
1005	.040	.020	.020	.010
1306	.050	.025	.020	.015
1310	.050	.040	.020	.015
1313	.050	.050	.020	.015
1508	.060	.030	.020	.015
1913*	.075	.050	.020	.020
2513*	.100	.050	.020	.020
2525	.100	.100	.020	.020
3217*	.125	.065	.020	.020
3813*	.150	.050	.025	.020
5152	.200	.100	.030	.025
6432	.250	.250	.125	.025

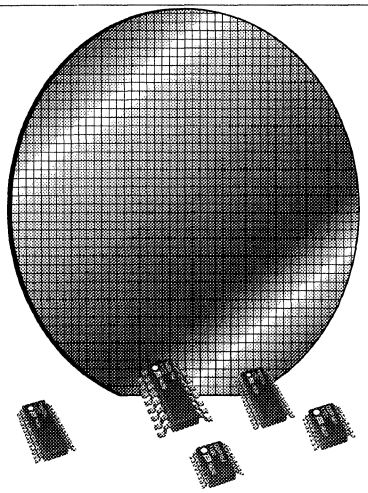
* QPL listed in Mil-R-55342

ELECTRICAL CHARACTERISTICS

METRIC SIZE CODE	MINIMUM VALUE (OHMS)	MAXIMUM VALUE (OHMS)	MAXIMUM POWER (mW)	MAXIMUM VOLTAGE
0805	3.0	5.1M	60	24
1005	6.2	10.0M	80	32
1306	6.2	10.0M	125	40
1310	3.0	5.1M	200	40
1313	9.1	15.0M	180	48
1508	2.0	3.3M	250	40
1913*	3.6	5.6M	280	60
2513*	6.2	10.0M	375	80
2525	2.2	3.9M	750	80
3217*	5.6	9.1M	600	100
3813*	11.0	18.0M	560	120
5152	5.6	9.1M	1500	160
6432	5.6	10.0M	2300	200

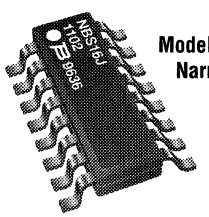
* QPL listed in Mil-R-55342

BOURNS, INC., • 2533 NORTH 1500 WEST, OGDEN, UTAH 84401
For technical assistance call (801) 786-6360.
www.bourns.com

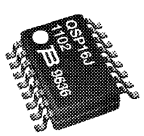


MiniNet™
RESISTOR NETWORKS

Thin-Film-On-Silicon Technology



Model 2NBS Series
Narrow Body SOIC



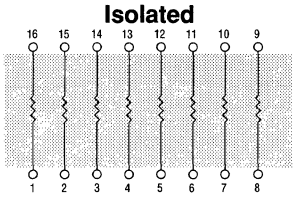
Model 2QSP Series
QSOP

Standard Specifications

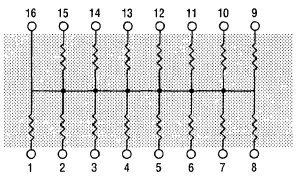
Resistance Values .....See table
Tolerance .....±5%, ±2%
TCR.....±100ppm/°C
TCR Tracking (Typical).....±25ppm/°C
Power Rating (per resistor).....100mW
Maximum Operating Voltage 50V
Operating Temperature.....55°C to +125°C
Packages.....QSOP, NBSOIC,
(Contact the factory for other package availability.)

MiniNet™
RESISTOR NETWORKS

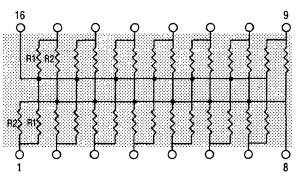
Circuit 1
Isolated



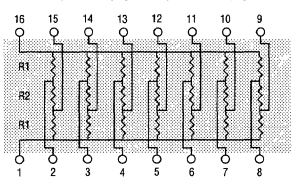
Circuit 2
Bussed



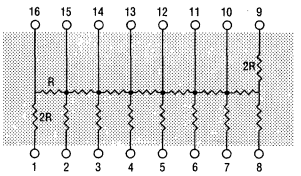
Circuit 3
Dual Terminator



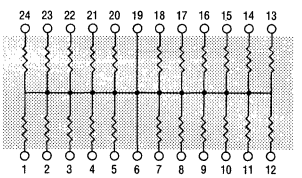
Circuit 4
Differential Terminator I



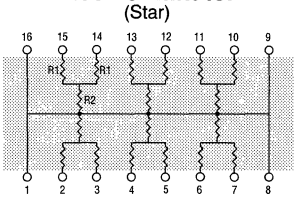
Circuit 6
R/2R Ladder



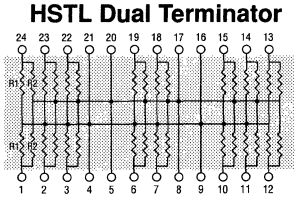
Circuit 7
Bussed Terminator



Circuit 8
V.35 Terminator
(Star)



Circuit 9
HSTL Dual Terminator



Standard Resistance Values

Type	Circuit	Standard Values (ohms)
Isolated	#1	10 47 330 1K 20K 22 51 470 2.2K 50K 33 68 510 4.7K 100K 39 220 680 10K
Bussed	#2	100 330 680 2K 10K 220 390 1K 2.2K 100K 270 470 1.5K 4.7K
Dual Terminator	#3	R1 = 220, R2 = 330
Diff. Term. I & II	#4, #5	R1 = 330, R2 = 150
R/2R	#6	10K/20K 25K/50K
Bussed Terminator	#7	47, 50, 56 68, 90
V.35 Terminator	#8	'Star' R1 = 50 R2 = 125 'Delta' R1 = 300 R2 = 120
HSTL Dual Terminator	#9	**V01** 94 94 **V03** 112 112 **V02** 100 100 **V04** 136 136
NTL Terminator	#0	R1 = 22, R2 = 90

Non-standard component values, tolerances and device packages also available. Consult your Bourns representative.

How to Order

2 QSP 20 - T J 2 - 471

Product Class
Thin-Film-on-Silicon

Package Style
QSP = QSOP
NBS = Narrow Body SOIC

Pin Count
QSP = 16,20,24,28
NBS = 8,14,16

Dispensing Method
R = Reel T = Tube

Grade:

	Tolerance	TCR
J =	±5%	±100ppm
G =	±2%	±100ppm

Circuit
1 = Isolated
2 = Bussed
3 = Dual Terminator
4 = Differential Terminator I
5 = Differential Terminator II (not shown)
6 = R/2R Ladder
7 = Bussed Terminator
8 = V.35Terminator
9 = HSTL Dual Terminator
0 = NTL Terminator (not shown)

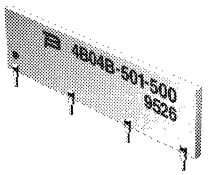
Resistance Value Code[1,2]
1st two digits are significant
3rd digit represents number of zeros to follow

[1]For the V.35 Terminator, 001 denotes 'Star' configuration, 002 denotes 'Delta' configuration.

[2]For the HSTL Terminator insert the appropriate resistor Value Code to indicate the R1, R2 combination required (see table).

BOURNS, INC., • 1400 NORTH 1000 WEST, LOGAN, UTAH 84321
For technical assistance call (801) 750-7302.
www.bourns.com

APPLICATION SPECIFIC RESISTOR NETWORKS



Model 4B04
Thick Film Surge Resistor Network

- **Lightning surge for standard waveforms**
- **Standard "off the shelf" design**
- **1/2" (12.7mm) seated height**
- **Applications typically line card protection in telecom switching circuits and other high power applications**
- **Custom design available, contact factory**

Product Characteristics – Resistors
Resistance Values
.....between 50 ohms and 100 ohms
Resistance Tolerance ±1%
TCR .....100ppm/°C

Environmental Specifications
Resistance to Solvents
.....No Marking Deterioration
Resistance to Solder Heat
.....±0.5% or 0.5 ohms, whichever is greater
Solderability .....>95% Coverage
Insulation Resistance
.....10 megohms minimum (between isolated pins)
Bias Humidity Test
.....50V/85% RH/85°C

Functional Characteristics
Lightning Surge Test
Bellcore Spec TR-NWT-001089
10 x 1000 µsec .....1 kV
2 x 10 µsec .....2.5 kV
IEC Spec 801-5
10 x 700 µsec .....2 kV
Power Cross Test..Per Bellcore spec (Vrms applied vary with resistance values)

Physical Characteristics
Body Style .....Open-Frame SIP
Body Material
.....96% Alumina Ceramic
Body Style .....Open Frame SIP
Pin Count.....4

Part Numbers**
.....4B04B-501-XXX
**XXX refers to the resistance code

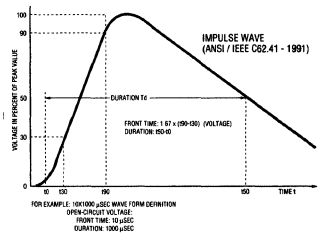
HOW TO ORDER

4B 04 B - 501 - XXX

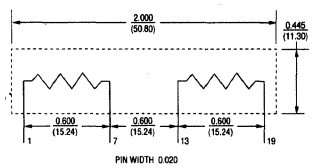
Model (4B = Open Frame)
Number of Pins
Physical Configuration
Electrical Configuration •501 = Surge Device
Resistance Code •First 2 digits are significant •Third digit represents the number of zeros to follow.

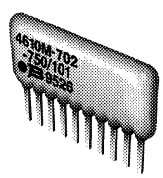
Specifications are subject to change without notice.

SURGE WAVEFORM DEFINITION



STANDARD SURGE NETWORK CONFIGURATION





RC Termination
Conformal SIP Package

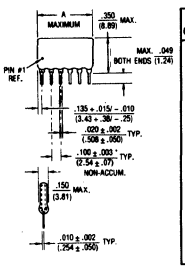
- **Reduced insertion time**
- **Low noise termination for CMOS**
- **Combined resistors and capacitors in SIP package saves space**
- **Insulation resistance testing for reliability**
- **Pin counts from 4 to 16 available**

Product Characteristics – Resistors
Standard Resistance Range
.....22 ohms to 1 megohm
Resistance Tolerance ±2%
.....50 ohms to 1 megohm
Operating Voltage
.....50 volts maximum

Product Characteristics – Capacitors
Capacitance Range
.....330 pF to 39,000 pF X7R
Capacitance Range
.....39 pF to 270 pF NPO
Capacitance Tolerance.....±20%
Operating Temperature
.....-55°C to +125°C
Voltage Rating.....50 volts

Physical Characteristics
Flammability
.....Conforms to UL94V-0
Lead Frame Material
.....Copper (OLIN 194) 90/10 plated
Body Material .....Conformal coat

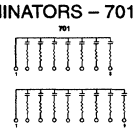
700 Series



Pin Count	A Maximum Inches (mm)
4	.398 (10.11)
5	.498 (12.65)
6	.598 (15.19)
7	.698 (17.73)
8	.798 (20.27)
9	.898 (22.81)
10	.998 (25.35)
11	1.098 (27.89)
12	1.198 (30.43)
13	1.298 (32.97)
14	1.398 (35.51)
15	1.498 (38.04)
16	1.598 (40.59)
17	1.698 (43.13)
18	1.798 (45.67)

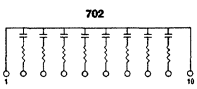
Governing dimensions are in inches. Dimensions in parentheses are metric (mm) and are approximate. *Terminal centerline to centerline measurements made at point of emergence of the lead from the body.

AC TERMINATORS – 701



NO. OF LINES	BOURNS P/N	PACKAGE
7	4608H-701-RC/CC	High Profile Conformal SIP
8	4609H-701-RC/CC	
9	4610H-701-RC/CC	

AC TERMINATORS – 702



NO. OF LINES	BOURNS P/N	PACKAGE
8	4610H-702-RC/CC	High Profile Conformal SIP

For all AC terminators, standard R values are 50, 68, 75 and 100 ohms. Standard values for C are 47, 100, 500 and 1000pF. See data sheet to select custom combinations of R and C.

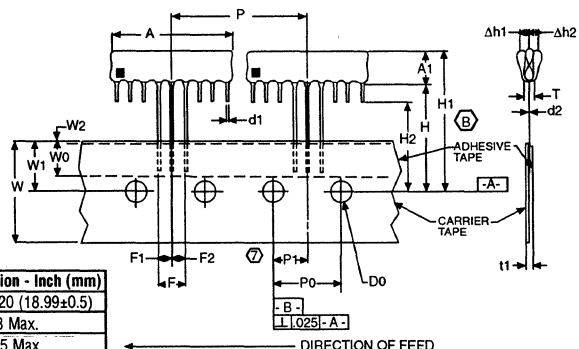
HOW TO ORDER

46 08 H - 701 - RC/CC

Model (46 = Conformal SIP)
Number of Pins •4 to 18
Physical Config. (•H = High Profile)
Electrical Configuration •701 = Single Termination •702 = Double Termination
Resistance/Capacitance Code •First 2 digits are significant •Third digit represents the number of zeros to follow.

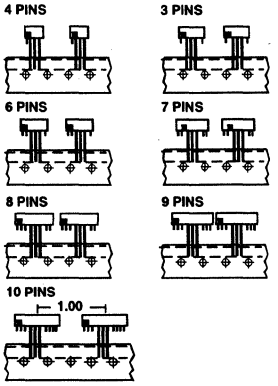
Consult factory for other available options.
Specifications are subject to change without notice.

Ammo Pak
Packaging 100-300 MAX



Code	Dimension - Inch (mm)	Code	Dimension - Inch (mm)
A	See Table I	H	.748±.020 (18.99±0.5)
A1	X = .195 (4.95) Max.	H1	X = .993 Max.
	M = .250 (6.35) Max.		M = 1.05 Max.
	H = .350 (8.89) Max.		H = 1.15 Max.
α1	.020±0.005 (0.50±0.12)	H2	.630+.030 -.020
α2	.012±.005 (0.30±0.13)	W0	.709±.020 (18.0±0.50)
P	1.00±.04 (25.4±1.0) (See Note)	W1	.197 (5.0) min.
P0	.500±.012 (12.70±0.30)	W2	.354±.020 (9.0±0.50)
F1 F2	.100±.010 (2.54±0.25)	D0	ø.157±.012 (ø4.0±0.3)
F	.200±.012 (5.08±0.30)	T	.100 (2.54) Max.
Δh1 Δh2	.079 (2.0 Max.	t1	.059 (1.5) Max.

SUPPORTED PIN COUNTS



BOURNS, INC., • 1400 NORTH 1000 WEST, LOGAN, UTAH 84321
For technical assistance call (801) 750-7302.
www.bourns.com

THICK FILM RESISTOR NETWORKS

General Specifications

The following specifications apply to all Bourns standard networks (Series 4100, 4300, 4400, 4600 and 4800).

Product Specifications

Standard Resistance Range
.....10 ohms to 10 megohms
Resistance Tolerance
(Bussed and Isolated Circuits)
±2.0%....50 ohms to 5 megohms*
±1 ohm.....10 ohms to 49 ohms
Dual Terminator
±2.0%...100 ohms to 5 megohms*
±2 ohms.....10 ohms to 99 ohms
Maximum Operating Voltage
Through-Hole Components.....100V
SMD Components.....50V
Temperature Coefficient (TCR)
±100PPM/°C 50 ohms to 2.2 megohms
±250PPM/°C Below 50 ohms and above 2.2 megohms
TCR Tracking....50PPM/°C maximum Equal value resistors
Insulation Resistance (@100V)
.....10,000 megohms minimum
Dielectric Withstanding Voltage
200VRMS.....1Ma maximum leakage current
*Above 5 megohms = ±5.0%

Mechanical Specifications

Flammability.....Conforms to UL94V-0
Leadframe.....Copper (Olin 194) Tin/lead Finish
Body Material
Molded Product.....Epoxy/Novolac
Conformal Product...Epoxy/Anhydride
Lead Solderability and Solvent Resistance
...Meet requirements of MIL-R-83401

Environmental Specifications

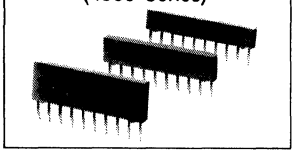
Tests per MIL-R-83401.....ΔR Maximum
Short time Overload(STOL).....±0.25%
Load Life.....±1.00%
Thermal Shock.....±0.25%
Mechanical Shock.....±0.25%
Moisture Resistance.....±0.50%
Resistance to Solar Heat.....±0.25%
Terminal Strength.....±0.25%
Vibration.....±0.25%
Operating Temperature
.....-55 to +125°C
Storage Temperature.....-65 to +150°C

COMMON RESISTANCE VALUES
(003, 104 Circuits)

Resistance			
Ohms		Code	
R_1	R_2	R_1	R_2
160	240	161	241
180	390	181	391
220	270	221	271
220	330	221	331
330	390	331	391
330	470	331	471
3000	6200	302	622

Molded SIP

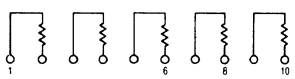
(4300 Series)



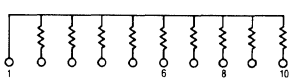
The Molded SIP product is suitable for automatic insertion and is available in low profile (.195" high), medium profile (.250" high) and high profile (.350" high) styles.

PIN COUNTS AVAILABLE
Low Profile.....6-8-9-10-11
Medium Profile.....4-6-8-10
High Profile.....4-6-8-10

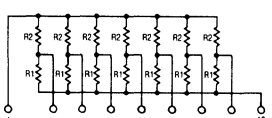
ISOLATED RESISTORS
(102 Circuit)



BUSSED RESISTORS
(101 Circuit)



DUAL TERMINATOR
(104 Circuit)



MAXIMUM PACKAGE POWER
(Watts @ 70°C)

Pins	Low Profile	Medium Profile	High Profile
4	—	.600	.800
6	.750	.900	1.200
8	1.000	1.200	1.600
9	1.125	—	—
10	1.250	1.500	2.000
11	1.375	—	—

MAXIMUM RESISTOR POWER
(Watts @ 70°C)

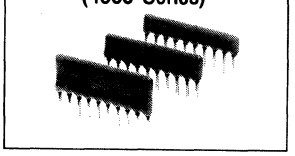
Profile	Isolated 102 Circuit	Bussed 101 Circuit	Dual Terminator 104 Circuit
Low	.300	.200	.200
Medium	.400	.250	.250
High	.500	.300	.300

Pins	Maximum Pkg Length Inches	(mm)
4	.384	(9.76)
6	.584	(14.84)
8	.784	(19.92)
9	.884	(22.46)
10	.984	(25.00)
11	1.084	(27.54)

Profile	Maximum Seated Height Inches	(mm)
Low	.195	(4.96)
Medium	.250	(6.35)
High	.350	(8.89)

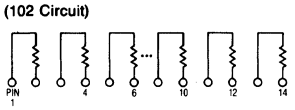
Conformal SIP

(4600 Series)

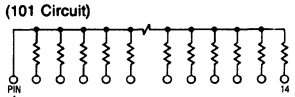


The Conformal SIP product is a lower cost alternative to the molded product and is suitable for use where manual insertion is employed. This product is available in all pin counts from 4 through 16 pins, in low profile (.200" high), medium profile (.250" high) and high profile (.350" high) packages.

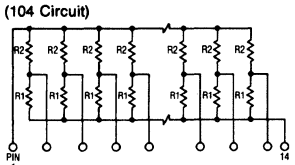
ISOLATED RESISTORS
(102 Circuit)



BUSSED RESISTORS
(101 Circuit)



DUAL TERMINATOR
(104 Circuit)



MAXIMUM PACKAGE POWER
(Watts @ 70°C)

Pins	Low Profile	Medium Profile	High Profile
4	.500	.600	.800
5	.625	.750	1.000
6	.750	.900	1.200
7	.875	1.050	1.400
8	1.000	1.200	1.600
9	1.125	1.350	1.800
10	1.250	1.500	2.000
11	1.375	1.650	2.200
12	1.500	1.800	2.400
13	1.625	1.950	2.600
14	1.750	2.100	2.800
15	1.875	2.250	3.000
16	2.000	2.400	3.200

MAXIMUM RESISTOR POWER
(Watts @ 70°C)

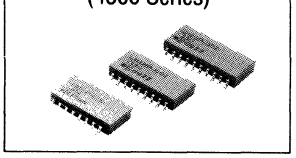
Profile	Isolated 102 Circuit	Bussed 101 Circuit	Dual Terminator 104 Circuit
Low	.300	.200	.200
Medium	.400	.250	.250
High	.500	.300	.300

Pin Count	Maximum Pkg Length Inches	(mm)
4	.398	(10.11)
5	.498	(12.65)
6	.598	(15.19)
7	.698	(17.73)
8	.798	(20.27)
9	.898	(22.81)
10	.998	(23.35)
11	1.098	(27.89)
12	1.198	(30.43)
13	1.298	(32.97)
14	1.398	(35.51)

Profile	Maximum Seated Height Inches	(mm)
Low	.200	(5.08)
Medium	.250	(6.35)
High	.350	(8.89)

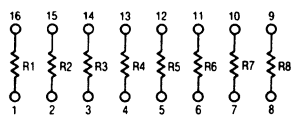
Medium Body SMD

(4800 Series)

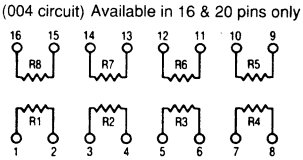


The SOM package is a surface-mount device (SMD) available in 14, 16, 18 and 20 pin versions. The Model 48XXP is designed per the EIA SOGN-0002 standard with gull wing leads, the most popular package style in the industry.

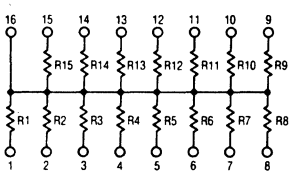
ISOLATED RESISTORS
(001 circuit)



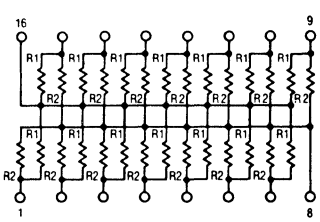
(004 circuit) Available in 16 & 20 pins only



BUSSED RESISTORS
(002 Circuit)



DUAL TERMINATOR
(003 Circuit)



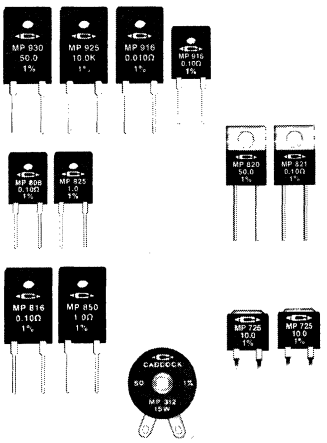
POWER RATINGS @ 70°C

Resistor
001 Circuit.....160W
002 Circuit.....080W
003 Circuit.....080W
004 Circuit.....160W
Package
4814.....1.12W
4816.....1.28W
4818.....1.44W
4820.....1.60W

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Index to Caddock High Performance Film Resistors

Power Resistors, Heat Sink Mountable with Non-Inductive Designs



MP915, MP916, MP925 and MP930 Power Film Resistors — Pages C5 and C6
Model MP915, 15 Watts, TO-126 All Molded Package, Resistance 0.020 ohm to 1.00K
Model MP916, 16 Watts, TO-220 All Molded Package, Resistance 0.010 ohm to 0.019 ohm
Model MP925, 25 Watts, TO-220 All Molded Package, Resistance 5.00K to 100K
Model MP930, 30 Watts, TO-220 All Molded Package, Resistance 0.020 ohm to 4.99K

MP820 and MP821 Power Film Resistors in the TO-220 Power Package — Page C9
20 Watt Power Resistor, Power Package with Metal Mounting Tab
Resistance 0.020 ohm to 10.0K

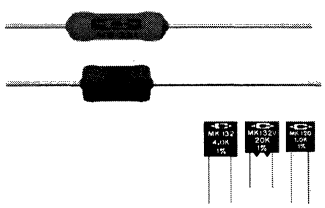
MP808 and MP825 Power Film Resistors, TO-126 Style Power Package — Pages C7 and C8
Model MP808, 8 Watts, All Molded Package, Resistance 0.020 ohm to 10.0K
Model MP825, 25 Watts, Integral Copper Heat Sink, Resistance 0.020 ohm to 10.0K

MP816 and MP850 Power Film Resistors, TO-220 Style Power Package — Pages C7 and C8
Model MP816, 16 Watts, All Molded Package, Resistance 0.100 ohm to 10.0K
Model MP850, 50 Watts, Integral Copper Heat Sink, Resistance 0.200 ohm to 10.0K

MP725 Surface Mount Power Film Resistor in a D-Pak Style Power Package — ***New Product*** Page C4
25 Watt Power Resistor, D-Pak Style Power Package for Surface Mount Applications
Resistance 0.020 ohm to 1.00K

MP312 and MP330 Power Film Resistors — Contact Caddock Applications Engineering
15 Watt and 30 Watt Ratings with Center Screw Chassis Mounting

Power Resistors, Axial Leads and Radial Leads with Non-Inductive Designs

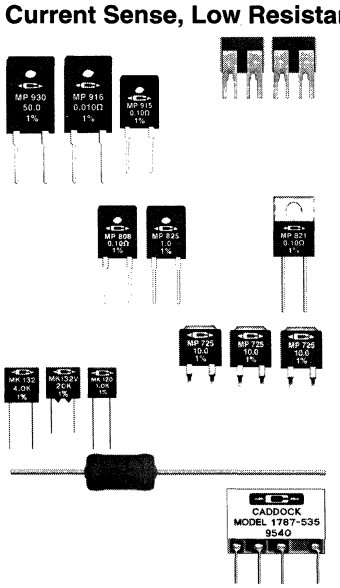


Type MS Power Film Resistors — Pages C11 and C12
Power Rating to 15 Watts, Voltage Rating to 6000 Volts,
Max. Temperature +275°C, Non-Inductive Design, 17 Models

Type MV Low Resistance Power Film Resistors — Contact Caddock Applications Engineering
Resistance from 0.1 ohm to 50 ohms, Power Rating to 10 Watts
Max. Temperature +275°C, Non-Inductive Design

MK132 and MK120 Precision Power Film Resistors with Non-Inductive Design — Pages C23 and C24
3/4 Watt at 400 Volts Max. and 1/2 Watt at 200 Volts Max. at +125°C,
Resistance 1 ohm to as high as 5 Megohms

Current Sense, Low Resistance with Non-Inductive Designs



Type SR Precision Current Sense Resistors — ***New Product*** Page C10
Compact Design with Kelvin Terminals, Absolute Tolerance of 1%,
Power rating 1.0 Watt, Resistance Values 0.008 ohm to 1.00 ohm

MP915, MP916 and MP930 Power Film Resistors — Pages C5 and C6
Model MP915, 15 Watts, TO-126 All Molded Package, Resistance down to 0.020 ohm
Model MP916, 16 Watts, TO-220 All Molded Package, Resistance down to 0.010 ohm
Model MP930, 30 Watts, TO-220 All Molded Package, Resistance down to 0.020 ohm

MP808 and MP825 Power Film Resistors, TO-126 Style Power Package — Pages C7 and C8
Model MP808, 8 Watts, All Molded Package, Resistance as low as 0.020 ohm
Model MP825, 25 Watts, Integral Copper Heat Sink, Resistance as low as 0.020 ohm

MP821 Power Film Resistors in the TO-220 Power Package — Page C9
20 Watt Power Resistor, Power Package with Metal Mounting Tab
Resistance **as low as 0.020 ohm at 1% tolerance**

MP725 Surface Mount Power Film Resistor in a D-Pak Style Power Package — ***New Product*** Page C4
25 Watt Power Resistor, D-Pak Style Power Package for Surface Mount Applications
Resistance **as low as 0.020 ohm**

MK132 and MK120 Precision Power Film Resistors — Pages C23 and C24
3/4 and 1/2 Watt Ratings at +125°C, Resistance as low as 1 ohm

Type MV Low Resistance Power Film Resistors — Contact Caddock Applications Engineering
Resistance as low as 0.1 ohm, Power Rating to 10 Watts,
Max. Temperature +275°C

Type 1787 Precision Current Sense Resistor Networks — Contact Caddock Applications Engineering
3 and 4-step Current Sense Resistor Networks for Current Sensing in
Multi-Range Instumentation, Absolute Tolerance of 0.25% to 0.05%

Low Resistance Chip Resistors

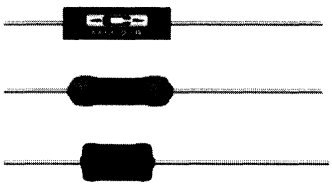
Type CC Low Resistance Precision Chip Resistors — ***New Product*** Page C3
Resistance range down to 0.020 ohm at ±5%, 0.050 ohm at ±2%, and 0.100 ohm at ±1%
Style FC Flip Chip version for surface mount applications
Style WB Version with metallized back surface for solder down heat sinking and pads to receive Aluminum wire bonds

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

High Temperature Resistors, 275°C

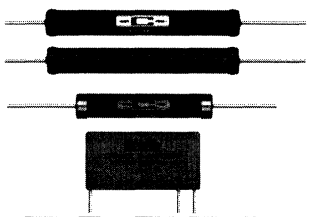


Type MM Precision Film Resistors — Page C13
High Temperature Resistors for Geophysical, Aerospace and Industrial Requirements, Max. Temperature +275°C

Type MS Power Film Resistors — Pages C11 and C12
Power Rating to 15 Watts, Max. Temperature +275°C, Non-Inductive Design, 17 Models

Type MV Low Resistance Power Film Resistors — Contact Caddock Applications Engineering
Resistance from 0.1 ohm to 50 ohms, Power Rating to 10 Watts, Max. Temperature +275°C, Non-Inductive Design

High Voltage Resistors and High Voltage Divider Networks



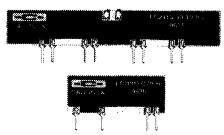
Type TG Low TC Precision High Voltage Resistors — Page C17
Temperature Coefficient of 25 ppm/°C from -55°C to +125°C

Type MG Precision High Voltage Resistors with Extended Resistance Range — Pages C15 and C16
Resistance Value to as high as 10,000 Megohms, TC of 80 ppm/°C

Type MX Lab Grade Precision High Voltage Resistors — Page C18
High Voltage Resistors for Laboratory and Industrial Applications

Type THV Precision High Voltage Divider Networks — Page C14
Ratio Temperature Coefficient to 10 ppm/°C from -55°C to +125°C
Ratio Tolerance to 0.25% at 10 KVDC, 15 KVDC or 20 KVDC

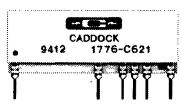
Telephone Line Interface Resistor Networks and Custom Resistor Networks



LC 2000 Series Standard Transient Tolerant Precision Resistor Networks — Page C28
Lightning Transient Handling with Optional Thermal Cut-off Protection or Optional Thermistor Temperature Sensing Element for Telephone Line Card Applications
Resistor Networks available which meet the requirements of GR-1089-CORE and ITU-T K.20

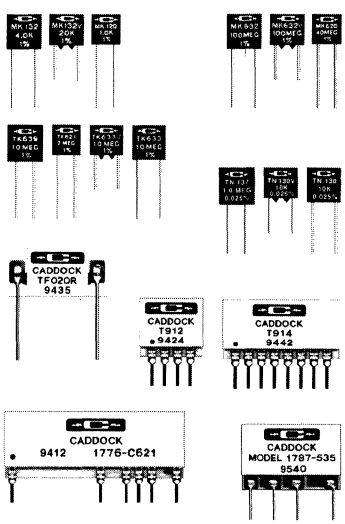
LC 2000 Series Custom Transient Tolerant Resistor Networks — Page C28
Lightning Transient Handling Custom Resistor Networks for Telephone Line Card Applications

Decade Voltage Divider with Input Voltage Rating up to 1200 volts



Type 1776 Precision Decade Resistor Voltage Dividers — Pages C25 and C26
39 Models of Input Voltage Dividers for Digital Multimeters and other Range-Switching Circuits, Ratio Tol. 0.5% to 0.02%, 10,000:1, 1,000:1, 100:1, 10:1, Voltage Division, Ratio TC 50 ppm/°C to 5 ppm/°C

Precision and Ultra-Precision Discrete Resistors, Resistor Networks and Custom Resistor Networks



MK132 and MK120 Precision Power Film Radial-Lead Resistors — Pages C23 and C24
Tolerance 1.0% to 0.1%, 3/4 and 1/2 Watt Ratings at +125°C, 1 ohm to 5 Megohms

MK632 and MK620 Extended Resistance Range Radial-Lead Film Resistors — Pages C23 and C24
Tolerance 1.0% to 0.1%, Resistance Range from 2.1 Megohms to 100 Megohms

Type TK Military Temp Range, Precision Low TC, Radial-Lead Film Resistors — Pages C21 and C22
Tolerance 1.0% to 0.05%, Resistance Range from 1 Kohm to 10 Megohms, Temperature Coefficient of 5, 10 or 20 ppm/°C from -55°C to +125°C

Type TN Lab Grade, Precision Low TC, Radial-Lead Film Resistors — Page C20
Tolerance 1.0% to 0.025%, Resistance Range from 1 Kohm to 1 Megohm Temperature Coefficient of 5, 10, or 20 ppm/°C from 0°C to +70°C

Type TF Low TC Ultra-Precision Film Resistors — Page C19
Tolerance 1.0% to 0.01% Resistance Range from 1 Kohm to 125 Megohms, Temperature Coefficient 5, 10 or 15 ppm/°C from -15°C to +105°C

Type T912 and T914 Precision and Ultra-Precision Networks with Low Ratio TC — Page C27
Two Resistor and Four Resistor Networks with Precise Ratio Performance, Ratio Tolerance from 0.1% to 0.01%, Ratio TC 10 ppm/°C to 2 ppm/°C

Type 1776 Precision Decade Resistor Voltage Dividers — Pages C25 and C26
39 Models of Input Voltage Dividers for Digital Multimeters and other Range-Switching Circuits, Ratio Tol. 0.5% to 0.02%, Ratio TC 50 ppm/°C to 5 ppm/°C

Type 1787 Precision Current Sense Resistor Networks — Contact Caddock Applications Engineering
3 and 4-step Current Sense Resistor Networks for Current Sensing in Multi-Range Instrumentation, Absolute Tolerance of 0.25% to 0.05%

Type T1794 Custom Low Ratio TC, Precision SIP Resistor Networks — Page C28
Ratio TC to 5 ppm/°C, Ratio Tolerance to 0.01%, Resistance Range from 500 ohms to 50 Megohms

Type 1789 Custom Low Resistance Value, Precision SIP Resistor Networks — Contact Caddock Applications Engineering
Ratio TC to 15 ppm/°C, Ratio Tolerance to 0.05%, Resistance Range from 0.5 ohm to 10,000 ohms

Type MM Precision Film Resistors — Page C13
Tolerance 1.0% to 0.1%, High Temperature Resistors for Geophysical, Aerospace and Industrial Requirements

Type ML Precision Film Resistors — Page C13
Tolerance 1.0% to 0.1%, Resistors for Aerospace and Industrial Requirements

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

Page C2

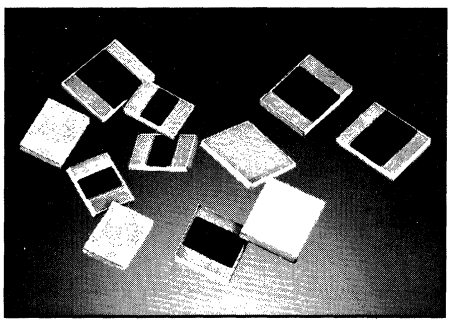
CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Type CC Low Resistance Precision Chip Resistors

Low Resistance Chip Resistors for Current Sense in Hybrid and SMT Applications

Type CC Low Resistance Precision Chip Resistors utilize the proven Caddock Micronox® resistance films to achieve the unique low resistance range in this family. The special performance features of the Type CC Low Resistance Precision Film Resistor include:

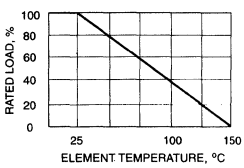
- **Flip Chip version for surface mount applications.**
- **Version with metallized back surface for solder down heat sinking of the chip, includes bondable termination pads to receive heavy aluminum wire bonds.**
- **Resistance as low as 0.020 ohm at ±5%, 0.050 ohm at ±2%, and 0.10 ohm at ±1%**
- **Non-Inductive performance.**
- **Custom Low Resistance Chip Resistors are available.**



Style WB is a hybrid mountable version with aluminum **wire bonding** pads and a metallized back surface for solder attachment of the back surface to a heat sinking substrate.

Model No.	Power Rating	Resistance		Dimensions			
		Min.	Max.	A	B	C	D
CC2520WB	15 Watts *	0.025Ω	10.0 Ω	.250 ±.007 (6.35 ±.18)	.200 ±.007 (5.08 ±.18)	.026 ±.003 (.66 ±.08)	.040 min. (1.02 min.)
CC2015WB	9 Watts *	0.020Ω	10.0 Ω	.200 ±.007 (5.08 ±.18)	.150 ±.007 (3.81 ±.18)	.026 ±.003 (.66 ±.08)	.050 min. (1.27 min.)

STYLE WB DERATING CURVE BASED ON ELEMENT TEMPERATURE

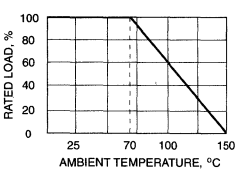


* **Element temperature is to be used as the basis for establishing the maximum applied power for Style WB Chip Resistors. See Derating Curve.** The element temperature measurement is made at the center of the resistor chip on the exposed side when mounted. Derate appropriately for the ambient temperature range, the thermal resistance of the mounting surface, and the temperature limitations of the adjacent materials (such as glass epoxy).

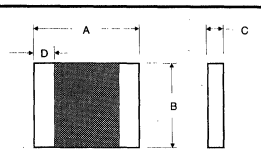
Style FC is a surface mount version with solderable pads for **flip chip** soldering.

Model No.	Power Rating	Resistance		Dimensions			
		Min.	Max.	A	B	C	D
CC2520FC	1.5 Watts **	0.025Ω	10.0 Ω	.250 ±.007 (6.35 ±.18)	.200 ±.007 (5.08 ±.18)	.041 ±.004 (1.04 ±.10)	.040 min. (1.02 min.)
CC2015FC	1.0 Watt **	0.020Ω	10.0 Ω	.200 ±.007 (5.08 ±.18)	.150 ±.007 (3.81 ±.18)	.026 ±.003 (.66 ±.08)	.050 min. (1.27 min.)

STYLE FC DERATING CURVE BASED ON AMBIENT TEMPERATURE



** **Ambient temperature is to be used as the basis for establishing the maximum applied power for Style FC Chip Resistors. See Derating Curve.** Derate appropriately for the maximum ambient temperature and the temperature limitations of the adjacent materials.



DIMENSIONS IN INCHES AND (MILLIMETERS)

Solder attachment note:
Style WB has a metallized back surface for soldering to a substrate or a heat sink. Recommended solder is 62Sn / 36Pb / 2Ag.

Style FC has a bare ceramic back surface. For flip chip solder attachment the recommended solder is 62Sn / 36Pb / 2Ag.

Ordering Information:

Model Number: CC2520FC - 0.10 - 1%
Style: CC2520FC
Resistor Value: 0.10
Tolerance: 1%

Packaging Note:
Quantities of 250 pieces or greater, will be supplied in tape and reel packaging. Normal full reel quantity is 1000 pieces per reel.

Standard Resistance Values:

0.020 Ω	0.10 Ω	0.50 Ω	3.30 Ω
0.025 Ω	0.15 Ω	0.75 Ω	4.00 Ω
0.030 Ω	0.20 Ω	1.00 Ω	5.00 Ω
0.033 Ω	0.25 Ω	1.50 Ω	7.50 Ω
0.040 Ω	0.30 Ω	2.00 Ω	8.00 Ω
0.050 Ω	0.33 Ω	2.50 Ω	10.0 Ω
0.075 Ω	0.40 Ω	3.00 Ω	

Specifications:

Resistance Tolerance: ±1% for 0.10Ω up to 10.0Ω, ±2% for 0.050Ω up to 0.099Ω, ±5% for 0.020Ω up to 0.049Ω (5% and 20% are available for most resistance values).

Temperature Coefficient:
TC referenced to +25°C, ΔR taken at +150°C
0.50 ohm and above, -20 to +80 ppm/°C
0.050 ohm to 0.49 ohm, 0 to +200 ppm/°C
0.020 ohm to 0.049 ohm, 0 to +300 ppm/°C

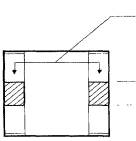
Momentary Overload: 1.5 times rated power for 5 seconds, ΔR ±(0.5 percent + 0.0005 ohm) max. Use derating curves to establish rated power.

Load Life: 1,000 hours at rated power, ΔR ±(0.5 percent + 0.0005 ohm). Power must be derated properly according to the appropriate derating curve.

Storage Temperature: -55°C to +150°C.

Connections and Measurement Note:
To achieve these specifications, connections (measurement contacts) must be made as follows. Four wire (Kelvin) connections, sense connections and separate current connections, shall be made to this device. As shown below, the crosshatch area of the metallization pads represents the area for the sense connection. Separate current connections may be made inside and/or outside of the crosshatch area. These sense and current connections are necessary for establishing the resistance value, tolerance and temperature coefficient.

Location for Sense (Potential) Connection:



SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

MP725 Surface Mount Power Film Resistors

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

D-Pak Style Surface Mount Power Package including Metal Tab - 0.020 Ohm to 1.00 Kohm

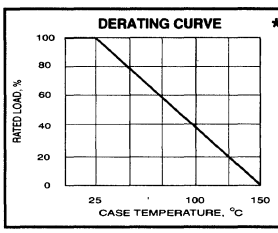
Use your thermal design experience with power semiconductors in D-Pak style power packages. This experience will help you get the most out of this unique family of surface mount power resistors. The thermal design issues are the same where power handling capability is based on the case temperature which is maintained in your design.

MP725 Surface Mount Power Film Resistors introduce our proven Micronox® resistance film system in the widely accepted D-Pak style surface mount power package. The non-inductive design makes this resistor ideal in high frequency communications, power switching circuits and snubbers.

The special performance features of our patented MP725 Surface Mount Power Film Resistors include:

- **D-Pak style power package for surface mount applications.**
- **Metal tab assists in post surface mount soldering inspection.**
- **Resistance values to 0.020 ohm for current sense applications.**
- **Non-Inductive Design.**
- **Up to 25 Watt power rating at +25°C case temperature.**
- **Resistor element is electrically isolated from the metal heat sink tab.**

Model No.	Power Rating	Dielect. Strength V_{RMS}AC	Max. Voltage	Resistance		Terminal
				Min.	Max.	
MP725	25 Watts *	1,500	200	0.020Ω	1.00K	Solderable



*** The case temperature is to be used for purposes of establishing the maximum applied power. See Derating Curve.** The case temperature measurement is made on the metal mounting tab against the molded body. Derate appropriately for the ambient temperature range, the thermal resistance of the mounting surface, and the temperature limitations of the adjacent materials (such as glass epoxy).

Derating (thermal resistance) is 0.200 W/°C (5.0°C/W).

Power dissipation is 2.5 watts, at an ambient temperature of 25°C, when mounted on a double sided copper board (2 ounce, G-10 or FR-4) 1 inch x 1 inch x .063 inch (thick).

Standard Resistance Values:

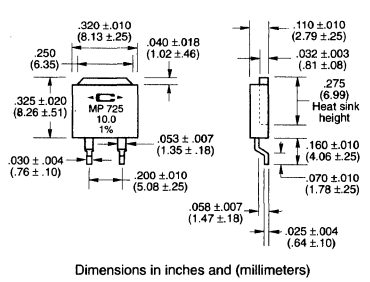
0.020 Ω	0.25 Ω	3.00 Ω	27.0 Ω	200 Ω
0.025 Ω	0.30 Ω	3.30 Ω	30.0 Ω	250 Ω
0.030 Ω	0.33 Ω	4.00 Ω	33.0 Ω	300 Ω
0.033 Ω	0.40 Ω	5.00 Ω	40.0 Ω	330 Ω
0.040 Ω	0.50 Ω	7.50 Ω	47.0 Ω	400 Ω
0.050 Ω	0.75 Ω	8.00 Ω	50.0 Ω	470 Ω
0.075 Ω	1.00 Ω	10.0 Ω	56.0 Ω	500 Ω
0.10 Ω	1.50 Ω	15.0 Ω	75.0 Ω	560 Ω
0.15 Ω	2.00 Ω	20.0 Ω	100 Ω	750 Ω
0.20 Ω	2.50 Ω	25.0 Ω	150 Ω	1.00K

Custom resistance values can be manufactured for high quantity applications. Please contact Caddock Applications Engineering.

Measurement Note:

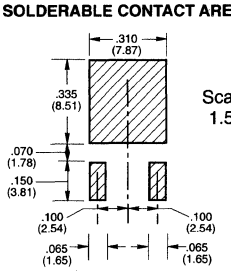
For the specifications, resistance measurement shall be made at the foot of surface mount formed terminal.

PACKAGE DIMENSIONS



Dimensions in inches and (millimeters)

FOOTPRINT FOR SOLDERABLE CONTACT AREA



Scale: 1.5X

Soldering Note: During surface mount soldering the soldering temperature profile must not cause the metal tab of this device to exceed 220°C.

Specification

Resistance Tolerance: ±1% for 0.050Ω up to 1.00KΩ, ±5% for 0.020Ω up to 0.049Ω (5% and 20% are available for most resistance values).

Temperature Coefficient:
TC referenced to +25°C, ΔR taken at +150°C
0.50 ohm and above, -20 to +80 ppm/°C
0.050 ohm to 0.49 ohm, 0 to +200 ppm/°C
0.020 ohm to 0.049 ohm, 0 to +300 ppm/°C

Thermal Shock: Mil-Std-202, Method 107, Cond. F, ΔR ±(0.5 percent + 0.0005 ohm) max.

Momentary Overload: 1.5 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds, ΔR ±(0.5 percent + 0.0005 ohm) max.

Load Life: 2,000 hours at rated power, ΔR ±(1.0 percent + 0.0005 ohm). Power rating dependent upon case temperature. See derating curve.

Moisture Resistance: Mil-Std-202, Method 106, ΔR ±(0.5 percent + 0.0005 ohm) max.

Shock: 100G, Mil-Std-202, Method 213, Cond. I, ΔR ±(0.4 percent + 0.0005 ohm) max.

Vibration, High Frequency: Mil-Std-202, Method 204, Cond. D, ΔR ±(0.4 percent + 0.0005 ohm) max.

Terminal Strength: Mil-Std-202, Method 211, Cond. A (Pull Test) 5 lbs., ΔR ±(0.2 percent + 0.0005 ohm) max.

Insulation Resistance: 10,000 Megohms, min. The resistor is electrically isolated from the metal tab.

DWV: The dielectric strength rating of 1500 V_{RMS}AC is based upon connections made between terminals shorted and either the metal surface the part is mounted to or a metal clip in contact with the top surface of the part.

Packaging Note:
Quantities of 250 pieces or greater, will be supplied in tape and reel packaging.

Ordering Information:

MP725 - 10.0 - 1.0%
Model Number: / **Resistor Value:** / **Tolerance**

Certain products shown in this catalog are covered by one or more patents, there are also patents pending.

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

MP900 Series Kool-Pak® Power Film Resistors

Low Cost Heat Sink Mountable Design with Non-Inductive Performance featuring an Exposed Ceramic Heat Dissipating Mounting Surface

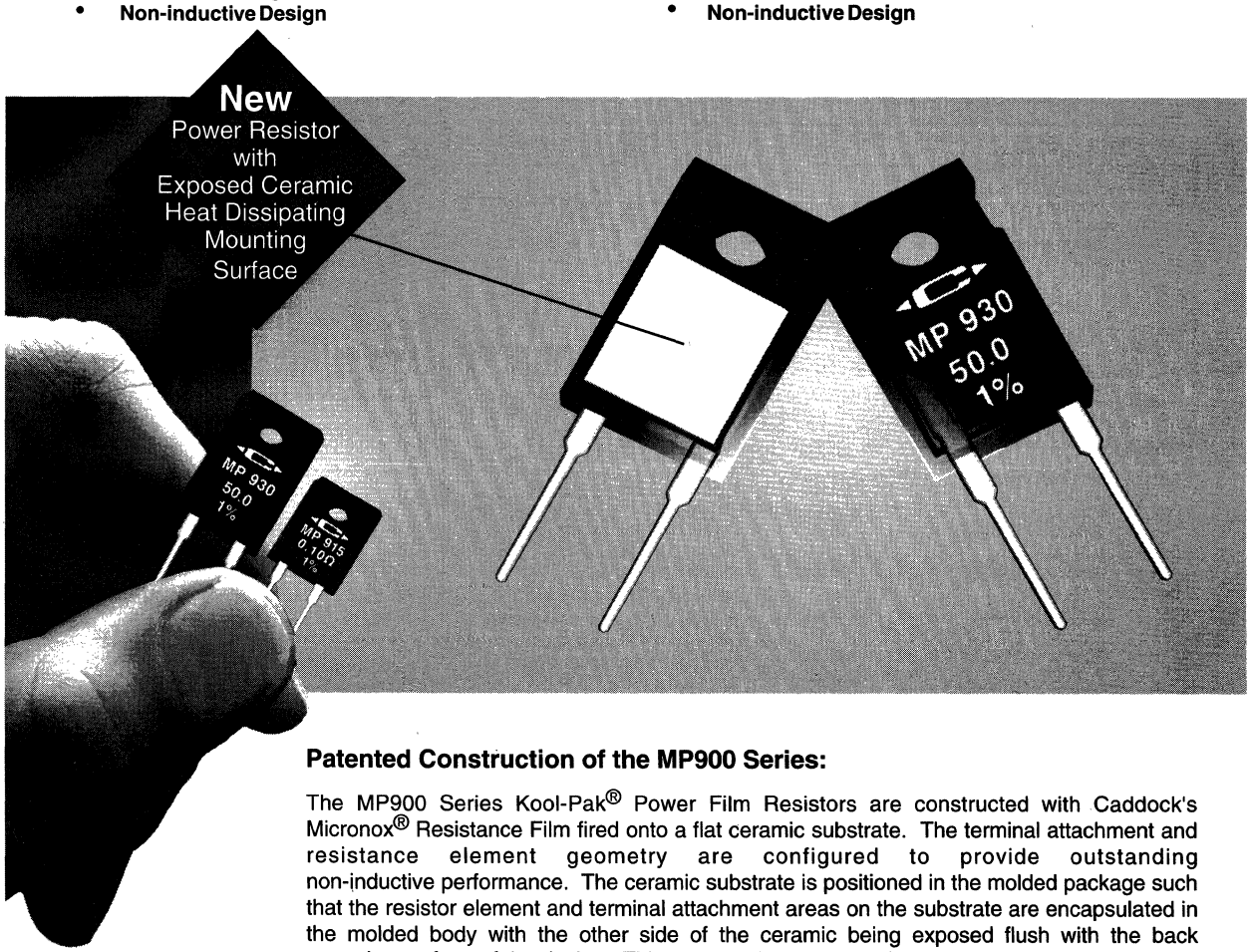
Use your thermal design experience with power semiconductors in the TO-126 and TO-220 style power packages. This experience will help you get the most out of this unique family of power resistors. The thermal design issues are the same where the power handling capability is based on the case temperature which is maintained in your design.

Model MP 915
TO-126 Style Power Package

- 15 Watts at +25°C Case Temperature derated to zero at +150°C
- Exposed Ceramic Heat Dissipating Mounting Surface
- Resistance Range of 0.020 ohm to 1K
- Non-inductive Design

Models MP 916, MP925 and MP930
TO-220 Style Power Package

- Up to 30 Watts at +25°C Case Temperature derated to zero at +150°C
- Exposed Ceramic Heat Dissipating Mounting Surface
- Resistance Range of 0.010 ohm to 100K
- Non-inductive Design



Patented Construction of the MP900 Series:

The MP900 Series Kool-Pak® Power Film Resistors are constructed with Caddock's Micronox® Resistance Film fired onto a flat ceramic substrate. The terminal attachment and resistance element geometry are configured to provide outstanding non-inductive performance. The ceramic substrate is positioned in the molded package such that the resistor element and terminal attachment areas on the substrate are encapsulated in the molded body with the other side of the ceramic being exposed flush with the back mounting surface of the device. This construction is covered by one or more issued patents, also patents pending.

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

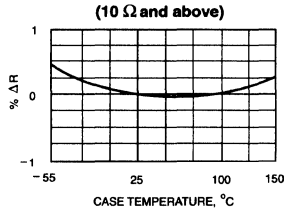
CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

MP900 Series Kool-Pak® Specifications and Dimensions

Model No.	Power Rating	Package	Dimensions	Dielect. Strength V_{RMS} AC	Max. Voltage	Resistance Min.	Resistance Max.	Terminal Material
MP915	15 Watts*	TO-126 Style	Figure 1	1,500	200	0.020Ω	1.00K	Solderable
MP916	16 Watts*	TO-220 Style	Figure 2	1,500	Power Limited	0.010Ω	0.019Ω	Solderable
MP925	25 Watts*	TO-220 Style	Figure 2	1,500	500	5.00K	100K	Solderable
MP930	30 Watts*	TO-220 Style	Figure 2	1,500	250	0.020Ω	4.99K	Solderable

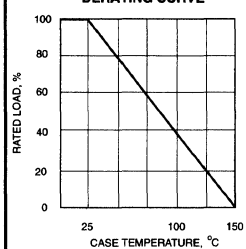
TYPICAL TEMPERATURE COEFFICIENT CURVE
(10 Ω and above)



Temperature Coefficient:
TC referenced to +25°C, ΔR taken at +150°C

0.50 ohm and above, -20 to +80 ppm/°C
0.050 ohm to 0.49 ohm, 0 to +200 ppm/°C
0.020 ohm to 0.049 ohm, 0 to +300 ppm/°C
0.010 ohm to 0.019 ohm, 0 to +500 ppm/°C

DERATING CURVE



* **The case temperature is to be used for purposes of establishing the maximum applied power. See Derating Curve.** The case temperature measurement is made with the thermocouple contacting the bottom insulated mounting surface of the package (center of bottom surface), the device mounted on a heat sink, thermal grease applied at a mounting torque of up to 8 in-lbs (0.90 N-m) maximum. **Without a heat sink, when in free air at +25°C, the MP915 is rated for 1.25 watts, the MP916, MP925 and MP930 are rated for 2.25 watts.**

Derating (thermal resistance) for each model is as follows:
MP915: 0.12 W/°C (8.33°C/W)
MP916: 0.13 W/°C (7.81°C/W)
MP925: 0.20 W/°C (5.00°C/W)
MP930: 0.24 W/°C (4.17°C/W)

Mounting Note: The MP Kool-Pak® Resistors should be mounted using a screw and compression washer mounting technique. This will provide sufficient pressure on the package over time and through large temperature variations to maintain the maximum power dissipation capability. Mounting torque to avoid package damage is 8 in-lbs. (0.90 N-m).

Figure 1
TO-126 Style
MP915

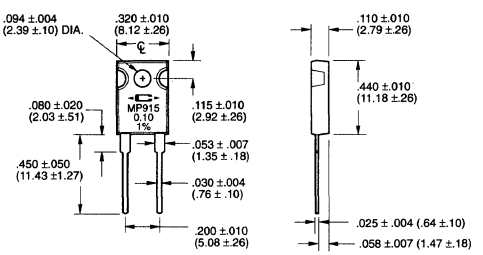
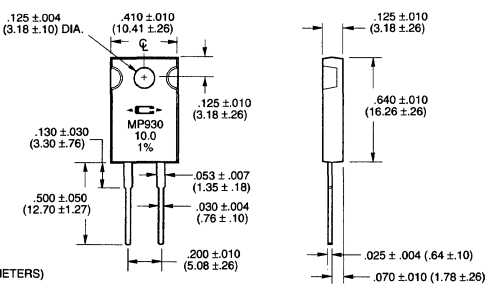


Figure 2
TO-220 Style
MP916, MP925
and MP930



DIMENSIONS IN INCHES AND (MILLIMETERS)

These products are covered by one or more patents, also patents pending.

Standard Resistance Values:

0.010 Ω	0.40 Ω	20.0 Ω	330 Ω	10.0K
0.015 Ω	0.50 Ω	25.0 Ω	400 Ω	15.0K
0.020 Ω	0.75 Ω	27.0 Ω	470 Ω	20.0K
0.025 Ω	1.00 Ω	30.0 Ω	500 Ω	25.0K
0.030 Ω	1.50 Ω	33.0 Ω	560 Ω	30.0K
0.033 Ω	2.00 Ω	40.0 Ω	750 Ω	33.0K
0.040 Ω	2.50 Ω	47.0 Ω	1.00K	40.0K
0.050 Ω	3.00 Ω	50.0 Ω	1.50K	47.0K
0.075 Ω	3.30 Ω	56.0 Ω	2.00K	50.0K
0.10 Ω	4.00 Ω	75.0 Ω	2.50K	56.0K
0.15 Ω	5.00 Ω	100 Ω	3.00K	68.0K
0.20 Ω	7.50 Ω	150 Ω	3.30K	75.0K
0.25 Ω	8.00 Ω	200 Ω	4.00K	82.0K
0.30 Ω	10.0 Ω	250 Ω	5.00K	100K
0.33 Ω	15.0 Ω	300 Ω	7.50K	

Custom resistance values can be manufactured for high quantity applications. Please contact Caddock Applications Engineering. Custom resistance values for low quantity applications should use Caddock MP 800 Series Power Film Resistors.

Specifications:

Resistance Tolerance: ±1% for 0.050Ω up to 100kΩ, ±5% for 0.010Ω up to 0.049Ω (5% and 20% are available for most resistance values).

Insulation Resistance: 10,000 Megohms, min. The resistor is electrically isolated from the mounting surface.

Terminal Strength: Mil-Std-202, Method 211, Cond. A (Pull Test) 5 lbs., ΔR ±(0.2 percent + 0.0005 ohm) max.

Thermal Shock: Mil-Std-202, Method 107, Cond. F, ΔR ±(0.5 percent + 0.0005 ohm) max.

Momentary Overload: 1.5 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds, ΔR ±(0.5 percent + 0.0005 ohm) max.

Moisture Resistance: Mil-Std-202, Method 106, ΔR ±(0.5 percent + 0.0005 ohm) max.

Load Life: 2,000 hours at rated power, ΔR ±(1.0 percent + 0.0005 ohm). Power rating dependent upon case temperature. See derating curve.

Shock: 100G, Mil-Std-202, Method 213, Cond. I, ΔR ±(0.4 percent + 0.0005 ohm) max.

Vibration, High Frequency: Mil-Std-202, Method 204, Cond. D, ΔR ±(0.4 percent + 0.0005 ohm) max.

DWV: The dielectric strength rating of 1500 V_{RMS}AC is based upon connections made between terminals shorted and either the metal surface the part is mounted to or a metal clip in contact with the top surface of the part.

Measurement Note: For these specifications, resistance measurement shall be made at a point 0.2 inch (5.08 mm) from the resistor body.

Ordering Information: MP900 series resistors are packaged in plastic shipping tubes, 50 pieces per tube. These resistors are available in a 50 piece minimum quantity and in full tube quantity increments (i.e. 50, 100, 150, etc.).

MP915 - 50.0 - 1%
Model Number: / **Resistor Value:** / **Tolerance**

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

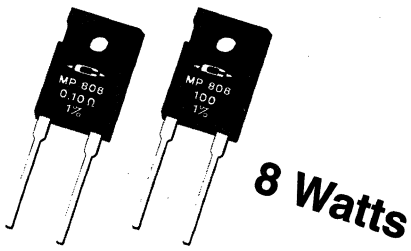
CADDOCK
HIGH PERFORMANCE FILM RESISTORS

MP808 and MP825 (TO-126 Style) MP816 and MP850 (TO-220 Style) Kool-Pak® Power Film Resistors

TO-126 and TO-220 Style Power Packages - Non-Inductive Designs

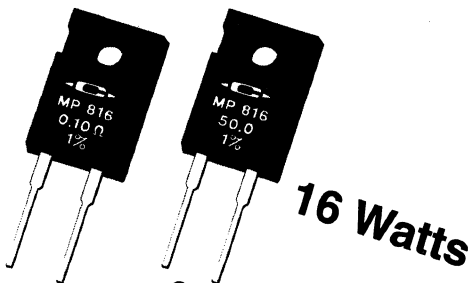
Use your thermal design experience with power semiconductors in the TO-220 and TO-126 style power package. This experience will help you get the most out of this unique family of power resistors. The thermal design issues are the same where power handling capability is based on the case temperature which is maintained in your design.

MP808 and MP816 with an All Molded Package Configuration



MP808 Kool-Pak® Power Resistors
TO-126 Style Power Package

- 8 Watts at +25°C Case Temperature derated to zero at +150°C
- Thermally Conductive Molded Package
- Lower Cost
- Resistance Range of 0.020 ohm to 10.0K
- Resistor element is electrically isolated from the mounting surface

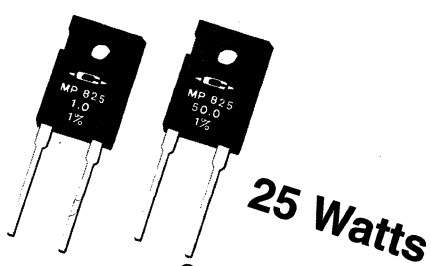


MP816 Kool-Pak® Power Resistors
TO-220 Style Power Package

- 16 Watts at +25°C Case Temperature derated to zero at +150°C
- Thermally Conductive Molded Package
- Lower Cost
- Resistance Range of 0.10 ohm to 10.0K
- Resistor element is electrically isolated from the mounting surface

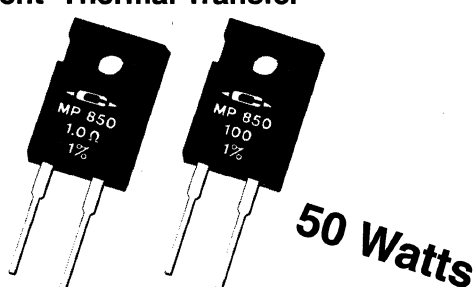
Construction of MP808 and MP816: The MP808 and MP816 Kool-Pak® Power Film Resistors are constructed with Caddock's Micronox® resistance film fired onto a flat ceramic substrate. The terminal attachment and resistance element geometry are configured to provide outstanding non-inductive performance. The resistor body is completely surrounded by a high thermal conductivity molding compound to finish this **cost effective power resistor package.**

MP825 and MP850 Power Packages Include an Integral Metal Mounting Surface for Highly Efficient Thermal Transfer



MP825 Kool-Pak® Power Resistors
TO-126 Style Power Package

- 25 Watts at +25°C Case Temperature derated to zero at +150°C
- Copper Heat Sink Integral in the Molded Package
- Resistance Range of 0.020 ohm to 10.0K
- Resistor element is electrically isolated from the mounting surface



MP850 Kool-Pak® Power Resistors
TO-220 Style Power Package

- 50 Watts at +25°C Case Temperature derated to zero at +150°C
- Copper Heat Sink Integral in the Molded Package
- Resistance Range of 0.20 ohm to 10.0K
- Resistor element is electrically isolated from the mounting surface

Construction of MP825 and MP850: The MP825 and MP850 Kool-Pak® Power Film Resistors are constructed with Caddock's Micronox® resistance film fired onto a flat ceramic substrate. The terminal attachment and resistance element geometry are configured to provide outstanding non-inductive performance. **The ceramic substrate is bonded to a copper heat sink which becomes the metal mounting surface.** This assembly is molded in a high thermal conductivity molding compound with the copper heat sink flush with the back surface of the part.

Certain products shown in this catalog are covered by one or more patents, there are also patents pending.

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

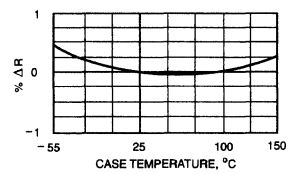
CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

Specifications and Dimensions

Model No.	Power Rating	Package	Dimensions	Dielect. Strength V_{RMS} AC	Max. Voltage	Resistance Min.	Resistance Max.	Terminal	Comments
MP808	8 Watts *	TO-126 Style	Figure 1	1,500	300	0.020 Ω	10.0 K	Solderable	All Molded Package
MP816	16 Watts*	TO-220 Style	Figure 2	1,500	300	0.10 Ω	10.0 K	Solderable	All Molded Package
MP825	25 Watts*	TO-126 Style	Figure 1	1,500	300	0.020 Ω	10.0 K	Solderable	Integral Metal Mounting Surface in Molded Package
MP850	50 Watts*	TO-220 Style	Figure 2	1,500	300	0.20 Ω	10.0 K	Solderable	Integral Metal Mounting Surface in Molded Package

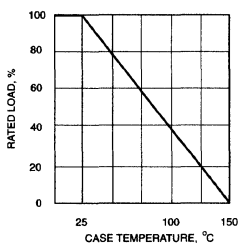
TYPICAL TEMPERATURE COEFFICIENT CURVE
(5 Ω and above)



Temperature Coefficient:
TC referenced to +25°C, ΔR taken at +150°C

5.00 ohms and above, -20 to +50 ppm/°C
0.50 ohm to 4.99 ohms, -20 to +80 ppm/°C
0.050 ohm to 0.49 ohm, 0 to +200 ppm/°C
0.020 ohm to 0.049 ohm, 0 to +300 ppm/°C

DERATING CURVE



*** The case temperature is to be used for purposes of establishing the maximum applied power. See Derating Curve.** The case temperature measurement is made with the thermocouple contacting the bottom insulated mounting surface of the package (center of bottom surface), the device mounted on a heat sink, thermal grease applied at a mounting torque of up to 8 in-lbs (0.90 N-m) maximum. **Without a heat sink, when in free air at +25°C, the MP808 and the MP825 are rated for 1.25 watts, the MP816 and the MP850 are rated for 2.25 watts.**

Derating (thermal resistance) for each model is as follows:
MP808: 0.064 W/°C (15.63°C/W)
MP816: 0.128 W/°C (7.81°C/W)
MP825: 0.200 W/°C (5.00°C/W)
MP850: 0.400 W/°C (2.50°C/W)

Mounting Note: The MP Kool-Pak® Resistors must be mounted using a screw and compression washer mounting technique. This will provide sufficient pressure on the package over time and through large temperature variations to maintain the maximum power dissipation capability. Mounting torque to avoid package damage is 8 in-lbs (0.90 N-m).

Figure 1
TO-126 Style
MP808, MP825

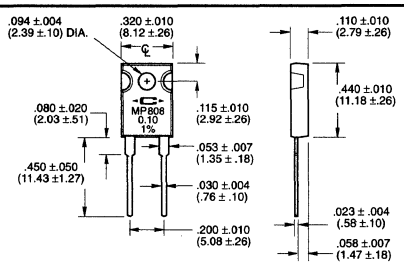
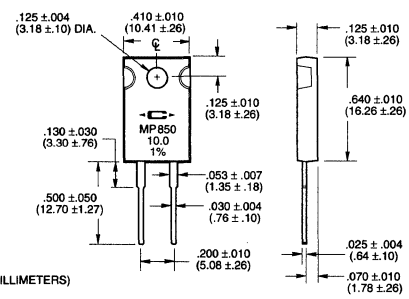


Figure 2
TO-220 Style
MP816, MP850



DIMENSIONS IN INCHES AND (MILLIMETERS)

Specifications:

ResistanceTolerance: ±1% for 0.050Ω up to10.0kΩ, ±5% for 0.020Ω up to 0.049Ω (0.5%, 2%,5%,10% and 20% are available for most resistance values).

Insulation Resistance: 10,000 Megohms, min. The resistor element is electrically isolated from the mounting surface.

Terminal Strength: Mil-Std-202, Method 211, Cond. A (Pull Test) 5 lbs.
MP808, MP816, MP825:
ΔR ±(0.2 percent + 0.001 ohm) max.
MP850:
ΔR ±(0.2 percent + 0.01 ohm) max.

Thermal Shock: Mil-Std-202, Method 107, Cond. F.
MP808, MP816, MP825:
ΔR ±(0.3 percent + 0.001 ohm) max.
MP850:
ΔR ±(0.3 percent + 0.01 ohm) max.

Momentary Overload:
MP816 and MP850: 2 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds.
MP816:
ΔR ±(0.3 percent + 0.001 ohm) max.
MP850:
ΔR ±(0.3 percent + 0.01 ohm) max.

MP808 and MP825: 1.5 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds.
MP808, MP825:
ΔR ±(0.3 percent + 0.001 ohm) max.

Moisture Resistance: Mil-Std-202, Method 106.
MP808, MP816, MP825:
ΔR ±(0.5 percent + 0.001 ohm) max.
MP850:
ΔR ±(0.5 percent + 0.01 ohm) max.

Load Life: 2,000 hours at rated power. Power rating dependent upon case temperature. See derating curve.
MP808, MP816, MP825:
ΔR ±(1.0 percent + 0.001 ohm) max.
MP850:
ΔR ±(1.0 percent + 0.01 ohm) max.

Shock: 100G, Mil-Std-202, Method 213, Cond. I.
MP808, MP816, MP825:
ΔR ±(0.2 percent + 0.001 ohm) max.
MP850:
ΔR ±(0.2 percent + 0.01 ohm) max.

Vibration, High Frequency: Mil-Std-202, Method 204, Cond. D.
MP808, MP816, MP825:
ΔR ±(0.2 percent + 0.001 ohm) max.
MP850:
ΔR ±(0.2 percent + 0.01 ohm) max.

Measurement Note: For these specifications, resistance measurement shall be made at a point 0.2 inch (5.08 mm) from the resistor body.

Ordering Information: MP816 - 50.0 - 1.0%
Model Number: MP816
Resistor Value: 50.0
Tolerance: 1.0%

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

MP820 and MP821 Kool-Tab® Power Film Resistors

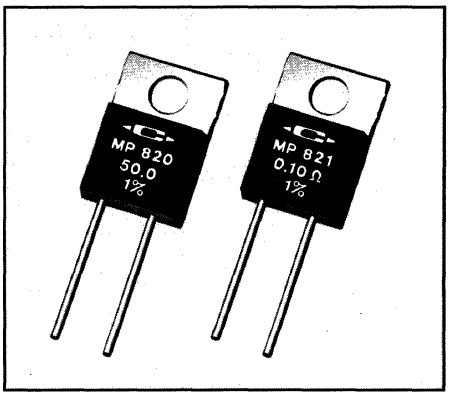
TO-220 Power Package with Metal Mounting Tab - 0.020 Ohm to 10.0 Kohm

Use your thermal design experience with power semiconductors in TO-220 style power packages. This experience will help you get the most out of this unique family of power resistors. The thermal design issues are the same where power handling capability is based on the case temperature which is maintained in your design.

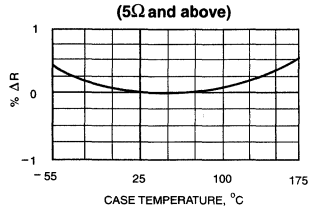
MP820/821 Kool-Tab® Power Film Resistors introduce our proven Micronox® resistance film system in the widely accepted TO-220 Power Package to provide a compact 20 watt heat sink mountable resistor. The non-inductive design makes this resistor ideal in high frequency communications, power switching circuits and snubbers.

The special performance features of the series MP 820/821 Kool-Tab® Power Film Resistors include:

- **Up to 20 Watt power rating at +25°C case temperature.**
- **Resistance values to 0.020 ohm for current sense applications.**
- **Non-Inductive Design.**
- Single screw mounting simplifies resistor attachment to the heat sink.
- Low profile provides an easier fit in tight places.
- A molded case for environmental protection.
- Resistor element is electrically isolated from the metal heat sink tab.



Model No.	Power Rating	Dielect. Strength V_{RMS} AC	Max. Voltage	Resistance		Leadwire
				Min.	Max.	
MP820	20 Watts *	1,500	300	10.0 Ω	10.0 K	Solderable
MP821	20 Watts *	1,500	Power Limited	0.020 Ω	9.99 Ω	Solderable



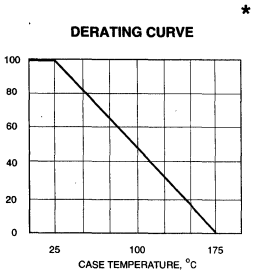
Temperature Coefficient:
TC referenced to +25°C, ΔR taken at +175°C

MP 820:
All resistance values, -20 to +50 ppm/°C

MP 821:
5.00 ohms to 9.99 ohms, -20 to +50 ppm/°C
0.50 ohm to 4.99 ohms, -20 to +80 ppm/°C
0.050 ohm to 0.49 ohm, 0 to +200 ppm/°C
0.020 ohm to 0.049 ohm, 0 to +300 ppm/°C

Non-Inductive Design

MP 820/821 Kool-Tab® Power Film Resistors are constructed with our Micronox® resistance film fired onto a flat substrate which is thermally bonded to the copper heat sink tab. The resistor body is then molded to finish the TO-220 package. The lead wire attachment and resistance element geometry are configured to provide outstanding non-inductive performance.



* **The case temperature is to be used for purposes of establishing the maximum applied power. See Derating Curve.** The case temperature measurement is made on the metal mounting tab against the molded body, the device mounted on a heat sink, with thermal grease applied at a mounting torque of 6 to 8 in-lbs. **Without a heat sink, when in free air at +25°C, the MP 820 / MP 821 is rated for 2.25 watts.**

Derating (thermal resistance) is 0.133 W/°C (7.50°C/W).

Mounting Note: The MP Kool-Tab® Resistors must be mounted using a screw and compression washer mounting technique. This will provide sufficient pressure on the package over time and through large temperature variations to maintain the maximum power dissipation capability. Maximum torque to be applied to mounting screw is 8 in-lbs.

Ordering Information:

MP820 - 50.0 - 1.0%
Model Number: MP820
Resistor Value: 50.0
Tolerance: 1.0%

Specifications:

Resistance Tolerance: ±1% (0.5%, 2%, 5%, 10% and 20% are available for most resistance values).

Insulation Resistance: 10,000 Megohms, min. Resitor element is electrically isolated from the mounting surface.

Terminal Strength: Mil-Std-202, Method 211, Cond. A (Pull Test) 5 lbs., ΔR ±(0.2 percent + 0.001 ohm) max.

Thermal Shock: Mil-Std-202, Method 107, Cond. F, ΔR ±(0.3 percent + 0.001 ohm) max.

Momentary Overload: 2 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds, ΔR ±(0.3 percent + 0.001 ohm) max.

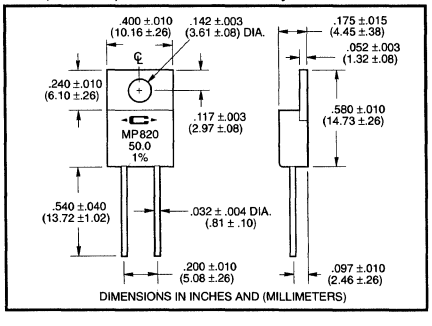
Moisture Resistance: Mil-Std-202, Method 106, ΔR ±(0.5 percent + 0.001 ohm) max.

Load Life: 2,000 hours at rated power, ΔR ±(1.0 percent + 0.001 ohm). Power rating dependent upon case temperature. See derating curve.

Shock: 100G, Mil-Std-202, Method 213, Cond. I, ΔR ±(0.2 percent + 0.001 ohm) max.

Vibration, High Frequency: Mil-Std-202, Method 204, Cond. D, ΔR ±(0.2 percent + 0.001 ohm) max.

Measurement Note: For these specifications, resistance measurement shall be made at a point 0.2 inch (5.08 mm) from the resistor body.



SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

Type SR Precision Current Sense Resistors

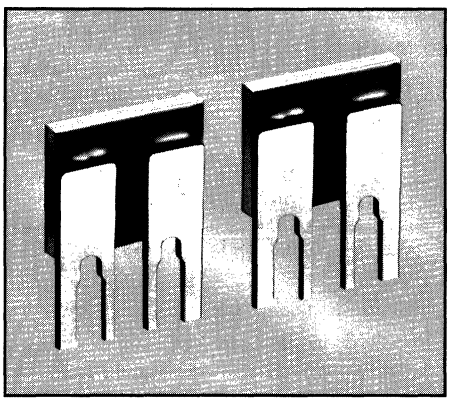
CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Non-Inductive Design - Compact Footprint Minimizes Circuit Board Space
Kelvin Terminals (Four Wire) - Resistance Values 0.008Ω to 1.00Ω

Type SR Current Sense Resistors utilize Caddock's Micronox resistance films to achieve a low cost resistor with Non-Inductive Performance. This compact construction makes this sense resistor ideal for many current monitoring or control applications.

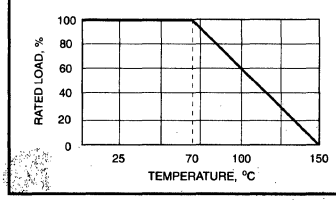
The special performance features of these Type SR Current Sense Resistors include:

- Available in Standard Resistances down to 8 milliohm
- Non-Inductive Design
- Terminals are constructed for Kelvin connections to the circuit board
- Compact footprint



Model No.	Power Rating at 70°C *	Voltage Rating	Terminal Material
SR10	1.0 Watt	Power Limited	Solderable

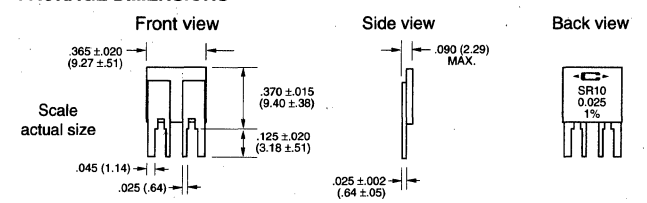
POWER DERATING CURVE



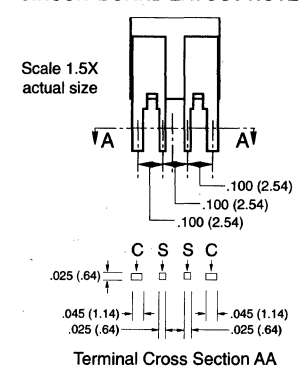
*** Power rating**

The power rating should be limited as shown by the derating curve based upon the maximum ambient temperature. The derating curve is based on still air with natural convection around the resistor.

PACKAGE DIMENSIONS



CIRCUIT BOARD LAYOUT NOTES



Terminal Cross Section AA

DIMENSIONS IN INCHES AND (MILLIMETERS)

Measurement note:

For purposes of these specifications resistance measurement shall be made using Kelvin connections (four wire) with appropriate current and sense connections to the device terminals.

C = Current connection
S = Sense connection

Circuit Board Layout:

The circuit board traces connecting to the current terminals must be sized appropriately for the current flowing through the trace. For example; 0.008Ω operated at 1.5 watts would have 13.7 amps flowing through the circuit board traces into the current terminals.

Standard Resistance Values:

0.008Ω	0.030Ω	0.100Ω	0.750Ω
0.010Ω	0.033Ω	0.200Ω	1.00Ω
0.015Ω	0.040Ω	0.250Ω	
0.020Ω	0.050Ω	0.400Ω	
0.025Ω	0.075Ω	0.500Ω	

Custom resistance values can be manufactured for high quantity applications. Please contact Caddock Applications Engineering.

Specifications:

Resistance Tolerance: ±1.0%

Temperature Coefficient: TC referenced to 25°C, ΔR taken at -15°C and +105°C.

0.081 to 1.00 ohm	-50 to +100 ppm/°C
0.025 to 0.080 ohm	0 to +150 ppm/°C
0.008 to 0.024 ohm	0 to +200 ppm/°C

Load Life: 1000 hours at rated power at +70°C ΔR 0.2% max.

Thermal Shock: Mil-Std-202, Method 107, Cond. A, ΔR 0.2 percent max.

Moisture Resistance: Mil-Std-202, Method 106, ΔR 0.2% max.

Encapsulation: Polymer over resistance element.

Ordering Information:

SR10 - 0.050 - 1%
Model Number: — **Resistor Value:** — **Tolerance**

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Type MS Power Film Resistors

Power Film Resistor Family with Wide Resistance Range and +275°C Maximum Temperature

With power ratings to 15 watts and voltage ratings as high as 6,000 volts in an axial-lead resistor with values to 30 Megohms, the Type MS Power Film Resistors deliver the performance capabilities that can simplify circuit design and reduce equipment cost and complexity.

Type MS Power Film Resistors provide all these features in a single resistor:

- Full power and voltage ratings, without derating:
  - for non-inductive performance.
  - for high resistance values that extend the critical resistance value up to 10 times.
- Higher voltage ratings without the limitations of minimum wire size and spacing.
- Excellent long-term stability.
  Tests demonstrate typical stability of 0.05% per 1,000 hours over extended life.

Micronox® Resistance Films

Type MS performance begins with Caddock's Micronox® resistance films. Produced exclusively by Caddock Electronics, these proven complex oxide films have been used reliably for over 30 years in Caddock's precision power resistor products.

Micronox® resistance films are fired directly onto a ceramic core at temperatures above 1400°F. These resistance films have demonstrated outstanding stability when exposed to a high ambient temperature, thermal shock and high power densities.

This unique approach to precision power resistors opens new design possibilities by providing a wider resistance range, precise temperature characteristics, and higher temperature and power handling capability.

The Serpentine Pattern used in this Patented Product contain features which Enhances High Stability and High-Power Resistor Applications.

Most models are manufactured with Caddock's Non-Inductive serpentine resistive pattern that provides for neighboring lines to carry current in opposite directions, thereby achieving maximum cancellation of flux fields over the entire length of the resistor. This efficient non-inductive construction is accomplished without derating of any performance advantages.

The result is a truly non-inductive resistor that is about as inductive as a straight piece of wire the length of the resistor body. This efficient design means faster settling times and minimum distortion in all types of high frequency circuits.

Carefully Controlled Manufacturing and Test Procedures Assure Compliance with Strict Quality Control Requirements.

Manufacturing Control

Type MS Resistors are produced under intensive manufacturing controls with processes which include power conditioning, overvoltage conditioning and maximum temperature conditioning.

Quality Control

From the certification and testing of all materials, to the supervision of manufacturing processes, all Caddock Type MS Power Film Resistors are produced under procedures that have been approved for conformance to the requirements of Mil-I-45208 in many recent surveys as described on page 8.

Reliability Verification

Type MS resistors are included in the Caddock Reliability Testing Program. Conformance to specification parameters including Extended Life, Shock, Vibration and Humidity are verified on a periodic basis. Data from Type MS resistors can be compared by similarity to other Caddock resistor types, since Type ML, MM, MS, MP, MG and MK represent an identical combination of materials - aluminum oxide substrate, Micronox® resistance film and silicone insulating coating.

Certain products shown in this catalog are covered by one or more patents, there are also patents pending.

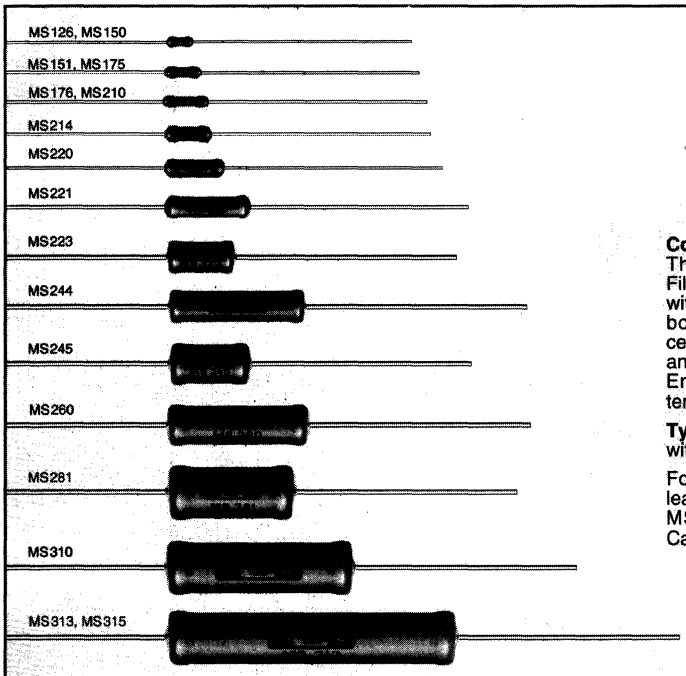
SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

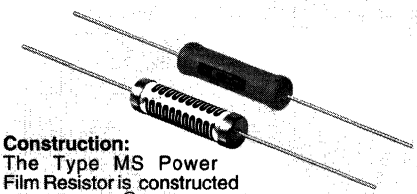
CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

Type MS Power Film Resistors

CADDOCK
HIGH PERFORMANCE FILM RESISTORS





Construction:
The Type MS Power Film Resistor is constructed with Micronox® resistance films bonded to a high strength solid ceramic core. Nickel alloy end caps and axial leads complete the assembly. Encapsulation is provided by a high temperature silicone conformal coating.

Type MS: Lead material is Nickel Clad Copper with thin Gold Plate, solderable.

For welding applications optional pure nickel leads are available on Models MS126, MS150, MS151, MS175, MS176, MS210. Contact Caddock Applications Engineering.

Model No.	Wattage at +25°C	Wattage at +125°C	Max. Voltage	Dielect. Strength	Resistance Min.	Resistance Max.	Dimensions in inches and (millimeters) A	B	C
MS126	.25	.25	200	500	20 Ω	1 Meg	.188 ±.020 (4.78 ±.51)	.070 ±.015 (1.78 ±.38)	.020 ±.002 (.51 ±.05)
MS150	.50	.30	*	500	20 Ω	2 K	.188 ±.020 (4.78 ±.51)	.070 ±.015 (1.78 ±.38)	.020 ±.002 (.51 ±.05)
MS151	.50	.50	300	750	20 Ω	2 Meg	.250 ±.020 (6.35 ±.51)	.094 ±.015 (2.39 ±.38)	.025 ±.002 (.64 ±.05)
MS175	.75	.45	*	750	20 Ω	2 K	.250 ±.020 (6.35 ±.51)	.094 ±.015 (2.39 ±.38)	.025 ±.002 (.64 ±.05)
MS176	.75	.75	500	750	45 Ω	5 Meg	.313 ±.020 (7.95 ±.51)	.094 ±.015 (2.39 ±.38)	.025 ±.002 (.64 ±.05)
MS210	1.0	.60	*	750	45 Ω	3 K	.313 ±.020 (7.95 ±.51)	.094 ±.015 (2.39 ±.38)	.025 ±.002 (.64 ±.05)
MS214	1.0	.60	500	750	45 Ω	5 Meg	.313 ±.030 (7.95 ±.76)	.109 ±.025 (2.77 ±.64)	.025 ±.002 (.64 ±.05)
MS220	2.0	1.2	1,000	800	20 Ω	10 Meg	.400 ±.060 (10.16 ±1.52)	.140 ±.030 (3.56 ±.76)	.025 ±.002 (.64 ±.05)
MS221	3.0	1.8	1,000	800	45 Ω	10 Meg	.575 ±.050 (14.61 ±1.27)	.165 ±.030 (4.19 ±.76)	.032 ±.002 (.81 ±.05)
MS223	3.0	1.8	800	1,000	20 Ω	4 Meg	.480 ±.060 (12.19 ±1.52)	.230 ±.030 (5.84 ±.76)	.040 ±.002 (1.02 ±.05)
MS244	4.0	2.4	2,000	1,000	45 Ω	15 Meg	.950 ±.060 (24.13 ±1.52)	.230 ±.030 (5.84 ±.76)	.040 ±.002 (1.02 ±.05)
MS245	4.0	2.4	800	1,000	20 Ω	6 Meg	.570 ±.060 (14.48 ±1.52)	.300 ±.030 (7.62 ±.76)	.040 ±.002 (1.02 ±.05)
MS260	6.0	3.6	2,000	1,000	45 Ω	15 Meg	.970 ±.060 (24.64 ±1.52)	.300 ±.030 (7.62 ±.76)	.040 ±.002 (1.02 ±.05)
MS281	8.0	4.8	2,000	1,000	45 Ω	8 Meg	.910 ±.060 (23.11 ±1.52)	.350 ±.040 (8.89 ±1.02)	.040 ±.002 (1.02 ±.05)
MS310	10.0	6.0	4,500	1,000	45 Ω	20 Meg	1.250 ±.070 (31.75 ±1.78)	.350 ±.040 (8.89 ±1.02)	.040 ±.002 (1.02 ±.05)
MS313	12.5	7.5	6,000	1,000	50 Ω	30 Meg	2.000 ±.080 (50.80 ±2.03)	.350 ±.040 (8.89 ±1.02)	.040 ±.002 (1.02 ±.05)
MS315	15.0	9.0	*	1,000	50 Ω	1 Meg	2.000 ±.080 (50.80 ±2.03)	.350 ±.040 (8.89 ±1.02)	.040 ±.002 (1.02 ±.05)

* Limited by power rating.
Models with low inductance construction are in shaded areas.
Models with Caddock's Non-Inductive Resistance Pattern are in non-shaded areas.

Ordering Information: MS220 -100K - 1%
Model Number: MS220
Resistor Value: 100K
Tolerance: 1%

Specifications:

Resistance Tolerance: ±1% (tolerances to 0.1% on special order).

Temperature Coefficient: ±50 ppm/°C. TC referenced to +25°C, ΔR taken at -15°C and +105°C.

Insulation Resistance: 10,000 Megohms, min.

Overload/Overvoltage: 5 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds. ΔR 0.5% max. or 0.5 ohm max., whichever is greater.

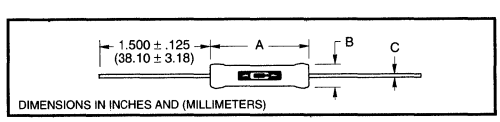
Thermal Shock: Mil-Std-202, Method 107, Cond. C, ΔR 0.5% max. or 0.5 ohm max., whichever is greater.

Moisture Resistance: Mil-Std-202, Method 106, ΔR 0.5% max. or 0.5 ohm max., whichever is greater.

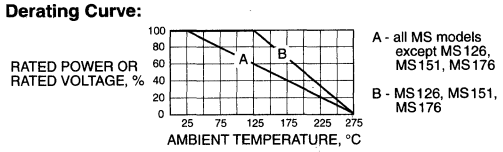
Load Life: 1,000 hours at rated power at +25°C or +125°C (see derating curve), not to exceed rated voltage, ΔR 0.5% max. or 0.5 ohm max., whichever is greater.

Maximum Operating Temperature: +275°C.

Encapsulation: High Temperature Silicone Conformal.



Derating Curve:



SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

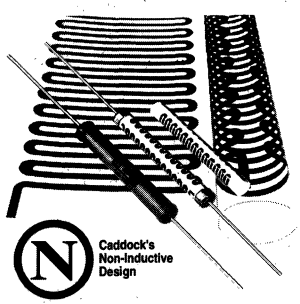
CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Type MM and ML Precision Film Resistors

High Temperature Resistors for Geophysical, Aerospace and Industrial Requirements

Type MM and ML resistors have a proven performance history in industrial, computer, military and space applications. Utilizing our proven Micronox® resistance films, these resistors are available with power ratings up to 3 watts and resistance values to 15 Megohms. These resistors are ideal for applications requiring tolerances as close as 0.1% and extended life stability of 0.1% per 1,000 hours.

Most models of Type MM and ML resistors are manufactured with Caddock's Non-Inductive Design that provides for neighboring lines to carry current in opposite directions. This efficient non-inductive construction is accomplished without derating of any performance advantages.

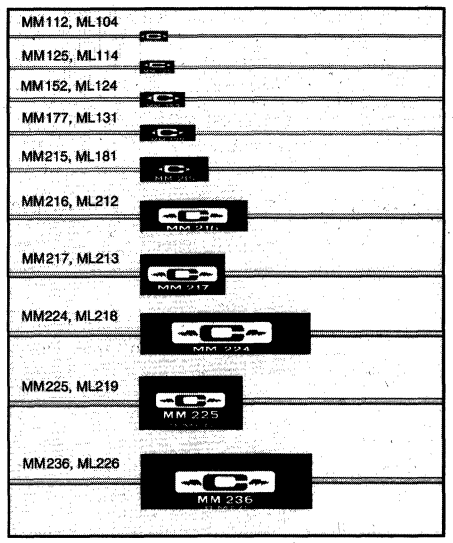


Type MM features:

- Max. Operating Temperature to +275°C.
- High Power Rating at +125°C.
- TC of 50 ppm/°C from -15°C to +105°C.
- Non-Inductive Performance Available.

Type ML features:

- Non-Inductive performance at a low cost.
- TC of 50 ppm/°C from -15°C to +105°C.



Model No.	Watt-age	Max. Voltage	Oper. Temp. (Max.)	Dielect. Strength	Resistance		Dimensions in inches and (millimeters)		
					Min.	Max.	A	B	C
MM112	.12	200	275°C	400	45 Ω	500 K	.160 ±.010 (4.06 ±.26)	.065 ±.010 (1.65 ±.26)	.016 ±.002 (.41 ±.05)
MM125	.25	200	275°C	500	30 Ω	1 Meg	.188 ±.020 (4.78 ±.51)	.070 ±.015 (1.78 ±.38)	.020 ±.002 (.51 ±.05)
MM152	.4	300	275°C	750	30 Ω	2 Meg	.250 ±.020 (6.35 ±.51)	.094 ±.006 (2.39 ±.15)	.025 ±.002 (.64 ±.05)
MM177	.6	500	275°C	750	45 Ω	5 Meg	.313 ±.020 (7.95 ±.51)	.094 ±.006 (2.39 ±.15)	.025 ±.002 (.64 ±.05)
MM215	1.0	800	275°C	1,000	45 Ω	10 Meg	.400 ±.020 (10.16 ±.51)	.150 ±.010 (3.81 ±.26)	.025 ±.002 (.64 ±.05)
MM216	1.5	1,000	275°C	1,000	45 Ω	10 Meg	.625 ±.030 (15.88 ±.76)	.190 ±.020 (4.83 ±.51)	.032 ±.002 (.81 ±.05)
MM217	1.5	800	275°C	1,500	30 Ω	4 Meg	.500 ±.030 (12.70 ±.76)	.250 ±.020 (6.35 ±.51)	.040 ±.002 (1.02 ±.05)
MM224	2.0	2,000	275°C	1,500	45 Ω	15 Meg	1.000 ±.030 (25.40 ±.76)	.250 ±.020 (6.35 ±.51)	.040 ±.002 (1.02 ±.05)
MM225	2.0	800	275°C	2,000	30 Ω	6 Meg	.600 ±.030 (15.24 ±.76)	.330 ±.020 (8.38 ±.51)	.040 ±.002 (1.02 ±.05)
MM236	3.0	2,000	275°C	2,000	45 Ω	15 Meg	1.000 ±.030 (25.40 ±.76)	.330 ±.020 (8.38 ±.51)	.040 ±.002 (1.02 ±.05)
ML104	.08	200	175°C	400	50 Ω	300 K	.160 ±.010 (4.06 ±.26)	.065 ±.010 (1.65 ±.26)	.016 ±.002 (.41 ±.05)
ML114	.15	200	175°C	500	50 Ω	500 K	.188 ±.020 (4.78 ±.51)	.070 ±.015 (1.78 ±.38)	.020 ±.002 (.51 ±.05)
ML124	.25	300	175°C	750	50 Ω	600 K	.250 ±.020 (6.35 ±.51)	.094 ±.006 (2.39 ±.15)	.025 ±.002 (.64 ±.05)
ML131	.4	500	175°C	750	50 Ω	1 Meg	.313 ±.020 (7.95 ±.51)	.094 ±.006 (2.39 ±.15)	.025 ±.002 (.64 ±.05)
ML181	.6	600	175°C	750	50 Ω	5 Meg	.400 ±.020 (10.16 ±.51)	.150 ±.010 (3.81 ±.26)	.025 ±.002 (.64 ±.05)
ML212	1.0	1,000	175°C	1,000	45 Ω	10 Meg	.625 ±.030 (15.88 ±.76)	.190 ±.020 (4.83 ±.51)	.032 ±.002 (.81 ±.05)
ML213	1.0	800	175°C	1,500	30 Ω	4 Meg	.500 ±.030 (12.70 ±.76)	.250 ±.020 (6.35 ±.51)	.040 ±.002 (1.02 ±.05)
ML218	1.25	2,000	175°C	1,500	45 Ω	15 Meg	1.000 ±.030 (25.40 ±.76)	.250 ±.020 (6.35 ±.51)	.040 ±.002 (1.02 ±.05)
ML219	1.25	800	175°C	2,000	30 Ω	6 Meg	.600 ±.030 (15.24 ±.76)	.330 ±.020 (8.38 ±.51)	.040 ±.002 (1.02 ±.05)
ML226	2.0	2,000	175°C	2,000	45 Ω	15 Meg	1.000 ±.030 (25.40 ±.76)	.330 ±.020 (8.38 ±.51)	.040 ±.002 (1.02 ±.05)

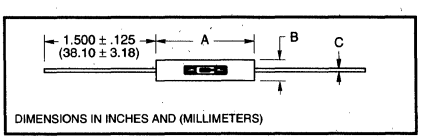
Models with low inductance construction are in shaded areas.
Models with Caddock's Non-Inductive Resistance Pattern are in non-shaded areas.

Ordering Information:

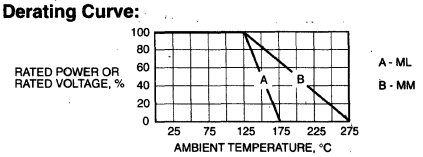
ML124 - 20K - 1%
Model Number: ML124
Resistor Value: 20K
Tolerance: 1%

Specifications:

Resistance Tolerance: ±1% (tolerances to 0.1% on special order).
Temperature Coefficient: 50 ppm/°C referenced to +25°C, ΔR taken at -15°C and +105°C.
Insulation Resistance: 10,000 Megohms, min.
Overload/Overvoltage: 5 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds, ΔR 0.5% max. or 0.5 ohm max., whichever is greater.
Thermal Shock: Mil-Std-202, Method 107, Cond. F, ΔR 0.2% max. or 0.5 ohm max., whichever is greater.
Moisture Resistance: Mil-Std-202, Method 106, ΔR 0.5% max. or 0.5 ohm max., whichever is greater.
Loadlife: 1,000 hours at +125°C at rated power, not to exceed rated voltage, ΔR 0.5% max. or 0.5 ohm max., whichever is greater.
Solderable leads
Encapsulation: Transfer Molded.



Derating Curve:



SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

Type THV Precision High Voltage Divider Networks

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

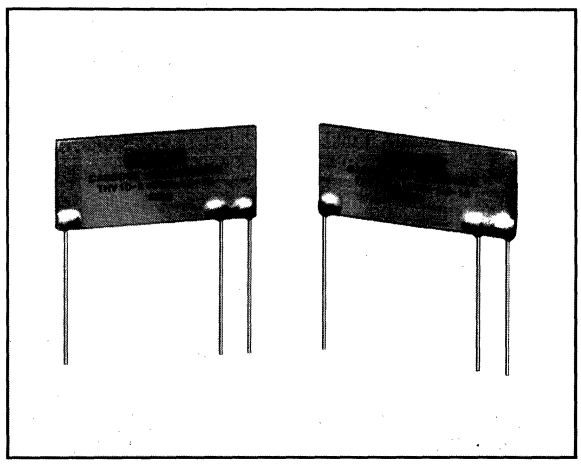
Ratio TC to 10 ppm/°C, Ratio Tolerance to ±0.25%, Voltage Ratings of 10 KV, 15 KV or 20 KVDC

The Type THV Precision High Voltage Divider Networks introduce Caddock's advanced high voltage resistor technology which doubles the allowable working voltage over the length of the high voltage section. This technology combines Caddock's Tetrinox® resistance films with a patented laser-generated V-Notch Geometry which optimizes the voltage gradient over the length of the resistance pattern.

Type THV networks provide tighter ratio temperature coefficients and tighter ratio tolerances than have previously been available in standard high voltage divider products.

- Ratio Temperature Coefficients of 10 ppm/°C or 25 ppm/°C from -55°C to +125°C.
- Ratio Tolerances of ±0.25%, ±0.5%, ±1.0% or ±2.0% at Rated Voltage.
- Voltage Ratings of 10 KVDC, 15 KVDC or 20 KVDC at +125°C.
- Standard Voltage Division Ratios of 1,000:1 or 100:1, with custom ratios available.

These specifications can provide important improvements in performance in many types of advanced electronic systems, including TWT power supplies, radar systems, X-ray systems, analytical equipment and high resolution CRT displays.



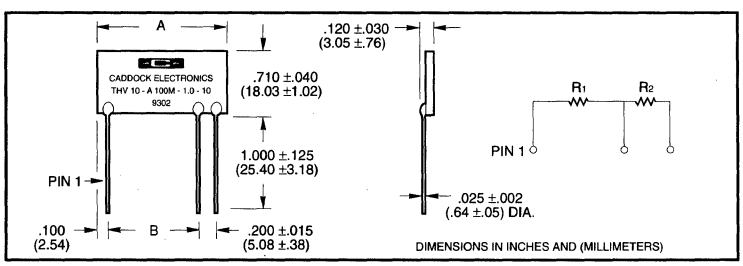
For complete information on price and delivery of both evaluation and production quantities, contact our Sales Office.

Standard Type THV Precision High Voltage Divider Networks

Model No.	Voltage Rating	Ratio Code Letter	Voltage Division	Resistance			Dimensions inches (mm)	
				R_1	R_2	Total	A	B
THV10	10 KVDC	A	1,000:1	99.9 Meg	100 K	100 Meg	1.500 ±.030 (38.10 ±.76)	1.100 ±.015 (27.94 ±.38)
		B	100:1	99 Meg	1 Meg	100 Meg		
THV15	15 KVDC	A	1,000:1	149.85 Meg	150 K	150 Meg	2.050 ±.030 (52.07 ±.76)	1.650 ±.015 (41.91 ±.38)
		B	100:1	148.5 Meg	1.5 Meg	150 Meg		
THV20	20 KVDC	A	1,000:1	199.8 Meg	200 K	200 Meg	2.600 ±.030 (66.04 ±.76)	2.200 ±.015 (55.88 ±.38)
		B	100:1	198 Meg	2 Meg	200 Meg		

Ordering Information: THV10 - A 100M - 1.0 - 10

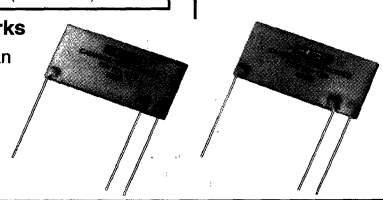
- Model Number: THV10
- Ratio Code Letter: A
- Total Resistance Value of the Divider: 100M
- Ratio Temperature Coefficient from -55°C to +125°C: -25 = 25 ppm/°C, -10 = 10 ppm/°C
- Standard Ratio Tolerance at Rated Voltage: -2.0 = 2.0%, -1.0 = 1.0%, -0.5 = 0.5%, -0.25 = 0.25%



Custom Type THV Precision High Voltage Divider Networks

Custom Type THV Precision High Voltage Divider Networks can be produced with a broad range of resistance values, voltage ratios, voltage ratings, ratio tolerances and ratio temperature coefficients.

Contact our Applications Engineering about your custom high voltage divider requirement.



Specifications:

Ratio Tolerance: See ordering information.

Absolute Tolerance: ±1.0% for all resistors.

Ratio Temperature Coefficient: See ordering information.

Absolute Temperature Coefficient: 30 ppm/°C. Referenced to +25°C, ΔR taken at -55°C and +125°C.

Voltage Rating: Rated voltage applied to R_1 and R_2 in series.

Load Life: Ratio change with rated voltage applied for 1,000 hours at +125°C, 0.4% max.

Overvoltage: 1.5 times rated voltage for 5 seconds, ratio change 0.5% max.

Thermal Shock: Mil-Std-202, Method 107, Cond. C, ratio change 0.25% max.

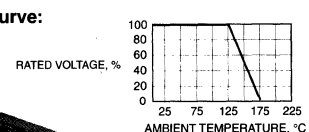
Moisture Resistance: Mil-Std-202, Method 106, ratio change 0.5% max.

Solderable Leads

Encapsulation: High Temperature Silicone Conformal with Dielectric Withstanding Voltage of 750 volts.

Insulation Resistance: 10,000 Megohms, min.

Derating Curve:



SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Type MG Precision High Voltage Resistors

Now with Extended Resistance Range to 10,000 Megohms and Additional Models

Temperature Coefficient as tight as 80 ppm/°C, Combined with Excellent Long-Term Stability, and Precision Tolerances.

Caddock's Micronox® resistance films are the source of the Type MG Precision High Voltage Resistors' outstanding combination of performance features:

- Single-resistor values as high as 10,000 Megohms.
- Maximum continuous operating voltages as high as 48,000 volts ("-15" Ratings).
- Overvoltage capabilities of 150% of standard working voltages for all models and values, (except "-15" ratings).
- Resistance Tolerances from ±1.0% to ±0.1%.
- Temperature Coefficient, for standard resistance range, of 80 ppm/°C in combination with resistance tolerances as tight as ±0.1%.
- Typical extended life stability of 0.02% per 1,000 hours for standard resistance range as demonstrated by reliability testing.

This exceptional performance has been proven through many years of use in equipment that demands the highest reliability and stability, including TWT amplifiers, X-ray systems, geophysical instruments and medical electronics.

Preconditioning for Power and Voltage Ratings

All power ratings and maximum operating voltage ratings are for continuous duty. These ratings are based on pre-stress voltage levels applied during the manufacturing process to provide for stable resistor performance even under momentary overload conditions.

Maximum operating voltages 60% higher than the values listed in the table may be specified by adding "-15" to the model number (Example: MG750-15). Note that overload and overvoltage ratings do not apply to the "-15" resistors. Resistance ranges for "-15" resistors shown in the table are from "-15 Min." to "Standard Max."

Non-Inductive Performance

Most models are manufactured with Caddock's Non-Inductive Design which uses a serpentine resistive pattern that provides for neighboring lines to carry current in opposite directions, thereby achieving maximum cancellation of flux fields over the entire length of the resistor. This efficient non-inductive construction is accomplished without derating of any performance advantages.

Model No.	Wattage	Max. Continuous Oper. Volt.	Dielect. Strength	Resistance				Dimensions in inches and (millimeters)		
				Min.	-15 Min.	Standard Max.	Extended Max.	A	B	C
MG650	.5	600	750	200 Ω	N/A	5 Meg	N/A	.313 ±.020 (7.95 ±.51)	.094 ±.015 (2.39 ±.38)	.025 ±.002 (.64 ±.05)
MG665	.5	600	750	200 Ω	N/A	8 Meg	N/A	.313 ±.030 (7.95 ±.76)	.109 ±.015 (2.77 ±.38)	.025 ±.002 (.64 ±.05)
MG660	.6	1,000	750	400 Ω	N/A	10 Meg	N/A	.500 ±.030 (12.70 ±.76)	.094 ±.015 (2.39 ±.38)	.025 ±.002 (.64 ±.05)
MG680	.8	2,000	750	600 Ω	N/A	20 Meg	N/A	.750 ±.030 (19.05 ±.76)	.094 ±.015 (2.39 ±.38)	.025 ±.002 (.64 ±.05)
MG710	1.0	4,000	750	800 Ω	N/A	50 Meg	N/A	1.000 ±.040 (25.40 ±1.02)	.094 ±.015 (2.39 ±.38)	.025 ±.002 (.64 ±.05)
MG712	.6	1,000	750	800 Ω	N/A	20 Meg	N/A	.400 ±.060 (10.16 ±.152)	.140 ±.030 (3.56 ±.76)	.025 ±.002 (.64 ±.05)
MG714	1.0	1,000	750	200 Ω	6.5 Meg	20 Meg	N/A	.562 ±.060 (14.27 ±1.52)	.150 ±.030 (3.81 ±.76)	.032 ±.002 (.81 ±.05)
MG715	1.0	2,000	750	400 Ω	26 Meg	50 Meg	N/A	.750 ±.060 (19.05 ±1.52)	.140 ±.030 (3.56 ±.76)	.025 ±.002 (.64 ±.05)
MG716	1.5	4,000	750	600 Ω	70 Meg	75 Meg	N/A	1.000 ±.060 (25.40 ±1.52)	.140 ±.030 (3.56 ±.76)	.025 ±.002 (.64 ±.05)
MG717	1.5	2,000	750	600 Ω	17 Meg	75 Meg	225 M	.710 ±.050 (18.03 ±1.27)	.240 ±.030 (6.10 ±.76)	.040 ±.002 (1.02 ±.05)
MG720	2.0	6,000	750	1 K	N/A	150 Meg	N/A	1.500 ±.080 (38.10 ±2.03)	.140 ±.030 (3.56 ±.76)	.025 ±.002 (.64 ±.05)
MG721	2.0	4,000	750	200 Ω	51 Meg	100 Meg	300 M	1.000 ±.050 (25.40 ±1.27)	.240 ±.030 (6.10 ±.76)	.040 ±.002 (1.02 ±.05)
MG725	2.5	10,000	750	1.5 K	N/A	200 Meg	N/A	2.000 ±.080 (50.80 ±2.03)	.140 ±.030 (3.56 ±.76)	.025 ±.002 (.64 ±.05)
MG730	3.0	6,000	1,000	500 Ω	77 Meg	250 Meg	750 M	1.500 ±.080 (38.10 ±2.03)	.240 ±.030 (6.10 ±.76)	.040 ±.002 (1.02 ±.05)
MG731	2.6	4,000	1,000	200 Ω	40 Meg	150 Meg	750 M	1.000 ±.060 (25.40 ±1.52)	.315 ±.030 (8.00 ±.76)	.040 ±.002 (1.02 ±.05)
MG735	3.6	10,000	1,000	750 Ω	178 Meg	300 Meg	1,000 M	2.000 ±.080 (50.80 ±2.03)	.240 ±.030 (6.10 ±.76)	.040 ±.002 (1.02 ±.05)
MG740	3.6	6,000	1,000	300 Ω	64 Meg	300 Meg	1,500 M	1.500 ±.060 (38.10 ±1.52)	.315 ±.030 (8.00 ±.76)	.040 ±.002 (1.02 ±.05)
MG745	5.0	15,000	1,000	1 K	288 Meg	500 Meg	1,500 M	3.000 ±.100 (76.20 ±2.54)	.240 ±.030 (6.10 ±.76)	.040 ±.002 (1.02 ±.05)
MG750	5.0	10,000	1,000	400 Ω	128 Meg	500 Meg	2,500 M	2.125 ±.060 (53.98 ±1.52)	.315 ±.030 (8.00 ±.76)	.040 ±.002 (1.02 ±.05)
MG780	7.5	15,000	1,000	600 Ω	192 Meg	750 Meg	3,750 M	3.125 ±.060 (79.38 ±1.52)	.315 ±.030 (8.00 ±.76)	.040 ±.002 (1.02 ±.05)
MG785	8.0	20,000	1,000	800 Ω	320 Meg	1,000 Meg	5,000 M	4.000 ±.120 (101.60 ±3.05)	.315 ±.030 (8.00 ±.76)	.040 ±.002 (1.02 ±.05)
MG810	10.0	25,000	1,000	1 K	400 Meg	1,250 Meg	6,250 M	5.000 ±.120 (127.00 ±3.05)	.315 ±.030 (8.00 ±.76)	.040 ±.002 (1.02 ±.05)
MG815	15.0	30,000	1,000	1 K	384 Meg	2,000 Meg	10,000 M	6.000 ±.120 (152.40 ±3.05)	.350 ±.040 (8.89 ±1.02)	.040 ±.002 (1.02 ±.05)

Models with low inductance construction are in shaded areas.

Models with Caddock's Non-Inductive Resistance Pattern are in non-shaded areas.

Specifications:

Resistance Tolerance:

Resistance Range	Tolerance
Standard	±1%, ±0.5%, ±0.25%, ±0.1%
St'd with "-15" rating	±1%
Extended Range	±1%

Temperature Coefficient:

Resistance Range	TC Specifications
Standard and St'd with "-15" rating	±80 ppm/°C from -15°C to +105°C, referenced to +25°C.
Extended Range	±80 ppm/°C from +25°C to +105°C, -200 ppm/°C to +50 ppm/°C from -15°C to +25°C.

Insulation Resistance: 10,000 Megohms, min.

Overload/Overvoltage: 5 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds.

Resistance Range	Load Life, ΔR
Standard	0.5% max.
St'd with "-15" rating	0.8% max.
Extended Range	0.8% max.

Thermal Shock: Mil-Std-202, Method 107, Cond. C, ΔR 0.25% max.

Moisture Resistance: Mil-Std-202, Method 106, ΔR 0.4% max.

Load Life: 1,000 hours at +125°C at rated voltage, not to exceed rated power.

Resistance Range	Load Life, ΔR
Standard	0.5% max.
St'd with "-15" rating	0.8% max.
Extended Range	0.8% max.

Solderable Leads

Encapsulation: High Temperature Silicone Conformal.

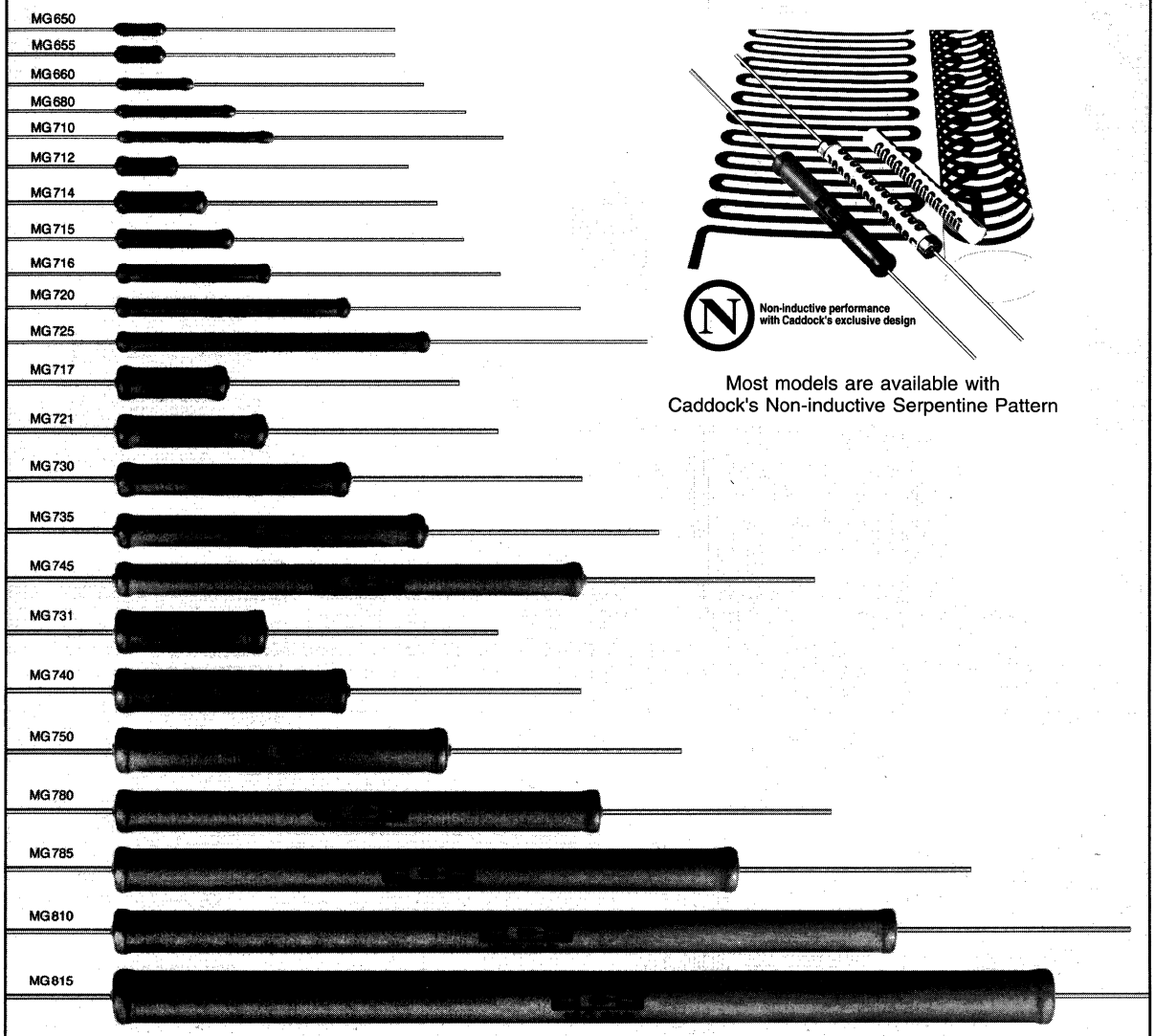
SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

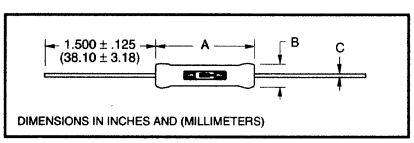
Type MG Precision High Voltage Resistors

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

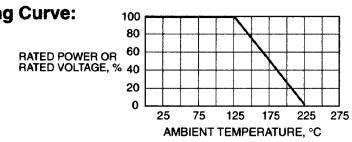


Most models are available with
Caddock's Non-inductive Serpentine Pattern

Certain products shown in this catalog are covered by one or more patents, there are also patents pending.



Derating Curve:



Design Assistance in Developing High Voltage Resistor Sets with Low TC Tracking.

For immediate engineering assistance in developing Low Ratio TC matched high voltage resistor sets, call or write our Applications Engineering and we will be pleased to offer the best solution from our high voltage resistor product capabilities.

Ordering Information:

MG750 -100M - 1%

Model Number: MG750
Resistor Value: 100M
Tolerance: 1%

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Type TG Low TC Precision High Voltage Resistors

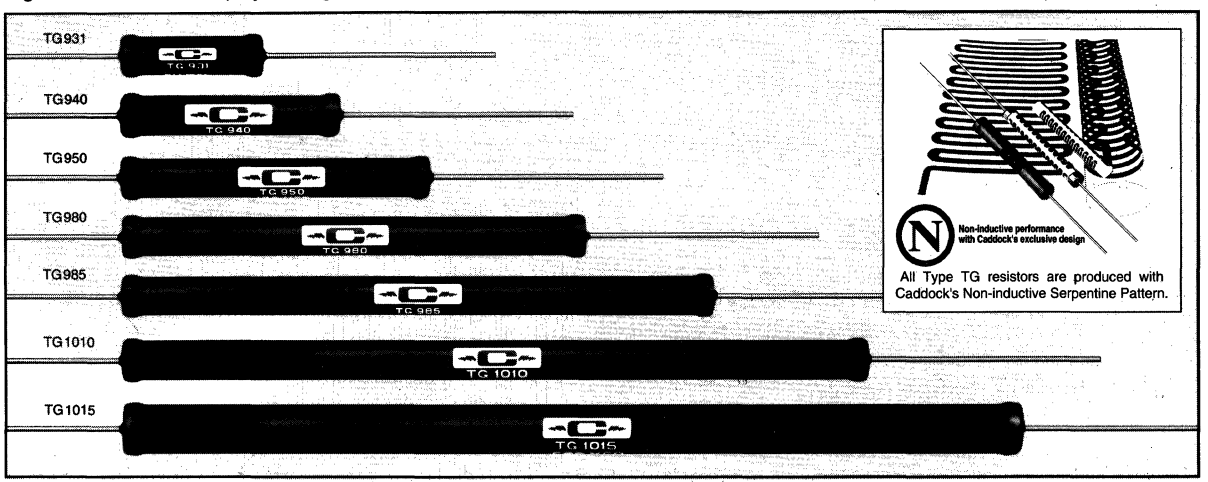
TC of 25 ppm/°C from -55°C to +125°C, Resistance Range from 1 Megohm to 1,000 Megohms

To meet the precision temperature stability requirements of high accuracy, high voltage systems, Caddock introduces the Type TG Low TC Precision High Voltage Resistors. These resistors utilize our proven Tetrinox® resistance system to achieve the unique combination of low temperature coefficient with high stability performance at high operating voltages.

The Type TG Low TC Precision High Voltage Resistors are designed to meet the demanding stability requirements of TWT power supplies, electron microscopes, X-ray systems, high resolution CRT displays and geophysical instruments.

The performance features of the Type TG Low TC Precision High Voltage Resistors are:

- Temperature Coefficient: 25 ppm/°C from -55°C to +125°C.
- Load Life Stability of 0.25% per 1,000 hours at +125°C.
- Resistance Tolerance from ±1.0% to ±0.1%.
- Resistance Range from 1 Megohm to 1,000 Megohms.
- Maximum Continuous Operating Temperature of +225°C.
- The low temperature coefficient minimizes the self-drift due to power dissipation warm-up.



Model No.	Wattage	Max. Continuous Oper. Volt.	Dielect. Strength	TC ppm/°C	Resistance			Dimensions in inches and (millimeters)		
					Min.	-15 Min.	Max.	A	B	C
TG931	1.0	4,000	750	25	1 Meg	40 Meg	50 Meg	1.000 ±.060 (25.40 ±1.52)	.315 ±.030 (8.00 ±.76)	.040 ±.002 (1.02 ±.05)
TG940	1.5	6,000	750	25	1.5 Meg	64 Meg	100 Meg	1.500 ±.060 (38.10 ±1.52)	.315 ±.030 (8.00 ±.76)	.040 ±.002 (1.02 ±.05)
TG950	2.0	10,000	1,000	25	2 Meg	128 Meg	200 Meg	2.125 ±.060 (53.98 ±1.52)	.315 ±.030 (8.00 ±.76)	.040 ±.002 (1.02 ±.05)
TG980	3.0	15,000	1,000	25	3 Meg	192 Meg	300 Meg	3.125 ±.060 (79.38 ±1.52)	.315 ±.030 (8.00 ±.76)	.040 ±.002 (1.02 ±.05)
TG985	4.0	20,000	1,000	25	4 Meg	320 Meg	400 Meg	4.000 ±.120 (101.60 ±3.05)	.315 ±.030 (8.00 ±.76)	.040 ±.002 (1.02 ±.05)
TG1010	5.0	25,000	1,000	25	5 Meg	400 Meg	500 Meg	5.000 ±.120 (127.00 ±3.05)	.315 ±.030 (8.00 ±.76)	.040 ±.002 (1.02 ±.05)
TG1015	6.0	30,000	1,000	25	6 Meg	384 Meg	1000 Meg	6.000 ±.120 (152.40 ±3.05)	.350 ±.040 (8.89 ±1.02)	.040 ±.002 (1.02 ±.05)

Extended Maximum Continuous Operating Voltage Rating

Maximum continuous operating voltages up to 60% higher than the values listed in the table can be achieved through special factory conditioning. To specify maximum continuous operating voltages above the values listed in the table, add a "-15" to the model number (Example: TG950-15). Note that the standard overload and overvoltage ratings do not apply to the "-15" resistors. Resistance range for "-15" resistors shown in the table are from "-15 Min." to "Max."

Combine Type TG and Type TK Resistors for Low Ratio TC Tracking

The Type TG Low TC Precision High Voltage Resistors can be used in combination with the low Absolute Temperature Coefficient of the Type TK Low TC Precision Radial-Lead Film Resistors (Model TK133 with TC of 5 ppm/°C) to achieve 30 ppm/°C Ratio TC without special matching.

With special matching, a **Ratio TC of 10 ppm/°C** can be achieved.

The low temperature coefficient for both the Type TG and Type TK resistors will also minimize ratio drift due to power dissipation warm-up.

Specifications:

Resistance Tolerance: ±1% (tolerances to 0.1% on special order).

Temperature Coefficient: +25 ppm/°C referenced to 25°C, ΔR taken at -55°C and +125°C.

Insulation Resistance: 10,000 Megohms, min.

Overload/Overvoltage: 5 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds. ΔR 0.20% max.

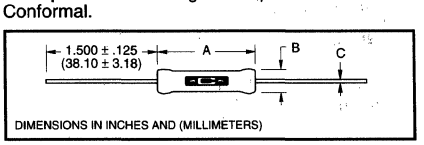
Thermal Shock: Mil-Std-202, Method 107, Cond. B, ΔR 0.20% max.

Moisture Resistance: Mil-Std-202, Method 106, ΔR 0.20% max.

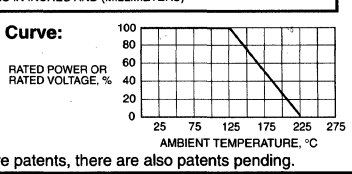
Load Life: 1,000 hours at +125°C at rated voltage, not to exceed rated power, ΔR 0.25%.

Solderable Leads

Encapsulation: High Temperature Silicone Conformal.



Derating Curve:



Certain products shown in this catalog are covered by one or more patents, there are also patents pending.

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

Type MX Lab Grade Precision High Voltage Resistors

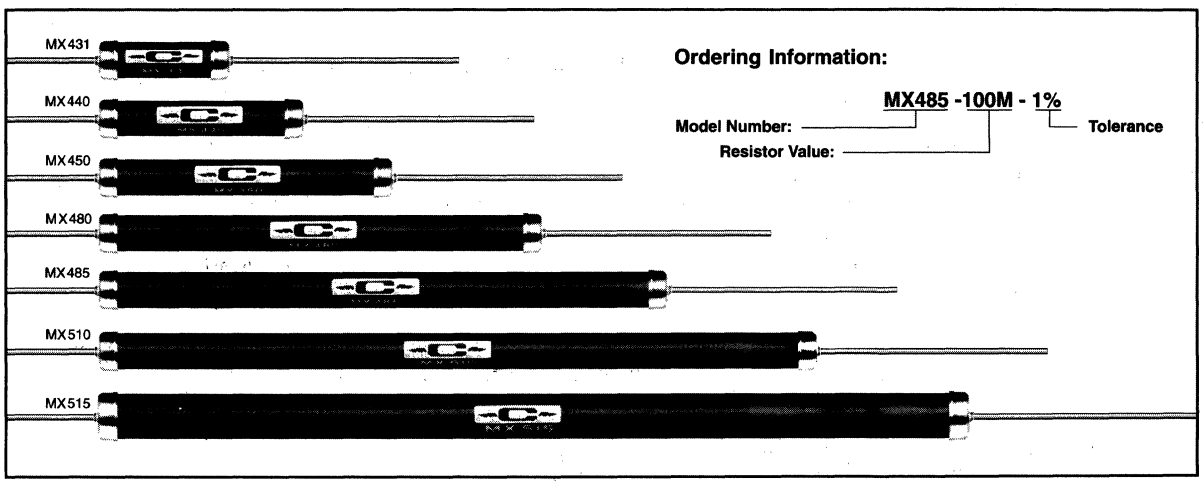
CADDOCK
HIGH PERFORMANCE FILM RESISTORS

High Voltage Resistors for Laboratory and Industrial Applications

The Type MX Lab Grade Precision High Voltage Resistors were specifically developed for use in high performance laboratory and industrial high voltage systems. These resistors combine the proven performance of Caddock's Micronox® resistance system with new cost efficient design elements. These resistors are intended for the design of high voltage systems where the system is not exposed to full military or space grade operating conditions. For full military or space grade operating conditions, we recommend Caddock's **Type TG Low TC Precision High Voltage Resistors** or **Type MG Precision High Voltage Resistors.**

The performance features of the Type MX Lab Grade Precision High Voltage Resistors are:

- Seven Models with Voltage Ratings from 7.5 KV to 48 KV.
- Temperature Coefficient: 80 ppm/°C from 0°C to +70°C.
- Load Life Stability of 0.50% per 1,000 hours.
- Resistance Tolerance from ±0.1% to ±10%.
- Non-Inductive Design.
- Resistance Range from 1 Megohm to 2,000 Megohms.



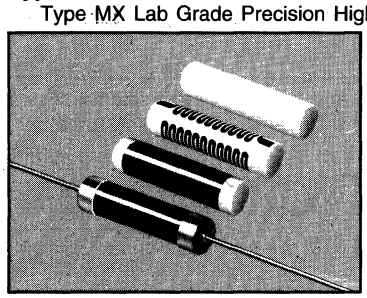
Ordering Information:

MX485 -100M - 1%
Model Number:
Resistor Value:
Tolerance

Model No.	Watt-age	Max. Continuous Oper. Volt.	TC ppm/°C	Resistance		Dimensions in inches and (millimeters)		
				Min.	Max.	A	B	C
MX431	2.0	7,500	80	1 Meg	150 Meg	.940 ±.040 (23.88 ±1.02)	.270 ±.020 (6.86 ±.51)	.040 ±.002 (1.02 ±.05)
MX440	3.5	11,000	80	1.5 Meg	300 Meg	1.450 ±.040 (36.83 ±1.02)	.270 ±.020 (6.86 ±.51)	.040 ±.002 (1.02 ±.05)
MX450	5.0	16,000	80	2 Meg	500 Meg	2.080 ±.040 (52.83 ±1.02)	.270 ±.020 (6.86 ±.51)	.040 ±.002 (1.02 ±.05)
MX480	7.5	24,000	80	3 Meg	750 Meg	3.080 ±.050 (78.23 ±1.27)	.270 ±.020 (6.86 ±.51)	.040 ±.002 (1.02 ±.05)
MX485	10.0	32,000	80	4 Meg	1,000 Meg	3.940 ±.050 (100.08 ±1.27)	.270 ±.020 (6.86 ±.51)	.040 ±.002 (1.02 ±.05)
MX510	12.5	40,000	80	5 Meg	1,250 Meg	4.940 ±.080 (125.48 ±2.03)	.270 ±.020 (6.86 ±.51)	.040 ±.002 (1.02 ±.05)
MX515	15.0	48,000	80	6 Meg	2,000 Meg	5.940 ±.080 (150.88 ±2.03)	.330 ±.020 (8.38 ±.51)	.040 ±.002 (1.02 ±.05)

Type MX Resistors Utilize Caddock's Patented Coating Design

Type MX Lab Grade Precision High Voltage Resistors combine Caddock's Non-Inductive serpentine pattern with a patented, high thru-put screen printed silicone coating. The alignment of the gap in the coating pattern with the gap in the serpentine resistor pattern provides a complete encapsulation of the resistor element. The cap and lead assemblies are pressed onto the resistor core, finishing the resistor and providing rugged terminal attachment.



Specifications:

Resistance Tolerance: ±1%, ±2%, ±5% or ±10% (tolerance to ±0.5%, ±0.25% or ±0.1% on special order).

Temperature Coefficient: 80 ppm/°C referenced to +25°C, ΔR taken at 0°C and +70°C.

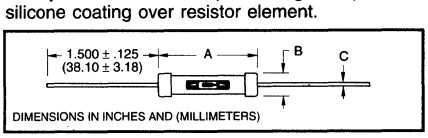
Thermal Shock: Mil-Std-202, Method 107, Cond. A, ΔR, 0.20% max.

Moisture Resistance: Mil-Std-202, Method 106, ΔR, 0.40% max.

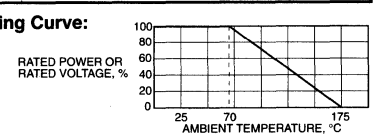
Load Life: 1,000 hours at rated voltage at +70°C, not to exceed rated power, ΔR, 0.50% max.

Lead Material: Tinned copper clad steel, solderable.

Encapsulation: Screen printed high temperature silicone coating over resistor element.



Derating Curve:



Certain products shown in this catalog are covered by one or more patents, there are also patents pending.

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

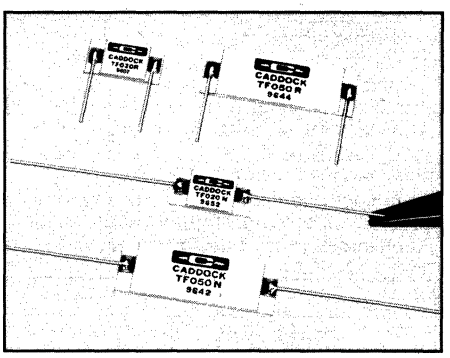
Type TF Low TC Ultra-Precision Film Resistors

Absolute TC to 5 ppm/°C, Values from 1 Kohm to 125 Megohms, Absolute Tolerance to ±0.01%

Type TF precision resistors employ the Caddock Tetrinox® resistance films - the resistance system that sets a new standard for high value, ultra-stable precision resistors that provide an exceptional combination of performance characteristics:

- **Ultra-Precision** - Seven standard resistance tolerances from ±1% to ±0.01%.
- **A Wide Range of Resistance Values** - from 1 Kohm to 125 Megohms.
- **Low Temperature Coefficient** - 5 ppm/°C, 10 ppm/°C or 15 ppm/°C.
- **Long-Term Stability** - to 0.01% per 1,000 hours.

This approach to quantity production of ultra-precision discrete resistors is the result of combining our unique complex oxide resistance film technology with an advanced high thru-put laser manufacturing capability.

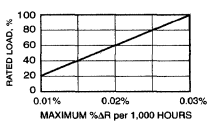


Type TF - Standard Resistance Range - 1 Kohm to 10 Megohms.

Model Number		Wattage @ +70°C	Maximum Continuous Oper. Voltage	Resistance		Dimensions inches (mm)	
Axial Leads	Radial Leads			Min.	Max.	A	B
TF020N	TF020R	.33	300	1 K	2 Meg	.750 ±.020 (19.05 ±.51)	.375 ±.020 (9.53 ±.51)
TF050N	TF050R	.75	1,400	10 K	10 Meg	1.500 ±.020 (38.10 ±.51)	.500 ±.020 (12.70 ±.51)

Shelf Life: Typically 0.0025% per year

Load Stability:



Type TF - Extended Resistance Range - 2 Megohms to 125 Megohms.

Model Number		Wattage @ +70°C	Maximum Continuous Oper. Voltage	Resistance		Dimensions inches (mm)	
Axial Leads	Radial Leads			Min.	Max.	A	B
TF626N	TF626R	.33	300	2.01 Meg	35 Meg	.750 ±.020 (19.05 ±.51)	.375 ±.020 (9.53 ±.51)
TF656N	TF656R	.75	1,400	10.01 Meg	125 Meg	1.500 ±.020 (38.10 ±.51)	.500 ±.020 (12.70 ±.51)

Load Stability: 1,000 hours at rated voltage at +70°C, maximum ΔR 0.03%

Shelf Life: Typically 0.005% per year

Specifications:

Apply to all Type TF resistor models

Absolute Temperature Coefficient: 5 ppm/°C, 10 ppm/°C or 15 ppm/°C referenced to +25°C, ΔR taken at -15°C and +105°C.

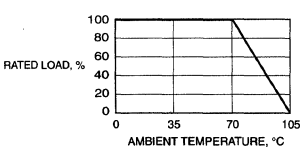
Resistance Tolerance: ±0.01%, ±0.025%, ±0.05%, ±0.10%, ±0.25%, ±0.50% or ±1.0%.

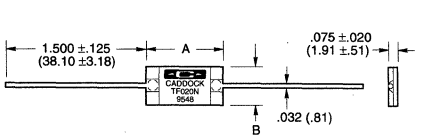
Load Life: 1,000 hours at +70°C. Load stability versus applied power is shown in the load stability curve on this page.

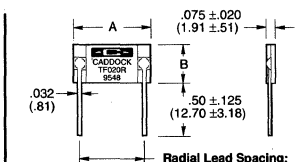
Storage Temperature: -55°C to +105°C.

Leadwire: Tinned Copper

Derating Curve:







DIMENSIONS IN INCHES AND (MILLIMETERS)

.600 ±.020 (15.24 ±.51) for Models TF020R and TF626R
1.350 ±.020 (34.29 ±.51) for Models TF050R and TF656R

Ordering Information

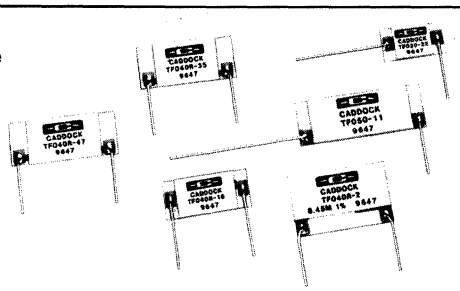
TF050R - 10 Meg - 0.01% - 10 ppm/°C

Model Number | Resistor Value | Tolerance | Temperature Coefficient

Custom Type TF Resistors

Additional cost savings can be realized when your high volume ultra-precision Type TF resistor is optimized for:

- Lightning transient capability
- Voltage rating
- Power rating
- Mechanical configuration
- Ratio matched sets



And for special requirements, custom Type TF resistors are available with:

- TC of 5 ppm/°C, 10 ppm/°C, 15 ppm/°C, 20 ppm/°C or 25 ppm/°C.
- Shelf stability of 0.0025% per year.

Type TF resistors can also be produced with custom-spaced radial leads that will plug directly into your existing circuit layout.

Page C19

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

Type TN Lab Grade Low TC Precision Film Resistors

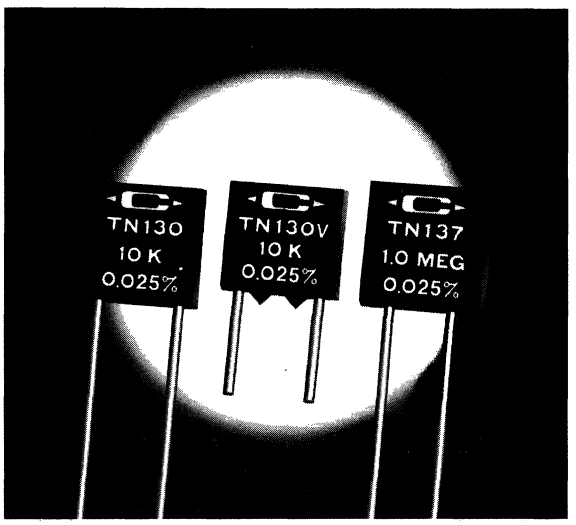
CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Low TC of 5 ppm/°C, 10 ppm/°C or 20 ppm/°C from 0°C to +70°C
Tolerance of ±0.025%, ±0.05%, ±0.1% to ±1%, Values from 1 Kohm to 1 Meg

Type TN Lab Grade Low TC Film Resistors were specifically developed for use in 0°C to +70°C applications which require a low temperature coefficient and a high degree of precision. These resistors combine the outstanding characteristics of Caddock's Tetrinox® resistance system with a space efficient, non-inductive, radial-lead design. These resistors are intended for precision analog designs where the system is not exposed to full military or space grade operating conditions. For full military or space grade operating conditions, we recommend Caddock's **Type TK Low TC Precision Radial-Lead Film Resistors.** For lab grade applications which require higher voltage ratings (up to 1,400 volts) and power ratings (up to 0.75 watt), we recommend Caddock's **Type TF Low TC Ultra-Precision Film Resistors**.

The performance features of the Type TN Lab Grade Low TC Precision Film Resistors are:

- **Low Temperature Coefficient** - 5, 10 or 20 ppm/°C.
- **Ultra-Precision** - 6 standard tolerances from ±0.025% to ±1%.
- **Resistance Range** - from 1 Kohm to 1 Megohm.
- **Non-Inductive Design.**
- **Radial-Lead Design** - conserves board space.



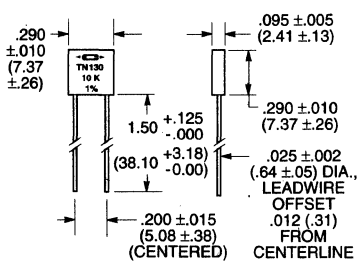
Type TN Lab Grade Low TC Precision Film Resistors

Model No.	Temperature Coefficient ppm/°C	Wattage @ +70°C	Max. Working Voltage	Dielect. Strength	Resistance Min.	Resistance Max.	Dimensions	Comments
TN130	5, 10 or 20	.3	200	400	1 K	1 Meg	Ref. Case "A" Dwg.	———
TN130V	5, 10 or 20	.3	200	400	1 K	1 Meg	Ref. Case "C" Dwg.	With Standoff
TN137	5, 10 or 20	.3	200	400	1 K	1 Meg	Ref. Case "B" Dwg.	———

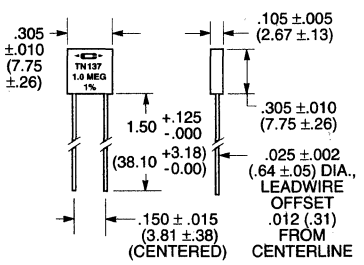
Temperature Coefficient Identification: 5 ppm/°C Silver Dot, 10 ppm/°C No Dot, 20 ppm/°C Green Dot

ALL DIMENSIONS IN INCHES AND (MILLIMETERS)

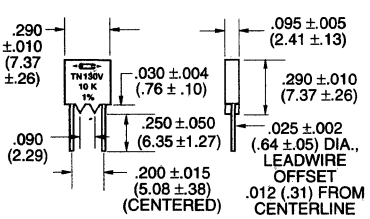
Case "A"
Model TN130



Case "B"
Model TN137



Case "C"
Model TN130V



Ordering Information:

TN130 - 10 K - 0.025% - 10 ppm/°C

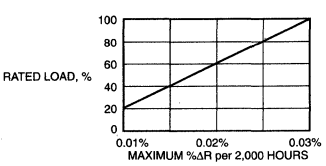
Model Number | Resistor Value | Tolerance | Temperature Coefficient

Specifications:

Resistance Tolerance: ±0.025%, ±0.05%, ±0.10%, ±0.25%, ±0.50% or ±1.0%.

Absolute Temperature Coefficient: 5ppm/°C, 10ppm/°C or 20ppm/°C referenced to +25°C, ΔR taken at 0°C and +70°C.

Load Life Stability at +70°C:



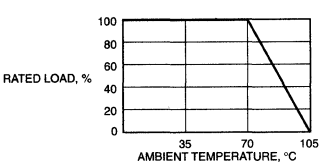
Shelf Life (Typical): 25 ppm/year.

Storage Temperature: -55°C to +105°C.

Encapsulation: Transfer Molded.

Leadwire: Tinned Copper.

Derating Curve:



SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

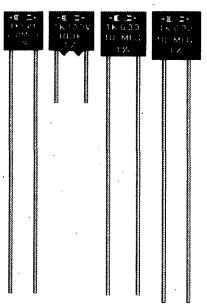
Type TK Low TC Precision Radial-Lead Film Resistors

Low TC of 5 ppm/°C, 10 ppm/°C or 20 ppm/°C and Resistance Range from 1Kohm to 10 Megs

Type TK Low TC Precision Radial-Lead Resistors with the Tetrinox® resistance system solve the reliability problems related to other low TC precision resistor technologies. The robust construction of Caddock's Type TK Resistors provides reliable operation even in harsh temperature cycling and/or power cycling environments.

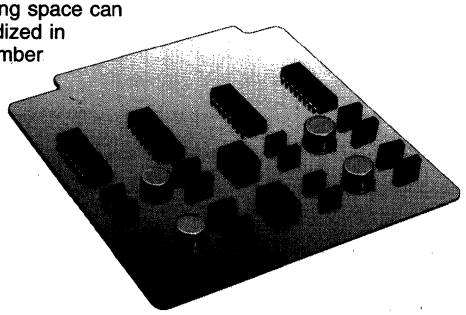
Type TK Low TC Precision Radial-Lead Film Resistors provide a combination of performance advantages never before available in a resistive component:

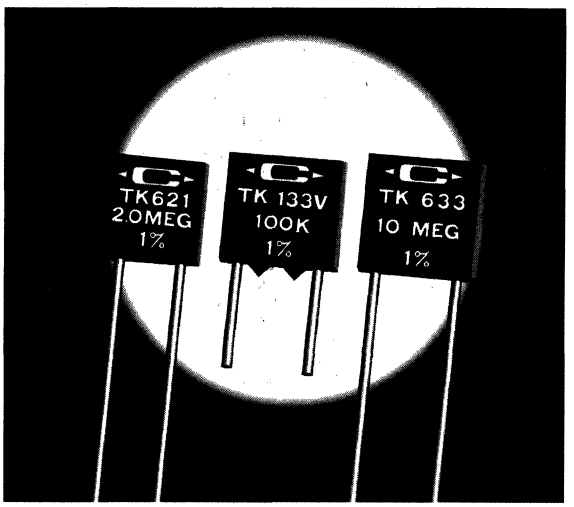
- **Low Temperature Coefficient** - better than 5 ppm/°C, 10 ppm/°C or 20 ppm/°C over the entire temperature range from -55°C to +125°C!
- **Long-Term Absolute Stability** - typically better than ±0.05% per 2,000 hours of operation.
- **Extended Resistance Range** - from 1,000 ohms to 10 Megohms.
- **Precision Tolerances** - ±1% is standard, and tolerances as close as ±0.05% are available.
- **Wide Operating Temperature Range** - from -55°C to +175°C.
- **Small Size** - with four miniature rectangular cases for maximum packaging density and minimum mounting area.
- **High Power Density** - with power ratings of .2 watt and .3 watt in molded cases, the largest of which is a standard CK06 package.



(Photos show resistors full size)

- **Caddock's Non-Inductive Performance** - provides faster settling times and minimum distortion in all types of high frequency circuits.
- **High Density Packaging** - the radial-lead mounting and small rectangular case of the Type TK resistors permit high packaging densities in low profile circuitry. Because the four models of the Type TK resistors are available in an exceptionally wide range of resistance values, lead spacing and mounting space can be standardized in a larger number of designs.





Building on over 30 years of experience with our unique complex oxide technology, Caddock has perfected the Tetrinox® resistance system - the first high resistance system to provide a TC that is well within 10 ppm/°C and that is also essentially linear over the entire temperature range from -55°C to +125°C.

The exceptional performance of Type TK resistors can achieve improvements in many circuit applications:

Low TC "Matched-Pair" Voltage Dividers Can be Assembled Without Pre-Selection of Resistors.

An important application for Type TK resistors is in "matched-pair" voltage dividers where the low 5 ppm/°C temperature coefficient provides ratio tracking of less than 10 ppm/°C without resistor pre-selection or special testing.

With factory selection, Type TK resistor pairs can be matched to within 1 ppm/°C.

Extended Resistance Range Reduces Power Requirements

Because the Type TK resistors provide resistance values as high as 10 Megohms - values that are up to 100 times higher than other types of ultra-low TC resistors - engineers can now design precision circuits with lower current drain and lower power requirements.

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

Type TK Low TC Precision Radial-Lead Film Resistors

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Type TK Low TC Precision Radial-Lead Film Resistors - Standard Resistance Range

Model No.	Temperature Coefficient ppm/°C	Wattage @ +125°C	Max. Working Voltage	Dielect. Strength	Resistance Min.	Resistance Max.	Dimensions	Encapsulation	Leadwire	Comments
TK121	5, 10 or 20	.2	200	300	1 K	500 K	Ref. Case "A" Dwg.	Transfer Molded	Tinned Copper	———
TK133	5, 10 or 20	.3	300	400	1 K	1.5 Meg	Ref. Case "B" Dwg.	Transfer Molded	Tinned Copper	———
TK133V	5, 10 or 20	.3	300	400	1 K	1.5 Meg	Ref. Case "D" Dwg.	Transfer Molded	Tinned Copper	With Standoff
TK139	5, 10 or 20	.3	300	400	1 K	1.5 Meg	Ref. Case "C" Dwg.	Transfer Molded	Tinned Copper	———

Temperature Coefficient Identification:
5 ppm/°C Silver Dot
10 ppm/°C No Dot
20 ppm/°C Green Dot

Resistance Tolerance: ±1% (tolerances to ±0.05% on special order).
Operating Temperature: -55°C to +175°C.
TC Temperature Range: -55°C to +125°C.
Overload:* 6.25 times rated power for 5 seconds at voltage not to exceed 1.5 times maximum rated working voltage, ΔR less than 0.05%.

Thermal Shock: Mil-Std-202, Method 107, Cond. B, ΔR less than 0.05%.
Low Temperature Operation:* ΔR less than 0.02%.
Dielectric Withstanding Voltage:* ΔR less than 0.02%.
Moisture Resistance:* Mil-Std-202, Method 106, 1K to 500K ΔR less than 0.05% 500.1K to 1.5 Meg ΔR less than 0.10%.

Load Life:* 2,000 hours at +125°C, 1K to 500K ΔR less than 0.07% 500.1K to 1.5 Meg. ΔR less than 0.10%
Shelf Life (Typical): 25 ppm/year.
Insulation Resistance: 10,000 Megohms.
Vibration:* ΔR less than 0.03%.
Shock:* ΔR less than 0.05%.
*Test methods per procedures of Mil-R-55182/9.

Type TK Low TC Precision Radial-Lead Film Resistors - Extended Resistance Range

Model No.	Temperature Coefficient ppm/°C	Wattage @ +125°C	Max. Working Voltage	Dielect. Strength	Resistance Min.	Resistance Max.	Dimensions	Encapsulation	Leadwire	Comments
TK621	5, 10 or 20	Limited by Maximum Working Voltage	200	300	501 K	2 Meg	Ref. Case "A" Dwg.	Transfer Molded	Tinned Copper	———
TK633	5, 10 or 20		300	400	1.51 Meg	10 Meg	Ref. Case "B" Dwg.	Transfer Molded	Tinned Copper	———
TK633V	5, 10 or 20		300	400	1.51 Meg	10 Meg	Ref. Case "D" Dwg.	Transfer Molded	Tinned Copper	With Standoff
TK639	5, 10 or 20		300	400	1.51 Meg	10 Meg	Ref. Case "C" Dwg.	Transfer Molded	Tinned Copper	———

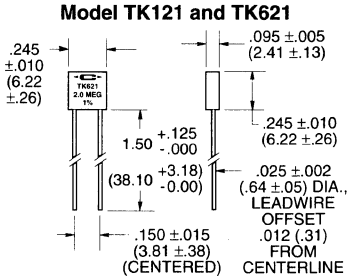
Temperature Coefficient Identification:
5 ppm/°C Silver Dot
10 ppm/°C No Dot
20 ppm/°C Green Dot

Resistance Tolerance: ±1% (tolerances to ±0.05% on special order).
Operating Temperature: -55°C to +175°C.
TC Temperature Range: -55°C to +125°C.
Overload:* 1.5 times rated working voltage for 5 seconds, ΔR less than 0.2%.

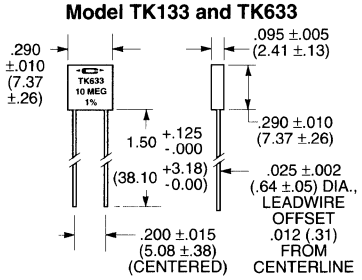
Thermal Shock: Mil-Std-202, Method 107, Cond. B, ΔR less than 0.1%.
Low Temperature Operation:* ΔR less than 0.05%.
Dielectric Withstanding Voltage:* ΔR less than 0.05%.
Moisture Resistance:* Mil-Std-202, Method 106, ΔR less than 0.10%.

Load Life:* 2,000 hours at +125°C, ΔR less than 0.2%.
Shelf Life (Typical): 50 ppm/year.
Insulation Resistance: 10,000 Megohms.
Vibration:* ΔR less than 0.05%.
Shock:* ΔR less than 0.05%.
*Test methods per procedures of Mil-R-55182/9.

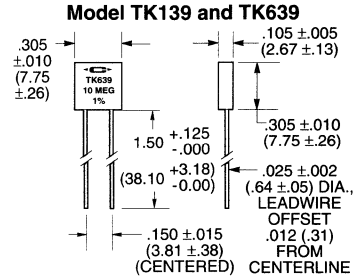
Case "A"
Model TK121 and TK621



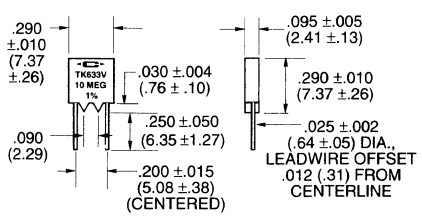
Case "B"
Model TK133 and TK633



Case "C"
Model TK139 and TK639



Case "D"
Model TK133V and TK633V

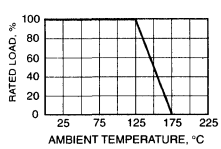


Ordering Information

TK633 - 10 Meg - 0.1% - 10 ppm/°C
Model Number | Resistor Value | Tolerance | Temperature Coefficient

DIMENSIONS IN INCHES AND (MILLIMETERS)

Derating Curve:



SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Type MK Precision Power Film Radial-Lead Resistors

Non-Inductive with Expanded Resistance Range — 1 Ohm to 100 Megohms

Here are the precision radial lead resistors that provide high density packaging in circuit board applications. Available in three miniature rectangular package configurations with standard lead spacings, Type MK Precision Power Radial-Lead Film Resistors now cover the entire resistance range from 1 ohm to 100 Megohms.

Constructed with Caddock's Micronox® resistance films fired onto a solid ceramic substrate, Type MK Precision Film Resistors combine all of these outstanding advantages:

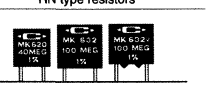
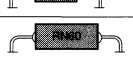
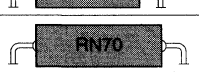
- **±1% Resistance Tolerance is Standard** - tolerances to ±0.1% are available on special order.
- **Operating Temperature** - from -55°C to +175°C.
- **Full Power Rating at +125°C.**
- **Temperature Coefficient is ≤ 50 ppm/°C from 5 ohms to 5 Megohms and ≤ 80 ppm/°C up to 100 Megohms** - referenced to +25°C with the ΔR taken at -15°C and +105°C.
- **Extended Life Stability is Typically Better Than 0.1% per 1,000 Hours.**
- **Caddock's Non-Inductive Performance** - provides faster settling times and minimum distortion in all types of high frequency circuits.

This combination of performance advantages in a small, standardized case can simplify many engineering and production problems:

One size of Type MK resistor can replace many sizes of axial-lead resistors.

This table of "RN" style axial-lead resistors shows the many sizes and power ratings that can be replaced with one of the three models of Type MK Precision Film Resistors within the maximum allowable voltage ratings.

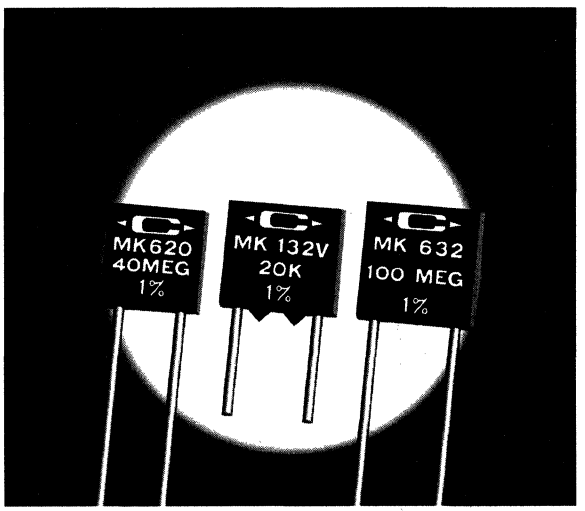
Comparison of Type MK and "RN" Ratings and Dimensions

Resistor Type	Power Rating	Maximum Resistance	Mounting Hole Spacing	Even the smallest Type MK resistor can replace all of these RN type resistors
MK120 or MK620	**.50 W**	**40 Megohms**	**.150 (3.81)**	
MK132, MK132V, MK632 or MK632V	**.75 W**	**100 Megohms**	**.200 (5.08)**	
RN50	.05 W	1 Megohm	.400 (10.15)	
RN55	.10 W	5 Megohms	.500 (12.70)	
RN60	.125 W	10 Megohms	.625 (15.90)	
RN65	.25 W	20 Megohms	.875 (22.20)	
RN70	.50 W	40 Megohms	1.000 (25.40)	

All outline drawings full size - dimensions in inches and (millimeters).

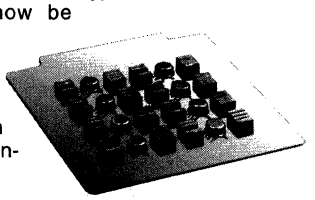
The largest Type MK - rated at .75 watt - requires less board space than even the .05 watt RN50.

The smallest Type MK - rated at .50 watt - provides power dissipation **equal** to the RN70 resistor. The RN70 resistor requires a mounting hole spacing of 1 inch and a side-to-side spacing of .25 inch, resulting in a total mounting area of .25 square inch - **10 times the area required for a .50 watt Type MK resistor!**



One standard resistor configuration can simplify board layouts.

With the exceptionally wide range of resistance values that are available in each model of Type MK Precision Film Resistors, circuits can now be designed for maximum packaging densities without the need for leaving extra space where resistor value changes can require larger resistors or non-uniform lead spacings.



Standardization of resistor size can speed assembly procedures and reduce procurement costs.

The standardization of resistor size can pay additional dividends by simplifying assembly procedures. The radial leads do not require additional bending prior to insertion, and the standard lead spacing can reduce the time required for assembly.

The combination of higher power ratings and smaller size can also lower procurement costs. By reducing the wide variety of sizes and types of axial-lead resistors to a single, standardized resistor type, unit prices can be lowered and inventory problems simplified. For specific price and delivery information, call or write our Sales Office.

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

Type MK Precision Power Film Radial-Lead Resistors

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Type MK Precision Film Resistors - Low and Standard Resistance Ranges

Model No.	Watt-age	Max. Voltage	Oper. Temp. Max.	Dielect. Strength	Resistance			Dimensions	Encapsulation	Leadwire	Comments
					Low Min.	Standard Min.	Standard Max.				
MK120	.50	200	175°C	300	1 Ω	5 Ω	2 Meg	Ref. Case "A" Dwg.	Transfer Molded	Tinned Copper	———
MK132	.75	400	175°C	400	1 Ω	5 Ω	5 Meg	Ref. Case "B" Dwg.	Transfer Molded	Tinned Copper	———
MK132V	.75	400	175°C	400	1 Ω	5 Ω	5 Meg	Ref. Case "C" Dwg.	Transfer Molded	Tinned Copper	With Standoff

Resistance Tolerance: ±1% (tolerances to ±0.1% available on values of 30 ohms or higher).

Overload/Overvoltage: 5 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds, ΔR ±(0.15 percent + 0.01 ohm) max.

Operating Temperature: -55°C to +175°C.

Temperature Coefficient:

Resistance Range	Temp. Coef.
Standard : 5 Ω and above	50 ppm/°C
Low : 1 Ω to 4.99 Ω	200 ppm/°C

Temperature Coefficient referenced to +25°C, ΔR taken at -15°C and +105°C.

Insulation Resistance: 10,000 Megohms, minimum.

Load Life: 1,000 hours at +125°C at rated power, ΔR ±(0.4 percent +0.01 ohm) max.

Thermal Shock: Mil-Std-202, Method 107, Cond. B, ΔR ±(0.2 percent + 0.01 ohm) max.

Moisture Resistance: Mil-Std-202, Method 106, ΔR ±(0.5 percent + 0.01 ohm) max.

Measurement Note: Resistance measurement on low resistance values shall be made at a point within 0.2 inch (5.08 mm) of the body.

Type MK Precision Film Resistors - Extended Resistance Range

Model No.	Watt-age	Max. Voltage	Oper. Temp. Max.	Dielect. Strength	TC ppm/°C	Resistance		Dimensions	Encapsulation	Leadwire	Comments
						Min.	Max.				
MK620	.50	200	175°C	300	80	2.01 Meg	40 Meg	Ref. Case "A" Dwg.	Transfer Molded	Tinned Copper	———
MK632	.75	400	175°C	400	80	5.01 Meg	100 Meg	Ref. Case "B" Dwg.	Transfer Molded	Tinned Copper	———
MK632V	.75	400	175°C	400	80	5.01 Meg	100 Meg	Ref. Case "C" Dwg.	Transfer Molded	Tinned Copper	With Standoff

Resistance Tolerance: ±1% (consult factory for tighter tolerances).

Overload/Overvoltage: 1.5 times max. voltage for 5 seconds, ΔR 0.5% max.

Operating Temperature: -55°C to +175°C.

Temperature Coefficient: See Table for TC value. TC referenced to +25°C, ΔR taken at -15°C and +105°C.

Insulation Resistance: 10,000 Megohms, minimum.

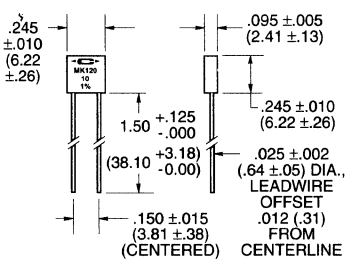
Load Life: 1,000 hours at +125°C at rated power, ΔR 0.5% max.

Thermal Shock: Mil-Std-202, Method 107, Cond. B, ΔR 0.5% max.

Moisture Resistance: Mil-Std-202, Method 106, ΔR 0.5% max.

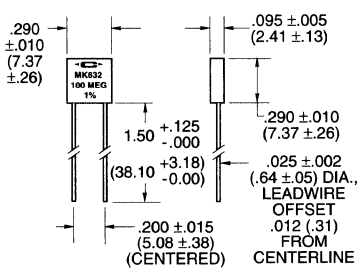
Case "A"

Model MK120 and MK620



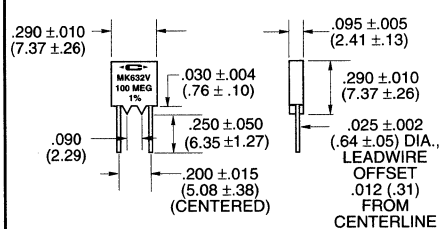
Case "B"

Model MK132 and MK632



Case "C"

Model MK132V and MK632V

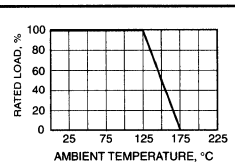


Ordering Information:

MK132 - 5M - 1%

- **Model Number:** MK132
- **Resistor Value:** 5M
- **Tolerance:** 1%

Derating Curve:



ALL DIMENSIONS IN INCHES AND (MILLIMETERS)

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

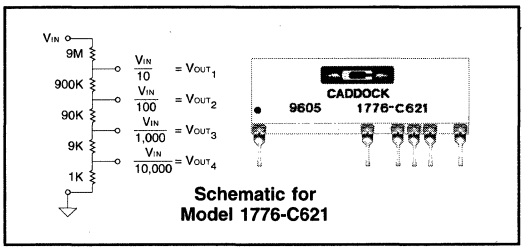
CADDOCK
HIGH PERFORMANCE FILM RESISTORS

Type 1776 Precision Decade Resistor Voltage Dividers

Input Voltage Dividers for Digital Multimeters and Range-Switching Instruments

The exceptional performance of this extensive family of Type 1776 Precision Decade Resistor Voltage Dividers has been achieved through the special combination of advantages provided by Caddock's Tetrinox® resistance films. This advanced film resistor technology provides the performance characteristics required by the precision input signal circuits of both bench-type and laboratory digital instruments.

In addition to requiring less board space, these compact precision resistor networks deliver higher performance than selected discrete resistor sets and thin-film networks.



Schematic for Model 1776-C621

There are now 39 standard models in the expanded family of Type 1776 precision resistor networks that include:

- 3, 4 and 5 - decade voltage dividers with ratios from 10:1 to 10,000:1.
- 1,200 volts continuous ratings and overvoltage to 2,000 volts.
- Many combinations of Ratio and Absolute Tolerance, and Ratio and Absolute Temperature Coefficient.

For complete information on quantity price and delivery, call or write our Sales Office.

Model No.	Resistance Values					Fig.	Voltage Rating ⑦	Absolute Tolerance %	Ratio Tolerance % ①	Absolute TC ppm/°C	Ratio TC ppm/°C ②	Voltage Coefficient of Ratio ppm/volt ③	Ratio Stability % Change in Ratio		
	R1	R2	R3	R4	R5								Load Life ④	Shelf Life ⑤	Over-Voltage ⑥
1776-C61	9 Meg	900 K	90 K	9 K	900	6	1200	0.1	0.1	30	10	0.1	0.01	0.005	0.01
1776-C611	9 Meg	900 K	90 K	9 K	900	6	1200	0.1	0.05	30	10	0.1	0.01	0.005	0.01
1776-C6117	9 Meg	900 K	90 K	9 K	900	6	1200	0.1	0.02	30	10	0.1	0.01	0.005	0.01
1776-C62	9 Meg	900 K	90 K	9 K	1 K	6	1200	0.1	0.1	30	10	0.1	0.01	0.005	0.01
1776-C621	9 Meg	900 K	90 K	9 K	1 K	6	1200	0.1	0.05	30	10	0.1	0.01	0.005	0.01
1776-C6217	9 Meg	900 K	90 K	9 K	1 K	6	1200	0.1	0.02	30	10	0.1	0.01	0.005	0.01
1776-C732	9 Meg	900 K	90 K	9 K	900	7	1200	0.25	0.25	50	50	0.5	0.04	0.02	0.04
1776-C73	9 Meg	900 K	90 K	9 K	900	7	1200	0.1	0.1	50	50	0.5	0.04	0.02	0.04
1776-C742	9 Meg	900 K	90 K	9 K	1 K	7	1200	0.25	0.25	50	50	0.5	0.04	0.02	0.04
1776-C74	9 Meg	900 K	90 K	9 K	1 K	7	1200	0.1	0.1	50	50	0.5	0.04	0.02	0.04
1776-232	9 Meg	900 K	90 K	9 K	900	3	1200	0.25	0.25	50	50	0.3	0.04	0.02	0.04
1776-23	9 Meg	900 K	90 K	9 K	900	3	1200	0.1	0.1	50	50	0.2	0.02	0.01	0.02
1776-231	9 Meg	900 K	90 K	9 K	900	3	1200	0.1	0.05	50	50	0.2	0.02	0.01	0.02
1776-242	9 Meg	900 K	90 K	9 K	1 K	3	1200	0.25	0.25	50	50	0.3	0.04	0.02	0.04
1776-24	9 Meg	900 K	90 K	9 K	1 K	3	1200	0.25	0.1	50	50	0.2	0.02	0.01	0.02
1776-241	9 Meg	900 K	90 K	9 K	1 K	3	1200	0.25	0.05	50	50	0.2	0.02	0.01	0.02
1776-10	9 Meg	900 K	90 K	10 K	N/A	4	1200	+0, -0.5	0.1	30	10	0.02	0.01	0.005	0.01
1776-105	9 Meg	900 K	90 K	10 K	N/A	4	1200	+0, -0.5	0.1	30	5	0.02	0.01	0.005	0.01
1776-C10	9 Meg	900 K	90 K	10 K	N/A	9	1200	+0, -0.5	0.1	30	10	0.02	0.01	0.005	0.01
1776-C105	9 Meg	900 K	90 K	10 K	N/A	9	1200	+0, -0.5	0.1	30	5	0.02	0.01	0.005	0.01
1776-1	9 Meg	900 K	90 K	10 K	N/A	2	1200	0.25	0.05	30	10	0.02	0.01	0.005	0.01
1776-14	9 Meg	900 K	90 K	10 K	N/A	2	1200	0.25	0.1	30	10	0.02	0.01	0.005	0.01
1776-8	9.9 Meg	90 K	10 K	N/A	N/A	1	1200	0.25	0.1	30	25	0.2	0.02	0.01	0.02
1776-81	9.9 Meg	90 K	10 K	N/A	N/A	1	1200	0.25	0.05	30	25	0.2	0.02	0.01	0.02
1776-9	9.9 Meg	90 K	10 K	N/A	N/A	1	1200	0.25	0.1	30	10	0.02	0.01	0.005	0.01
1776-91	9.9 Meg	90 K	10 K	N/A	N/A	1	1200	0.25	0.05	30	10	0.02	0.01	0.005	0.01
1776-912	9.9 Meg	90 K	10 K	N/A	N/A	1	1200	0.25	0.02	30	5	0.02	0.01	0.005	0.01
1776-C4	10 Meg	1.1111M	101.01K	10.01K	1.0001K	8	1200	0.25	0.25	30	10	0.1	0.01	0.005	0.01
1776-C44	10 Meg	1.1111M	101.01K	10.01K	1.0001K	8	1200	0.1	0.1	30	10	0.1	0.01	0.005	0.01
1776-C441	10 Meg	1.1111M	101.01K	10.01K	1.0001K	8	1200	0.1	0.05	30	10	0.1	0.01	0.005	0.01
1776-C4417	10 Meg	1.1111M	101.01K	10.01K	1.0001K	8	1200	0.1	0.02	30	10	0.1	0.01	0.005	0.01
1776-C3	10 Meg	1.1111M	101.01K	10.01K	1.0001K	8	1200	0.5	0.5	50	50	0.5	0.04	0.02	0.04
1776-C34	10 Meg	1.1111M	101.01K	10.01K	1.0001K	8	1200	0.25	0.25	50	50	0.5	0.04	0.02	0.04
1776-C532	900 K	90 K	9 K	900	N/A	5	750	0.25	0.25	25	25	0.4	0.02	0.01	0.02
1776-C53	900 K	90 K	9 K	900	N/A	5	750	0.1	0.1	25	15	0.3	0.02	0.01	0.02
1776-C531	900 K	90 K	9 K	900	N/A	5	750	0.1	0.05	25	15	0.3	0.02	0.01	0.02
1776-C542	900 K	90 K	9 K	1 K	N/A	5	750	0.25	0.25	25	25	0.4	0.02	0.01	0.02
1776-C54	900 K	90 K	9 K	1 K	N/A	5	750	0.1	0.1	25	15	0.3	0.02	0.01	0.02
1776-C541	900 K	90 K	9 K	1 K	N/A	5	750	0.1	0.05	25	15	0.3	0.02	0.01	0.02

Specifications:

(Numbers inside circles reference columns in Model No. table)

① **Ratio Tolerance:** Maximum ratio difference between two resistors in the network. (See the specific Figures for the Ratio Definition).

② **Ratio Temperature Coefficient:** Ratio track from 0°C to +70°C.

③ **Voltage Coefficient of Ratio (ppm/volt):** R1 in series with any combination of R2, R3, R4 and R5, 100 volts to rated voltage.

④ **Load Life:** Ratio stability of resistance under full load at +70°C, rated voltage applied to R1 in series with any combination of R2, R3, R4 and R5.

⑤ **Shelf Stability of Ratio:** Six months at shelf conditions.

⑥ **Overvoltage:** Maximum voltage of 1.67 times rated DC voltage. Volts DC or peak AC applied to R1 and any combination of R2, R3, R4 and R5 in series with R1 for 10 seconds.

⑦ **Voltage Rating:** DC or RMS AC voltage applied to R1 in series with any combination of R2, R3, R4 and R5.

Storage Temperature: -55°C to +85°C.

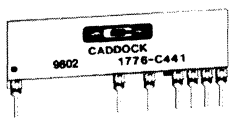
SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

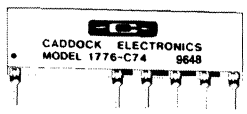
CADDOCK
ELECTRONICS, INCORPORATED

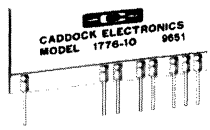
APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

Type 1776 Precision Decade Resistor Voltage Dividers

CADDOCK
HIGH PERFORMANCE FILM RESISTORS







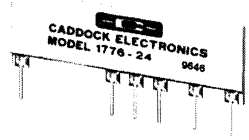
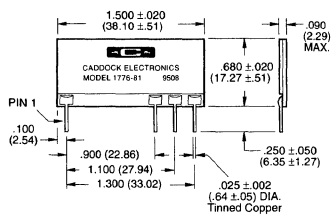


Figure 1



RATIO DEFINITION:
ALL RESISTORS RATIO
ONE ANOTHER

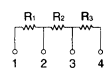
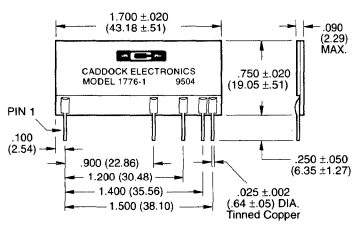


Figure 2



RATIO DEFINITION:
ALL RESISTORS RATIO
ONE ANOTHER

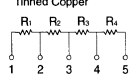
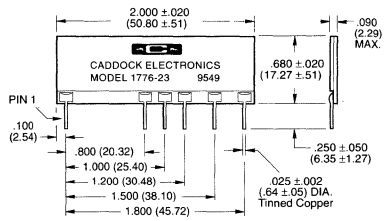


Figure 3



RATIO DEFINITION:
ALL RESISTORS RATIO
ONE ANOTHER

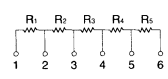
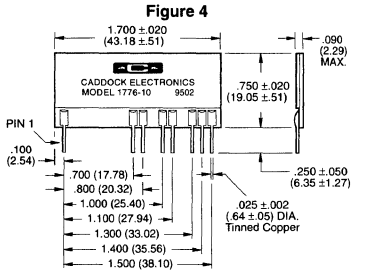


Figure 4



RATIO DEFINITION:
ALL RESISTORS RATIO
ONE ANOTHER

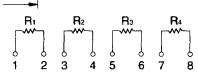
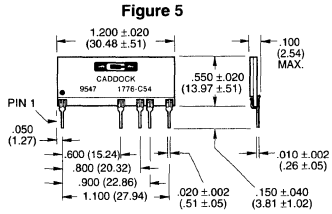


Figure 5



RATIO DEFINITION:
ALL RESISTORS RATIO
ONE ANOTHER

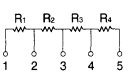
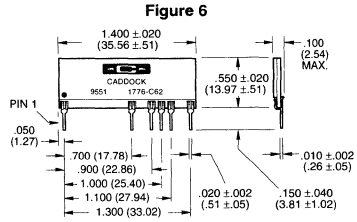


Figure 6



RATIO DEFINITION: Where $R_T = R_1 + R_2 + R_3 + R_4 + R_5$
RATIO 1 $(R_2 + R_3 + R_4 + R_5):R_T$
RATIO 2 $(R_3 + R_4 + R_5):R_T$
RATIO 3 $(R_4 + R_5):R_T$
RATIO 4 $(R_5):R_T$

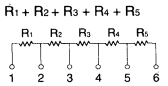
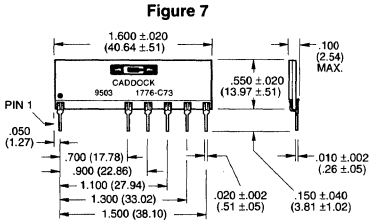


Figure 7



RATIO DEFINITION:
ALL RESISTORS RATIO
ONE ANOTHER

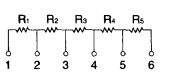
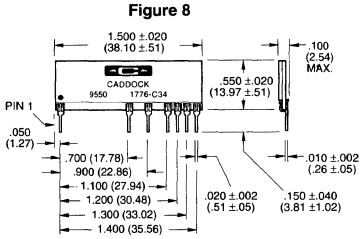


Figure 8



RATIO DEFINITION:
RATIO 1 $R_1:R_2$
RATIO 2 $R_1:R_3$
RATIO 3 $R_1:R_4$
RATIO 4 $R_1:R_5$

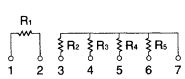
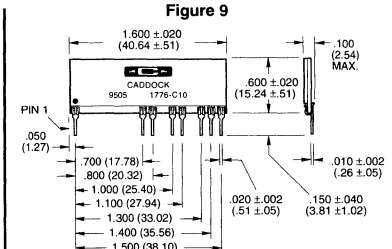
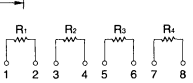


Figure 9



RATIO DEFINITION:
ALL RESISTORS RATIO
ONE ANOTHER



DIMENSIONS IN INCHES AND (MILLIMETERS)

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

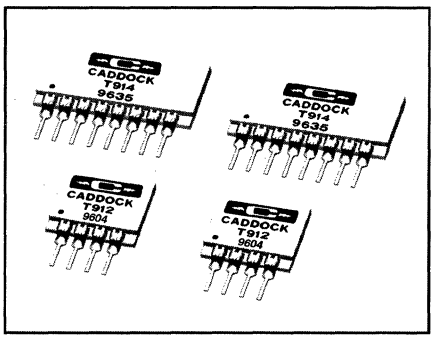
Type T912 and T914 Precision Resistor Networks

Resistor Pairs and Quads with Ratio Characteristics for Precision Analog Circuits

Type T912 and T914 Precision Resistor Networks are constructed with Caddock Tetrinox® resistance films to achieve the precise ratio performance and stability required by highly accurate amplifier circuits, voltage reference circuits and precision bridge circuits.

- **Ratio Tolerance** - from ±0.1% to ±0.01%.
- **Ratio Temperature Coefficient** - 10 ppm/°C, 5 ppm/°C or 2 ppm/°C.
- **Absolute Temperature Coefficient** - 25 ppm/°C.
- **Ratio Stability of Resistance at Full Load for 2,000 hours** - within ±0.01%.
- **Shelf Life Stability of Ratio for 6 Months** - within ±0.005%.

Both the T912 and the T914 are available in 14 standard resistance values between 1,000 ohms and 1 Megohm. Caddock's high thru-put manufacturing capability assures that prototype and large-volume production quantities are available either from stock or within 6 weeks after receipt of order.



Standard Type T912 and Type T914 Precision Resistor Networks

In addition to the 14 standard **equal value** models of the Type T912 and T914, the Type T912 can also be ordered with -

- **10:1 Resistance Ratio** - for use in amplifier gain-setting.
- **9:1 Resistance Ratio** - for use in voltage reference dividers.

Ordering Information: T912 - A 10K - 010 - 02

Model Number

Ratio Code Letter: *
- **A** - T912 with R1: R2 where R2 = 10R1
  - 1K:10K, 10K:100K, 40K:400K
  - 2K:20K, 20K:200K, 50K:500K
  - 5K:50K, 25K:250K, 100K:1 Meg
- **B** - T912 with R1: R2 where R2 = 9R1
  - 1K:9K, 10K:90K, 40K:360K
  - 2K:18K, 20K:180K, 50K:450K
  - 5K:45K, 25K:225K, 100K:900K
- **No Letter** - T912 with R1 = R2
- **No Letter** - T914 with R1 = R2 = R3 = R4

Ratio Temperature Track (0°C to +70°C):*
-10 = 10 ppm/°C, -05 = 5 ppm/°C, -02 = 2 ppm/°C

Ratio Tolerance: * -100 = 0.1%, -020 = 0.02%, -050 = 0.05%, -010 = 0.01%

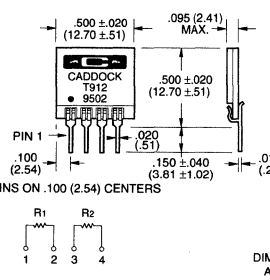
Standard Resistance Values: * (R1)

1K	10K	40K	200K	500K
2K	20K	50K	250K	1 Meg
5K	25K	100K	400K	

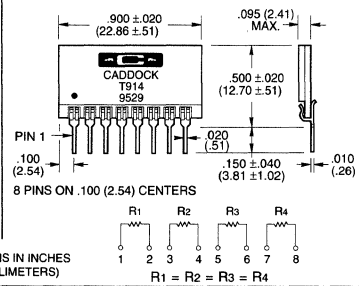
Special or mixed resistance values are available as custom networks. See the custom section at the bottom of this page.

* (This information appears on the back side of the network)

Type T912
Ratios Available: 1:1, 9:1, 10:1 and Custom.



Type T914
Ratios Available: 1:1 and Custom.



DIMENSIONS IN INCHES AND (MILLIMETERS)

Specifications:

Absolute Tolerance: ±0.1% for all resistors.

Absolute Temperature Coefficient: ±25 ppm/°C referenced to +25°C, ΔR taken at 0°C and +70°C.

Voltage Rating: 30 volts DC or RMS AC applied to R1, R2, R3 and R4.

Power Rating: 0.10 watt applied to R1, R2, R3 and R4 (not to exceed rated voltage).

Package Power Rating: Type T912, 0.200 watt. Type T914, 0.400 watt.

Storage Temperature: -55°C to +105°C.

Insulation Resistance Between Isolated Pins: Pin 2 to Pin 3, Pin 4 to Pin 5, or Pin 6 to Pin 7, 1,000 Megohms, minimum.

Dielectric Strength Between Isolated Pins: 50 volts RMS AC.

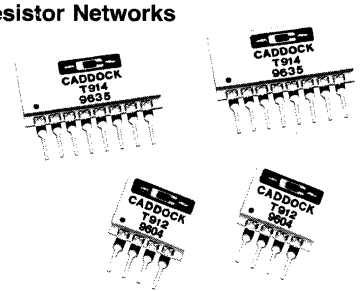
Ratio Stability Under Load: Ratio change between any two resistors in the network under full load for 2,000 hours at +70°C, 0.01% maximum.

Shelf Stability of Ratio: Six months at shelf conditions, 50 ppm maximum.

Custom Model T912 and T914 Precision Resistor Networks

For applications requiring non-standard resistance values, the T912 and T914 custom configurations can include these special features:

- Mixed resistance values with a maximum ratio of 250-to-1. (Example: 1.0 Megohm and 4 K)
- Absolute TC as low as 15 ppm/°C.
- Ratio TC as low as 2 ppm/°C.
- Custom voltage ratings.
- Matched resistors of any special value between 1 K and 2 Megohms.



Call or write our Applications Engineering for performance, price and availability of these custom resistor networks.

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

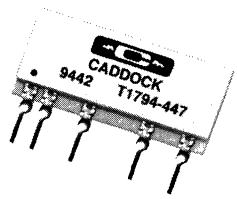
High Performance Resistor Networks

CADDOCK
HIGH PERFORMANCE FILM RESISTORS

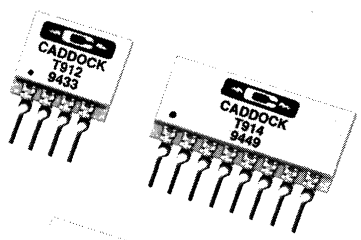
Custom Precision and Ultra-Precision SIP Resistor Networks Engineered to your Application...Fast

FAST
Custom Precision Networks within 6 weeks

- Resistance Values from 1 ohm to 50 Meg
- Absolute Tolerance from ±0.025% to ±0.25%
- Ratio Tolerance as tight as 0.01%
- Absolute TC of 15 ppm, 25 ppm or 50 ppm/°C
- Ratio TC of 5 ppm, 10 ppm, 25 ppm or 50 ppm/°C



Standard Precision SIP Resistor Networks

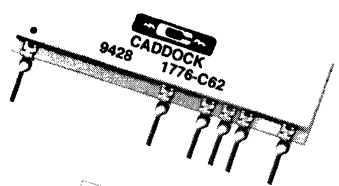


Type T912 Two Resistor Networks
Type T914 Four Resistor Networks

- Ratio Tolerance: 0.01%, 0.02%, 0.05% or 0.10%
- Ratio TC: 2 ppm, 5 ppm or 10 ppm/°C

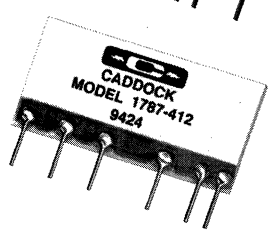
For Precision Analog Design

Type 1776 Decade Voltage Dividers



- Ratios of 10:1, 100:1, 1000:1 and 10000:1
- Ratio Tolerance: 0.02%, 0.05%, 0.10% to 0.50%
- Ratio TC: 5ppm, 10 ppm, 25 ppm or 50 ppm/°C
- 1200V Input Voltage Rating

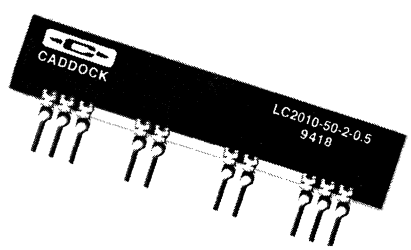
Type 1787 Current Sense Networks



- Resistance Values from 0.9 ohm to 1000 ohms
- 0.1Ω Available in a Custom Network
- Absolute Tolerance from ±0.05% to ±0.25%
- Absolute TC of 25 ppm/°C to 100 ppm/°C

Transient Tolerant Precision SIP Networks

For Telecom Applications and Power Monitoring Applications



- **Lightning Transient Handling Capability**
- 50 ohm pair, 100 ohm pair or 200 ohm pair
- Also Voltage Divider Networks
- Absolute Tolerance from ±0.10% to ±2.0%
- Ratio Tolerance from 0.10% to 0.50%
- Available with optional Spring Thermal cutoff protection

Contact Caddock Applications Engineering for additional product information on these High Performance Resistor Network products.

SALES OFFICE
CORPORATE HEADQUARTERS
1717 CHICAGO AVENUE
RIVERSIDE, CALIFORNIA 92507
PHONE: (909) 788-1700
FAX: (909) 369-1151

CADDOCK
ELECTRONICS, INCORPORATED

APPLICATIONS ENGINEERING
APPLIED SCIENCES DIVISION
17271 NORTH UMPQUA HWY.
ROSEBURG, OREGON 97470
PHONE: (541) 496-0700
FAX: (541) 496-0408

CESIWID
KANTHAL CERAMICS DIVISION
A Sandvik Company
(formerly Sohio/Carborundum)

Cesiwid Non-Inductive Bulk Ceramic Power Resistors

Non-inductive bulk ceramic construction for uniform distribution of energy throughout resistor body. No film or wire to fail.

Choose Type SP for great A-C power handling capability, whether it be at power frequency or many megahertz.

Choose Type AS for its ability to absorb huge amounts of energy and for its non-inductive property at high voltage.

Choose Type A when high resistance is required in a high power non-inductive resistor.

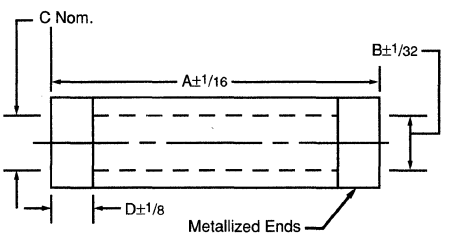
CHARACTERISTICS	Type SP	Type AS	Type A
Maximum Operating Temperature: °C	350	230 150*	230
Temperature Coefficient: Percent per degree C, -55°C to maximum rated temperature	+0.2 -0.08	+0.0 -0.08	+0.0 -0.2
Voltage Coefficient: Maximum percent per kilovolt per inch active length (overall length less termination)	1.0	1.0	–
Short Time Overload: Maximum percent change after 5 cycles 10 times rated power, 5 seconds on, 90 seconds off	2.0	2.0	–
Moisture Resistance: Maximum percent change when tested per MIL-STD-202 method 103	2.5	2.5	2.5

*With epoxy insulation for use in oil.

STANDARD SIZES

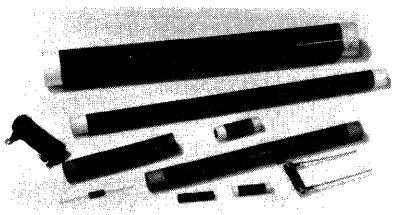
(Special sizes are also available: consult factory.)

Type	A	B	C (SP & AS)	C (A)	D
884 SP	2.0	0.50	0.22	–	0.25
885 SP, AS, & A	2.5	0.75	0.50	0	0.50
886 SP, AS, & A	5.0	0.75	0.50	0	0.62
887 SP, AS, & A	6.0	1.00	0.75	0.5	0.50
888 SP, AS, & A	8.0	1.00	0.75	0.5	0.88
889 SP, AS, & A	12.0	1.00	0.75	0.5	0.88
890 SP, AS, & A	18.0	1.00	0.75	0.5	0.88
891 SP	18.0	2.00	1.50	–	1.0
892 SP	24.0	2.00	1.50	–	1.0



SERIES 800 AND 1000

This general line is available in a wide variety of sizes and terminations. They retain the non-inductive and heavy load characteristics of all Cesiwid ceramic resistors. These resistors can handle up to 1000 watts, 165 KJ and 165 KV in resistance values from 1 ohm to 1 megohm.



Parts are specified by the four or five character type number (for example 885SP, 888AS, 890A), the first two digits of the resistance, a single digit to indicate the power of ten multiplier, and a "J" for ±5%, a "K" for ±10%, or an "L" for ±20%. Where the resistance is less than ten ohms, the power of ten multiplier is not used, and an "R" replaces the decimal point. Thus R50 = 0.50 ohm, 7R5 = 7.5 ohm, 220 = 22.0 ohm, 152 = 1500 ohm, etc. Standard construction for SP resistors is aluminum metalization. Type A resistors have nickel metalization. Type AS resistors have silver metalization with a dielectric coating. This standard feature is designated by part number suffix "DS." Radial tab ("G") and axial tab ("H") terminations are available on SP and AS resistors. "No Arc" ("N") butt-end terminations are available on Type AS and A resistors for applications requiring high energy or current density performance. Epoxy coating is available on AS and A resistors for use in oil ("O"). Typical part numbers: 889SP501K represents a Type SP, 500 ohm ±10%, 886AS500KDS represents a standard Type AS, 50 ohm ±10%, with dielectric coating and silver terminations. 890A503L represents Type A, 50,000 ohm ±20%. 886AS500KNO represents Type AS, 50 ohm ±10% with "No Arc" terminal and epoxy coating. Consult plant for termination dimension details and additional options and part number detail.

ELECTRICAL SPECIFICATIONS

Length and Diameter	Type	Resistance Available (ohms) Min.	to Max.	Average Power @ 40 C (watts)	Peak** Energy (joules)	** Peak*** Voltage (volts)
2" x 1/2"	884SP	1.0	200	22.5	250	1,000
2-1/2" x 3/4"	885SP	1.0	130	45	250	1,000
	885AS	6.0	1200	15	2,800	8,000
	885A	1500	220K	15	750	3,750
5" x 3/4"	886SP	1.0	330	90	500	4,000
	886AS	15.0	3300	30	7,000	20,000
	886A	3900	390K	30	1,500	10,000
6" x 1"	887SP	1.0	330	150	1,600	4,000
	887AS	12.0	3300	50	13,000	30,000
	887A	3900	390k	50	6,000	12,000
6" x 1-1/2"	1026AS	5.0	1200	70	37,000	30,000
8" x 1"	888SP	1.0	390	190	2,100	6,000
	888AS	15.0	3900	75	16,500	45,000
	888A	4700	470K	60	7,500	15,000
8" x 1-1/2"	1028AS	6.5	1875	100	46,000	45,000
12" x 1"	889SP	1.0	680	275	3,200	10,000
	889AS	25.00	6800	100	27,000	75,000
	889A	8200	680K	90	12,500	25,000
12" x 1-1/2"	1032AS	9.0	2500	150	75,000	75,000
18" x 1"	890SP	1.0	1000	375	4,200	16,000
	890AS	40.0	10K	150	43,000	120,000
	890A	12K	1M	125	20,000	40,000
18" x 1-1/2"	1038AS	15.0	3800	225	119,000	120,000
18" x 2"	891SP	1.0	450	750	15,000	16,000
24" x 2"	892SP	1.0	600	1000	17,500	22,000
24" x 1-1/2"	1044AS	20.0	4800	300	164,000	165,000

**Allowable peak energy/voltage will depend on the resistance value. Consult Cesiwid. ***Derate by 50% with epoxy coating. Energy ratings are based on pulses <10 milliseconds. Type SP ratings can be substantially greater for longer pulses. Consult Cesiwid.

CESIWID INC. 3425 Hyde Park Blvd. • Niagara Falls, NY 14302 • Tel: 716-286-7610 • Fax: 716-286-7601
www.cesiwid.com • email: ceramic@cesiwid.com

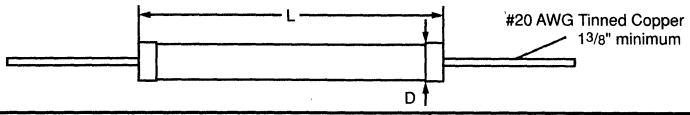
CESIWID
KANTHAL CERAMICS DIVISION
A Sandvik Company
(formerly Sohio/Carborundum)

Cesiwid Non-Inductive Power Resistors For Special Problem Solutions

SERIES 100/200 TYPE AS & SP AXIAL LEADED RESISTORS

Candidates for Replacement of Carbon Composition Resistors

Type AS for high voltage and energy applications.
Type SP for high AC and power handling capabilities.



SPECIFICATIONS	TYPE AS	TYPE SP
Short Time Overload, 10 Cycles 1000% Rated Power, 5 Sec. On, 90 Sec. Off	±2% Max.	±5% Max.
Life Test, 1000 Hour @ Rated Power	±5% Max	±5% Max.
Temperature Coefficient	+0.0 to -0.08%/°C	+0.2 to -0.08%/°C

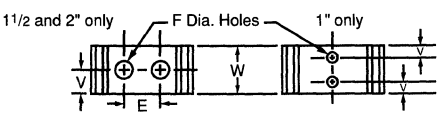
Body Size	Resistance Range, Ohms	Dia. (D) Max. in. (mm)	Length (L) Max. in. (mm)	Rated Peak** Voltage	Average* Power Rating, Watts @ 40°C Amb.	Rated* Peak Energy, Joules	Peak Current Amps
231AS	25-6,350	0.2 (5.1)	0.75 (19.1)	1,500 V	1.5	75	25
231SP	1-1,000	0.2 (5.1)	0.75 (19.1)	375 V	3	15	360
233AS	6-1,800	0.31 (7.9)	0.75 (19.1)	1,100 V	2	170	35
233SP	1-120	0.31 (7.9)	0.75 (19.1)	375V	7	20	550
234AS	12-5,000	0.31 (7.9)	1.125 (28.6)	2,500 KV	3	275	35
234SP	1-330	0.31 (7.9)	1.125 (28.6)	500 V	10	30	550
250AS	4-1,200	0.44 (11.1)	0.75 (19.1)	1,500 V	2.5	260	45
250SP	1-150	0.44 (11.1)	0.75 (19.1)	375 V	8.5	20	700
251AS	8-2,300	0.44 (11.1)	1.125 (28.6)	2,500 V	3.5	400	45
251SP	1-350	0.44 (11.1)	1.125 (28.6)	500 V	12	30	700
102AS	30-9,000	0.31 (7.9)	2.125 (54.0)	3,000 V	5	600	35
102SP	1-700	0.31 (7.9)	2.125 (54.0)	1,000 V	15	50	550
104AS	55-18,000	0.31 (7.9)	4.125 (104.8)	9,000 V	9	1,200	35
104SP	2-1,500	0.31 (7.9)	4.125 (104.8)	3,600 V	25	95	550
106AS	90-30,000	0.31 (7.9)	6.125 (155.6)	15,000 V	13	1,900	35
106SP	3-2,400	0.31 (7.9)	6.125 (155.6)	5,000 V	36	155	550
109AS	150-48,000	0.31 (7.9)	9.125 (231.8)	25,000 V	20	3,000	35
109SP	4-3,800	0.31 (7.9)	9.125 (231.8)	6,600 V	55	250	550

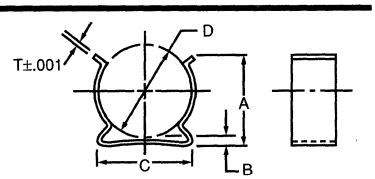
*Rated Power. Derate linearly to 0 Watts at 230°C for Type AS. Derate linearly to 0 Watts at 350°C for Type SP. **Allowable peak energy/voltage will depend on the resistance value and pulse width. Consult Cesiwid. Energy ratings are based on pulse <10 milliseconds. Type SP ratings can be substantially greater for longer pulses. Consult Cesiwid. Peak Current ratings presume pulse energy approaching rated peak energy values. Allowable current can be higher for lower energy values. Consult Cesiwid.

TERMINATION AND MOUNTING

Electrical connection to the resistive bodies of resistors is made by metal end bands. The standard metal is aluminum for Type SP, silver for Type AS and nickel for Type A. Special terminations of brass, copper or tinned ends are also available. Add "B", "C," or "T" respectively to the part number to designate these special terminations.

In most cases, connections to the resistors may be made by stock clips and connector caps such as these:



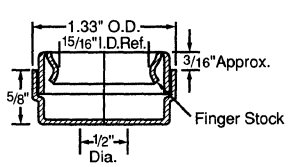


MOUNTING CLIPS DIMENSIONS

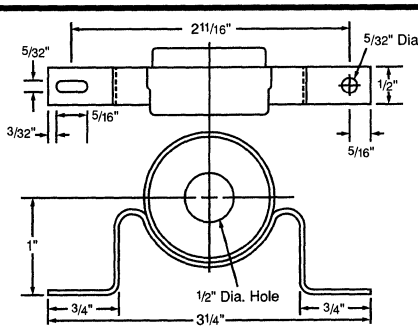
Stock No.	Size	Holes	A	B	C	D	E	F	T	V	W
35370	1/2"	1	0.620	0.090	0.560	0.500		0.093	0.020	0.188	0.375
35267	3/4"	1	0.940	0.155	0.830	0.750		0.144	0.020	0.312	0.625
35268	1"	2	1.230	0.170	1.070	1.000		0.128	0.024	0.156	0.625
35371	1-1/2"	2	1.650	0.100	1.650	1.500	0.925	0.103	0.032	0.250	0.500
35269	2"	2	2.375	0.544	1.080	2.000	0.375	0.125	0.043	0.375	0.750

Material: Beryllium Copper Finish: Electro Tin Plate

CONNECTOR CAPS



Part G-4361
Connector Cap Assembly (without strap)
Material: Copper Cap, Beryllium-Copper Finger Stock



Part G-4362
Connector Cap Assembly (with strap)
Material: Copper Cap, Beryllium Copper, Finger Stock and Strap

CESIWID INC. 3425 Hyde Park Blvd. • Niagara Falls, NY 14302 • Tel: 716-286-7610 • Fax: 716-286-7601
www.cesiwid.com • email: ceramic@cesiwid.com

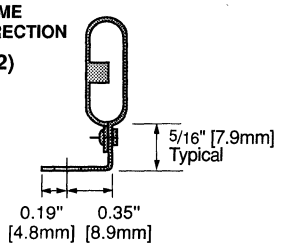
CESIWID
KANTHAL CERAMICS DIVISION
A Sandvik Company
(formerly Sohio/Carborundum)

Cesiwid Non-Inductive Bulk Ceramic Slab & Disc Resistors

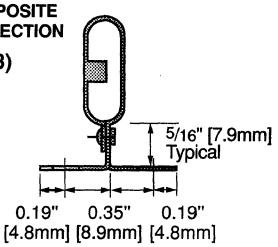
SERIES 500SP NON-INDUCTIVE BULK CERAMIC SLAB RESISTORS

Series 500SP Slab Resistors provide high power and energy dissipation in a slim, compact size. The Series 500SP design enables the designer to minimize resistor package size and cost while providing unequaled performance and reliability.

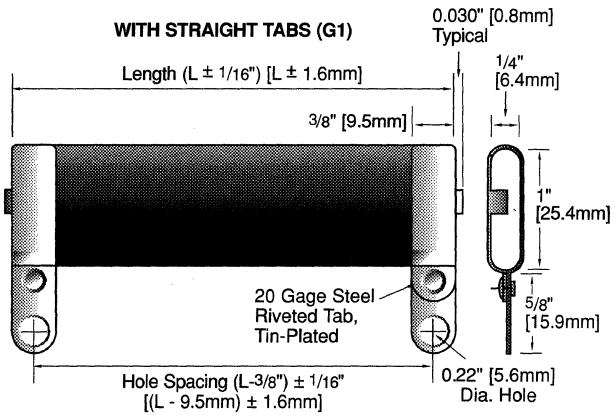
WITH RIGHT ANGLE TABS SAME DIRECTION (G2)



WITH RIGHT ANGLE TABS OPPOSITE DIRECTION (G3)



WITH STRAIGHT TABS (G1)

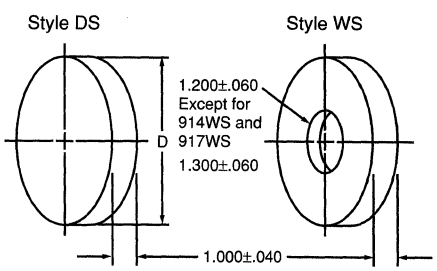


Type	Length (L)	Resistance Range (Ohms)	Average Power @ 40°C Amb. (Watts)	Peak* Energy @ 40°C Amb. (Joules*)	Peak Voltage (Volts)	Resistor Element Weight (Grams)
502SP	2" [50.8mm]	0.2 80	30	150	900	15
503SP	3" [76.2mm]	0.3 150	45	290	1900	22.5
504SP	4" [101.6mm]	0.4 210	60	480	2800	30
506SP	6" [152.4mm]	0.8 340	90	800	4700	45
508SP	8" [203.2mm]	1.0 470	120	1100	6700	60
510SP	10" [254.0mm]	1.3 600	150	1400	8500	75

*Based on energy absorption in less than 10 milliseconds. Energy rating can be substantially greater for longer pulses. Contact CESIWID.

SERIES 900 DISC AND WASHER STYLE RESISTORS

This Type AS high energy series is available in solid discs and washer styles.



SPECIFICATIONS

Type	Style	Diameter "D" (inches)	Peak Energy (joules)	Available Resistances Minimum	Maximum
911DS	Solid Disc	1.60± 0.06	9,000	1.6	100
912DS	Solid Disc	2.37± 0.06	21,000	0.7	90
913DS	Solid Disc	3.00± 0.08	33,000	0.5	56
914DS	Solid Disc	3.75± 0.08	52,500	0.3	36
913WS	Washer	3.00± 0.08	27,600	0.5	78
914WS	Washer	3.75± 0.08	47,000	0.3	40
915WS	Washer	4.37± 0.08	65,500	0.2	28
916WS	Washer	4.75± 0.08	79,500	0.2	24
917WS	Washer	5.00± 0.08	80,500	0.2	20

CHARACTERISTICS

Maximum Temperature	230°C
Minimum Peak Voltage	5000 volts
Contacts	Brass metallization on faces
Recommended contact pressure	25 psi minimum; 100-300 psi preferred
Power Rating	Dependent upon mounting. In free air, parts will safely dissipate 2.5 watts per square inch of surface area at 40°C
Temperature coefficient of resistance	-0.1%/°C to 0.0%/°C

CESIWID INC. 3425 Hyde Park Blvd. • Niagara Falls, NY 14302 • Tel: 716-286-7610 • Fax: 716-286-7601
www.cesiwid.com • email: ceramic@cesiwid.com

BREL

BREL PRECISION COMPONENTS

SRT Resistor Technology

- **Chip-Resistors in Thickfilm Technology**
- **Wirewounded Products**
- **Leaded Resistors**
- **Temperature Sensor Chips**
- **Chip Resistors in R-Networks in Thinfilm Technology**

Chip-Resistors in Thikfilm Technology

Types		Sizes	Range	Tolerances	TCR (ppm/K)	Characterization	Connection Technique	Main Application
CRS	Miniature/Standard Chip Resistors	0302/0402/0504/ 0603/0805/1206	OR1...100M	0.5...20%	50/250	Ni/SnPb-Contacts Glass Passivation	Soldering	Industry Electronics Hearing Aid Industry
CHS	High Value Chip Resistors	0402/0603/0805/ 1206/1210/2512	10M...100G	2...30%	100/3000	PtAg-Contacts	Soldering/ Glueing	Automotive Sensor Electronics
CRW	Power Chip Resistors	1210/1216/2010/ 2040/2512	OR1...10M	1...20%	50/250	Ni/SnPb-Contacts Glass Passivation	Soldering	Industry Electronics
CRA	Trimmable Chip-Resistors	0612/0805/1206/ 1216/1216H	1R...10M	5...30%	50/250	Ni/SnPb-Contacts Glass Passivation	Soldering	Industry Electronics Sensor Electronics
CRB	Trimmable Chip-Resistors	0612/0805/1206/ 1216/1216H	1R...10M	5...30%	50/250	PtAg-Contacts	Soldering/ Glueing	Industry Electronics Sensor Electronics
CHR	Chip-Resistors for Conductive Glueing	0402/0504/0603/ 0805/1206	1R...10M	0.5...20%	50/250	PtAg-Contacts	Soldering/ Glueing	Industry Electronics Data Processing

Leaded Resistors

Types		Sizes	Range	Tolerances	TCR (ppm/K)	Characterization	Connection Technique	Main Application
RKL2/5	Miniature Carbonfilm Resistor	<0103/<0204	10R...47M	5...20%	–	Resistor without End Caps	Soldering	Hearing Aid Industry
GST	High Value Thickfilm Resistor	1210/2512	1M...1T	1...50%	100/3600	Radial Leads Variable Spacing	Soldering	Industry Electronics Sensor Electronics
HVR	High Voltage Thickfilm Resistor	30/40/40	1M...1T	1...30%	50/1000	Radial or Axial Leads	Soldering	Measuring Equipment
AST	Trimmable Thickfilm Resistor	25/25H	10R...1M	10...30%	50/100	Radial Leads Spacing 2.5 mm	Soldering	Industry Electronics
LMR	Miniature Thickfilm Resistor	0504/0805/1206	OR1...100M	1...20%	50/250	Radial Leads	Soldering	Hearing Aid Industry Industry Electronics

Chip-Resistors and R-Networks in Thinfilm Technology

Types		Sizes	Range	Tolerances	TCR (ppm/K)	Characterization	Connection Technique	Main Application
CMF	Precision Chip-Resistors	0603/0805/1206	5R1...5M	0.05...1%	10/50	Ni/SnPb-Contacts Polymer Passivation	Soldering	Industry Electronics Measuring Equipment
SRN	Precision Chip Resistors R-Networks	0.5 x 0.5 mm up	100R...1M	abs. 0.05..1% rel. 0.025% up	abs. 5/25 rel. 1 up	Si-Substrate with AL-Bonding Pads	Bonding	Automotive Aerospace
SCN	Precision SMT R-Networks	SOT143/SOT223/ SO8/SO14/SO16	100R...1M	abs. 0.05..1% rel. 0.025% up	abs. 5/25 rel. 1 up	Molded Si-Substrate	Soldering	Measuring Equipment Industry Electronics
HPN	Precision SIL/DIL-R-Networks	SIL/DIL-Spacing 1.27/2.5/2.54 mm	20R...10M	abs. 0.05..1% rel. 0.025% up	abs. 5/25 rel. 1 up	Ceramic-Substrate Conformal Coated	Soldering	Measuring Equipment Industry Electronics

Temperature Sensor Chips

Types		Sizes	Range	Tolerances	TCR (ppm/K)	Characterization	Connection Technique	Main Application
TRS	PTC-Temperature Sensors in Thinfim Tech.	0805/1206	100R...10K	0.5...5%	+3300/ +3850	SMT-Sensors	Soldering	Industry Electronics Sensor Electronics
TPS	PTC-Temperature Sensors in Thickfim Tech.	0402/0603 0805/1206	1R...1K	5...20%	+1500/ +4000	SMT-Sensors	Soldering/ Glueing	Industry Electronics Sensor Electronics

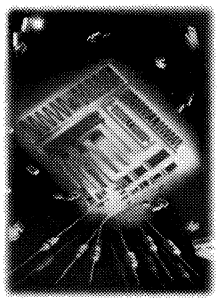
Wirewounded Products

Types		Sizes	Range	Tolerances	TCR (ppm/K)	Characterization	Connection Technique	Main Application
CCK	Chip Coils on Ceramic Core	0603/0805/1206	1.0...3000nH	2...20%	–	High Q-Values High SRF	Soldering/ Glueing	Hearing Aid Industry Industry Elect. Telecom
CCF	Chip Coils on Ferrite Core	0805/1206	1000... 68000 nH	5...20%	–	High Inductance High Current Capacity	Soldering/ Glueing	Industry Electronics Telecom
CCW	Wirewounded Chip Resistors	0805/1206/2512	0.1...1000Ω 1R...1K	1...10%	10/15	High Impulse Load	Soldering/ Glueing	Industry Electronics

This "Specials" program evolved out of the requirements of medium sized companies and meets those requirements which are not or cannot be met satisfactorily by the mass-manufacturers. This has necessarily resulted in the fact that SRT is the sole supplier for many of its customers which in turn makes increased demands on quality and delivery performances.

Today the internal processing meets DIN ISO 9000 to a large extent and together with the technological base it is already accepted by several renowned customers.

In addition to the standard products, SRT offers customized problem solving in resistor areas with normal or PTC-characteristics on ceramic or stainless steel substrates. For example, also in the range of 10 to 100 Megohms, by close control of production parameters it is possible to supply resistor products with TCR 25 or even lower.



Our well-known small leaded resistors type RKL2 with the main customers in the hearing aid industry, the product range was recently extended to include new essential types which facilitate new solutions of electronic problems, including a new leaded type LMR0504 taking over the title "the smallest leaded resistor in the world" from the older type RKL2:

- **Chip-Resistors for bonding and glueing**
- **High Value Chip and Leaded Resistors**
- **Miniature Leaded Thickfilm Resistors**
- **Precision Chip-Resistors and Networks**
- **Power Chip-Resistors Thickfilm and wirewounded**
- **Trimmable Resistors**
- **High Voltage Resistors**
- **Temperature Sensors**
- **Miniature Chip Coils**

In the new product group "Wirewounded Chip Coils" the production has been started with the size 0603, the smallest wirewounded coil on the market,

A new activity is our working as distributor for miniReel, a supplier of a variety of passive and active components on small reels or in bags with short lead times.

BREL

BREL PRECISION COMPONENTS

1621 West University Parkway
Sarasota, FL 34243
Sales: 1-800-237-4564
Phone: (941) 355-9791
Fax: (941) 355-1530

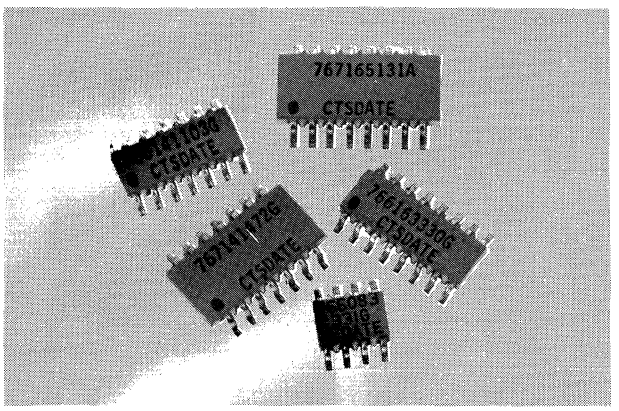
CTS CORPORATION

See the full catalog at **http://www.ctscorp.com**

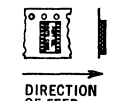
Resistive Solutions For The World.

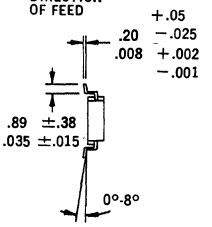
Leaded Surface Mount Resistor Networks

CTS Resistor Products • 406 Parr Road • Berne, IN 46711 • Tel. (219) 589-8220 • FAX (219) 589-3243



SERIES 766





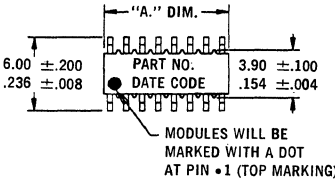
NO. PINS	"A" DIM.
8	4.90 ±.10 / .193 ±.004
14	8.65 ±.10 / .340 ±.004
16	9.90 ±.10 / .390 ±.004

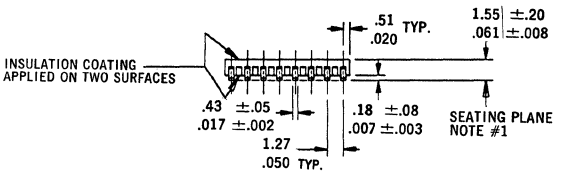
NOTE: 16 PIN ILLUSTRATED

mm / inch DIMENSIONS

mm & inch DIMENSIONS ARE NOT EQUIVALENT

NOTES:
1. LEADS TO BE FORMED TO ±.05 / ±.002 PLANARITY.





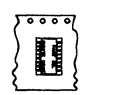
SPECIFICATIONS

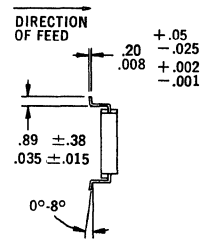
- **Resistance Range:** Standard 10 ohm to 1.0 Megohm
- **Resistance Tolerance:** Standard ±2%
  Special 0.5% or 0.5 ohm (whichever greater)
- **Max Operating Voltage:** 50V not to exceed rated power
- **Temp. Coefficient:** ±100 PPM typical
- **Operating Temp. Range:** –55°C to +125°C
- **Storage Temp. Range:** –55°C to +125°C
- **Dielectric Strength:** 100V
- **Power Rating:** Total network power

	Series 766			Series 767	
	8 Pin	14 Pin	16 Pin	14 Pin	16 Pin
@ 70°C	0.6w	1.0w	1.2w	1.3w	1.5w
@ 25°C	0.9w	1.6w	1.8w	2.0w	2.3w

*Custom networks can usually be designed to exceed resistance range. Individual resistor power, maximum operating temperature and maximum operating voltage standard. TCR may be affected by some custom network requirements.

SERIES 767





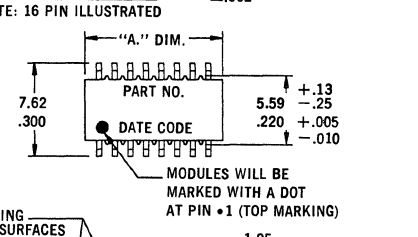
NO. PINS	"A" DIM.
14	9.91 +.25 −.13 / .390 +.010 −.005
16	11.18 +.25 −.13 / .440 +.010 −.005

NOTE: 16 PIN ILLUSTRATED

mm / inch DIMENSIONS

mm & inch DIMENSIONS ARE NOT EQUIVALENT

NOTES:
1. LEADS TO BE FORMED TO ±.05 / ±.002 PLANARITY.



How to Order

767 — 14 — 3 — 101 — G — TR

Series
766
767

Number of Pins
14
16

Schematic
1 Bussed
3 Isolated
5 Dual Terminator

Resistor Code

Tolerance
1 & 3
J = ±5%
G = ±2%
A = Circuit 5

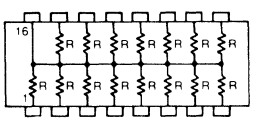
Packaging
TR = Tape & Reel
SP = Slide Pack

Resistor Code
Bussed and Isolated
First two digits are significant
Third digit is multiplier
Dual Terminator — Call factory

Packaging
TR - Tape and Reel
Series 766, 8 pins - 12 mm wide
Series 766, 14 and 16 pins - 16 mm wide, 7" or 13" reels
Series 767, 14 and 16 pins - 24 mm wide, 13" reels
SP - Slide Pack - All slide packs are 20" length

ORDERING INFORMATION: Place orders using above address.

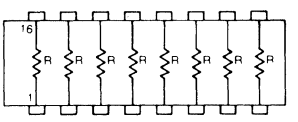
STANDARD CIRCUITS



1 Circuit Bussed

Maximum Resistor Power*

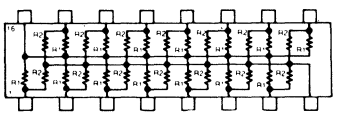
	Series 766	Series 767
@ 25°C	.12 w	.15 w
@ 70°C	.08 w	.1 w



3 Circuit Isolated

Maximum Resistor Power*

	Series 766	Series 767
@ 70°C	.16 w	.2 w
@ 25°C	.24 w	.3 w



5 Circuit Dual Terminator

Maximum Resistor Power*

	Series 766	Series 767
@ 70°C	.08 w	.1 w
@ 25°C	.12 w	.15 w

NOTE: 16 pin illustrated. * Not to exceed maximum network power.

CTS CORPORATION

Resistive Solutions For The World.

See the full catalog at http://www.ctscorp.com

Leadless Surface Mount Resistor Networks

CTS Resistor Products • 406 Parr Road • Berne, IN 46711 • Tel. (219) 589-8220 • FAX (219) 589-3243

Surface Mount Series 752

Resistance Range:
Standard: 10Ω to 1 MegΩ

Resistance Tolerance:
Standard: ±2%
Special: ±1% or 0.5Ω
(whichever is greater)

Maximum Operating Voltage:
25V not to exceed rated power

Temperature Coefficient:
Standard: ±200 PPM/°C
Special: ±100 PPM/°C
(33Ω to 1 MegΩ)

Dielectric Strength:
100 VAC

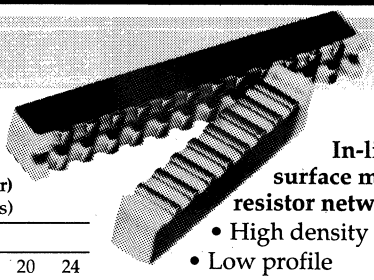
Operating Temperature Range:
–55°C to +125°C

Power Rating: (Total Network Power)
Number of input/outputs (watts)

SRT	8	9	10	12				
DRT					16	18	20	24
@ 25°C	1.2	1.3	1.4	1.7	1.4	1.5	1.6	2.0
@ 70°C	0.8	0.85	0.9	1.1	0.9	0.95	1.0	1.3

Maximum Resistor Power
(Not To Exceed Total Network Power)

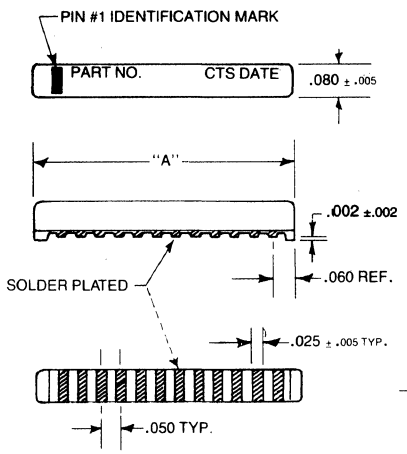
	Bussed & Dual Terminator Schematic	Isolated Schematic
@ 25°C	.12w	.24w
@ 70°C	.08w	.16w



In-line surface mount resistor networks

- High density packaging
- Low profile
- Input/outputs available:
  Dual Row Terminations - 16, 18, 20, 24
  Single Row Terminations - 8, 9, 10, 12
- Solder coated pads
- Designed for visual inspection of solder joints
- 24mm tape & reel packaging
- Custom circuits available
- Meets UL-94VO requirements

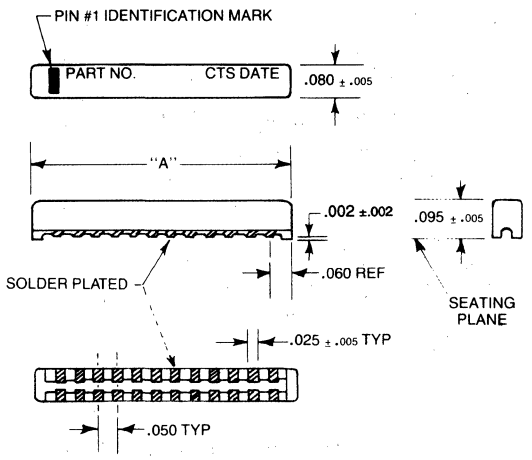
Single Row Termination
SRT



NOTES:
1. MODULES MAY HAVE CIRCUITRY ON TWO SIDES.
2. INSULATION COATING WILL BE APPLIED ONLY ON SURFACES WITH CIRCUITRY.

Input/Outputs "A" Dim.	
SRT	
8	.465 ± .005
9	.515 ± .005
10	.565 ± .005
12	.665 ± .005
SRT	
8	.465 ± .005
9	.515 ± .005
10	.565 ± .005
12	.665 ± .005

Double Row Termination
DRT



For Standard Electrical Schematics, Resistor Values, Land Patterns, Power Derating, Packaging, Environmental Performance Specifications, and Custom Networks/Schematics, Consult Factory.

How to Order Series 752 In-Line SM Networks

Custom Networks
Custom networks are either a customer part number or a non-descriptive CTS part number. Send documentation to CTS Sales Office giving schematic, resistor values and tolerance, and other non-standard information. Consult factory for custom network information.

752 16 3 101 J TR

Series (752)

Input/Ouputs

SRT	DRT
08	**16**
09	18
10	20
12	24

Schematic
1 Bussed
3 Isolated
5 Dual Terminator
(5 not available in 16, 18, 20 or 24 I/Os.)
(Consult factory)

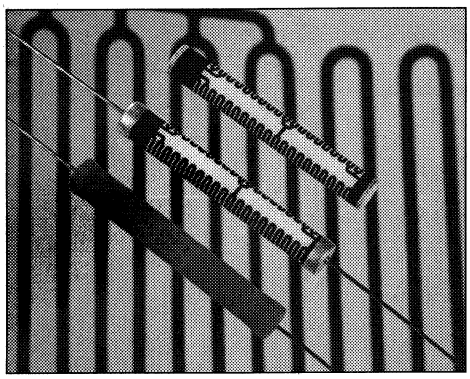
Resistor
(for standard values, consult factory)

Tolerance

Schematic 1 & 3	Schematic 5
J = ±5%	All 5 Schematic networks are ±2% tolerance.
G = ±2%	
F = ±1%	

Packaging
TR = Tape & Reel
B = Bulk (Consult factory)

HIGH VOLTAGE RESISTORS

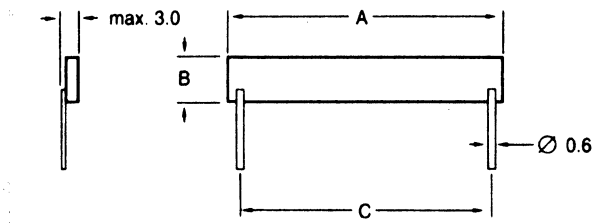


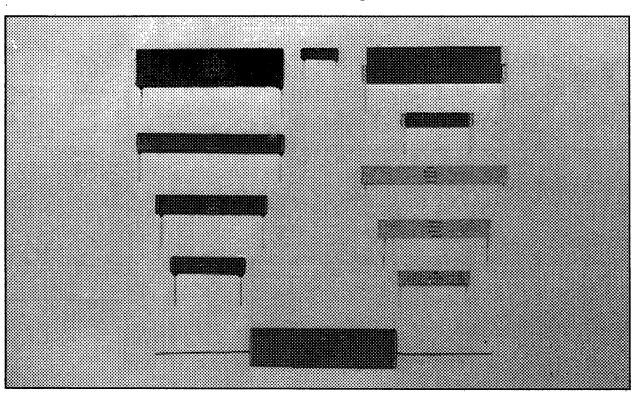
SPECIFICATIONS

- **Resistance Tolerance:**
  Standard ±10%, ±5%, ±2%, ±1%, ±0.5%, ±0.25%, ±0.1%
- **Temperature Coefficient:**
  Standard ±80ppm/°C from –15°C to +105°C, referenced to +25°C
- **Load Life:**
  1,000 hours at rated power, ΔR 0.5% max.
- **Lead Material:**
  O.F.H.C. Copper tin plated.
- **Encapsulation:**
  Silicone Conformal

High Voltage Resistors for high density packaging

3 different coatings available





Series FEX with Epoxy Protection

Model No.	Watt-age	Max Continuous Oper. Volt.	Dimensions in millimeters (inches)		
			A (max.)	B (max.)	C
FEX1/4	.25	3750	13.80	5.00	10.20 ± .50
FEX4/5	.80	7500	26.10	6.70	22.90 ± .50
FEX3/2	1.50	11300	38.90	7.90	35.50 ± .50
FEX2	2.00	15000	51.50	8.10	48.20 ± .50
FEX2/2	3.00	22000	51.50	14.40	48.20 ± .50

SPECIFICATIONS

- **Resistance Range:**
  200 Ohms to 2000Meg
- **Temperature Coefficient:**
  ±0.5% to ±10%
- **Temperature Coefficient:**
  ±50ppm/°C to ±250ppm/°C depending on value
- **Max. Operating Voltage:**
  on request up to 35% higher than listed.
- **Voltage Coefficient (typically):**

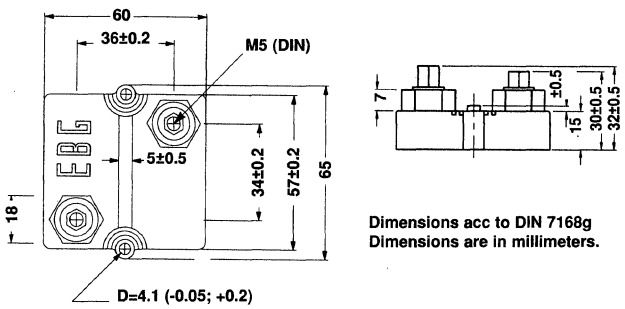
Resistance Range	-ppm/V
200R - 1M	0.1 - 1.0
1M - 100M	0.2 - 3.0
100M - 2000M	0.5 - 10.0

Model No.	Wattage	Max. Cont. Oper. Volt. (KV)	Dielect. Strength	Resistance		Dimensions in millimeters (inches)		
				Min.	Max.	A	B	C
OGP 13	0.60	1.5	1000	200R	1000M	13.30±.50	4.20±.50	.60±.05
OGP 20	1.00	2.0	1000	400R	2000M	19.70±.50	4.20±.50	.60±.05
OGP 26	1.25	4.0	1000	600R	2000M	26.20±.50	4.20±.50	.60±.05
OGP 30	1.50	5.0	1000	800R	2000M	32.30±.50	4.20±.50	.60±.05
OGP 39	2.00	6.0	1000	1000R	2000M	39.40±.50	4.20±.50	.60±.05
OGP 52	2.50	10.0	1000	400R	2000M	49.50±.50	4.20±.50	.60±.05
SGP 20	1.50	2.0	1000	600R	2000M	20.20±.50	8.20±.50	1.00±.05
SGP 26	2.50	4.0	1000	600R	2000M	26.90±.50	8.20±.50	1.00±.05
SGP 39	3.00	7.5	1000	500R	2000M	39.50±.50	8.20±.50	1.00±.05
SGP 52	5.00	10.0	1000	400R	2000M	52.10±.50	8.20±.50	1.00±.05
SGP 78	7.50	15.0	1000	600R	2000M	77.70±.50	8.20±.50	1.00±.05
SGP 103	8.00	20.0	1000	800R	2000M	102.90±.50	8.20±.50	1.00±.05
SGP 124	10.00	25.0	1000	1000R	2000M	123.70±.50	8.20±.50	1.00±.05
SGP 154	15.00	30.0	1000	1000R	2000M	153.70±.50	8.20±.50	1.00±.05

E B G INC.
3705 Trindle Road, Camp Hill, PA 17011
PHONE # 717 737 9877 FAX # 717 737 9664
http://www.ebgusa.com email: sales@ebgusa.com

HIGH POWER RESISTORS

UXP-600

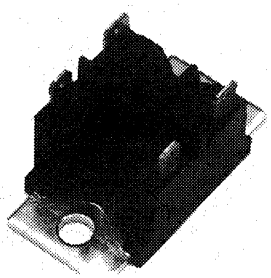


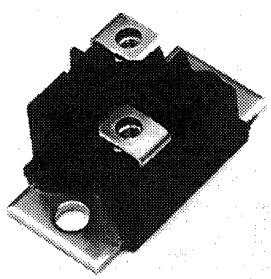
Dimensions acc to DIN 7168g
Dimensions are in millimeters.

SPECIFICATIONS - UXP-600

- **Resistance Values:** 0.5 Ohm to 100 K
- **Resistance Tolerance:** ±5% to ±10%
- **Temperature Coefficient:** ±150ppm/°C (others upon request)
- **Insulation Resistance:** 10,000 Megohm Minimum at 500V
- **Operation Temperature:** –55°C to +140°C (up to 200°C upon request)
- **Power Rating**:** 600 Watts at 70°C heatsink temperature
- **Maximum Working Voltage:** 5,000 Volt DC
- **Electric Strengths Voltage:** up to > 10,000 Vrms, 50 Hz, 1 Min.
- **Single Shot Voltage:** up to 12 kV Normwave (1,5/50µsec)
- **Creeping Distance:** 42 mm Minimum
- **Air Distance:** 14mm Minimum
- **Partial Discharge:** to be specified
- **Inductance:** <=80 nH
- **Capacity/Mass:** <=110 pF
- **Max. Torque for Contacts:** 200 Ncm
- **Max. Torque for Mounting:** 180 Ncm

HPP, HPS

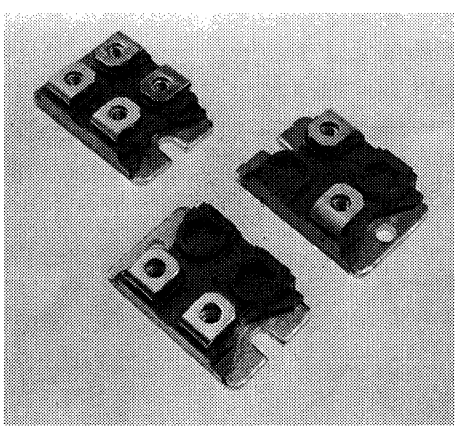




SPECIFICATIONS - HPP, HPS

- **Tolerance:** ±1, 2, 5, 10%
- **TCR:** ±50ppm, ±100ppm, ±250ppm (at +105°C ref. to +25°C)
- **Power rating at 25°C:** 120W (others upon request)
- **Max. working Voltage:** 500V (up to 1000V on special request)
- **Resistance range:** 1R to 1Meg (other values on request)
- **Voltage proof:** 5000 VDC, 3000 VAC
- **Heat resistance to cooling plate:** < 0.35 K/W
- **Capacitance/mass:** 45 pF
- **Working temperature range:** –55°C to +155°C
- **Max. torque for base plate (static):** 1.5 Nm

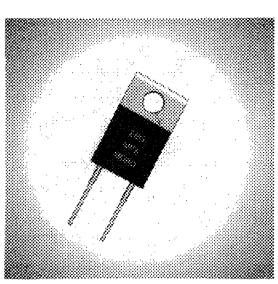
HXP



SPECIFICATIONS - HXP

- **Tolerance:** ±1, 2, 5, 10%
- **TCR:** ±50ppm, ±100ppm, ±250ppm (at +105°C ref. to +25°C)
- **Power rating at 25°C:** 200W (see derating)
- **Max. work. Voltage:** 500V (up to 1000V on special request)
- **Resistance range:** 0.1R to 1Meg
- **Voltage proof:** DIELECTRIC STRENGTH up to 4000 V against ground.
- **Protectionclass acc. to IEC 950/CSA22.2 950/M-89 and EN 60950.88:** 2
- **Heat resistance to cooling plate:** R_{th} <0.35 K/W
- **Partial discharge:** up to ≥ 2000 Vrms/80 pC
- **Capacitance/mass:** 45 pF
- **Working temp. range:** –55°C to +155°C
- **Max. torque for contacts (static):** 1.3 Nm
- **Max. torque for base plate (static):** 1.5 Nm

Thick Film Power Resistors for HF- and Pulse Loading Applications



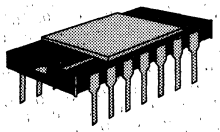
The special performance features of the Type MXP include:

- 30 Watt power rating at 25°C
- TO-220 package configuration
- Single screw mounting simplifies attachment to heat sink
- Heat resistance to cooling plate: Rth <4.16K/W
- A molded case for environmental protection.
- Resistor element is electrically isolated from the metal sink tab.
- Standard lead form for easier fit.

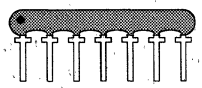
Model No.	Power Rating	Dielect. Strength Vrms AC	Max. Voltage	Resistance Min.	Resistance Max.
				OHM	
LXP	16 Watt	1500	300	0.1R	10k
MXP	30Watt	1500	300	0.1R	10K

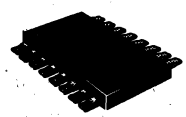
E B G INC.
3705 Trindle Road, Camp Hill, PA 17011
PHONE # 717 737 9877 FAX # 717 737 9664
http://www.ebgusa.com email: sales@ebgusa.com

PRECISION THIN - FILM RESISTOR


HERMETIC DIP

MOLDED SIP

COATED SIP 

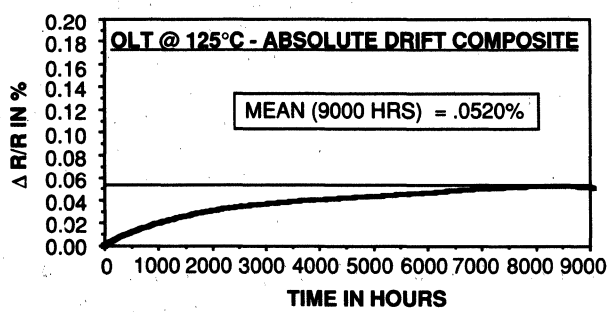

SOIC

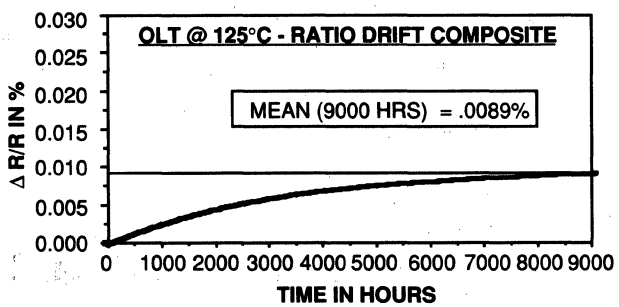
Electro - Films Inc. is a leading supplier of thin-film resistive components offering the broadest line of products in the industry. The products range from hybrid substrates, unpackaged resistor networks and chip resistors to a wide variety of packaged resistor networks including surface mount components.

Both NiCr and TaN resistor material can be sup - plied depending upon the application. Parts can be produced to MIL STD 883C level B or S, 83401 or 55342 as appropriate for the particular product. The table below illustrates the range of parameters attainable. All tolerances and values are not available in every type package or configuration. EFI Application Engineering looks forward to discussing your particular application and suggesting appropriate packaging solutions.

GENERAL PRODUCT CAPABILITY CHART

PARAMETER	NiCr	TaN
Resistance Values	1 ohm to 2 Megohm	1 ohm to 25 Megohm
Absolute Tolerance	±0.05%	±0.1%
Absolute TCR	10 PPM/ °C to 50 PPM/ °C	10 PPM /°C to 100 PPM / °C
Ratio Tolerance	±0.003%	±0.02%
Ratio TCR	±0.5 PPM / °C	±2.0 PPM / °C
Stability: 1000 Hrs. @ 125°C	0.020% Absolute; 0.005% Ratio	0.080% Absolute; 0.02% Ratio
Stability: 1 Yr. @ 125°C	0.052% Absolute; 0.010% Ratio	0.015% Absolute; 0.04% Ratio
Stability: 1000 Hrs. @ 200°C	0.15% Absolute	





HYBRID CIRCUIT SUBSTRATES

* Patterned and etched
* With / without resistors
* Sizes to 3" x 4"
* Conductors: Au standard, Cu available
* Ni barrier for solderability
* Sputtered metals available: NiCr, TaN, TiW, TaW,Ti, Mo, Ni, Pd
* Plated metals: Au, Cu, Ni
* Overcoat for wirebond crossovers available
* MIL STD 883C, 2032 visual

UNPACKAGED RESISTOR NETWORKS

* Wide range of values on same chip
* Silicon or alumina substrates
* NiCr or TaN resistors
* MIL STD 883C, 2032 visual
* Tight ratio tolerance, to 0.003%
* Tight TCR tracking to ±0.5 PPM / °C

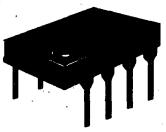
ISO 9001 CERTIFIED

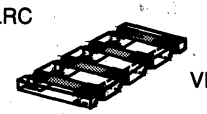
ELECTRO-FILMS INCORPORATED

111 GILBANE STREET, WARWICK CENTRAL INDUSTRIAL PARK, WARWICK, RI 02886
Tel. (401) 738-9150 • FAX (401) 738-4389
Website: www.electro-films.com • E-mail: efichips@aol.com

COMPONENTS & PACKAGED NETWORKS

LLCC

MOLDED DIP 

SLRC 

VERSA - CHIP

PACKAGE TYPES AVAILABLE

Electro-Films, Inc. supplies standard and custom precision resistor networks in most standard packages in addition to several proprietary packages. Both industrial and military versions, including MIL STD 883C level H and K and MIL STD 83401 are available.

Ratio tolerances to 0.01% can be achieved in most package styles. Performance characteristics are summarized on the facing page.

EFI also manufactures R/C networks for use in EMI/RFI filtering applications. High volume, cost competitive thin film versions of thick film networks in both 50 mil and 25 mil lead spaced SOIC's are also available.

SURFACE MOUNT

LLCC: Leadless Chip Carrier

- 16, 18, 20, 28 leads
- MIL STD 83401
- MIL STD 883C level H or K

FLAT-PAKS

- Hermetic: 14, 16, 24 lead std.
- MIL STD 883C level H or K
- MIL STD 83401

PLCC: Plastic Leadless Chip Carrier

- 16, 18, 20, 28, 44 pads
- Industrial, MIL STD 83401
- Mixed Values and Tolerance

SOIC: Small Outline Leaded

- 8, 14, 16, lead narrow body
- 16, 18, 20, 24, 28 lead wide body
- Industrial, MIL STD 83401

SLRC: Single Layer Resistor Carrier

- 4 to 36 pads
- Industrial
- Mixed Values and Tolerances

SOT-23 Microdivider

- Smallest Divider available
- Wide range of ratios
- Industrial

Wrap Around Chip Resistors

- Std. 402, 805, 1206 sizes
- Tolerances to 0.05%
- TCR's 10, 25, 50 ppm/ c
- Solder Coated or Gold Terminals
- Nickel Barrier for Solderability

PLUG-IN

Dual In-Line

Hermetic:
- 8, 14, 16, 20, 24 leads
- MIL STD 883C level H

Molded:
- 8, 14, 16, 20, 24 leads
- MIL STD 83401: Industrial

Single In-Line

Molded:
- 4, 7, 8, 9, 10 leads
- Industrial: MIL STD 83401

Coated:
- 3 to 10 leads
- Industrial

ELECTRICAL CONFIGURATIONS

The standard electrical configurations that are available in the above packages are isolated resistor, common buss, series connected, and R/2R ladders. In general the values and tolerances can be mixed within a given network for these configurations without incurring an artwork charge.

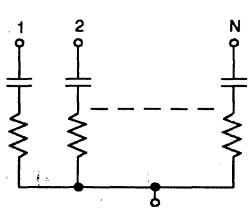
EFI also specializes in custom networks providing rapid delivery.

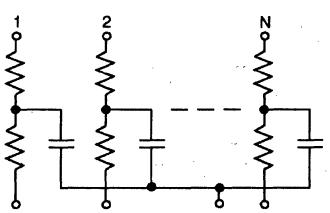
R/C NETWORKS

EMI/RFI Filters

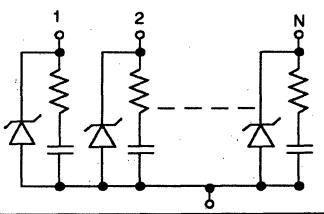
Value Ranges depend on package style; Capacitance to 1000pf; Resistance to 1 megohm; Tolerances of 5, 10, 20%; 50 and 25 mil lead spacing-- SOIC, SOT-23, SIP

R/C 100 Series





RC D 300 Series

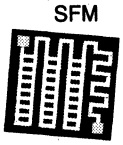
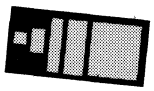
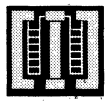
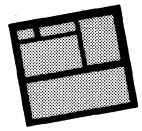


ELECTRO-FILMS INCORPORATED

111 GILBANE STREET, WARWICK CENTRAL INDUSTRIAL PARK, WARWICK, RI 02886
Tel. (401) 738-9150 • FAX (401) 738-4389
Website: www.electro-films.com • E-mail: efichips@aol.com

ISO 9001 CERTIFIED

THIN - FILM CHIP RESISTORS

SFM  CBB  CTR  CBC 

This is the broadest line of thin-film chip resistors available - silicon or alumina substrates, TaN or NiCr resistive material, wire bond or solder attach, tight absolute and center-tap ratio tolerances, low TCR and excellent long term stability. (For Microwave Chip Resistors, see our ad under Microwave Components.)

SILICON CHIP RESISTORS

TYPE	SIZE (Mils)	FEATURE	RESISTOR MATERIAL	* POWER
CTR	30 X 20	Center Tap - 1 Ω to 1MΩ	TaN or NiCr	250 mw
SFM	20 X 20	Single Value - 4.3 Ω to 1MΩ	TaN or NiCr	250 mw
BCR	20 X 20	Single Value, Back Contact	TaN	250 mw
SFX	40 X 40	Single Value - 1M to 2.5 MΩ	TaN	20 mw
MTR	33 X 33	Multi-Tap, 11 Taps 400 Ω to 240 KΩ	TaN	250 mw
PWA	30 X 45	Single Value - High Power	TaN or NiCr	500 mw
NET	30 X 30	(2) Resistors, series or isolated	TaN or NiCr	125 mw

* Power @70°C derated to 0 @ 175°C (100V max.)

ELECTRICAL SPECIFICATIONS	
TCR	± 100 PPM / °C STD ± 10, ±25, ±50 Special
Stability	< 0.2% Type dependent (1000 Hrs. @ 125°C)
Tolerance	0.1% to 10 %

MATERIAL SPECIFICATIONS		
Substrate	Silicon	10 ± 2 Mils
Dielectric	SiO2	10 KÅ Min.
Metalization	Aluminum	10 KÅ Min.
	Gold	15 KÅ Min.

ALUMINA CHIP RESISTORS

TYPE	SIZE** (Mils)	FEATURE	RESISTOR MATERIAL	POWER @ 125°C
1	20 X 40	20Ω to 24KΩ	TaN or NiCr	40 mw
2	30 X 30	25Ω to 40 KΩ	TaN or NiCr	40 mw
3	50 X 50	20Ω to 125 KΩ	TaN or NiCr	100 mw
4	50 X 100	40Ω to 400 KΩ	TaN or NiCr	175 mw
5	100 X 100	20Ω to 1 MΩ	TaN or NiCr	400 mw
6	30 X 45	20Ω to 59 KΩ	TaN or NiCr	60 mw

** All sizes available in Center Tapped versions.

ELECTRICAL SPECIFICATIONS		
TCR	±10, 25, 50 PPM / °C ± 100, 200 PPM / °C	NiCr TaN
Stability	< 0.05% / 1000 Hrs.@125°C	NiCr
Tolerance	±0.05% to 10 % C.T. Ratio to 0.01%	NiCr

MATERIAL SPECIFICATIONS		
Substrate	Alumina 99.6%	10 ± 2 Mils
Metalization	Gold	15 KÅ Min.
	Ni Barrier	5 KÅ Min.
	Solder	———

CHIP CAPACITORS

Thin Film MOS / MNOS Capacitor Chips

TYPE	SIZE (Mils)	FEATURE	Working Voltage (DC)
NCA	20 X 20	0.5 pf - 51 pf	100 V - 40 V
NCB	30 X 30	33 pf - 100 pf	100 V - 50 V
NCC	40 X 40	50 pf - 220 pf	100 V - 50 V
NCD	55 X 55	150 pf - 510 pf	100 V - 50 V
NCE	60 X 60	500 pf - 1000 pf	40 V - 25 V
CBA	20 X 30	0.25, 0.50, 1.0, 2.0 pf ±25% 1, 2, 4, 8 pf ±10%	100 V, 30 V
CBB	20 X 50	Binary 1, 2, 4, 8, 16 pf	75 V
CBC	46 X 46	Binary 3, 6, 12, 24, 48 pf	75 V

MATERIAL SPECIFICATIONS		
Substrate	Silicon	10 ±2 Mils
Dielectric	MOS / MNOS	———
Metalization	Aluminum	10 KÅ Min.
	Gold	15 KÅ Min.

ISO 9001 CERTIFIED

ELECTRO-FILMS INCORPORATED

111 GILBANE STREET, WARWICK CENTRAL INDUSTRIAL PARK, WARWICK, RI 02886
Tel. (401) 738-9150 • FAX (401) 738-4389
Website: www.electro-films.com • E-mail: efichips@aol.com

MASTER DISTRIBUTORS

"Get It Faster From Master"

Phoenix, Arizona
2425 South 21st St.
Phoenix, AZ 85034
☎ (602) 267-1111
Fax: (602) 267-7070

Northern California
1026 6th Ave.
Oakland, CA 94606
☎ (510) 835-1500
Fax: (510) 835-0398

Southern California
1301 Olympic Blvd.
Santa Monica, CA 90404
☎ (310) 452-1229
Fax: (310) 399-8600

Louisville, Kentucky
842 South 7th St.
Louisville, KY 40203
☎ (502) 568-8888
Fax: (502) 589-9829

Northwest
12506 130th Lane NE
Kirkland, WA 98034
☎ (425) 821-5454
Fax: (425) 821-2929

Austin, Texas
9701 Dessau Rd., #204
Austin, TX 78753
☎ (512) 491-0101
Fax: (512) 491-0111

Miami, Florida
4028 NW 25th St.
Miami, FL 33142
☎ (305) 871-0071
Fax: (305) 871-0072

CABINETS
BUD
Hammond

CAPACITORS
Surge

CIRCUIT BREAKERS
Airpax
Fuji
Heinemann / Eaton
Idec
Master Electronics
Siemens / Potter & Brumfield
Siemens Energy & Automation
Wieland

CONNECTORS & SOCKETS
3M
ADC
Amphenol
Curtis
Custom Connector
Kings Connectors
Master Electronics
Panduit
Pomona
Siemens / Potter & Brumfield
Precicontact
Switchcraft
Vernitron-Beau
Wieland

CONTACTORS/ STARTERS
Deltrol
Fuji
Furnas
Siemens Energy & Automation

COUNTERS
ATC
Curtis Instruments
Hecon
IVO
Kessler-Ellis
Master Electronics
Omron
Redington
Sodeco/Maxmar

DIODES
International Rectifier
Surge

FANS
Aromat / NIAS
ETRI
EBM / Papst
U.S. Toyo
Qualtek

FILTERS
Curtis

FUSES
Bussmann
Ferraz
Littelfuse
USD

INDICATOR LAMPS & LED'S
IDI
JKL
Ledtronics
Lighting Components
Lumex
Sylvania

HEAT SINKS
Wakefield

PHOTO & PROX
Agastat
Electro
Idec
Omron
Opto Switch
Skan-A-Matic

PLC's
Fuji
Idec
Omron

POTS & RESISTORS
Bourns
Clarostat
MEC
Ohmite
Surge

SOLENOIDS
Deltrol
Dormeyer
Guardian

TERMINAL BLOCKS
Auguat / RDI
T&B / Buchanan
Curtis
Kulka / Marathon
Magnum / USD
Marco
Riacon / RIA
Siemens Energy & Automation
USD
Vernitron-Beau
Weidmuller
Wieland

RELAYS
Aleph International
Allied Controls
American Zettler
Aromat / NIAS
AT&T
C.P. Clare
Communications Inst. (CII)
Coto
Crydom Controls
Deltrol
Elec-Trol
Fuji
Genicom
Gentron
Gordos
Guardian
Hamlin
Idec
Line Electric
Magnecraft / MSD
Master Electronics
MEC
Midtex
Omron
Siemens / Potter & Brumfield
Schrack
Siemens Energy & Automation
Sigma
Solid State Optronics
Struthers-Dunn
Takamisawa
Teledyne
Theta-J
Triridge
Wieland

TEST EQUIPMENT
Biddle
Fluke
Simpson Electric
Triplett
Tektronix

TIMERS
Agastat
Amperite
Aromat / NIAS
ATC
Bourns
Crouzet
Curtis Instruments
Guardian
Idec
Industrial Timer
Magnecraft / MSD
Master Electronics
Midtex
Omron
Siemens / Potter & Brumfield
Syrelec

SWITCHES
Apem
Aromat / NAIS
Augat/Alco
Bourns
C&K
Cherry
Cutler-Hammer / Eaton
EECO / Transico
Electro-Mech
Fuji
Idec
McGill
Microswitch
Omron
Oslo
RAFI / C&K
Siemens Energy & Automation
Switchcraft
Tschudin & Heid
Unimax / C&K

TRANSFORMERS & POWER SUPPLIES
ACME
Deltron
Dormeyer
Idec
Magnetek
Microtran
Omron
Power One
Siemens Energy & Automation
SL Waber
Sola
Stancor
Superior
Tamura
Topaz
Triad
Tripp Lite

WIRE, WIRING DEVICES & HARDWARE
Alpha
Arrow Hart / Cooper
Belden
Birtcher
Buchanan
Commscope
Crouse-Hinds
Harvey Hubbell
H.H. Smith
Insultab
Manhattan
Panduit
Pomona
Thomas & Betts
Tyton / Hellerman
Wakefield
Wieland

STOP ***ORDERS PLACED BY 5:00 P.M. ARE SHIPPED THE SAME DAY*** STOP

"MASTER DISTRIBUTORS Is Your Best Source for..."

idec

CLAROSTAT

HUNTINGTON ELECTRIC, INC. and RESISTOR, INC. RESISTORS

About the Company

Huntington Electric, Inc. has been in business since 1950. Our products are designed and manufactured to the highest degree of reliability and quality in the industry. Our practice of blending quality, price, delivery and flexibility has given us the reputation and responsibility necessary to qualify as a quality vendor for major electrical and electronic manufacturers throughout the world.

Our on-time, as promised, delivery schedules, coupled with our process quality controls, insure you of getting what you want when you want it. Why go any where else?

FAST LANE SERVICE -
TWO (2) WEEK DELIVERY GUARANTEED

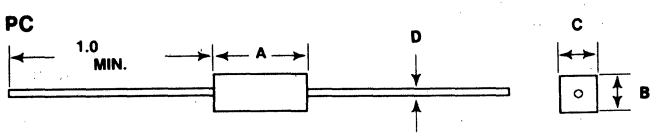
Ceramic Housed Wirewound - *Axial*

Leaded Standard/Tab Mount

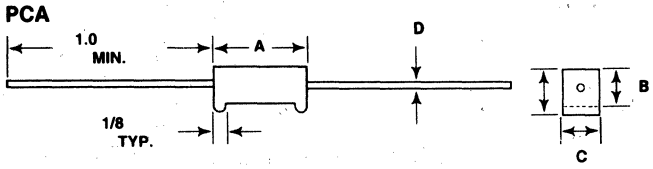
Standard Features

- Ceramic housing
- Axial leads
- 3 watts to 50 watts
- 5% or 10%
- 1 ohm to 40K ohm
- Solvent Resistant
- Temperature Coefficient
  800 ppm below 1 ohm
  300 ppm above 1 ohm
- Fireproof construction
- High temperature potting compound

Standard Configuration- PC Style



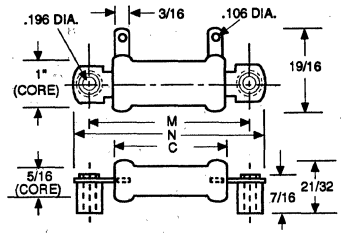
Alternate Configuration- PCA Style



Type	Watts	A	B	C	D	Resistance Range
PC-3	3	.875	.3125	.3125	.032	1 ohm 10K ohm
PC-5	5	.875	.375	.375	.032	1 ohm 10K ohm
PC-7	7	1.400	.375	.375	.032	1 ohm 27K ohm
PC-10	10	1.875	.375	.375	.032	1 ohm 30K ohm
PC-15	15 - 20	1.875	.500	.500	.036	ohm 40K ohm
PC-22	22 - 25	2.500	.500	.500	.036	ohm 40K ohm
PC-40	40	3.000	.75	.75	*	1 ohm 30K ohm
PC-50	50	3.500	.75	.75	*	1 ohm 40K ohm

Standard Oval Vitreous or Silicone-

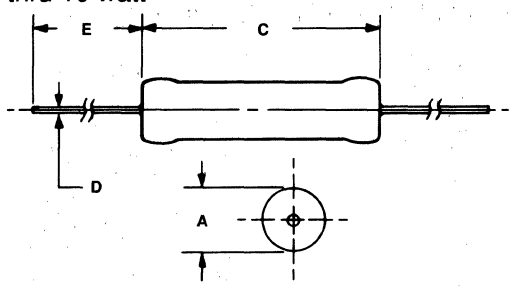
30 Watt thru 95 Watts



Watts	Core A	Core B	Core C
30	1 1/4	2	2 1/2
40	2	2 3/4	3 1/4
55	3 1/2	4 1/4	4 3/4
70	4 3/4	5 1/2	6
95	6	6 3/4	7 1/4

Axial Lead Vitreous or Silicone -

1Watt thru 10 watt



Watt	A ±.032	C ±.032	D	E (Type.)
1	.125	.437	.020	1 1/2
1	.110	.385	.020	1 1/2
3	.218	.563	.032	1 1/2
3	.200	.563	.032	1 1/2
5	.218	1.031	.032	1 1/2
5	.200	.937	.032	1 1/2
5/7	.343	1.031	.032	1 1/2
5/7	.312	.937	.032	1 1/2
10	.343	1.843	.032	1 1/2
10	.312	1.800	.032	1 1/2

Note: The above chart applies to both vitreous and silicone coated resistors. The "type" nomenclature shown is for vitreous coating. When ordering silicone, Substitute the letter "S" for the letter "V" in the type.
Example: FVT= Vitreous FST= Silicone

\+ Standard sizes

* Mounting centers shown are nominal dimensions when using HEI standard friction-grip mounting brackets. Built-in "spring" allows for minor variations in these dimensions.

Ordering Information

FVT-10-250-1%-NI-QC-BKTS

Type
V=Vitreous
S=Silicone

Resistance Value

Add for Special Tolerance

Add For Non Inductive

Add for Quick Connect

Add For Standard Brackets

Optional Features:

Resistance Tolerance
Non-Inductive
Quick Connect Terminals
Mounting Brackets

For your custom requirements, contact manufacturer.

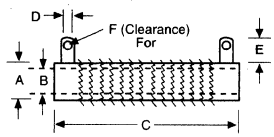
Huntington Electric, Inc. • P.O. Box 366 • Huntington, In 46750 • (219) 356-0756 • FAX: (219) 356-7891 www.heiresistor.com

HUNTINGTON ELECTRIC, INC. and RESISTOR, INC.

RESISTORS

Edgewound Fixed and Adjustable Vitreous and Silicone-

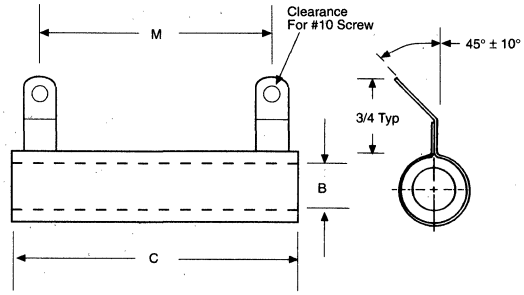
40 Watt thru 1500 Watts



Watts	Core		
	A	B	C
40	9/16	5/16	2
50	3/4	1/2	2
90	9/16	5/16	4
100	3/4	1/2	3 1/2
110	3/4	1/2	4
120	3/4	35/64	4 1/2
155	1 1/8	3/4	4 1/4
240	1 1/8	3/4	6 1/2
300	1 1/8	3/4	8 1/2
375	1 1/8	3/4	10 1/2
420	1 1/8	3/4	11 3/4
500	1 5/8	1 1/8	10 1/2
750	2 1/2	1 3/4	12
1000	2 1/2	1 3/4	15
1500	2 1/2	1 3/4	20

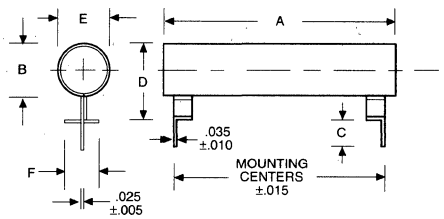
Capacitor Mount Vitreous or Silicone-

16 Watt thru 22 Watts



Watts	Core			
	A	B	C	M
16	9/16	5/16	1 1/4	7/8
20	9/16	5/16	1 3/4	1 1/8
22	9/16	5/16	1 3/4	1 1/4

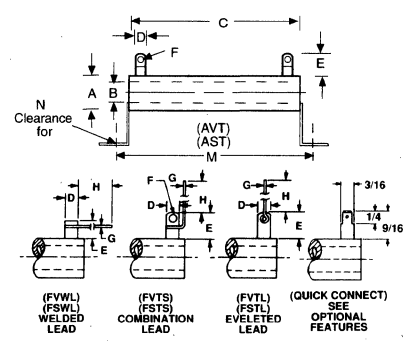
Printed Circuit Board Mount Vitreous or Silicone--*3 Watt thru 20 Watts*



Note: Recommended mounting hole is 0.078 diameter.

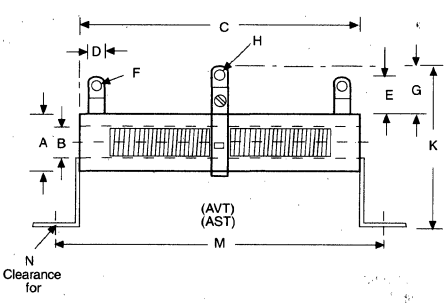
Watts	Mounting Ctrs		Core		Type	Max	Max	Max
	Standard	Maximum	A	B	C	D	E	F
3	0.600	0.846	1	0.200	0.125	0.450	.281	.400
5/3	0.900	0.971	1 1/8	0.200	0.125	0.450	.281	.400
7/4	0.600	0.846	1	5/16	0.150	0.600	.410	.500
8/5	0.900	0.971	1 1/8	5/16	0.150	0.600	.410	.500
10	1.300	1.596	1 3/4	5/16	0.150	0.600	.410	.500
12/10	1.700	1.971	2 1/8	5/16	0.150	0.600	.410	.500
20/15	1.700	1.846	2	7/16	0.200	0.725	.531	.531
20	2.200	2.221	2 3/8	7/16	0.200	0.725	.531	.531

Fixed Vitreous or Silicone - *5 Watt thru 20 watts*



Watt	Core			Leads		Mounting	
	A	B	C	G	H	M	N
5	5/16	3/16	1	-	-	1 7/16	6-32
5	5/16	3/16	1	.032	-	1 7/16	6-32
5	5/16	3/16	1	.032	2	1 7/16	6-32
8	5/16	3/16	1	.032	2	1 7/16	6-32
12	5/16	3/16	1 3/4	-	-	2 3/16	6-32
12	5/16	3/16	1 3/4	.032	2	2 3/16	6-32
12	5/16	3/16	1 3/4	.032	2	2 3/16	6-32
12	5/16	3/16	1 3/4	.032	2	2 3/16	6-32
20	7/16	1/4	2	-	-	2 1/2	6-32
20	7/16	1/4	2	.040	2	2 1/2	6-32
20	7/16	1/4	2	.040	2	2 1/2	6-32
20	7/16	1/4	2	.040	2	2 1/2	6-32

Adjustable and Fixed Vitreous or Silicone - *12 Watt thru 225 watts*



Watt	Core			Leads		Mounting		
	A	B	C	G	H	K	M	N
12	5/16	3/16	1 3/4	1/2	.104	15/16	2 3/16	6-32
25	9/16	5/16	2	11/16	.166	1 11/16	2 3/4	8-32
30	3/4	1/2	2	11/16	.166	2 5/16	2 7/8	10-32
30	5/8	29/64	2	11/16	.166	1 11/16	2 5/8	8-32
50	9/16	5/16	4	11/16	.166	1 11/16	4 3/4	8-32
60	3/4	1/2	4	11/16	.166	2 5/16	4 7/8	10-32
70	3/4	35/64	4 1/2	11/16	.166	2 5/16	5 3/8	10-32
75	9/16	5/16	6	11/16	.166	1 11/16	6 3/4	8-32
90	3/4	1/2	6	11/16	.166	2 5/16	6 7/8	10-32
100	3/4	1/2	6 1/2	11/16	.166	2 5/16	7 3/8	10-32
130	1 1/8	3/4	6 1/2	7/8	.166	2 13/16	7 3/8	10-32
175	1 1/8	3/4	8 1/2	7/8	.166	2 13/16	9 3/8	10-32
225	1 1/8	3/4	10 1/2	7/8	.166	1 13/16	11 3/8	10-32

For your custom requirements, contact manufacturer.

Huntington Electric, Inc. • P.O. Box 366 • Huntington, In 46750 • (219) 356-0756 • FAX: (219) 356-7891 www.heiresistor.com

QUALITY THICK FILM RESISTORS

HY-MEG CORPORATION

852-854 WESTGATE DR.,ADDISON, IL.60101-5026
PHONE: (630) 543-9250 FAX: (630) 543-9260

QUALITY THICK FILM RESISTORS

HY-MEG CORPORATION offers a complete line of precision and high voltage thick film resistors.

The **HA SERIES** precision resistor line is an extremely stable, tight tolerance series with low voltage and temperature coefficients.

The **HV SERIES** extends the voltage and wattage ratings of the HA series while maintaining nearly identical enviromental and physical properties.

The **FV & DVN SERIES** are precision plate resistors available in a broad range of resistance values, voltages, tolerances, and divider matching requirements.

The **HP SERIES** was designed to replace non-inductive wirewound resistors for their greatly extended resistance ranges, much higher voltage ratings, and improved non-inductive performance.

The **FA SERIES** are plate resistors that offer resistance values to 4 TeraOhms with equivalent performance characteristics to our FV series.

Hy-Meg has many special services to offer, such as testing to MIL-R-49462A, 100% testing of voltage coefficients using voltages up to 10,000VDC, matched resistor sets, special packaging, 1000 hour voltage burn-in, and a custom design department so that we can meet your physical and electrical requirements.

HA - SERIES PRECISION THICK FILM RESISTORS

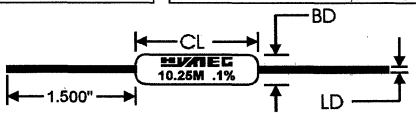
- **TOLERANCES from 0.1% to 10.0%**
- **ENCAPSULATION: SILCONE CONFORMAL**
- **PRECONDITIONING AVAILABLE TO 10KVDC**
- **MATCHED SETS ARE AVAILABLE FOR LOW TC AND TOLERANCE TRACKING**
- **HA SERIES RESISTORS ARE PRESTRESSED DURING MANUFACTURING TO INSURE EXCEPTIONAL STABILITY.**

DIMENSIONS

Style	Max. CL	Max. BD	LD
HA-55	0.290"	0.100"	AWG #22
HA-60	0.405"	0.150"	AWG #20
HA-65	0.620"	0.171"	AWG #20
HA-70	0.835"	0.255"	AWG #20
HA-80	0.965"	0.340"	AWG #20
HA-100	1.815"	0.340"	AWG #20
HA-120	2.130"	0.340"	AWG #20

SPECIFICATIONS

HMC TYPE	WATTAGE RATING	VOLTAGE RATING	RESISTANCE RANGE
HA-55	.25W	500VDC	10K - 100M
HA-60	.50W	750VDC	10K - 100M
HA-65	1.0W	1500VDC	20K - 100M
HA-70	2.0W	3500VDC	50K - 100M
HA-80	3.0W	5000VDC	75K - 100M
HA-100	4.0W	7500VDC	100K - 100M
HA-120	5.0W	10,000VDC	150K - 100M



ENVIRONMENTAL PERFORMANCE	MAX. △R
LOADLIFE (1000 hrs. RATED VOLTAGE AT 70°C	0.25%
OVERLOAD (1.5 TIMES RATED VOLTAGE FOR 10 SEC.)	0.20%
MOISTURE RESISTANCE (NO LOAD POLAR)	0.50%
THERMAL SHOCK	0.25%
SOLDER EFFECT	0.10%
TERMINAL STRENGTH	0.20%
SHELF LIFE (1 yr. AT 25°C)	0.10%
INSULATION RESISTANCE (AT 750VDC)	10KM
LOW TEMPERATURE OPERATION	0.25%
HIGH TEMPERATURE EXPOSURE	
150°C FOR 2000 HRS.	0.50%
175°C FOR 2000 HRS.	0.75%
DIELECTRIC STRENGTH	0.25%

TEMPERATURE COEFFICIENTS

T9 = 0 ± 25 PPM/°C from 0 to +70°C
T2 = 0 ± 50 PPM/°C from -15°C to +105°C
T0 = 0 ± 100 PPM/°C from -55°C to +125°C

HV - SERIES HIGH VOLTAGE THICK FILM RESISTORS

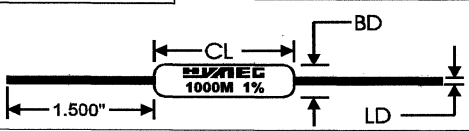
- **TOLERANCES FROM 0.5% TO 10%**
- **VCR'S DOWN TO 0.5ppm**
- **ENCAPSULATION: SILCONE CONFORMAL**
- **PRECONDITIONING AVAILABLE TO 10KVDC**
- **HV SERIES RESISTORS ARE PRESTRESSED DURING MANUFACTURING TO INSURE EXCEPTIONAL STABILITY.**

DIMENSIONS

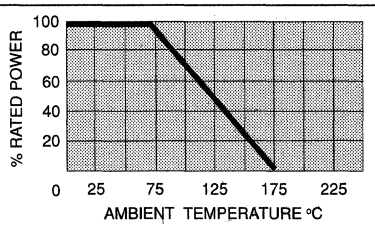
Style	Max. CL	Max. BD	LD
HV-55	0.290"	0.100"	AWG #22
HV-60	0.405"	0.150"	AWG #20
HV-65	0.620"	0.171"	AWG #20
HV-70	0.835"	0.255"	AWG #20
HV-80	0.965"	0.340"	AWG #20
HV-100	1.815"	0.340"	AWG #20
HV-120	2.130"	0.340"	AWG #20

SPECIFICATIONS

HMC TYPE	WATTAGE RATING	VOLTAGE RATING	RESISTANCE RANGE
HV-55	0.5W	750VDC	25K - 1000M
HV-60	1.0W	1500VDC	25K - 2500M
HV-65	2.0W	2500VDC	50K - 10KM
HV-70	3.0W	5000VDC	100K - 10KM
HV-80	4.0W	7500VDC	150K - 10KM
HV-100	5.0W	15,000VDC	200K - 10KM
HV-120	6.0W	20,000VDC	300K - 10KM



ENVIRONMENTAL PERFORMANCE	MAX. △R
LOADLIFE (1000 hrs. RATED VOLTAGE AT 70°C	0.50%
OVERLOAD (1.5 TIMES RATED VOLTAGE FOR 10 SEC.)	0.30%
MOISTURE RESISTANCE (NO LOAD POLAR)	0.50%
THERMAL SHOCK	0.25%
SOLDER EFFECT	0.10%
TERMINAL STRENGTH	0.20%
SHELF LIFE (1 yr. AT 25°C)	0.25%
INSULATION RESISTANCE (AT 750VDC)	10KM
LOW TEMPERATURE OPERATION	0.25%
HIGH TEMPERATURE EXPOSURE	
150°C FOR 2000 HRS.	0.50%
175°C FOR 2000 HRS.	0.75%
DIELECTRIC STRENGTH	0.25%



FOR FAST HELP ON NEW OR RUSH ORDERS CALL 1-800-322-1953

FOR TECHNICAL INFORMATION CALL 1-630-543-9252 0R FAX 1-630-543-9260

HY-MEG CORPORATION
852-854 WESTGATE DR.,ADDISON, IL.60101-5026
PHONE: (630) 543-9250 FAX: (630) 543-9260
QUALITY THICK FILM RESISTORS

FV & DVN SERIES — HIGH VOLTAGE THICK FILM PLATE RESISTORS

- FV Series Tolerances to 0.5%
- FV Series TCR'S down to 25ppm
- FV Series VCR's down to .04ppm
- DVN Series Ratio Tolerances from .1% to 2%
- DVN Series Ratio Tolerances down to 10ppm
- DVN Series Ratio VCR'S down to .2ppm

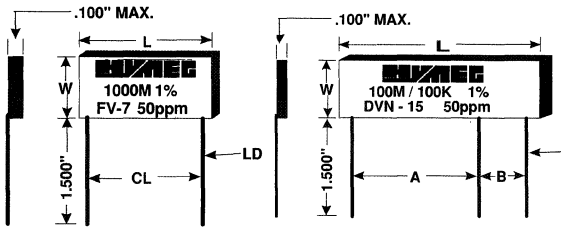
ENVIRONMENTAL PERFORMANCE	FV	DVN
LOADLIFE (1000 hrs. RATED VOLTAGE AT 70°C	0.25%	0.50%
OVERLOAD (1.5 TIMES RATED VOLTAGE FOR 10 SEC.)	0.20%	0.30%
MOISTURE RESISTANCE (NO LOAD POLAR)	0.50%	0.50%
THERMAL SHOCK	0.10%	0.25%
SOLDER EFFECT	0.10%	0.10%
TERMINAL STRENGTH	0.10%	0.10%
SHELF LIFE (1 yr. AT 25°C)	0.10%	0.25%
INSULATION RESISTANCE (AT 750VDC)	10KM	10KM
DIELECTRIC STRENGTH	0.25%	0.25%

FV SPECIFICATIONS

HMC TYPE	WATTAGE RATING	VOLTAGE RATING	RESISTANCE RANGE	DIMENSIONS L	W	CL	LD
FV-3	2.0 W	5.0KVDC	1 MEG - 1.2 KM	1.00	.350	.800	.032
FV-7	3.0 W	12.0KVDC	1 MEG - 5.0 KM	1.10	.580	.870	.032
FV-10	4.0 W	20.0KVDC	1 MEG - 5.0 KM	2.00	.500	1.80	.032
FV-15	6.0 W	30.0KVDC	1 MEG - 10 KM	2.00	1.00	1.80	.032

DVN SPECIFICATIONS

HMC TYPE	WATTAGE RATING	VOLTAGE RATING	RESISTANCE RANGE	MAX. RATIO	DIMENSIONS L	W	A	B
DVN 2	1.0 W	5.0KVDC	1 MEG -1.0 KM	1000:1	.750	.680	.450	.200
DVN 7	2.0 W	10.0KVDC	1 MEG - 5.0 KM	1500:1	1.10	.580	.700	.200
DVN 10	4.0 W	20.0KVDC	1 MEG - 5.0 KM	3000:1	2.00	.500	1.80	.200
DVN 15	6.0 W	25.0KVDC	1 MEG - 10 KM	5000:1	2.00	1.00	1.60	.200



HP SERIES — NON-INDUCTIVE HIGH POWER RESISTORS

- NON-INDUCTIVE DESIGN
- TOLERANCES FROM .1% to 10%
- 50PPM TCR STANDARD FOR ALL VALUES
- PRESTRESSED FOR LONG TERM STABILITY

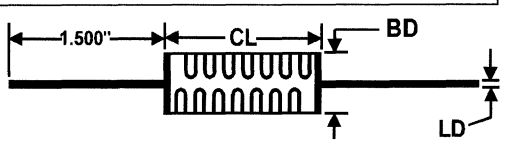
ENVIRONMENTAL PERFORMANCE	MAX. △R
LOADLIFE (1000 hrs. RATED VOLTAGE AT 70°C	0.40%
OVERLOAD (1.5 TIMES RATED VOLTAGE FOR 10 SEC.)	0.40%
MOISTURE RESISTANCE (NO LOAD POLAR)	0.50%
THERMAL SHOCK	0.25%
SOLDER EFFECT	0.10%
TERMINAL STRENGTH	0.20%
SHELF LIFE (1 yr. AT 25°C)	0.10%
INSULATION RESISTANCE (AT 750VDC)	10KM
LOW TEMPERATURE OPERATION	0.25%
HIGH TEMPERATURE EXPOSURE	
150°C FOR 2000 HRS.	0.50%
175°C FOR 2000 HRS.	0.75%
DIELECTRIC STRENGTH	0.25%

DIMENSIONS

Style	Max. CL	Max. BD	LD
HP-200	0.290"	0.100"	AWG #22
HP-220	0.405"	0.150"	AWG #20
HP-230	0.620"	0.171"	AWG #20
HP-240	1.060"	0.270"	AWG #20
HP-260	1.040"	0.340"	AWG #18
HP-280	0.965"	0.380"	AWG #18
HP-310	1.320"	0.380"	AWG #18
HP-312	2.075"	0.380"	AWG #18

SPECIFICATIONS

HMC TYPE	WATTAGE RATING	VOLTAGE RATING	RESISTANCE RANGE
HP-200	1.0W	500VDC	25Ω - 5M
HP-220	2.0W	1000VDC	25Ω - 10M
HP-230	3.0W	1000VDC	50Ω - 10M
HP-240	4.0W	2000VDC	60Ω - 15M
HP-260	6.0W	2000VDC	70Ω - 15M
HP-280	8.0W	2000VDC	70Ω - 8M
HP-310	10.0W	4500VDC	80Ω - 20M
HP-312	12.5W	6000VDC	100Ω - 10M



FA SERIES — HIGH VALUE THICK FILM PLATE RESISTORS

- RESISTANCE IS LINEAR TO 2VDC
- VOLTAGE COEFFICIENTS FROM 5.0ppm TO 0.5ppm
- NON-INDUCTIVE PERFORMANCE
- TOLERANCES FROM 1% TO 20%

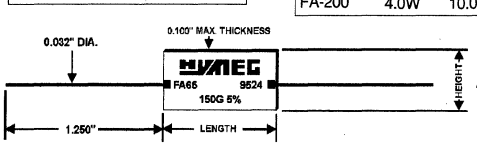
ENVIRONMENTAL PERFORMANCE	MAX. △R
LOADLIFE (1000 hrs. RATED VOLTAGE AT 70°C	0.25%
OVERLOAD (1.5 TIMES RATED VOLTAGE FOR 10 SEC.)	0.25%
MOISTURE RESISTANCE (NO LOAD POLAR)	0.20%
THERMAL SHOCK	0.10%
SOLDER EFFECT	0.10%
TERMINAL STRENGTH	0.05%
SHELF LIFE (1 yr. AT 25°C)	0.10%
INSULATION RESISTANCE (AT 750VDC)	10KM
DIELECTRIC STRENGTH	0.25%

DIMENSIONS

Style	Length	Height	CL
FA-60	0.400"	0.300"	0.300"
FA-65	0.580"	0.400"	0.480"
FA-80	1.000"	0.400"	0.900"
FA-100	1.500"	0.400"	1.400"
FA-150	1.800"	0.580"	1.600"
FA-200	2.000"	1.000"	1.800"

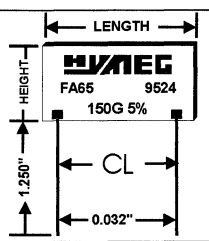
SPECIFICATIONS

HMC TYPE	WATTAGE RATING	VOLTAGE RATING	RESISTANCE RANGE
FA-60	0.5W	1.0KVDC	100M - 100G
FA-65	1.0W	2.0KVDC	100M - 200G
FA-80	2.0W	5.0KVDC	100M - 500G
FA-100	3.0W	7.5KVDC	100M - 1.0T
FA-150	4.0W	10.0KVDC	100M - 2.0T
FA-200	4.0W	10.0KVDC	100M - 4.0T



AXIAL DESIGN

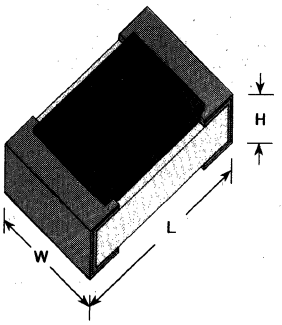
RADIAL DESIGN



FOR FAST HELP ON NEW OR RUSH ORDERS CALL 1-800-322-1953
FOR TECHNICAL INFORMATION CALL 1-630-543-9252 0R FAX 1-630-543-9260

International Manufacturing Services, Inc.
50 Schoolhouse Lane
Portsmouth, RI 02871-2418
Tel:(401) 683-9700 • Fax:(401)683-5571
ims @ ims-resistors.com

SURFACE MOUNT CHIP RESISTORS WITH WRAPAROUND TERMINATIONS



IMS No.	Nom. Length (in.)	Nom. Width (in.)	Max. Height (in.)	Rated Power at 70°C	Max. Working Voltage	Resistance Range	Tolerances (±%)
SOLDERABLE NICKEL BARRIER TINNED TERMINATIONS							
RCI-0402	0.039	0.020	0.016	63mW	50	1 Ω – 5.6M Ω	1, 5, 10
RCI-0603	0.063	0.031	0.022	100mW	50	1 Ω – 10M Ω	1, 2, 5, 10
RCI-0805	0.079	0.049	0.024	175mW	150	1 Ω – 22M Ω	1, 2, 5, 10
RCI-1206	0.122	0.061	0.026	250mW	200	0.15 Ω – 22M Ω	1, 2, 5, 10
RCI-2010 RTI-2010	0.196 0.196	0.098 0.098	0.028 0.028	500mW	200	0.33 Ω – 100K Ω Untrimmed	1, 2, 5, 10 +0–30
RCI-2512 RTI-2512	0.248 0.248	0.124 0.124	0.028 0.028	1W	350	0.33 Ω – 100K Ω Untrimmed	1, 2, 5, 10 +0–30
RCI-2512S	0.248	0.124	0.026	2W	350	1 Ω – 2.2K Ω	1, 2, 5, 10
LOW OHM VALUE SOLDERABLE NICKEL BARRIER TINNED TERMINATION							
RLI-0805	0.079	0.049	0.028	125mW	0.64	0.1 Ω – 0.91 Ω	2, 5
RLI-1206	0.122	0.061	0.028	250mW	0.90	0.1 Ω – 0.91 Ω	2, 5
RLI-1210	0.122	0.100	0.028	500mW	1.28	0.068 Ω – 1.0 Ω	5
PLATINUM SILVER TERMINATIONS FOR EPOXY ATTACHMENT							
RC3-0302	0.030	0.020	0.020	63mW	50	10 Ω – 25M Ω	5, 10
RC3-0402	0.040	0.020	0.020	80mW	50	10 Ω – 25M Ω	1, 2, 5, 10
RC3-0504	0.050	0.040	0.020	125mW	50	10 Ω – 25M Ω	1, 2, 5, 10
RC3-0603	0.060	0.030	0.020	100mW	50	10 Ω – 25M Ω	1, 2, 5, 10
RC3-0805	0.080	0.050	0.020	175mW	150	10 Ω – 50M Ω	1, 2, 5, 10
SUBMINIATURE SIZES WITH PLATINUM GOLD TERMINATIONS							
RC4-0302	0.030	0.020	0.020	63mW	50	10 Ω – 25M Ω	5, 10
RC4-0402	0.045	0.025	0.020	125mW	60	10 Ω – 50M Ω	1, 2, 5
SUBMINIATURE SINGLE WRAPAROUND WITH GOLD TERMINATIONS AND BACKPLANE							
RC1-0302SG	0.030	0.020	0.020	63mW	50	25 Ω – 1K Ω	5, 10
RC4-0402S6	0.045	0.025	0.020	125mW	60	10 Ω – 1K Ω	5, 10
HIGH MEG AND GIGOHM VALUES WITH PLATINUM SILVER SOLDER COATED TERMINATIONS							
RCC-0402	0.040	0.020	0.020	80mW	50	6.2M Ω – 1G Ω	5, 10, 15, 30
RCC-0603	0.060	0.030	0.020	100mW	50	12M Ω – 100G Ω	5, 10, 15, 30
RCC-0805	0.080	0.050	0.020	175mW	150	25M Ω – 1G Ω	5, 10, 15, 30
HCC-0805	0.080	0.050	0.020	175mW	150	1.2G Ω – 1,000G Ω	15, 35, 50
POWER CHIP RESISTOR WITH PLATINUM SILVER SOLDER COATED TERMINATIONS							
RCC-3614S	0.360	0.140	0.050	2.5W	√2.5R	10 Ω – 2K Ω	5, 10
RCC-4418	0.44	0.18	0.050	4W	√4R	5 Ω – 2K Ω	5

Same Day Shipment of Stock Values

Engineering Kits are Available– Call Factory

Custom Designs and Values are Available — Call Factory

THIN FILM PRECISION CHIP RESISTORS WITH NICKEL BARRIER TINNED TERMINATIONS

IMS No.	Nom. Length (in.)	Nom. Width (in.)	Max. Height (in.)	Rated Power at 70°C	Max. Working Voltage	Resistance Range	Tolerances (±%)	TCR PPM/°C
TPI-0603	0.063	0.031	0.020	63mW	75	10 Ω – 332K	0.5	25,50,100*
TPI-0603	0.063	0.031	0.020	63mW	75	100 Ω – 33.2K	0.1	100
TPI-0805	0.079	0.049	0.020	250mW	1.3	0.022 Ω – 8.2 Ω	1, 2, 5 ,10*	+350,+200*
TPI-0805	0.079	0.049	0.020	100mW	100	10 Ω – 100K Ω	0.5	25, 50*
TPI-0805	0.079	0.049	0.020	100mW	100	100 Ω – 100K Ω	0.1	25
TPI-1206	0.126	0.063	0.020	125mW	150	100 Ω – 249K Ω	0.1	25

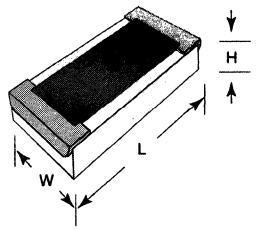
*Note Tolerances and/or TCR vary by value ranges.

Manufacturer of Quality Chip Resistors Since 1974
VISA AND MASTERCARDS ACCEPTED
On-Line http://www.ims-resistors.com

International Manufacturing Services, Inc.
50 Schoolhouse Lane
Portsmouth, RI 02871-2418
Tel:(401) 683-9700 • Fax:(401)683-5571
ims @ ims-resistors.com

HIGH FREQUENCY SURFACE MOUNT CHIP RESISTOR WITH PARTIAL WRAP TERMINATIONS

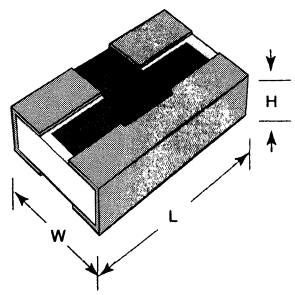
PLATINUM SILVER SOLDER COATED TERMINATIONS



IMS No.	Nom. Length (in.)	Nom. Width (in.)	Max. Height (in.)	Rated Power at 70°C	Max. Working Voltage	Frequency	VSWR	Resistance Range
RCC-0402PW	0.040	0.020	0.020	80mW	50	36GHz	1.4:1	10Ω-10K Ω
RCC-0502PW	0.050	0.020	0.020	100mW	60	26.5GHz	1.3:1	10Ω-10K Ω
RCC-0805PW	0.080	0.020	0.020	175mW	150	8GHz	1.5:1	10Ω-2K Ω

THIN FILM SURFACE MOUNT CHIP ATTENUATORS WITH WRAPAROUND TERMINATIONS

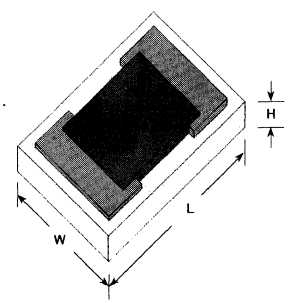
SOLDERABLE NICKEL BARRIER TINNED TERMINATIONS



IMS No.	Nom. Length (in.)	Nom. Width (in.)	Max. Height (in.)	Rated Power at 70°C	Imp. Z	Frequency	VSWR	Attenuation
A-0805	0.079	0.049	0.020	100mW	50 Ω	10GHz	1.3:1	1-10dB

FLIP CHIP RESISTORS WITH SINGLE SIDED TERMINATIONS

GOLD, PALLADIUM SILVER, PLATINUM SILVER OR SOLDER COATED TERMINATIONS



IMS No.	Nom. Length (in.)	Nom. Width (in.)	Max. Height (in.)	Rated Power at 70°C	Max. Working Voltage	Resistance Range	Tolerances (±%)
000	0.045	0.030	0.016	125mW	60	1 Ω – 25M Ω	1, 2, 5, 10
001	0.050	0.050	0.016	125mW	60	0.1 Ω – 100M Ω	1, 2, 5, 10
002	0.075	0.050	0.016	175mW	100	1 Ω – 25M Ω	1, 2, 5, 10
003	0.100	0.050	0.016	250mW	160	1 Ω – 25M Ω	1, 2, 5, 10
004	0.150	0.050	0.016	350mW	350	10Ω – 25M Ω	1, 2, 5, 10
005	0.100	0.100	0.016	500mW	160	0.1 Ω – 25M Ω	1, 2, 5, 10
007	0.025	0.030	0.016	30mW	40	1 Ω – 100M Ω	1, 2, 5, 10
008	0.100	0.025	0.016	100mW	175	10 Ω – 25M Ω	1, 2, 5, 10
009	0.080	0.050	0.016	175mW	150	10 Ω – 25M Ω	1, 2, 5, 10
010	0.125	0.050	0.016	250mW	230	0.1 Ω – 200M Ω	1, 2, 5, 10
013	0.045	0.030	0.016	125mW	60	1 Ω – 25M Ω	1, 2, 5, 10
014	0.035	0.035	0.016	125mW	50	10 Ω – 25 M Ω	1, 2, 5, 10

HIGH MEG AND GIGOHM VALUES WITH GOLD TERMINATIONS

000	0.045	0.030	0.016	125mW	60	25M Ω – 1000G Ω	10, 20, 30, 40
009	0.080	0.050	0.016	175mW	150	25M Ω – 200G Ω	10, 20, 30, 40
015	0.045	0.030	0.016	125mW	60	3.3G Ω - 50G Ω	20, 30, 40

POWER CHIPS RESISTORS WITH GOLD OR PLATINUM SILVER SOLDER COATED TERMINATIONS

024	0.240	0.120	0.021	1W	350	1 Ω – 20M Ω	1, 2, 5, 10
026	0.120	0.240	0.035	1W	200	0.05 Ω – 1 Ω	10
202	0.360	0.140	0.035	2W	800	1 Ω – 1M Ω	1, 2, 5, 10
204	0.440	0.180	0.035	4W	1100	1 Ω – 1M Ω	1, 2, 5, 10
206	0.520	0.215	0.035	6W	1400	1 Ω – 1M Ω	1, 2, 5, 10
208	0.560	0.240	0.035	8W	1500	1 Ω – 1M Ω	1, 2, 5, 10
210	0.620	0.270	0.035	10W	1800	1 Ω – 1M Ω	1, 2, 5, 10

Tolerances listed might not apply to Low or High Resistance values shown. Check factory for tolerances available.

Manufacturer of Quality Chip Resistors Since 1974
VISA AND MASTERCARDS ACCEPTED
On-Line http://www.ims-resistors.com

Call IRC at 1-800-IRC-OHMS (1-800-472-6467) or visit www.irctt.com

IRC Surface Mount Resistive Products

Type	Series	Technology	Power (Watts)	Resistance Range (Ohms)	TCR (ppm/°C)	Tolerance
Current Sense	OARS-1	Open-Air Sense Resistor	1W	0.005Ω - 0.50Ω	±20 - ±30	±1%, ±5%
	CHP	Metal Glaze General Purpose Power Resistor	1/8W - 2W	0.1Ω - 2.2MΩ	±50, ±100	± 0.25% - ±5%
	WSM	Molded Power Wirewound Resistor	2W	0.05Ω - 900Ω	±50, ±100	±1% - ±10%
	PPS-1	Metal Glaze High Power Density Resistor	1W	0.1Ω - 1.0MΩ	±50, ±100	±0.25% - ±5%
	LRC	Ceramic-based Thick Film Flip Chip Resistor	0.25W - 1W	0.010Ω - 1.0Ω	±100	±1% - ±5%
	LRF	Ceramic-based Thick Film Resistor	1W	0.010Ω - 1.0Ω	±100	±1% - ±5%
	LRK	Ceramic-based Thick Film Resistor	1W - 2W	0.003Ω - 1.0Ω	±100	±1% - ±5%
	PLR	Ceramic-based Thick Film Resistor	1/2W - 2W	0.010Ω - 1.0Ω	±100	±1% - ±5%
RC Filters	IEE1284	Silicon-based Resistor Capacitor Network	0.1W	10Ω - 100KΩ	±25	±5%
	T-Filter	Silcon-based Surface Mount RC Network	0.1W	10Ω - 100KΩ	±25	±5%
	Line Terminator	Silcon-based Surface Mount RC Network	0.1W	10Ω - 100KΩ	±25	±5%
General Purpose	CHP	Metal Glaze Resistor	1/8W - 2W	0.1Ω - 2.2MΩ	±50, ±100	±0.25% - ±5%
	ZCHP	Cylindrical Zerohm Jumpers	0.18W - 0.2W	0.02Ω - 0.035Ω		
	ASSM	Wirewound Resistor	2W - 3W	0.1Ω - 1.5KΩ	±20	±0.25% - ±5%
	OARS	Open Air Sense Resistor	1W	0.005Ω - 0.50Ω	±20 - ±30	±1%, ±5%
	HR	High Value Surface Mount Resistor		100MΩ - 50GigΩ	±0 to - ±2000	±5%, ±10% ±25%, ±50%
	CR	Surface Mount Resistor	0.063W - 0.025W	1Ω - 100MΩ		±0.25%
	MRC	Metal Glaze High Power Density	1/2W	0.1Ω - 10KΩ	±50, ±100	±0.25% - ±5%
	PPS-1	Metal Glaze High Power Density Resistor	1W	0.1Ω - 2.21MΩ	±50, ±100	±0.25% - ±5%
	WCR	Thick Film Chip Resistor	1/20W- 1W	0.27Ω - 22MΩ	±50	±0.5% - ±5%
	WCA	Thick Film Chip Resistor Arrays	0.063W	10Ω - 1MΩ	±200	±5%
	WCC	Thick Film Chip Resistor Arrays	0.063W	10Ω - 1MΩ	±200	±5%
	QSOP	TaNSil .025" Lead Pitch Resistor Network	0.75W - 1W	10Ω - 100KΩ	±25 - ±100	±0.01% - ±10%
	SOIC	TaNSil .05" Lead Pitch Resistor Network	0.4W - 0.8W	10Ω - 400Ω	±25 - ±100	±0.01% - ±10%
	RC Chip	Thick Film Resistor Capacitor Chip		10Ω - 100KΩ	±25	±5%
High Value	HR	High Value Surface Mount Resistor		100MΩ - 50GigΩ	±0 - ±2000	±5%, ±10% ±25%, ±50%
	CR	Surface Mount Resistor	0.063W - 0.025W	1Ω - 100MΩ		±0.25%
Military	MCHP	High Reliability Resistor	0.125W - 2W	0.1Ω - 2.2MΩ	±100	±1%, ±2%, ±5%
	PFC	TaNFilm Precision Chip Resistor	50MW - 250MW	5Ω - 1MΩ	±5 - ±100	±0.02% - ±1%
	FP	TaNFilm Precision Flat Pack	0.5W	49.9Ω - 121KΩ	±25 - ±300	±0.0190% - ±2%
	CCN	TaNFilm Chip Carrier Resistor Network	0.1W - 1.0W	10Ω - 300KΩ	±10 - ±100	±0.05% - ±2%
	SON	TaNFilm Small Outline Leadless	0.1W - 0.08W	50Ω - 100KΩ	±10 - ±100	±0.01% - ±2%
	Gull Wing	TaNFilm Small Outline	0.4W - 1W	10Ω - 150KΩ	±25 - ±100	±0.1% - ±2.0%
Precision	PFC	TaNFilm Precision Chip Resistor	50MW - 250MW	5Ω - 1MΩ	±5 - ±100	±0.02% - ±1%
	PCF	Thin Film Nichrome Precision Chip Resistor	1/16W - 1/8W	10Ω - 250KΩ	±10 - ±100	±0.1% - ±0.5%
	D1206	Voltage Divider	0.25W	10Ω - 200KΩ	±25 - ±300	±0.1% - ±2%
	SOT23	TaNSil Divider Network	0.125W - 0.25W	10Ω - 100KΩ	±25 - ±100	Avail to ±0.05%
	WBC	Wire Bondable Resistor	0.25W	10Ω - 100KΩ	±5 - ±25	±0.05%
	CCN	TaNFilm Chip Carrier Resistor Network	0.1W - 1.0W	10Ω - 300KΩ	±10 - ±100	±0.05% - ±2%
	SON	TaNFilm Small Outline Leadless	0.1W - 0.08W	50Ω - 100KΩ	±10 - ±100	±0.01% - ±2%
	PLCC	TaNFilm Plastic Leaded Chip Carrier Network	1W	10Ω - 200KΩ	±25 - ±100	±0.1% - ±2%
	FP	TaNFilm Precision Flat Pack	0.5W			
	SOIC	TaNSil .05" Lead Pitch Resistor Network	0.4W - 0.8W	10Ω - 400KΩ	±25 - ±100	±0.01% - ±10%
	QSOP	TaNSil .025" Lead Pitch Resistor Network	0.75W - 1W	10Ω - 100KΩ	±25 - ±100	±0.01% - ±10%
Surge Power	WSM	Molded Wirewound Resistor	2W	0.05Ω - 900Ω	±50, ±100	±1% - ±10%
	ASSM	Wirewound Resistor	2W - 3W	0.1Ω - 1.5K	±20	±0.25% - ±5%
	CHP	Metal Glaze General Purpose Power Resistor	1/8W - 2W	0.1Ω - 2.2MΩ	±50, ±100	±0.25% - ±5%
	WSM	Molded Wirewound Resistor	2W	0.05Ω - 900Ω	±50, ±100	±1% - ±10%
	AS-SM	Wirewound Resistor	2W - 3W	0.1Ω - 1.5K	±20	±0.25% - ±5%
Temperature Sensors	CHPT	Metal GlazeThermally Sensitive Resistor	400MW	500Ω - 10KΩ	Negative	±2%, ±5%, ±10%
	ISMD	Miniature Platinum Film Temperature Sensors		100Ω - 1000Ω	±0.003850	Class B

IRC Wirewound and Film Technologies Division 736 Greenway Road, PO Box 1860 Boone, North Carolina 28607-USA (828) 264-8861 phone (828) 264-8865 fax

IRC Through Hole Resistive Products

Type	Series	Technology	Power (Watts)	Resistance Range (Ohms)	TCR (ppm/°C)	Tolerance
Current Sense	LOB	Low Resistance Metal Element Resistor	1W - 5W	0.005Ω - 0.1Ω	Varies	±1% - ±5%
	4LPW	Wirewound Resistor	3W - 15W	0.005Ω - 1.0Ω	±40	±1% - ±10%
	PLO	Extremely Low Resistance Power Wirewound	3W - 15W	0.005Ω - 0.18Ω	±30 - ±500	±1% - ±10%
	OAR	Open Air Sense Resistor	1W - 5W	0.005Ω - 0.10Ω	±20	±1% - ±5%
	PWRL	Low Resistance Stand-Up Wirewound	3W - 10W	0.01Ω - 0.18Ω	±50 - ±500	±1% - ±10%
General Purpose	GP	Precision Metal Film Resistor	1/8W - 1/2W	10Ω - 10MΩ	±25 - ±100	±0.025% - ±1%
	CF	Carbon Film Resistor	1/8W - 1/2W	1.0Ω - 4.7M		±0.2% - ±0.5%
	IBT	Carbon Composition Resistor	1/4W - 1/2W	2.2Ω - 20MΩ		±5% - ±10%
	MO	Metal Oxide Resistor	1/2W - 5W	0.01Ω - 180KΩ		±5%, ±1%
	MOM	Metal Oxide Mini Series Resistor	1/2W - 5W	0.1Ω - 150KΩ		±5%, ±1%
	RG	Commercial Thick-Film Metal Glaze Resistor	1/8W - 3W	0.4Ω - 5.1MΩ	±25 - ±200	±0.5% - ±5%
	GF	Thick-Film Metal Glaze Resistor	1/2W - 3W	0.4Ω - 2MΩ	±50 - ±200	±1%, ±2, ±5%
	TF	Precision Non-Military Metal Glaze Resistor	1/4W - 1W	1Ω - 9.9Ω	±100	±1%, ±2, ±5%
	SPP	Low Cost Conformal Coated Wirewound Resistor	1W - 3W	0.1Ω - 2400Ω	±300 - ±600	±5%, ±10%
	SP	Fail-Safe Molded Wirewound Resistor	1W - 2W	0.1Ω - 1200Ω	As low as ±150	±5%, ±10%
	PW	Power Wirewound Resistor	2W - 25W	0.10Ω - 30KΩ	±300 - ±5500	±10%, ±5%
	PWR	Standup Power Wirewound Resistor	3W - 10W	0.1Ω - 18KΩ	±300 - ±5500	±5%. ±10%
	ZEROHM	Molded Jumper Wires	1/4W	Less than 0.01Ω		
	AS/LAS	Semi-Precision Power Wirewound Resistor	1/2W - 10W	0.1Ω - 175KΩ	±20	±0.5% - ±5%
	T	Semi-Precision Power Wirewound Resistor	1W - 14W	0.1Ω - 300KΩ	±20 - ±650	±1% - ±0.1%
	AL	Chassis Mounted Power Wirewound Resistor	5W - 50W	0.1Ω - 180KΩ	±20 - ±90	±1%
	MO-S	Power Metal Oxide Resistor	.05W - 5W	10Ω - 100KΩ	±350	±5%, ±10%
High Value	CGH, CMH, CGX	Precision High Voltage Thick Film Resistor	1/4W - 5W	50KΩ - 2GigΩ	±50 or ±100	±0.5% - ±5%
	T-44	High Voltage Precision Thick Film Resistor	1.5W - 10W	1KΩ - 45GigΩ	±20, ±50, ±100	±1%, ±2%, ±5%
	3800	Ultra High Value Precision Resistor		100MΩ to 100TΩ	±500 - ±3500	±1% to ±20%
	F	High Voltage Thick Film Resistor	.07W - 1.3W	2MΩ - 150GigΩ	±2000 - ±250	±2%, ±5% ±10%
High Voltage	CGH, CMH, CGX	Precision High Voltage Thick Film Resistor	1/4W - 5W	50KΩ - 2GigΩ	±50 or ±100	±0.5% to ±5%
	T	High Voltage Precision Thick Film Resistor	1.5W - 10W	1KΩ - 45GigΩ	±20, ±50, ±100	±1%, ±2% ±5%
	F	High Voltage Thick Film Resistor	.07W - 1.3W	2MΩ - 150GigΩ	±2000 - ±250	±2%, ±5% ±10%
	3800	Ultra High Value Precision Resistor		100MΩ to 100TΩ	±500 - ±3500	±1% to ±20%
Military	RLR	Established Reliability MIL-Qualified Metal Glaze Resistor	1/8W - 1/2W	4.3Ω - 3.01MΩ	±100	±1%, ±2%
	RNC	Established Reliability MIL-Qualified Metal Glaze Resistor	1/20W - 1/8W	10Ω - 2MΩ	±25 - ±100	±0.1% ±0.5%, ±1%
	RN	Precision MIL-Qualified Metal Glaze Resistor	1/8W - 1/2W	10Ω - 1MΩ	±25 - ±100	±0.1% - ±1%
	RWR	Precision MIL-Qualified Wirewound Resistor	1W - 10W	0.1Ω - 39.2KΩ		±0.01% - ±1%
	RBR	Precision MIL-Qualified Wirewound	0.100W - 0.500W	0.1Ω - 1.21MΩ		±0.01% - ±1%
	CMH	Thick Film, High Voltage, High Reliabilty MIL-Approved Metal Glaze Resistor	1/4W - 5W	330KΩ - 1GigΩ	±100 - ±500	±1%, ±2%, ±5%
	RL	Semi-Precision MIL-Qualified Metal Glaze Resistor	1/4W - 1/2W	4.3Ω - 470KΩ	±200	±2%, ±5%
	RB	Precision MIL-Qualified Wirewound Resistor	0.125W - 0.500W	0.1Ω - 1MΩ		±0.5% - ±1%
	RW	Precision MIL-Qualified Wirewound Resistor	1W - 14W	0.1Ω - 90.9KΩ		±0.5% - ±1%
	4700	TaNFilm Ultra Precision SIP Network	0.84W - 1.08W	20Ω - 400KΩ	±10 - ±300	±0.1% - ±2%
	1900	TaNFilm DIP Resistor Network	1.3W - 1.6W	50Ω - 100KΩ	±10 - ±300	±0.1% - ±2%
Precision	RBR	Precision MIL-Qualified Wirewound Resistor	0.100W - 0.500W	0.1Ω - 1.21MΩ		±0.01% - ±1%
	RB	Precision MIL-Qualified Wirewound Resistor	0.125W - 0.500W	0.1Ω - 1MΩ		±0.5% - ±1%
	GP	Metal Film Resistor	1/8W - 1/2W	10Ω - 10MΩ	±25 - ±100	±0.025% - ±1%
	RC	Metal Film Resistor	0.25W - 1W	1Ω - 10MΩ	±5 - ±100	±0.05% - ±1%
	CAR	Ultra Precision Metal Film Resistor	0.125W - 0.50W	1 RO - 1 MO	±5 - ±50	±.01% - ±.05%
	MAR40/42	Ultra Precision Metal Film Resistor	0.125W - 0.30W	10Ω - 500KΩ	±2 - ±10	±0.005% - ±1%
	1900	TaNFilm DIP Resistor Network	1.3W - 1.6W	50Ω - 100KΩ	±10 - ±300	±0.01% - ±2%
	M900	TaNFilm Resistor Network Molded DIP	0.1W - 2W	10Ω - 400KΩ	±25, ±50, ±100	±0.1%, ±0.5%, ±1%
	4700	TaNFilm Ultra Precision SIP Network	0.84W- 1.08W	20Ω - 400KΩ	±10 - ±300	±.01% - ±2%
	SM	Economical TaNFilm Conformally Coated SIP Network	0.60W - 1.08W	20Ω - 500KΩ	±25, ±50, ±100	±0.1% - ±2%
	PR4	Metal Film Resistor	0.25W	100Ω - 240KΩ	±25	±0.1%, ±0.25%
Surge Power	PPW	Semi-Precision Power Wirewound Resistor	2W - 15W	0.10Ω - 5000Ω	±20	±3% ±2%, ±1%
	AS	Semi Precision Power Wirewound Resistor	1/2W - 10W	0.1Ω - 175KΩ	±20	±0.5% - ±5%
	T	Semi-Precision Wirewound Resistor	1W - 14W	0.1Ω - 300KΩ	±20 - ±650	±1 - ±0.1%
	RG	High Power Metal Glaze Resistor	1W	1Ω - 5.1MΩ	±100	±2%, ±5%
	GS3	Thick Film Semi-Precision Resistor	2W - 3W	1Ω - 3MΩ	±50 - ±200	±1%, ±2%, ±5%
	LFR/ALRF	Telecommunications Line Feed Resistors	2W	1Ω - 1600Ω	±50	±1%, ±5%
	SPP	Low Cost General Purpose Conformal Coated Wirewound Resistor	1W - 3W	0.1Ω - 2400Ω	±300 - ±600	±5%, ±10%
	SP	General Purpose Fail-Safe Molded Wirewound Resistor	1W - 2W	0.1Ω - 1200Ω	As low as ±150	±5%, ±10%
	PW	General Purpose Power Wirewound Resistor	2W - 25W	0.10Ω - 30KΩ	±300 - ±5500	±10%, ±5%
Temperature Sensors	PW	General Purpose Power Wirewound Resistor	2W - 25W	0.10Ω - 30KΩ	±300 - ±5500	±10%, ±5%
	T	Semi-Precision Power Wirewound Resistors	1W - 14W	0.1Ω - 300KΩ	±20 - ±650	±1% - ±0.1%
	RGT	Thick Film Temperature Compensation Resistor	1/8W - 1/4W	740Ω - 10KΩ	±3000	±2%, ±5%, ±10%
	RTD55	Precision Platinum Wirewound	N/A	100Ω - 1000Ω	±0.003850	Class B
	IA	Platinum Film Temperature Sensor	N/A	100Ω - 1000Ω	±0.003850	Class B
	IG	Platinum Film Temperature Sensor	N/A	100Ω - 1000Ω	±0.003850	Class B
	IW	Platinum Wirewound Temperature Sensor	N/A	100Ω	±0.003850	Class B

IRC Wirewound and Film Technologies Division 736 Greenway Road, PO Box 1860 Boone, North Carolina 28607-USA (828) 264-8861 phone (828) 264-8865 fax

ISOTEK CORPORATION
435 Wilbur Avenue / Swansea, MA 02777 USA
TEL 508-673-2900 / FAX 508-676-0885
E-Mail: tekinfo@isotekcorp.com / Web Site: http://www.isotekcorp.com

ISOTEK...the company

Founded in 1989, ISOTEK CORPORATION has built a solid reputation for quality products and personal service.

Today, ISOTEK continues to respond aggressively to a diverse and rapidly expanding market with the Alpha line of ultra-precision resistors, the ISA-PLAN line of precision current sensing resistors, and a line of high power metal clad wire wound resistors. All three product groups are recognized as innovative leaders in resistor technology.

Backed by more than 25 years of sales experience and an expanded product line, ISOTEK now offers a wider range of solutions with cost-effective precision products.

ISA-PLAN® Precision Current Sensing Resistors

ISA-PLAN® precision resistors are ideal for sensing and controlling current. ISA-PLAN® resistor elements are etched from Manganin foil. Manganin's temperature coefficient of resistance is <10ppm/°C from 20 to 60°C and 25ppm/°C from 60 to 100°C. The foil is then laminated to a substrate resulting in a planar geometry that is ideal for high power dissipation and low inductance.

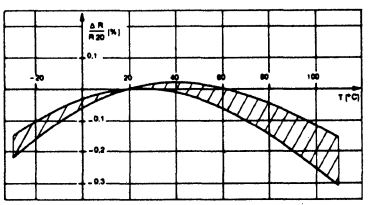
Many ISA-PLAN® models feature Kelvin (four terminal) connections. Kelvin resistors are generally recommended for resistance values of less than 100mΩ. The Kelvin connection removes the error caused by the tcr effect of the copper terminals.

All ISA-PLAN® resistors are burned in at 140°C during manufacturing to assure stable long-term resistance when operating at their maximum temperature rating of 125°C. Their unique laminated construction allows a pulse power rating of 10 times the continuous power rating for pulses up to one second in duration.

The inductance of most ISA-PLAN® resistors is <10nH. However, mounting and trace layout of the pcb may increase the effective inductance. The error caused by inductance increases with frequency and resistance value of each resistor.

Special annealing and manufacturing processes guarantee low temperature coefficient of resistance and excellent long-term stability.

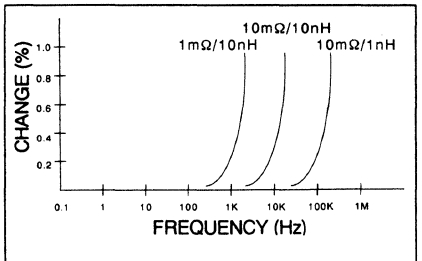
Manganin's Resistive Response



Temperature dependence of resistance of ISA-PLAN resistors. Due to different design and nominal values a variation may take place in the shaded area.

Manganin's resistive response to temperature. Shaded area denotes DIN 46460 allowable tolerance.

Frequency



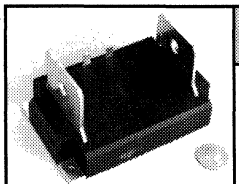
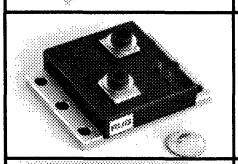
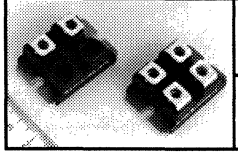
Change of Impedance verses Frequency

Photos and table of specifications for ISA-Plan® follows on pages A•1911 - A•1912

ISA-PLAN® Current Sensing Resistors

Heat Sink Mountable

To download data sheets visit www.isotekcorp.com

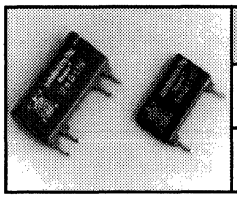
	Model	Description	Resistance [Ω]	Tolerance [%]	TCR ppm/°C	Rated Power @ 70°C [W]
	R-Z	high power precision resistor	0.0005 - 0.010	0.1/0.5	3/5/10	500
	RUG-Z	precision resistor	0.001 - 100	0.1/1	1-10	250
	RTO-A	TO-238/SOT-227B (ISOTOP)	0.500 - 100	1/5	<50	50
	RTO-B	TO-238/SOT-227B (ISOTOP)	0.0002 - 0.470	1/5	<20	30

ISOTEK CORPORATION
435 Wilbur Avenue / Swansea, MA 02777 USA
TEL 508-673-2900 / FAX 508-676-0885
E-Mail: tekinfo@isotekcorp.com / Web Site: http://www.isotekcorp.com

ISA-PLAN® Current Sensing Resistors (cont.)

P.C.B. Mount

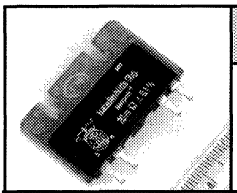
To download data sheets visit www.isotekcorp.com

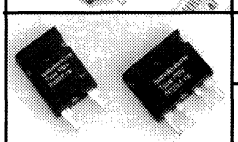


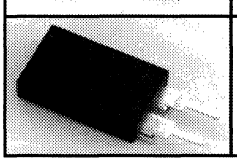
Model	Description	Resistance [Ω]	Tolerance [%]	TCR ppm/°C	Rated Power @ 70°C [W]
A-N	4-terminal (Kelvin) resistor	0.001 - 100	0.1/0.5/1	<10	1
C-N	2-terminal resistor	0.010 - 100	1	<50	1

P.C.B.w/Integral Heatsink

To download data sheets visit www.isotekcorp.com





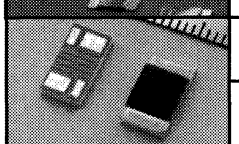


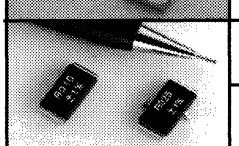
Model	Description	Resistance [Ω]	Tolerance [%]	TCR ppm/°C	Rated Power @ 70°C [W]
A-H	4-terminal (Kelvin) resistor	0.001 - 100	0.1/0.5/1	<10	10
PBH	2-terminal resistor TO-247	0.002 - 100	1/5	<50	3/10*
PBV	4-terminal resistor	0.0005 - 1	0.5/1/5	<30	3/10*
PSB	2-terminal resistor TO-220	0.005 - 1	1/5	<50	10*

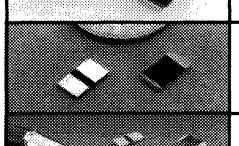
* Mounted on heat sink

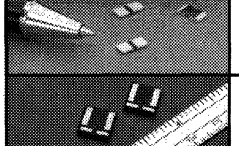
Surface Mount

To download data sheets visit www.isotekcorp.com









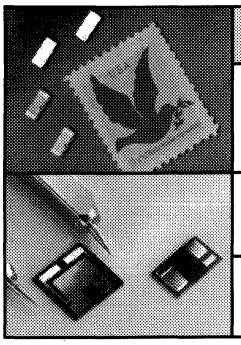
Model	Description	Resistance [Ω]	Tolerance [%]	TCR ppm/°C	Rated Power @ 70°C [W]
BVS	2-terminal surface mount resistor	0.0003/.0005/.001/.002/.003	1/5	<60 <10	3
PMA	4-terminal/surface mounting	0.002 - 1	1/5	<30	3
PMD	2-terminal/surface mounting	0.010 - 2	1/5	<50	2
SMR	2-terminal resistor	0.0005 - 4.7	0.5/1/5	<15	3
SMV	4-terminal resistor	0.001 - 1	0.5/1/5	<15	3
SMT	2-terminal resistor	0.001 - 1	1/2/5	<50	2
SMS	2512 Package/2-terminal	0.005 - 1	1/2/5	<50	1
PMC	4 terminal (Kelvin) surface mount resistor	.001/.003	1	<30	10

ISOTEK CORPORATION
435 Wilbur Avenue / Swansea, MA 02777 USA
TEL 508-673-2900 / FAX 508-676-0885
E-Mail: tekinfo@isotekcorp.com / Web Site: http://www.isotekcorp.com

ISA-PLAN® Current Sensing Resistors (cont.)

Wire Bondable

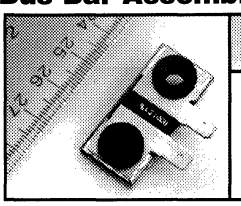
To download data sheets visit www.isotekcorp.com



Model	Description	Resistance [Ω]	Tolerance [%]	TCR ppm/°C	Rated Power @ 70°C [W]
SMH	wire bondable on DCB or IMS substrate	.005 - .500	1/2/5	<50	3
PMB	wire bondable on DCB substrate-4 terminal	0.001 - 20	1/5	<30	20
PMU	wire bondable on DCB substrate-4 terminal	0.002 - 1	1/5	<30	5

Bus Bar Assembly

To download data sheets visit www.isotekcorp.com



Model	Description	Resistance [Ω]	Tolerance [%]	TCR ppm/°C	Rated Power @ 70°C [W]
PVG	current sensing up to 100A	0.0002 - 0.010	0.5/1	<50	5/20 on bus bar assembly

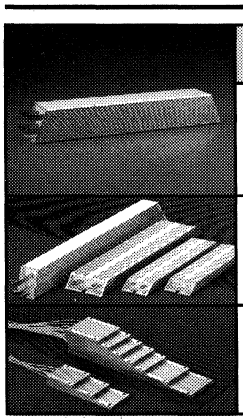
Metal Clad Wire Wound Resistors

Isotek offers high power metal clad wire wound resistors from 60W to 1200W in rugged package configurations designed to optimize thermal management. We offer popular resistance values (inductive and non-inductive windings) to fit most applications in snubber networks, motor braking and for use as a load resistor.

All models are designed to withstand short time overloads of five times the rated power. They are encased in extruded aluminum housings which provide excellent thermal management and facilitate simple chassis mounting.

Metal Clad Wire Wound Resistors

To download data sheets visit www.isotekcorp.com



Model	Description	Resistance [Ω]	Tolerance [%]	TCR ppm/K	Rated Power @ 70°C [W]
IRV	high power wire wound resistor encapsulated in an extruded aluminum case with a thermally conductive cement	0.1 - 6,800	0.5/1/2/5/10	260	60 - 1200
IRH	high power wire wound resistor encapsulated in an extruded aluminum case with a thermally conductive cement	0.1 - 6,800	0.5/1/2/5/10	260	60 - 500
IRF	high power wire wound resistor encapsulated in an extruded aluminum case with a thermally conductive cement	1 - 5,875	0.5/1/2/5/10	260	100 - 500

ALPHA Metal Foil Ultra-Precision Resistors

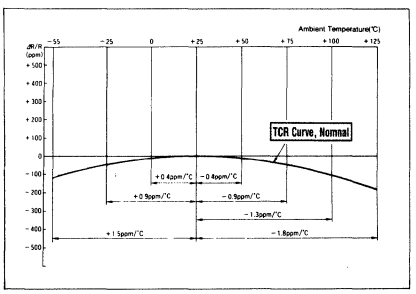
Unlike a metal film or wire wound resistor, a metal foil precision resistor is an ultra-precision resistor in which the primary resistance element is a special alloy foil several μm thick. Use of this metal foil as the resistance element gives superior performance not found in other resistors while satisfying MIL-R-122. Alpha metal foil ultra-precision resistors feature an extremely low temperature coefficient of resistance through strict quality control of the alloy composition and state-of-the-art foil stabilization technology. Also, because the metal film is several μm thick, instead of the extremely thin film of a metal film resistor, the natural stability of the alloy foil is preserved resulting in very little resistance change over several years. Alpha's

ISOTEK CORPORATION
435 Wilbur Avenue / Swansea, MA 02777 USA
TEL 508-673-2900 / FAX 508-676-0885
E-Mail: tekinfo@isotekcorp.com / Web Site: http://www.isotekcorp.com

ALPHA Metal Foil Ultra-Precision Resistors (cont.)

internally developed fine photoetching technology makes it possible to form the complicated resistance patern required for highly accurate resistance values. Alpha ultra-precision resistors are ideal for precise amplifier circuits, referential power supplies, etc., in sophisticated electronic equipment, test and measurement instruments, medical electronics, strain gauges, etc.

TCR Curve

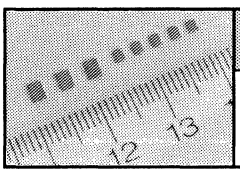


Characteristics

1. Temperature Coefficient of Resistance: 0.4ppm/°C (Nominal)
2. Resistance Tolerance: ±0.005%
3. Shelf Life: 25ppm/year 50ppm/3 years (Hermetically Sealed 5ppm/year 10ppm/3years)
4. Load Life: 0.03%/2000hours
5. Thermal EMF: 0.1μV/°C (between leads)
6. Noise: -42dB
7. Voltage Coefficint: 0.1ppm/V
8. Frequency Characteristics: Inductance: 0.08μH Capacitance: 0.5pF

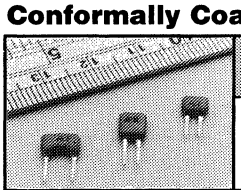
ALPHA Ultra-Precision Resistors

Wire Bondable Chip Resistors



Model	Description	Resistance [Ω]	Tolerance [%]	TCR ppm/K	Rated Power @ 70°C [W]
EP	For Hybrid circuits	5 - 30K	0.05 - 0.1	5	0.1
EQ	For Hybrid circuits	5 - 60K	0.05 - 0.1	5	0.125

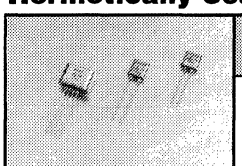
Conformally Coated

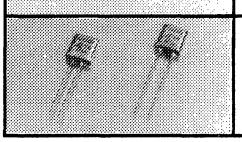


Model	Description	Resistance [Ω]	Tolerance [%]	TCR ppm/K	Rated Power @ 70°C [W]
FLA	Economy - Conformally coated	5 - 80K	0.05 - 0.1	2.5 - 5	0.125
FLB	Economy - Conformally coated	5 - 150K	0.05 - 0.1	2.5 - 5	0.25
SLD	Matched pair - Network Conformally coated	50 - 30K	0.05 - 1	2.5 - 5	0.25

* mounted on heat sink

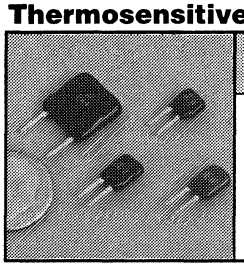
Hermetically Sealed





Model	Description	Resistance [Ω]	Tolerance [%]	TCR ppm/K	Rated Power @ 70°C [W]
HC	2 terminals	1 - 120K	0.005 - 1	1 - 15.	0.3
HD	2 terminals	1 - 120K	0.005 - 1	1 - 15.	0.3
HB	4 terminals	1 - 10K	0.005 - 1	2.5 - 15	0.3
HK/HL	ZERO TCR resistor - 2 terminals	100 - 100K	0.005 - 1	0	0.3

Thermosensitive Resistor



Model	Description	Resistance [Ω]	Tolerance [%]	TCR ppm/K	Rated Power @ 70°C [W]
NLA	Conformally coated - through hole mount	5 - 500	0.5 - 5	6040	0.125
NLB	Conformally coated - through hole mount	5 - 1K	0.5 - 5	6040	0.25
CLA	Conformally coated - through hole mount	5 - 100	0.5 - 5	4250	0.125
CLB	Conformally coated - through hole mount	5 - 200	0.5 - 5	4250	0.25
KLC	Conformally coated - through hole mount	200 - 40k	0.5 - 5	6040	0.25
NMP	Surface mount	5 - 250	0.5 - 5	6040	0.1
NMQ	Surface mount	5 - 500	0.5 - 5	6040	0.125

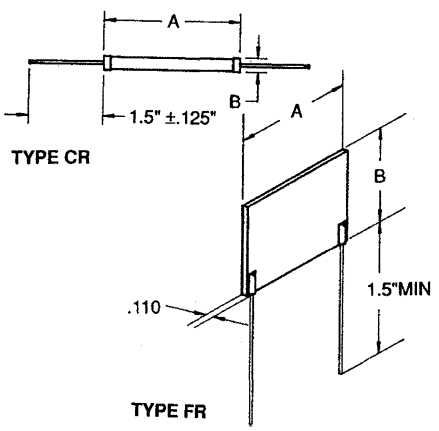
• PRECISION HIGH VOLTAGE RESISITORS
• CERAMIC CAPS • VOLTAGE DIVIDERS
• RC NETWORKS • CUSTOM TRANSFORMERS

KOBRA™ PRECISION METAL OXIDE HIGH VOLTAGE RESISTORS

Coatings: Epoxy varnish standard for cylindrical resistors; conformal epoxy for flat. Consult factory for silicon, glass, or other coatings.

Leads: Tinned copper .032" standard on all styles except CR1040 (which has .020" leads standard). 0.020 leads available on CR12XX Series; 0.020 nickel cap and lead standard with glass-encapsulated resistors (not available with Type CR1 040 or CR25XX Series). Consult factory for other sizes and materials.

Tolerances: 10%, 5%, 2%, and 1 % standard (above 500G, 10% only). Tolerances to .5% available for some types.



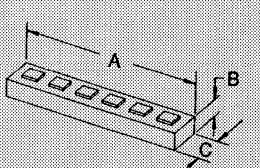
- **Maximum Surface Temperature:** 220°C for cylindrical styles (CR1040, CR12XX, CR25XX Series); 150°C for flat styles (FRXXXX and FDKXX Series).
- **Voltage Coefficient:** Typically less than 5 ppm/V in mid-resistance values.
- **TCR:** Tighter temperature coefficients than those tabulated available on some models.
- Burn-in and other specialized testing to high reliability specifications available. Consult factory.

RESISTANCE RANGE (92)	TCR (PPM/°C) 25-125°C	MAX OPR VOLTAGE	WATTS @ 70°C	MAX DIMENSIONS A	MAX DIMENSIONS B	TYPE
1M - 100M 100M-2G	100 200	2,000	0.75	0.460	0.145	CR1040
1M-100M 100M-100G	100 200	2,500	1.00	0.500	0.170	CR1243
1M - 200M 200M-50G	100 200	5,000	1.50	0.750	0.170	CR1268
1M - 400M 400M-100G 100G-1T	100 200 1,000	10,000	2.00	1.500	0.170	CR1213
1M - 500M 500M-5G	100 200	8,000	4.00	1.125	0.325	CR2510
1M - 1G 1G -10G	100 200	16,000	7.00	2.125	0.325	CR2520
1M- 1.5G 1.5G-15G	100 200	24,000	10.00	3.125	0.325	CR2530
1M - 2G 2G-20G	100 200	32,000	12.00	4.125	0.325	CR2540
1M - 500M 500M - 5G	100 250	12,000	2.00	1.550	0.350	FR0315
1M - 500M 500M -5G	100 250	10,000	2.00	1.050	0.550	FR0510
1M-500M 500M-5G	100 250	20,000	4.00	2.050	0.550	FRO520
1M - 1G 1G-10G	100 250	30,000	6.00	2.050	1.050	FR1020

MINIATURE HIGH VOLTAGE CERAMIC CAPACITORS

NO. SEC.	CAPACITANCE PER SEC (pF)	MAX VOLTAGE	DIMENSIONS (IN.) A	B	C	PART NUMBER
6	40 - 65	6,000	.500	.100	.050	102-123
3	40 - 65	6,000	.340	.10	.050	102-124
4	40 - 65	6,000	.500	.100	.050	102-126
3	80-130	2,500	.310	.150	.032	102-127
1	250	6,000	.500	.100	.050	102-129
2	70 -120	2,500	.235	.155	.030	102-135
2	30-55	6,000	.210	.100	.050	102-150

- Electrodes solder-coated for ease of soldering
- High mechanical and dielectric strength
- Custom design to customer requirements
- Easy to install



PRECISION VOLTAGE DIVIDER RESISTOR NETWORKS AND RESISTOR-CAPACITOR NETWORKS

- Fast delivery! Typical turn-around time: 10 days
- Custom designed; divider ratios to 1000:1
- Coating: conformal epoxy
- Burn-in and other specialized testing to high reliability specifications available. Consult factory.
- Dividers and networks are available in the following packages: (1) flat design (like Type FR resistors) and (2) custom design.
- TCR tracking as low as 25 ppm/°C

CHIP AND WIRE HYBRID CIRCUITS CUSTOM DESIGNED AND MANUFACTURED

Put K and M Electronics' experience in design and manufacturing of thick film hybrids to work for you. Our SMT hybrids are standard components of the world's finest miniaturized high voltage power supplies.

Your circuit will receive personal attention from the initial concept, through computer-aided design and manufacture, until the final product is tested and delivered to you, in less time than you might think.

ISO 9001 certified

K and M Electronics, Inc.
11 Interstate Drive, West Springfield, MA 01089
Phone: (413) 263-6283 • Fax: (413) 737-0608
http://www.kandm.com

SPEER ELECTRONICS, INC.

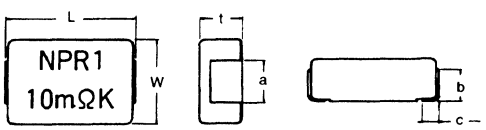
FIXED RESISTORS/ FIXED POWER RESISTORS/ POWER CHIP RESISTORS

FIXED RESISTORS / FIXED POWER RESISTORS

Parameter		Type Designation	Wattage	Temp. Coefficient (ppm/°C)	Resistance Tol. (%)	Operating Temperature Range	Short Time Overload (%)	Temp. Cycling (%)	Load Life (%)	Moisture Resistance (%)	Voltage Coefficient (ppm/v)	Failure Rate (1000 hrs)	Marking
FIXED RESISTORS													
METAL FILM	Ultra Precision	H	1/8, 1/4, 1/2, 1	5, 10, 15	0.05, 0.10, 0.25	-55°C~+175°C	≤0.10	≤0.10	≤1.0	≤1.0	<5	$<10^{-5}$	Alpha-Num
	Precision	MF	1/8, 1/4, 1/2, 1	25, 50, 100	0.1, 0.25, 0.50, 1	-55°C~+155°C	≤0.30	0.30	≤1.0	≤1.0	<5	$<10^{-5}$	Clr.Band (5)
	Semi Precision	ML	1/8, 1/4, 1/2	200	2, 5	-55°C~+155°C	0.30	0.50	1.5	1.5	<10	$<10^{-5}$	Clr.Band (4)
	MIL	RN	1/10, 1/8, 1/4, 1/2	50, 100	0.50, 1	-55°C~+175°C	≤0.10	0.10	≤1.0	≤1.0	<5	$<10^{-5}$	Alpha-Num
	Dual-Rated	SN2C	1/8, 1/4	50, 100	1	-55°C~+155°C	0.25	0.15	0.25	0.30	<5	$<10^{-5}$	Clr.Band (5)
		MS50	1/4, 1/2	50, 100	1	-55°C~+155°C	0.15	0.15	0.50	0.30	<5	$<10^{-5}$	Clr.Band (5)
CARBON FILM	Gen. Purp.	CF	1/8, 1/4, 1/2	250~3000	2, 5	-55°C~+155°C	≤0.50	0.50	≤2.0	≤2.0	≤10	$<10^{-5}$	Clr.Band (4)
	Flameproof	CFP	1/8, 1/4, 1/2	250~3000	2, 5	-55°C~+155°C	≤0.50	0.50	≤2.0	≤2.0	≤10	$<10^{-5}$	Clr.Band (4)
	Dual-Rated	RDS	1/8, 1/4, 1/4, 1/2	300~1000	2, 5	-55°C~+155°C	≤0.20	0.15	≤1.5	<1.0	<10	$<10^{-5}$	Clr.Band (4)
		RDS/FP	1/8, 1/4, 1/4, 1/2	300~1000	2, 5	-55°C~+155°C	≤0.20	0.15	≤1.5	1.0	<10	$<10^{-5}$	Clr.Band (4)
FIXED POWER RESISTORS													
METAL OXIDE	Standard	MO	1/2, 1, 2, 3	200	2, 5	-55°C~+200°C	0.50	0.50	2.0	2.0	<10	$<10^{-4}$	
	Reduced Size	RSS	1/2, 1, 2, 3, 5	200	1, 2, 5	-55°C~+200°C	0.50	0.50	2.5	2.5	<10	$<10^{-3}$	
CARBON	Reduced Size	SPR	1/2, 1, 2, 3, 5	150~600	2, 5	-55°C~+200°C	1.0	1.0	3.0	3.0	<10	$<10^{-3}$	
CERAMIC	Pulse Application	HPC	1/2, 1, 2, 3, 4, 5	300~1800	10, 20	-40°C~+200°C	2.0	2.0	5.0	5.0	<2000	$<10^{-5}$	

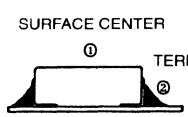
SEE OUR AD IN CAPACITOR SECTION.

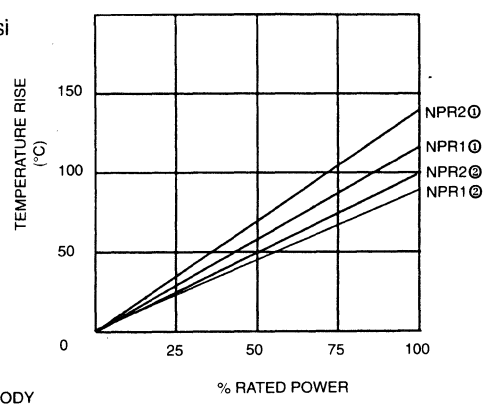
NPR THIN & THICK POWER CHIP RESISTORS



- Surface Mount Type Power Resi
- Flame Retardant
- Current Detecting Resistors for Power supplies, etc.

Symbol	NPR1	NPR2
L	7.5±1.0	12.0±1.0
W	4.5±-0.3	8.0±0.3
t	2.0±0.3	4.0±0.4
a	2.5±0.3	4.0±0.3
b	1.3±0.3	3.0±0.5
c	1.0±0.3	1.5±0.5





STANDARD APPLICATIONS

Type	Power Rating	Max Working Voltage	Max Overload Voltage	T.C.R. (ppm/°c)	R. Range (Ω)E24 F(±1%)	R. Range (Ω)E24 J(±5%)	R. Range (Ω)E24 K(±10%)	Rated Ambient Temp.	Operating Temp. Range
NPR1	1W	350V	700V	0.10Ω≤R:±100	0.1~10M	0.01~22M	0.0039~ 0.0091	+70°C	-55°C ~+180°
NPR2	2W	500V	1000V	R ≤0.1Ω:±200					

ORDERING AND SPECIFYING INFORMATION

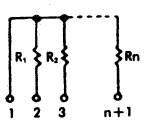
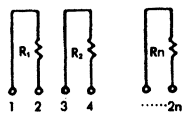
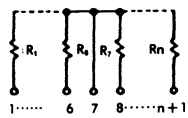
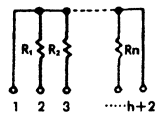
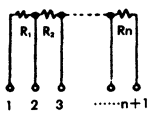
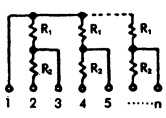
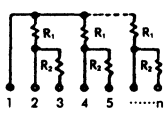
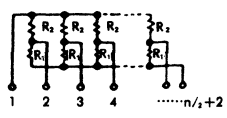
NPR	1	TE	103	J
Type	**Power Rating**	**Taping**	**Nominal Resistance**	**Tolerance**
	1 2	TE: Embossed Plastic	±1%: 3 Significant Figures + Multiplier ±2%/5% 2 Significant Figures + Multiplier R indicates decimal point	F: 1% J: 5% K: 10%

KOA Speer Electronics, Inc. Bolivar Drive, P.O.Box 547, Bradford, Pa. 16701 • Toll Free: 1-800-450-0573 • Web Site: www.koaspeer.com

KOA SPEER ELECTRONICS, INC.

SPECIALTY RESISTORS/ SIP RESISTORS NETWORKS

SIP RESISTORS NETWORKS

Circuit Symbol			S	C	D
CIRCUIT CONSTRUCTION		 $R_1 = R_2 \cdots = Rn$ (n = 3 to 13)	 $R_1 = R_2 \cdots + Rn$ (n = 2 to 7)	 $R_1 = R_2 \cdots + Rn$ (n = 4 to 12)	 $R_1 = R_2 \cdots = Rn$ (n = 3 to 12)
MARKING	RKC	10KΩJ	[4] S10KΩJ	10KΩJ	10KΩJ
	RKL	103J	S103J	C103J	D103J
	RKH	103J	[4] S103J	[6] C103J	[6] D103J
Circuit Symbol		**A**	**T**	**E**	**R**
CIRCUIT CONSTRUCTION		 $R_1 = R_2 \cdots = Rn$ (n = 3 to 13)	 (n = 4 to 12)	 (n = 4 to 12)	 (n = 6 to 18)

Parameter	Type		
	RKL	RKC	RKH
Seated Height (mm)	5.0	6.5	10.70
Element Power (watts)	0.125 ex "s" 0.200 "s"	0.125 ex "s" 0.250 "s"	0.250 ex "s" 0.500"s"
Maximum Working Voltage	100	200	250
Operating Temperature Range	-55°C~+155°C	-55°C~+155°C	-55°C~+155°C
Resistance Range	22Ω~+1.0M	22Ω~10M	56Ω~10M
Resistance Tolerance (%)	2, 5	1, 2, 5	1, 2, 5
Temperature Coefficient (ppm/°C)	200	100~200	100~200
Short Time Overload (%)	0.50	≤0.50	≤0.50
Resistance to Solder Heat (%)	0.50	≤0.50	≤0.50
Temperature Cycling (%)	0.50	≤0.50	≤0.50
Moisture Resistance (%)	<2.0	<1.5	<1.5
Load Life	<2.0	<1.0	<1.0

SPECIALTY RESISTORS

RESISTOR LAB KITS

Type	Wattages	# of Values	Tolerance	# pcs/value	Drawers/Kit
Carbon Film	1/8, 1/4, 1/2	60	5%	100	15
Flameproof CF	1/4, 1/2	60	5%	100	15
Metal Film	1/8, 1/4, 1/2	126	1%	10	18
SM Chip	1206 (1/8)	60	5%	50	15
SM Chip	1206 (1/8)	126	1%	25	24

JUMPER (Zero Ohm)

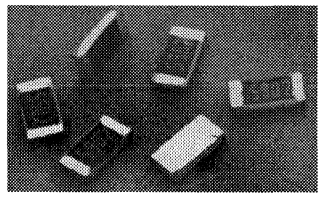
KSE PT#	Form	Size	Resistance	Amperage
Z12	Axial	3.7 x 1.6	20mΩmax	1.5A
Z16	Axial	3.4 x 1.7	20mΩmax	1.5A
Z25	Axial	6.3 x 2.4	20mΩmax	2.5A
Z33	Axial	8.5 x 3.0	20mΩmax	3.0A
J-1/6	Axial	3.4 x 1.7	10mΩmax	10.0A
J-1/4	Axial	5.0 x 2.3	10mΩmax	15.0A
RM73Z2A	SM	2.0 x 1.25	50mΩmax	1.5A
RM73Z2B	SM	3.2 x 1.6	50mΩmax	2.0A
CC10	MELF	2.0 x 1.25	10mΩmax	2.0A
CC12	MELF	3.5 x 1.45	10mΩmax	2.0A
CC20	MELF	3.2 x 1.55	10mΩmax	2.0A
CC25	MELF	5.9 x 2.2	10mΩmax	5.0A

LINEAR POSITIVE TEMP. COEFFICIENT RESISTORS

KSE PT#	Form	Size (mm)	Power	TC Range	Res. Range	Res. Tolerance
LT1/8	Axial	3.7 x 1.7	0.125W	150~4,500ppm	0.51Ω~51KΩ	2%, 5%
LT1/4	Axial	6.5 x 2.3	0.250W	150~4,500ppm	0.51Ω~110KΩ	2%, 5%
MLT2B	MELF	3.50 x 1.45	0.125W	150~4,500ppm	0.51Ω~51KΩ	2%, 5%
MLT2E	MELF	5.9 x 2.2	0.250W	150~4,500ppm	0.51Ω~100KΩ	2%, 5%

KOA SPEER ELECTRONICS, INC.

FLAT CHIP RESISTORS



RM73 GENERAL PURPOSE 5% & 2% TOLERANCE

- RuO_2 Thick Film Resistive Element
- Anti-Leaching Nickel Barrier Terminations
- 90/10 Solder Plated Terminations, Standard
- White 3 digit Marking on Black Protective Coat. No marking on 1E size.

STANDARD APPLICATIONS

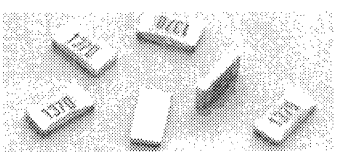
Part Designation*	Power Rating @ 70°C*	TCR (ppm/°C) MAX	Resistance Range (E-24) (G ± 2%)	Resistance Range E-24 (J ± 5%)	Absolute Maximum Working Voltage	Absolute Maximum Overload Voltage	Operating Temperature Range
RM73B1E (0402)	63mW	±200	—	10Ω~1MΩ	50V	100V	-55°C | +125°C
		±400	—	1.1MΩ~2.2MΩ			
RM73B1J (0603)	100mW	±200	10Ω~1MΩ	10Ω~1MΩ	50V	100V	-55°C | +175°C
		±400	1.0Ω~9.1Ω 1.1MΩ~10MΩ	1.0Ω~9.1Ω 1.1MΩ~10MΩ			
RM73B2A (0805)	125mW	±200	10Ω~1.0MΩ	10Ω~1MΩ	150V	300V	
		±400	1.0Ω~9.1Ω 1.1MΩ~10MΩ	1.0Ω~9.1Ω 1.1MΩ~10MΩ			
RM73B2B (1206)	250mW	±200	10Ω~5.6MΩ	10Ω~5.6MΩ	200V	400V	
		±400	1.0Ω~9.1Ω 6.2MΩ~10MΩ	1.0Ω~9.1Ω 6.2MΩ~22MΩ			
RM73B2E (1210)	330mW	±200	10Ω~5.6MΩ	10Ω~5.6MΩ			
		±400	—	1.0Ω~9.1Ω 6.2MΩ~10MΩ			
RM73B2H (2010)	750mW	±200	10Ω~5.6MΩ	10Ω~5.6MΩ			-55°C | +150°C
		±400	—	1.0Ω~9.1Ω, 6.2MΩ~22MΩ			
RM73B3A (2512)	1000mW	±200	10Ω~5.6MΩ	10Ω~5.6MΩ			
		±400	—	1.0Ω~9.1Ω, 6.2MΩ~22MΩ			

Parenthesis indicate EIA package size codes and power ratings

ORDERING & SPECIFYING INFORMATION

RM73	B	2B	T	103	J
Type	**TCR**	**Size Code**	**Packaging**	**Nominal Resistance**	**Tolerance**
	B: 200~500 ppm/°C (see above)	1E: 0402 2E: 1210 1J: 0603 2H: 2010 2A: 0805 3A: 2512 2B: 1206	T: Punched Paper TE: Embossed Plastic TP: Punched Paper 2mm Pitch 0402 (IE) only. TDD: 10" Punched Paper TED: 10" Embossed Plastic	2 Significant Figures & 1 Multiplier R Indicates Decimal on Values <10Ω	G: ±2% J: ±5%

RK73 PRECISION 1% & 0.5% TOLERANCE



- RuO_2 Thick Film Resistive Element
- Anti-Leaching Nickel Barrier Terminations
- 90/10 Solder Plated Terminations, Standard
- 4 Digit, Black Marking on Blue Protective Coat

STANDARD APPLICATIONS

Part Designation*	Power Rating @ 70°C	TCR (ppm/°C) *MAX	Resistance Range (E-96) (D ± 0.5%)	Resistance Range (E-96) (F ± 1%)	Absolute Maximum Working Voltage	Absolute Maximum Overload Voltage	Operating Temperature Range
RK73H1E (0402)	63mW	±200	—	10Ω~1MΩ	50V	100V	-55°C | +125°C
RK73H1J **(0603)	100mW	±100	10Ω~976KΩ	10Ω~1MΩ	50V	100V	-55°C | +175°C
		—	—				
RK73H2A (0805)	125mW	±100	10Ω~976Ω	10Ω~1MΩ	150V	300V	
		±400	—	1.0Ω~9.76Ω, 1.02MΩ~10MΩ			
RK73H2B (1206)	250mW	±100	10Ω~976KΩ	10Ω~1.0MΩ	200V	400V	
		±200	—	1.02MΩ~5.6MΩ			
		±400	—	1.0Ω~9.76Ω, 5.62MΩ~10MΩ			
RK73H2E (1210)	330mW	±100	10Ω~976KΩ	10Ω~1MΩ			
		±200	—	1.02MΩ~5.6MΩ			
		±400	—	1.0Ω~9.76Ω, 5.62MΩ~10MΩ			
RK73H2H (2010)	750mW	±100	10Ω~976Ω	10Ω~1MΩ			-55°C | +150°C
		±200	—	1.02MΩ~5.6MΩ			
		±400	—	1.0Ω~9.76Ω, 5.62MΩ~10MΩ			
RK73H3A (2512)	1000mW	±100	10Ω~976KΩ	10Ω~1MΩ			
		±200	—	1.02MΩ~5.6MΩ			
		±400	—	1.0Ω~9.76Ω, 5.62MΩ~10MΩ			

* Parenthesis indicate EIA package size codes and power ratings
**The RK73H1J (0603) is available in E24 series (marked) & E96 series (unmarked)

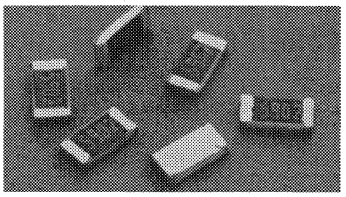
ORDERING & SPECIFYING INFORMATION

RK73	H	2B	T	1003	F
Type	**TCR**	**Size Code**	**Packaging**	**Nominal Resistance**	**Tolerance**
	H: 100~400 ppm/°C (see above)	1E: 0402 1J: 0603 2A: 0805 2B: 1206 2E: 1210 2H: 2010 3A: 2512	T: Punched Paper TE: Embossed Plastic TP: Punched Paper 2mm Pitch 0402 (IE) only. TDD: 10" Punched Paper TED: 10" Embossed Plastic	3 Significant Figures & 1 Multiplier R Indicates Decimal on Values <100Ω	F: ±1% D: ±0.5%

KOA Speer Electronics, Inc. Bolivar Drive, P.O.Box 547, Bradford, Pa. 16701 • Toll Free: 1-800-450-0573 • Web Site: www.koaspeer.com

KOA SPEER ELECTRONICS, INC.

FLAT CHIP RESISTORS



RN73 ULTRA PRECISION 0.1% TO 1% TOLERANCE

- NiCr Thin Film Resistor Element
- Anti-Leaching Nickel Barrier Terminations
- 90/10 Solder Plated Terminations, Standard
- Also Available with Epoxy Bondable Terminations
- Meets or Exceeds EIA 576, MIL-R-55342D, UL 94V-0
- Four (4) Digit Marking, Distinctive Color Identifiers

STANDARD APPLICATIONS

Part Designation	Power Rating @ 70°C	TCR (ppm/°C) MAX	E-24 / E-96 Resistance Range - Tolerance B(±0.1%)	C(±0.25%)	D(±0.5%)	F(±1.0 %)	Absolute Maximum Working Voltage	Absolute Maximum Overload Voltage	Operating Temperature Range
RN73T1J	63mW (1/16W)	±10	——				50V	100V	-55°C to +150°C
RN73E1J		±25	100Ω~33KΩ	——					
RN73C1J		±50	——		10Ω~33KΩ				
RN73T2A	100mW (1/10W)	±10	100Ω~100KΩ			——	100V	200V	
RN73E2A		±25	51Ω~100KΩ	51Ω~100KΩ	10Ω~100KΩ				
RN73C2A		±50	——	51Ω~150KΩ	10Ω~150KΩ				
RN73T2B	125mW (1/8W)	±10	100Ω~130KΩ			——	150V	300V	
RN73E2B		±25	51Ω~130KΩ	51Ω~130KΩ	10Ω~130KΩ				
RN73C2B		±50	——	51Ω~365KΩ	10Ω~365KΩ				
RN73T2E	250mW (1/4W)	±10	100Ω~240KΩ			——	200V	400V	
RN73E2E		±25	51Ω~240KΩ	51Ω~240KΩ	10Ω~240KΩ				
RN73C2E		±50	——	51Ω~510KΩ	10Ω~510KΩ				

ORDERING & SPECIFYING INFORMATION

RN73	E	2B	T	1002	B
Type	TCR	Size Code	Packaging	Nominal Resistance	Tolerance
	T: 10 ppm/°C E: 25 ppm/°C C: 50 ppm/°C	2E: 1210 2A: 0805 2H: 2010 2B: 1206 3A: 2512	T: Punched Paper TE: Embossed Plastic	3 Significant Figures & 1 Multiplier R Indicates Decimal on Values <100Ω	B: +0.1% C: ±0.25% D: ±0.50% F: ±1.0%

RK73N TRIMMABLE

- Same Quality Thick Film Construction as Type RM
- Glass Passivated, Supplied Without Protective Coat
- Anti-Leaching Nickel Barrier Terminations
- 90/10 Solder Plated Termination, Standard
- Trimmable in Circuit to 2X Original Value
- Replaces Trimmer in Critical Circuit Adjustments

STANDARD APPLICATIONS

Part Designation	Power Rating @ 70°C	TCR (ppm/°C) MAX	Resistance Range	Resistance Tolerance	Maximum Working Voltage	Maximum Overload Voltage	Operating Temperature Range
RK73N2A (0805)	125mW	±200	10Ω~1MΩ	K(+0%/ -30%) M(±20%)	100V	200V	-55°C ~ +150°C
RK73N2B (1206)	250mW				200V	400V	
RK73N2E (1210)	330mW						
RK73N2H (2010)	750mW						
RK73N3A (2512)	1000mW						

ORDERING & SPECIFYING INFORMATION

RK73N	2B	T	103	K
Type	Size Code	Packaging	Resistance Value	Tolerance
	2A: 0805 2B: 1206 2E: 1210 2H: 2010 3A: 2512	T: Punched Paper TE: Embossed Plastic	2 Significant Figures & 1 Multiplier	K: +0% / -30% M: ±20%

RK73C PRECISION 1% & 0.5% TOLERANCE

STANDARD APPLICATIONS

Part Designation**	Power Rating @ 70°C	TCR (ppm/°C) MAX	Resistance Range D(±0.5%)* E-24, E-96	Resistance Tolerance F(+1%)* E-24, E-96	Absolute Maximum Working Voltage	Absolute Maximum Overload Voltage	Operating Temperature Range
RK73C1J (0603)	0.063W	±50	*10Ω~976K	*10Ω~1M	50V	100V	-55°C
RK73C2A (0805)	0.1W				150V	200V	
RK73C2B (1206)	0.12W				200V	400V	+125°C

* The 1J-F (±1%) of E-96 Series have no marking
** Parenthesis indicates EIA Package Size Codes.

- RUO_2 Thick Film Resistor Element
- Anti-Leaching Nickel Barrier Terminations
- 90/10 Solder Plated Termination, Standard
- Also Available with Epoxy Bondable, (Palladium Silver) Terminations in 0805 &1206 sizes.
- 4 Digit, Yellow Marking on Blue Protective Coat. (Only E-24 Values are marked on 0603)

ORDERING & SPECIFYING INFORMATION

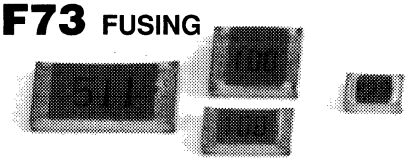
RK73	C	1J	T	1003	D
Type	TCR	Size Code	Packaging	Nominal Resistance	Tolerance
		1J: 0603 2A: 0805 2B: 1206	T: Punched Paper TE: Embossed Plastic TDD: 10" Punched Paper TED: 10" Embossed Plastic	3 Significant Figures & 1 Multiplier R Indicates Decimal on Values <100Ω	D: ±0.5% F: ±1.0%

KOA Speer Electronics, Inc. Bolivar Drive, P.O.Box 547, Bradford, Pa. 16701 • Toll Free: 1-800-450-0573 • Web Site: www.koaspeer.com

KOA SPEER ELECTRONICS, INC.

FLAT CHIP JUMPERS/ FLAT CHIP RESISTORS

RF73 FUSING



- Reflow & Wave Solderable
- Performs Like "RM" Under Normal Conditions
- Fuses When Overloaded
- Anti-Leaching Nickel Barrier & 90/10 Solder Plated Terminations
- Three Digit Black Marking on Brown Protective Coat

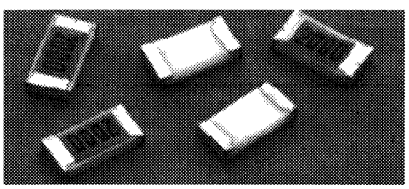
STANDARD APPLICATION

Part Designation	Power Rating @ 70°C	TCR (ppm/°C) Max.	Resistance Range E-24	Resistance Tolerance	Maximum Open Circuit Voltage	Fusing Characteristics					Operating Temperature Range	Maximum Fusing Time
RF73B2A	100mW	±1000 (0.2-4.3Ω)	0.2~510Ω	J(±5%)	50 V	3.0W/0.2~0.47Ω	2.6W/0.51~1.0Ω	2.4W/1.1~20Ω	2.0W/22~100Ω	1.75W/110~510Ω	-55°C to + 125°C	60 sec.
RF73B2B	125mW					3.75W/0.2~0.47Ω	2.875W/0.51~10Ω	2.5W/12~24Ω	2.2W/27~100Ω	2.0W/110~510Ω		
RF73B2E	250mW					4.5W/0.2~0.47Ω	4.1W/0.51~4.7Ω	3.5W/5.1~27Ω	3.2W/27~100Ω	3.0W/110~510Ω		
RF73B2H	500mW	±500 (4.7-510Ω)			100 V	5.5W/0.2~0.47Ω	5.0W/0.51~4.7Ω	4.0W/5.1~27Ω	3.5W/30~100Ω	3.2W/110~510Ω		
RF73B3A	1000mW					6.5W/0.2~0.47Ω	6.0W/0.51~4.7Ω	5.0W/5.1~30Ω	4.5W/33~100Ω	4.0W/110~510Ω		

ORDERING & SPECIFYING INFORMATION

RF73	B	2A	T	100	J
Type	TCR	Size Code	Packaging	Nominal Resistance	Tolerance
	±1000 ppm/°C (0.2Ω~4.3Ω) ±500 ppm/°C (4.7Ω~510Ω)	2A: 0805 2B: 1206 2E: 1210 2H: 2010 3A: 2512	T: Punched Paper TE: Embossed Plastic	2 Significant Figures & 1 Multiplier. R Indicates Decimal on Value <10Ω	J: 5%

LT73 LINEAR POSITIVE TEMPCO



- Anti-Leaching Nickel Barrier Terminations
- 90/10 Solder Plated Terminations Standard
- 25 Specific Temperature Characteristics
- Black 4 Digit Marking on Bronze Body Color
- 0805 & 1206 Size Option

ELECTRICAL SPECIFICATIONS

Part Designation	Power Rating @70°C	Maximum Working Voltage	Maximum Overload Voltage	Operating Temperature Range
LT73 (2A)	100mW	50V	100V	-40°C~+125°C
LT73 (2B)	125mW	75V	150V	

RESISTANCE RANGE & TEMPERATURE COEFFICIENT

Resistance Range (Ω) E-24		Resistance Tolerance	T.C.R. (ppm/°C)	T.C.R. Tolerance
LT73 (2A)	LT73 (2B)			
2K~24K	2K~51K	G (±2%)	150•250•350•450•500	±100ppm/°C
1K~20K	1K~43K	J (±5%)	600•700•800•900	±150ppm/°C
1K~13K	1K~27K		1000•1200•1400	±15%
510~4.7K	1K~10K		1600•1800	
510~4.3K	510~9.1K		2000•2200•2400	±10%
510~3.0K	510~6.2K		2600•2800	
510~3.0K	510~6.2K		3000•3300•3600	
510~3.0K	510~6.2K		3900	
100~1K	100~2.0K		4200	
51~510	51~510		4500	

NOTE: T.C.R. is factory tested from 25°C to 75°C

ORDERING & SPECIFYING INFORMATION

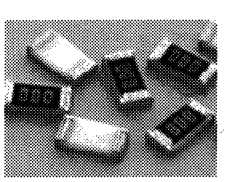
LT73	1000	2B	T	103	J
Type	TCR	Size Code	Packaging	Resistance Value	Tolerance
	See Above Chart	2A: 0805 2B: 1206	T: Punched Paper TE: Embossed Plastic	2 Significant Figures & 1 Multiplier	G: 2% J: 5%

RM73Z ZERO OHM JUMPER

- Silver Element
- Anti-Leaching Nickel Barrier Terminations
- 90/10 Solder Plated Terminations, Standard
- Also Available with 100% Tin Terminations
- White 000 Marking on Black Protective Coat; No Marking on 1E

TYPE DESIGNATION

RM73Z	2B	T
Type	Size Code	Packaging
	1E: 0402 1J: 0603 2A: 0805 2B: 1206 2E: 1210 2H: 2010 3A: 2512	T: 7" Punched Paper TE: 7" Embossed Plastic TP: 7" Punched Paper 2mm 0402 (1E) only. TDD: 10" Punched Paper TED: 10" Embossed Plastic



STANDARD APPLICATIONS

Part Designation	Maximum Current (Amps) @ 70°C	Maximum Resistance
RM73Z 1E	1.0 2.0 Max. Surge for <1 sec.	50mΩ
RM73Z 1J		
RM73Z 2A	1.5 5A Max. Surge for <1 sec.	
RM73Z 2B	2.0 10 Max. Surge for <1 sec.	
RM73Z 2E		
RM73Z 2H		
RM73Z 3A		

KOA SPEER ELECTRONICS, INC.

OTHER SMC

HN16 SOP THIN RESISTOR NETWORK

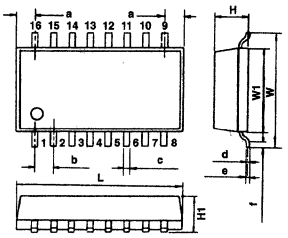
- .050" (1.27mm) Lead Space
- UL94V - 0 Molded Epoxy Case
- Operating Voltage up to 50V
- .087" (2.2mm) Maximum Seated Height
- Available Tape/Reel & Magazine Packaging

DIMENSIONS CHART

L	H[1]	H	W[1]	w	a	b	c	d	e	f
0.433±0.012	0.087 max.	0.079 max.	0.224 max.	0.303±0.002	0.049 max.	0.050±0.005	0.016±0.002	0.004 min.	0.006±0.002	0.012±0.002
11.0±0.3	2.2 max.	2.0 max.	5.7 max.	7.7±0.3	1.25 max.	1.27±0.12	0.40±0.05	0.10 min.	0.15±0.05	0.30±0.05

• Controlling Dimension In Millimeters

DIMENSIONS



STANDARD APPLICATIONS

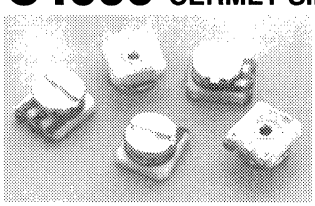
Part Designation	Circuit	Power Rating @ 70°C	Available TCR ppm / °C	Resistance Range E-24, E-96	Available Resistance Tolerance	Maximum Working Voltage	Operating Temperature Range
HN16	B	31.25 mW / element 470 mW / package	>10KΩ: T (10) >1KΩ: E(25) ALL: C(50) ALL: D(100)	100Ω ~ 49.9KΩ	>10KΩ: B(±0.1%) >1KΩ: C(±0.25%) ALL: D(±0.5%) ALL: F(±1.0%)	50V	-55°C ~ +125°C
HN16	S	62.5 mW / element 500 mW / package		100Ω ~ 100KΩ			

ORDERING & SPECIFYING INFORMATION

HN16	C	S	TE	1001	F
Type	TCR	Circuit	Packaging	Nominal Resistance Value	Tolerance
	T: 10 ppm/°C E: 25 C: 50 D: 100	B: Bussed S: Isolated	TE: Tape ST: Magazine	2 (E24) or (E96) Significant Figures & 1 Multiplier	B: ±0.10% C: ±0.25% D: ±0.50% F: ±1.0%

C4000 CERMET SINGLE TURN TRIMMER POTENTIOMETERS

- Miniature Size 3.8mm x 4.6mm
- Eleven Different Types / Configurations
- Available on Tape & Reel



STANDARD APPLICATIONS

Part Designation	Power Rating @ 70°C	TCR	Resistance Change Characteristics	Resistance Range E-6	Resistance Tolerance	Maximum Working Voltage	Operating Temperature Range	Operating Torque
C4315	0.1W (C4315)	±250ppm/°C	B (LINEAR)	100Ω ~ 2.2MΩ	±25%	50V	-30°C ~ +100°C	20 ~ 200 gm cm
All Other Styles	0.2W				±30%	100V		

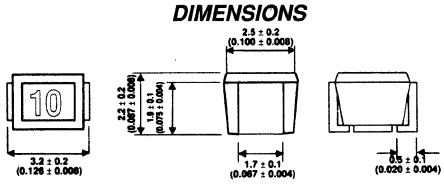
ORDERING & SPECIFYING INFORMATION

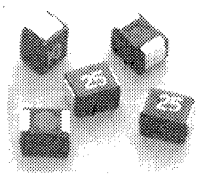
C	4212	TE	102
Type	Style	Packaging	Nominal Resistance
		None: Bulk • TE: Embossed Plastic	2 Significant Figures & 1 Multiplier

CCP CHIP CIRCUIT PROTECTORS

- Immediate Cut-Off of Excessive Current
- No Generation of Heat
- UL94V - 0 Epoxy Case
- Suitable for Reflow & Wave Solder
- CCP2E10, CCP2E20 & CCP2E25 are UL 198G Recognized. File No. E131375

DIMENSIONS





RATING

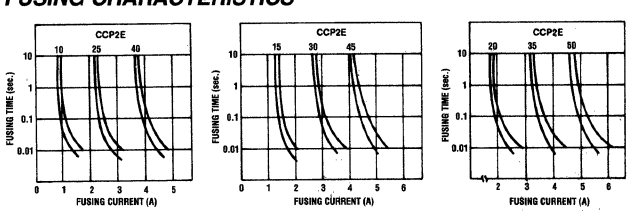
Type	Current Rating	Internal R. Max. (mΩ)	Max. Open Circuit Voltage	Rating Ambient Temp.	Operating Temp. Range	Definition of Fusing Characteristics		
						A x 2.0	A x 2.5	A x 6.0
CCP2E10	0.4A	200	70V	+70°C	-40°C ~ +125°C	No Fusing Within 20 msec.	Fusing Within 1 sec.	Fusing Within 20 msec.
CCP2E15	0.6A	150						
CCP2E20	0.8A	100						
CCP2E25	1.0A	75						
CCP2E30	1.2A	60						
CCP2E35	1.4A	50						
CCP2E40	1.6A	45						
CCP2E45	1.8A	40						
CCP2E50	2.0A	35						

A = CURRENT RATING

ORDERING & SPECIFYING INFORMATION

CCP	2E	10	TE
Type	Size	Current Rating	Packaging
		10: 400mA 15: 600mA 20: 800mA Etc.	TE: Embossed Plastic Tape

FUSING CHARACTERISTICS

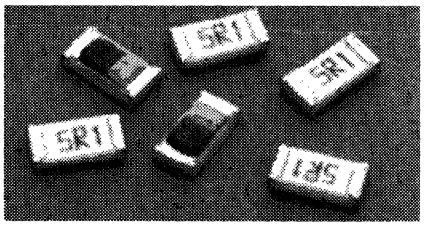


KOA Speer Electronics, Inc. Bolivar Drive, P.O.Box 547, Bradford, Pa. 16701 • Toll Free: 1-800-450-0573 • Web Site: www.koaspeer.com

CAPACITOR/RESISTOR CHIP

KOA SPEER ELECTRONICS, INC.

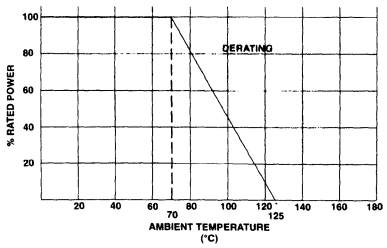
CR-73



FEATURES:

- Impedance Matching Function
- Ideal for High Speed Clock Circuits
- Noise Filtering Function
- Reduces Mounting Space and Component Count by 50%
- Nickel and Solder Plated Terminations

ENVIRONMENTAL APPLICATIONS



STANDARD APPLICATION

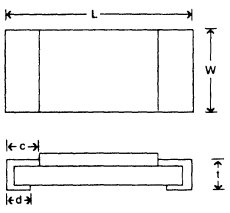
Resistor

TYPE	TCR (PPM/°C)	Power Rating	Maximum Working Voltage	Resistance Range (E-24)	Resistance Tolerance
CR732A	K (±200)	0.1W	3V	10~1KΩ (E12)	M(±20%)
CR732B		0.125W	5V	10~1KΩ (E24)	

Capacitor

TYPE	TC	Voltage Rating	Capacitance Range	Capacitance Tolerance @ 1kHz/25°C	Capacitance Dissipation Factor
CR732A	E (±20%/-55%)	25V	27~200pF(E6)	M(±20%)	5% max.
CR732B		50V	10~200pF(E12)		

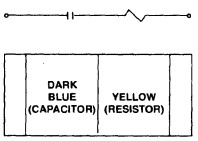
DIMENSIONS



units: mm

Type	L	W	c	d	t
CR732A	2.0+0.2	1.25±0.2	0.4±0.2	0.3±0.2	M (±20%)
CR732B	3.2+0.2	1.6±0.2	0.5±0.3	0.4±0.2	

CIRCUIT CONSTRUCTION



Parameter	Maximum D R	Test Method
Thermal Shock	C±10% R± 3%	MIL-STD-202F, Method 107D -40°C ~ +125°C, 100 cycles
Low Temperature Operation	C±10% R± 3%	MIL-R-55342D p 4.7.4 1 Hour @-40°C followed by 45 minutes of RCWV**
High Temperature Exposure	C±10% R± 3%	MIL-R-55342D p 4.7.6 1000 Hours @ 125°C
Resistance to Solder Heat	C±10% R± 3%	MIL-R-55342D p 4.7.7 260°C for 10 seconds
Terminal Strength-Bend	C±10% R± 3%	3mm Deflection in Either Direction for 10 seconds
Moisture Resistance	C±10% R± 3%	MIL-STD-202F, Method 106E 10 Cycles, 240 Hours
Life*	C±10% R± 3%	MIL-STD-202F, Method 108A 70°C, 1000 Hours 1.5 Hr ON, 0.5 Hr OFF
	Minimum	
Terminal Adhesion	15 Grams	Axial Pull, One Terminal at a Time
Dielectric Withstanding Voltage 2B	400V	
Insulation Resistance	1,000MΩ	

* Maximum D R Pertains to EIA power ratings
** RCWV- Rated Continuous Working Voltage

ORDERING AND SPECIFYING INFORMATION

CR73	2B	2	TE	270/510	M
Type	Size Code	Terminations	Packaging	Capacitance/Resistance	Tolerance
	2B:1206	2	None: Bulk TE: Embossed Plastic	2 Significant Figures & the Number of Zeros	M: ±20%

SPEER ELECTRONICS ENGINEERING LAB KITS

LEADED DEVICES

Carbon / Metal Film
1/8 Watt 5%
1/4 Watt 5%
1/2 Watt 5%

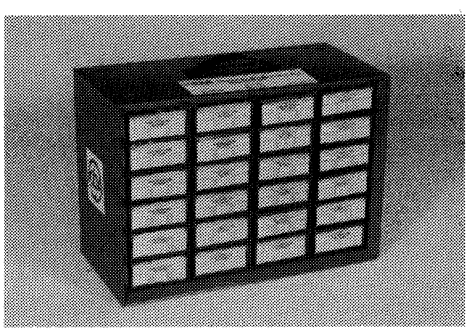
Carbon Film Flame Proof
1/4 Watt 5%
1/2 Watt 5%

SURFACE MOUNT DEVICES

Chip Resistors
General Purpose 5%
Precision 1%
In 0603, 0805, 1206, 1210 & 2010 Sizes

Tantalum
A, B, C, D (EIA J) and E (EIA D) Case Sizes
20 & 10%

Inductors
1210 Wire Wound
.005µH - 220µH 5 and 10%



A Sturdy compact cabinet that contains a wide selection of the most commonly used values for design and experimentation.

BANTRY COMPONENTS, INC.

KRL's complete product line is now available in Surface Mount Packaging, including: Precision Wirewound resistors with temperature coefficients from ±1 PPM to ±10 PPM and tolerances from ±.005% to ±1%; Power Resistors from 1 to 3.5 watts with Wirewound or Metal Oxide elements; and Linear Response Temperature Compensating resistors. While other manufacturers rely on mechanical terminations and connections, KRL has chosen to utilize standard Manufacturing techniques for thru-hole resistors, including Mil-R-93 and Mil-R-26 standards for wirewound resistors, and applied them to the production of a surface mountable device. As always, KRL's Application Specialists are available to assist with design criteria for any Surface Mount or Thru-hole resistive component need.

KRL Precision Wirewound Resistors Axial and Printed Circuit Styles — 500,EC,PC,K SERIES

GENERAL SPECIFICATIONS:

- Standard Tolerances: .005%, .01%, .02%, .05%, .1%, .2%, .5%, & 1%
- Standard Temperature Coefficient ±5 PPM to ±10 PPM(±1 PPM Avail.)
- Operating Temperature Range: -65°C to 145°C
- Resistance Range: 1Ω to maximum listed
- Temperature Compensating TC's from +80 through +6000 PPM
- TC Matching to ±0.5 PPM/°C @ 25°C
- Custom Designs Welcome

AXIAL LEAD RESISTORS — 500 SERIES

KRL STYLE	MIL-R-93	MIL-PRF-39005	DIMENSIONS [1] LENGTH ±.015	DIAM. ±.015	LEAD AWG	POWER In WATTS MIL 125°C	COMM 125°C	MAXIMUM VOLTAGE	MAXIMUM RESISTANCE
532			.200	.100	24	.025	.050	100	100 K
†533			.260	.100	24	.050	.100	100	150 K
†534			.300	.100	22	.050	.100	100	150 K
†535			.250	.125	22	.065	.125	150	300 K
536			.312	.125	22	.075	.150	200	400 K
†537			.375	.125	22	.100	.200	200	500 K
†538			.375	.187	22	.125	.250	300	1 MEG
539			.250	.187	22	.115	.225	250	550 K
†540		RBR-74	.500	.187	22	.175	.350	300	1.5 MEG
550		RBR-75	.295	.250	22	.125	.250	200	1.5 MEG
†555	RB-56	RBR-56	.375	.250	20	.175	.350	300	1.5 MEG
†560	RB-55	RBR-55	.500	.250	20	.250	.500	400	2 MEG
†565	RB-54	RBR-54	.750	.250	20	.375	.750	500	3.5 MEG
570	RB-53	RBR-53	.750	.375	20	.450	.900	600	4 MEG
575	RB-52	RBR-52	1.00	.375	20	.750	1.50	750	5 MEG
578			.500	.500	20	.330	.660	400	2 MEG
580	RB-57	RBR-57	1.00	.500	20	.850	1.75	850	10 MEG
585	RB-58		1.50	.500	20	1.00	2.00	1.5KV	15 MEG

ECONOMY LINE AXIAL LEAD RESISTORS — EC SERIES

KRL STYLE	MIL-R-10509 EQUIVALENT	LENGTH ±.062	DIAM. ±.032	LEAD AWG	POWER In WATTS	MAXIMUM VOLTAGE	MAXIMUM RESISTANCE
†EC-10	RN-55	.250	.125	22	0.25	200	100 K
†EC-20	RN-60	.375	.125	22	0.4	300	150 K
†EC-25		.375	.187	22	0.5	325	175 K
†EC-30	RN-65	.500	.187	22	0.75	350	200 K
EC-40	RN-70	.750	.250	20	1.0	400	300 K
EC-50	RN-75	1.00	.375	20	1.5	600	500 K

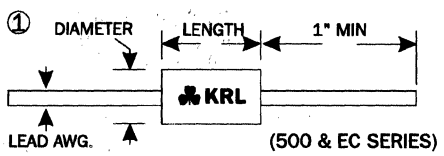
PRINTED CIRCUIT ROUND RESISTORS — PC SERIES

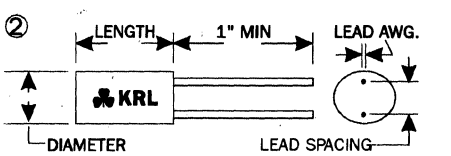
KRL STYLE	MIL-R -93	DIMENSIONS [2] LENGTH ±.032	DIAM. ±.015	LEAD SPACING ±.010	LEAD AWG	POWER In WATTS MIL 125°C	COMM 125°C	MAXIMUM VOLTAGE	MAXIMUM RESISTANCE
†PC-50	RB-71	.312	.250	.200	22	.125	.250	300	500 K
PC-51		.375	.250	.200	22	.125	.250	300	650 K
PC-52		.500	.250	.200	22	.250	.500	300	700 K
PC-53		.375	.375	.200	20	.250	.500	300	1 MEG
PC-55	RB-70	.500	.375	.200	20	.350	.700	300	1.5 MEG

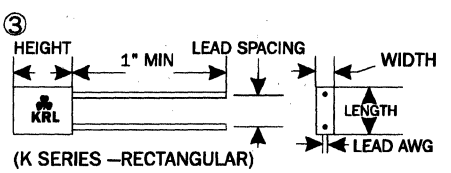
PRINTED CIRCUIT RECTANGULAR RESISTORS — K SERIES

KRL STYLE	DIMENSIONS [3] HEIGHT ±.032	WIDTH ±.020	LENGTH ±.020	LEAD SPACING ±.010	LEAD AWG	POWER In WATTS MIL 125°C	COMM 125°C	MAXIMUM VOLTAGE	MAXIMUM RESISTANCE
K-250	.250	.125	.250	.125	20	.125	.250	150	500 K
†K-300	.300	.125	.300	.150	22	.150	.300	150	1 MEG
K-500	.300	.150	.500	.250	20	.250	.500	150	1.5 MEG

† Indicates most popular types.

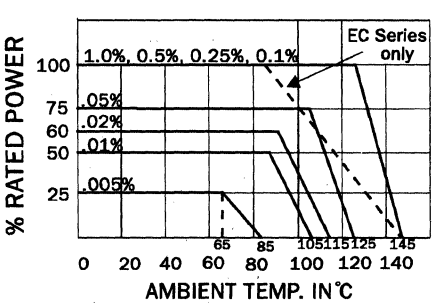






PERCENT OF RATED POWER

KRL PRECISION WIRE WOUND RESISTOR DERATING CHART - 500, EC, PC & K series resistors must be derated for tolerances below 0.1%. Use the chart below to select tolerance vs. operating temperature to determine the percent of rated power for operations. No derating is required for operation below +20 C.



KNOWN FOR FAST DELIVERY - CUSTOM DESIGN IS WELCOMED
E-MAIL: krlbantry@sprintmail.com OUR WEBSITE: http://www.krlbantry.com
KRL/Bantry Components, Inc. 160 Bouchard Street, Manchester, NH 03103-3399
Phone: 603-668-3210 FAX: 603-624-0634

ISO 9001 Registered Firm

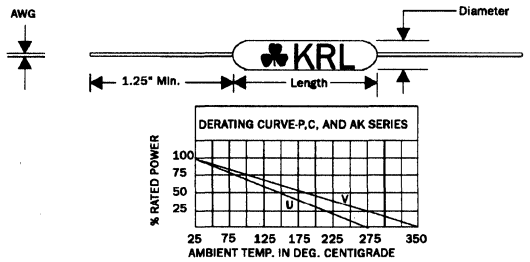
♣ KRL Wirewound Power Resistors P & C SERIES

KRL STYLE	MIL-R-26	MIL-PRF-39007	WATTAGE RATING U	WATTAGE RATING V	MAXIMUM WORKING VOLTAGE	DIELECTRIC WITHSTAND	MAXIMUM RESISTANCE IN OHMS	DIMENSIONS LENGTH ±.062 (±.010)	DIMENSIONS DIAMETER ±.032 (±.010)	LEAD AWG
C-1/4			.5	1.0	58V	500V	3.4K Ω	.250	.094	24 (.020)
(P-1/2) C-1/2			.75	1.2	73V	500V	4.5K Ω	.280 (.300)	.094 (.120)	24 (.020)
(P-1A) C-1A	RW-70		1.0	1.5	122V	500V	10K Ω	.406 (.425)	.094 (.120)	24 (.020)
C-1B			1.1	1.6	139V	500V	12K Ω	.530	.094	24 (.020)
(P-1C) C-1C			1.0	1.5	87V	500V	5K Ω	.330 (.360)	.094 (.120)	24 (.020)
C-1D			3.25	4.5	406V	500V	38K Ω	.700	.110	24 (.020)
(P-2) C-2			1.5	2.0	141V	1KV	10K Ω	.385 (.420)	.187 (.190)	20 (.032)
(P-2A) C-2A	RW-79		3.0	3.75	257V	1KV	22K Ω	.560 (.600)	.187 (.210)	20 (.032)
C-2B		RWR-71	3.25	4.75	444V	1KV	42K Ω	.812	.187	20 (.032)
(P-2C) C-2C			3.0	3.5	181V	1KV	32K Ω	.500 (.535)	.250 (.265)	20 (.032)
(P-2D) C-2D	RW-69		2.5	3.0	212V	1KV	20K Ω	.500 (.535)	.210 (.210)	20 (.032)
(P-2E) C-2E			3.0	3.75	261V	1KV	22K Ω	.560 (.600)	.158 (.173)	20 (.032)
(P-2F) C-2F			2.5	3.0	210V	1KV	20K Ω	.490 (.530)	.158 (.190)	20 (.032)
(P-3) C-3			4.0	5.5	295V	1KV	45K Ω	.625 (.680)	.250 (.265)	20 (.032)
C-4			5.0	6.0	444V	1KV	65K Ω	.875	.250	18 (.040)
(P-5) C-5	RW-74	RWR-74	5.0	6.0	444V	1KV	90K Ω	.875 (.925)	.312 (.335)	18 (.040)
(P-6) C-6	RW-67		6.0	6.5	488V	1KV	100K Ω	1.00 (1.08)	.312 (.335)	18 (.040)
C-7			7.0	8.0	730V	1KV	100K Ω	1.20 ±.094	.312 ±.062	18 (.040)
C-7A	RW-55		7.5	9.0	800V	1KV	150K Ω	1.375 ±.094	.375 ±.062	18 (.040)
C-10A	RW-78	RWR-78	10.0	12.0	1KV	1KV	275K Ω	1.78 ±.094	.375 ±.062	18 (.040)

P = Molded ( ) ; C = Coated

♣ KRL Space Miser Power Resistors AK SERIES

KRL STYLE	MIL-R-26	WATTAGE RATING U	WATTAGE RATING V	MAXIMUM WORKING VOLTAGE	DIELECTRIC WITHSTAND	MAXIMUM RESISTANCE IN OHMS	DIMENSIONS LENGTH ±.062	DIMENSIONS DIAMETER ±.032	LEAD AWG
AK-1	RW-81	1	-	58V	500V	3.4K Ω	.250	.094	24 (.020)
AK-2		1.5	-	82V	500V	4.5K Ω	.312	.094	24 (.020)
AK-3	RW-80	2.25	-	150V	500V	10K Ω	.406	.094	24 (.020)
AK-5		4.0	5.0	261V	1KV	22K Ω	.560	.158	20 (.032)
AK-5C		5.0	6.5	181V	1KV	32K Ω	.500	.250	18 (.040)
AK-6		6.0	7.0	295V	1KV	45K Ω	.625	.250	18 (.040)
AK-10		7.0	10.0	444V	1KV	90K Ω	.875	.312	18 (.040)



ELECTRICAL SPECIFICATIONS:

Resistance Tolerance: 5%, 3%, 1% std
(Accuracies available to .03%)
Standard Resistance Range: .1 Ω to maximum listed.
Temperature Coefficient: 90ppm/°C less than 1Ω;
50 ppm/°C 1Ω to 10Ω; 30 ppm/°C 10Ω to 100Ω;
20 ppm/°C 100Ω and above.
Short Term Overload: 5 Seconds at 5 times rated power.
Operating Range: -55°C to + 275°C (U Rating) or +350°C (V Rating)
Covering: Flame Retardent Silicone (Molded & Coated)
Windings: Space wound on Ceramic or Alumina Oxide Cores.
Noninductive windings are available & identified by adding an "N" in front of the style number. Divide maximum resistance by 2 for noninductive windings.

♣ KRL Temperature Compensating Wirewound Resistors

KRL High T.C. Resistors are available in any of the packages listed in this Catalog

- RESISTANCE RANGE - 10 Ω to 5 Meg Ω
- TOLERANCE - Standard from 10%, 5%, 3% and 1%. Accuracies to 0.1% are available. Consult factory for special requirements.
- TEMPERATURE RANGE - From -55 °C to +145 °C, +25 °C ref.
- TEMPERATURE COEFFICIENTS - Available from +80PPM/ °C to +6000PPM/ °C (see table to right). Use Order Code A thru T for standard T.C.'s shown.
- SPECIAL TEMPERATURE COEFFICIENTS - If you need a special. . . non standard T.C., use Order Code X and specify the exact T.C. required and temperature range of operation with +25 °C as reference temperature. (Factory must approve all non-standard T.C.'s)
- APPLICATIONS - Since there are many packages that a High T.C. Resistor can accommodate, it is impossible to show all types. Most often a customer will have a unique situation and our engineering department will gladly aid in any design and development of customer requirements.

KRL High T.C. Resistors have found their way into Power Supplies, Motor Controllers, Computers, Electronic Circuits for D to A and A to D converters, Temperature Sensors for the Medical Electronics Field, Aircraft Systems, Aerospace Flight Modules, and in Automotive Electronic Ignition Systems.

KRL Order Code	TEMPERATURE COEFFICIENT Cold Range In PPM/°C -55°C to +25°C	TEMPERATURE COEFFICIENT Hot Range In PPM/°C +25°C to +125°C	(2) Maximum Resistance in Percent
A	+80 ±20	+80 ±20	80
B	+100 ±10	+100 ±10	80
C	+120 ±10	+120 ±10	80
D	+140 ±30	+140 ±30	80
E	+180 ±30	+180 ±30	80
G	+290 ±30	+290 ±30	25
H	+380 ±40	+400 ±40	70
J	+450 ±50	+450 ±50	60
K	+700 ±200	+700 ±200	60
L	+850 ±80	+850 ±80	50
M	+1000 ±100	+1000 ±100	50
N	+1500 ±200	+1400 ±200	50
P	+2600 ±200	+2600 ±200	50
Q	+3200 ±300	+3500 ±300	40
R	+4000 ±400	+4500 ±400	5
T	+5000 ±300	+6000 ±300	5
X (1)	SPECIAL T.C.,SPECIFY EXACT TCR. SUBJECT TO FACTORY APPROVAL		

(1) KRL will manufacture to any T.C.R. to meet customer specifications.
(2) Maximum resistance in percent should be applied to the style choosen in the normal catalog listing column marked Maximum Resistance.

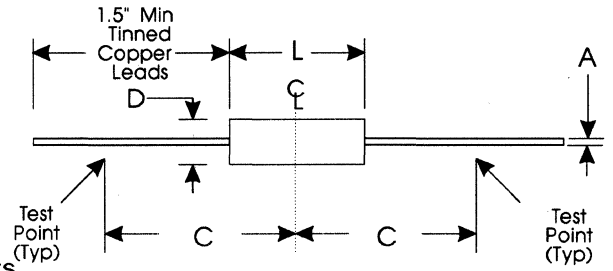
KNOWN FOR FAST DELIVERY - CUSTOM DESIGN IS WELCOMED
E-MAIL: krlbantry@sprintmail.com OUR WEBSITE: http://www.krlbantry.com
♣ KRL/Bantry Components, Inc. 160 Bouchard Street, Manchester, NH 03103-3399
Phone: 603-668-3210 FAX: 603-624-0634

ISO 9001 Registered Firm

♣ KRL LOW-OHM Power Resistors NP SERIES

Features:

- Std Range: .005Ω -.1Ω
- Std Tolerances: 5%, 3%, 1%
- Less than 20 Nanohenries Inductance
- Low Temperature Coefficients:
  NP-1A: ±40 ppm + $\frac{8250\text{ ppm}}{\text{value in milliohms}}$
  NP-2A, NP-3: ±40 ppm + $\frac{3030\text{ ppm}}{\text{value in milliohms}}$
  NP-5A: ± 40 ppm + $\frac{1865\text{ ppm}}{\text{value in milliohms}}$
- High Power to Size Ratio
- Operating Temperature Range: -55°C to 250°C
- Environmental Performance: Exceeds the requirements of MIL-R-49465
- Derate wattage linearly from 100% at 25°C ambient to 0 at 275°C ambient



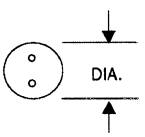
STYLE	MAXIMUM WATTS	MAXIMUM CURRENT	DIELECTRIC WITHSTAND	"L" LENGTH ±0.010"	"D" DIA. ±0.010"	"C" TEST PNT	"A" AWG ±0.003"
NP-1A	1	12A	500 VAC	.430	.120	.590	24 (.020")
NP-2A	3	20A	1000 VAC	.600	.210	.675	20 (.032")
NP-3	4	20A	1000 VAC	.680	.265	.715	20 (.032")
NP-5A	5	26A	1000 VAC	.925	.275	.838	18 (.040")

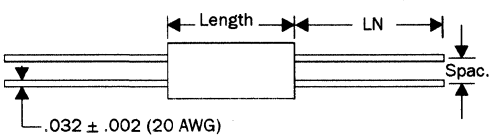
♣ KRL Four Terminal Low-Ohm Power Resistors NP(4) SERIES

KRL's Four Terminal Low-Ohm Resistors were designed for low resistance applications requiring the highest accuracy and temperature stability. When used in a "Kelvin" configuration, applying current through two opposite leads and sensing voltage across the other two leads, the resistance and temperature coefficient of the leads are effectively eliminated. This results in lower TC's and lower self-heating drift than with two terminal resistors, and eliminates the need for connecting to the leads at precise "test points", allowing tighter tolerances to be held as well.

Features:

- Resistance Range: .005Ω-.1Ω standard .001Ω-100Ω available
- Standard Tolerances: 5%, 3%, 1%, .5%, .25%, .1% available for .02Ω and higher
- Operating Temperature Range: -55°C to +200°C
- Temperature Coefficient, 0°C to 85°C; ±50 ppm/°C, .015Ω and higher; ± 100 ppm/°C below .015Ω.
- Environmental Performance: exceeds the requirements of MIL-R-49465
- Derate wattage linearly from 100% at 25°C ambient to 0 at 200°C ambient





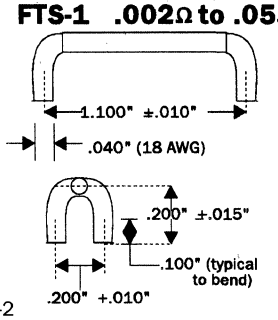
KRL STYLE	MAXIMUM WATTS	MAXIMUM CURRENT	DIELECTRIC WITHSTAND	DIMENSIONS			
				LENGTH ±.015	DIA. ±.015	SPAC.±.010	LN (Min)
NP(4)-2A	3	22A	1000 VAC	.625	.200	.125	1.25
NP(4)-7	7	22A	1500 VAC	1.500	.375	.200	1.50

♣ KRL Four Terminal Shunt Resistors FTS SERIES

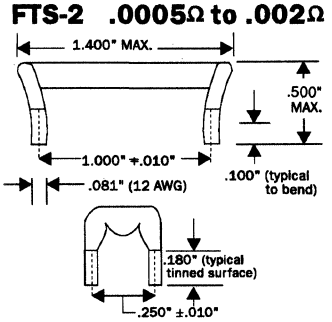
Features:

- Radial, Self-Supporting, PC Board Mounting
- High Power to Size Ratio
- Min Wattage: FTS-1=1W; FTS-2=5W
- Decimal Marked, Silicone Coated (FTS-2 only)
- Std. Tolerances: ±0.5% to ±10%
- Operating Range: -55°C to +275°C
- Temperature Coefficient, 0 C to 85°C: Below .015Ω: ±100 ppm/°C .015Ω and Higher: ±50 ppm/°C
- Derate wattage linearly from 100% at 25°C ambient to 0 at 275°C ambient
- Maximum current: 32 amps for FTS-1; 100 amps for FTS-2

FTS-1 .002Ω to .05Ω



FTS-2 .0005Ω to .002Ω



KNOWN FOR FAST DELIVERY - CUSTOM DESIGN IS WELCOMED
E-MAIL: krlbantry@sprintmail.com OUR WEBSITE: http://www.krlbantry.com
♣ KRL/Bantry Components, Inc. 160 Bouchard Street, Manchester, NH 03103-3399
Phone: 603-668-3210 FAX: 603-624-0634

ISO 9001 Registered Firm

♣ KRL SMT Wirewound Resistors S SERIES

- POWER (SP), PRECISION (SU), AND LOW OHM (SL) STYLES
- UL94V0 MOLDED CHIP DESIGN
- LOW OHM CURRENT SENSING
- LOW TC'S & TIGHT TOLERANCES
- TEMPERATURE COMPENSATING TC'S TO +6000 PPM AVAILABLE

KRL STYLE	WATTS	STD TOL	OHMIC RANGE	WORKING VOLTAGE
SP-1/2	0.75	± 0.1	.06Ω-1.4kΩ	33
SP-1	1.5	thru	.08Ω-5kΩ	58
SP-2	2.5	± 5%	0.1Ω-11kΩ	127
SP-3	3.5		0.1Ω-24kΩ	212

KRL STYLE	WATTS	STD TOL	OHMIC RANGE	TYPICAL INDUCTANCE
SL-1/2	0.5	±1.0	.01Ω-.05Ω	<7
SL-1	1.0	thru	.01Ω-.075Ω	Nanohenries
SL-2	2.0	± 5%	.005Ω-.09Ω	
SL-3	3.0		.005 -.09Ω	

KRL STYLE	WATTS	STD TOL	OHMIC RANGE	WORKING VOLTAGE
SU-1	.125	±.005%	1.0Ω -300KΩ	100
SU-2	.250	thru	1.0Ω -1MΩ	300
SU-3	.500	±1.0%	1.0Ω -2MΩ	400

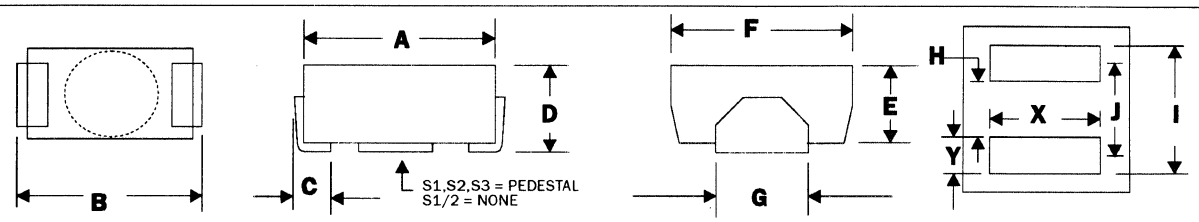
TEMPERATURE COEFFICIENT:

SP SERIES: ± 90 PPM/ °C less than 1Ω; ±50 PPM/ °C 1Ω to 10Ω;±30 PPM/ °C 10Ω to 100Ω;±20 PPM/ °C above 100Ω

SL SERIES: ±40 PPM/ °C + $\frac{2200\ \text{PPM/°C}}{\text{VALUE IN MILLIOHMS}}$

SU SERIES: ±25 PPM/ °C 1Ω to 10Ω; ±10 PPM/ °C above 10Ω (Avail. to ± 2PPM/ °C)

Dimensions & Suggested Land Patterns (Per ANSI/IPC-SM-782 Guidelines)



KRL STYLE	A ±.005"	B ±.010"	C ±.010"	D ±.015"	E ±.005"	F ±.005"	G ±.010"	H	I	J	X	Y
S-1/2	.190	.215	.040	.100	.093	.125	.050	.125	.275	.185	.075	.060
SL-1,SP-1	.240	.255	.035	.112	.107	.150	.050	.145	.337	.240	.112	.096
SU-1	.250	.272	.050	.140	.130	.140	.060	.145	.337	.240	.112	.096
S-2	.435	.478	.100	.210	.200	.230	.080	.250	.530	.420	.150	.140
S-3	.575	.600	.050	.255	.250	.275	.090	.390	.670	.530	.150	.155

Packaging

S-1/2 - 12mm
750 PCS = 7" reel
2000 PCS = 13" reel

S1 - 16mm
500 PCS = 7" reel
1500 PCS = 13" reel

S-2 - 24mm
1000 PCS = 13" reel

S-3 - 32mm
600 PCS = 13" reel

Environmental Performance (KRL Typ. Change)

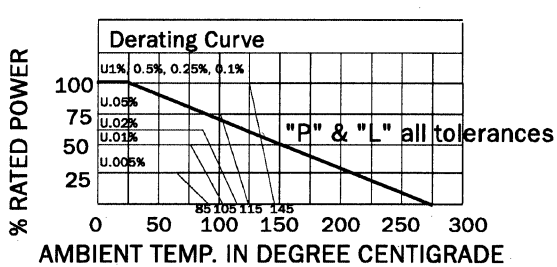
	SU Series	SP, SL Series
Solder Reflow Profile	.005%	.05%
Load Life	.1%	2%
Moisture Resistance	.02%	.2%
Thermal Shock	.02%	.2%
Dielectric Withstand	1000V AC	1000V AC
Short Term Overload	.005%	.2%
Solderability	95% Coverage	
Flammability	UL94V-0/ASTM Needle Flame	

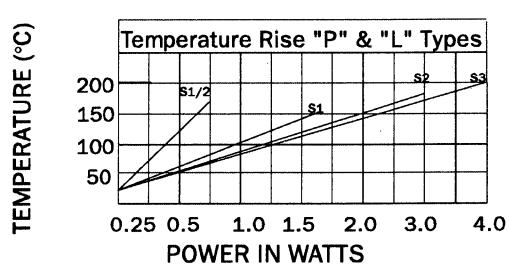
Part Marking

Example:

♣SP 1/2
0.1Ω ±1%

All Parts Have:
KRL Logo & P/N Ohm Value & Tol. Date Code (Opt.)





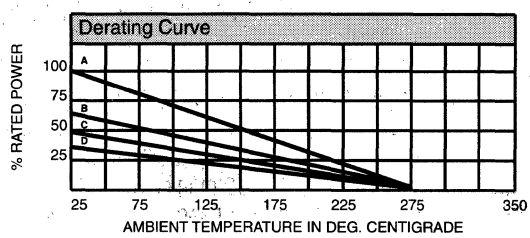
KNOWN FOR FAST DELIVERY - CUSTOM DESIGN IS WELCOMED
E-MAIL: krlbantry@sprintmail.com OUR WEBSITE: http://www.krlbantry.com
♣ KRL/Bantry Components, Inc. 160 Bouchard Street, Manchester, NH 03103-3399
Phone: 603-668-3210 FAX: 603-624-0634

ISO 9001 Registered Firm

KRL Heat Sink Power Resistors AT SERIES

Features:

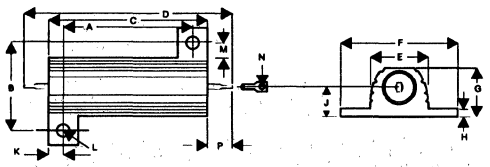
- Chassis mounting utilized for high power to size ratio
- Std Tolerances: 5%, 3%, 1%. Available to .05%
- Temperature Coefficient: 90 PPM/°C less than 1Ω; 50 PPM/°C 1Ω to 10Ω; 30 PPM/°C 10Ω to 100Ω; 20 PPM/°C 100Ω and above.
- Operating Range: -55°C to 275°C
- Specify "N" in front of the style for noninductive winding. (Divide maximum resistance by 2.)



KRL STYLE	MIL-R-18546	POWER In WATTS COMM	MIL	RESISTANCE RANGE	MAXIMUM WORKING VOLTAGE	DIELECTRIC RMS
AT-5	RE-60	7.5	5	0.1Ω - 25KΩ	160	1000
AT-10	RE-65	12.5	10	0.1Ω - 45KΩ	265	1000
AT-25	RE-70	25	20	0.1Ω - 95KΩ	550	1000
AT-50	RE-75	50	30	0.1Ω - 275KΩ	1250	2000

A = All units mounted to chassis C = AT-25 Unmounted

B = AT-10 Unmounted D = AT-50 Unmounted



Proper Heat Sinks:
4"x6"x2"x.040" Aluminum chassis for AT-5 and AT-10.
5"x7"x2"x.040" Aluminum chassis for AT-25 and AT-50.

KRL STYLE	MIL-R-18546	A ±.010	B ±.010	C ±.031	D ±.062	E ±.015	F ±.015	G ±.015	H ±.010	J ±.010	K ±.010	L ±.005	M ±.015	N ±.005	P ±.062
AT-5	RE-60	.444	.490	.600	1.125	.334	.646	.320	.065	.133	.078	.093	.078	.050	.262
AT-10	RE-65	.562	.625	.750	1.375	.420	.800	.390	.075	.200	.093	.093	.102	.086	.312
AT-25	RE-70	.719	.781	1.062	1.938	.550	1.08	.546	.075	.265	.172	.125	.115	.086	.438
AT-50	RE-75	1.563	.844	1.968	2.781	.630	1.140	.610	.088	.305	.196	.125	.107	.086	.406

KRL Nonflame Fusible Metal Film Resistors FPR SERIES

FPR Nonflame Fusible Metal Film Resistors

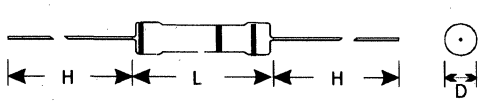
The FPR Nonflame Fusible Metal Film Resistors were designed to limit thermal surge and resulting circuit damage due to excessive voltage. FPR Resistors provide reliable and accurate blow characteristics. The FPR resistors fail in an open mode. These resistors are available in ohmic values from .22Ω to 100k ohms, and wattage sizes from 1/2 to 3 watts.

Various telephone power line, and tip & ring circuits utilize the FPR resistor to protect sensitive parts from lightning strike surges. Other circuits that would benefit from these fusible resistors are inputs that may be exposed to line voltage faults or power supplies that need current limiting with a safe, nonflame failure mode. Since each circuit has different and custom requirements, KRL/Bantry will work with your engineering staff to choose the correct part for your application.

FEATURES

- Small package size
- Noncombustible insulating coating
- Coating resists freon cleaning solvents
- Temperature coefficients less than ±200 PPM
- Uniform fusing characteristics
- Standard tolerance ±5%

DIMENSIONS:



TYPE	L±.04	D±.024	H±.25	Lead Awg	Resistance Range
FPR-1/2W	.276	.104	1.25	23	0.22Ω - 100kΩ
FPR-3/4W	.360	.120	1.25	22	0.22Ω - 100KΩ
FPR-1W	.360	.160	1.25	22	0.22Ω - 100KΩ
FPR-2W	.450	.180	1.25	20	0.3Ω - 100KΩ
FPR-3W	.620	.220	1.25	20	0.3Ω - 100KΩ

FUSING CHARACTERISTICS:

POWER	FUSING TIME Typical	Maximum
16 x Wattage	30 Sec.	1 Min.
20	20 Sec.	40 Sec.
24	10 Sec.	30 Sec.
28	8 Sec.	20 Sec.
32	5 Sec.	15 Sec.

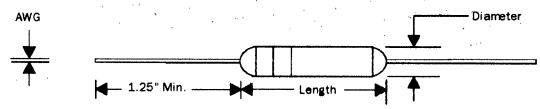
KNOWN FOR FAST DELIVERY - CUSTOM DESIGN IS WELCOMED
E-MAIL: krlbantry@sprintmail.com OUR WEBSITE: http://www.krlbantry.com
KRL/Bantry Components, Inc. 160 Bouchard Street, Manchester, NH 03103-3399
Phone: 603-668-3210 FAX: 603-624-0634

ISO 9001 Registered Firm

KRL Multi-Purpose Resistors 0X,0XH,CB,LB, & V SERIES

Miniature and Standard Metal Oxide Resistors

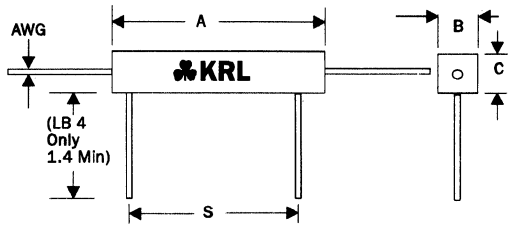
- Non Inductive Design
- Non-Flammable Coating
- Standard Temperature Coefficient ± 300 ppm/°C
- Standard Tolerance = ± 5%
- See Derating Diagram Below



KRL STYLE		POWER IN WATTS @ 75°C		MAXIMUM VOLTAGE		DIELECTRIC WITHSTANDING VOLTAGE	RESISTANCE RANGE		DIMENSIONS			
									LENGTH	DIA.	LEAD	
0XH	0X	0XH	0X	WORKING	OVERLOAD		MIN	MAX	L± .040"	D± .020"	AWG ± .005"	DIA. ±.005"
	0X-05		0.5	350V	600V	350V AC	.5Ω	120KΩ	.352	.128	22	.025
0XH-10	0X-10	1.0	1.0	350V	600V	350V AC	.5Ω	120KΩ	.365	.140	22	.025
0XH-20	—	2.0	—	350V	650V	500V AC	.5Ω	150KΩ	.440	.180	20	.032
0XH-30	0X-20	3.0	2.0	350V	700V	600V AC	.5Ω	150KΩ	.620	.200	20	.032
0XH-50	0X-30	5.0	3.0	350V	700V	1000V AC	.5Ω	150KΩ	.950	.340	20	.032
0XH-60	0X-40	6.0	4.0	450V	800V	1000V AC	1Ω	180KΩ	1.28	.340	20	.032
0XH-70	0X-50	7.0	5.0	500V	1000V	1000V AC	1Ω	200KΩ	1.64	.340	20	.032
0XH-100	0X-60	10.0	6.0	600V	1200V	1000V AC	1Ω	250KΩ	2.16	.340	20	.032

Axial Lead Wirewound & Ultra Low Ohm Ceramic Boat Resistors

- Wirewound Construction Typically Above .1Ω (CB Style).
- Metal Element Construction Typically .1Ω and Below (LB and LB(4) Styles.).
- Specify Style LB(4) for 4-Terminal Construction.
- Fireproof Construction.
- Standard Tolerances ±5%, ±3%, ±1%.
- Standard Temperature Coefficient ± 30 ppm Above 1Ω; ± 100 ppm .1Ω to 1Ω; ± 400 ppm below .1Ω; ± 40 ppm for style LB(4) all values.
- Dielectric Withstanding Voltage: 1500V AC Minimum
- 16 AWG- (.051) Axial Leads Available for High Current Applications.
- See Temperature Rise and Derating Diagrams Below.

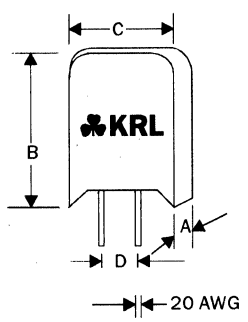


KRL STYLE	POWER @ 25°C	MAXIMUM CURRENT AMPS	RESISTANCE RANGE (HIGHER CUSTOM OHM VALUES AVAILABLE)	A ±.03	B ±.03	C ±.03	AWG ±.005	S ±.062
LB-1	1	18	.003 TO .1 OHM	.580	.250	.250	20	.490
LB-2	2	20	.003 TO .1 OHM	.690	.250	.250	20	.563
CB-3/LB-3	3	20	.003 TO 5K OHM	.875	.312	.312	20	.563
CB-5/LB-5	5	30	.003 TO 5K OHM	.875	.375	.350	18,20*	.563
CB-7/LB-7	7	30	.003 TO 10K OHM	1.40	.375	.350	18,20*	1.013
CB-10/LB-10	10	30	.003 TO 20K OHM	1.88	.375	.350	18,20*	1.388
CB-15/LB-15	15	30	.003 TO 20K OHM	1.88	.500	.500	18	1.388
CB-25/LB-25	22	30	.003 TO 40K OHM	2.50	.500	.500	18	2.000

* 18 AWG STYLE LB, 20 AWG STYLE CB

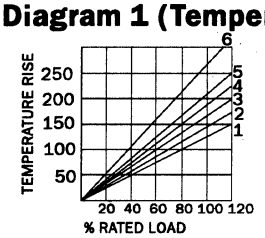
Vertical Mount Resistors

- Wirewound Construction Typically above .1Ω; Metal Element Construction .1Ω and below.
- Fireproof Construction
- Space Saving Design
- Standard Tolerances ±5%, ±3%, ±1%
- Standard Temperature Coefficient ± 30 ppm above 1Ω; ±100 ppm .1Ωto 1Ω, ±400 ppm below .1Ω.
- Dielectric Withstanding Voltage 1500 AC Minimum.
- See Temperature Rise and Derating Diagrams Below.



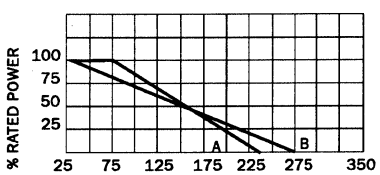
KRL STYLE	POWER @ 25°C	A ±.039	B ±.059	C ±.039	D ±.032	RESISTANCE RANGE
V-2	2	.275	.800	.435	.197	.01-20K OHMS
V-3	3	.320	1.00	.475	.197	.01-22K OHMS
V-5	5	.350	1.00	.520	.197	.01-22K OHMS
V-10	10	.365	1.50	.520	.197	.01-90K OHMS
V-15	12.5	.500	1.40	.640	.297	.01-90K-OHMS

Diagram 1 (Temperature Rise)



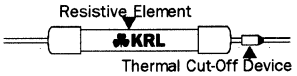
1) LB-3, CB-3, V-2 & V-3
2) LB-5, CB-5, & V-5
3) LB-7, CB-7
4) LB-10, CB-10, & V-10
5) LB-15, CB-15, & V-15
6) LB-25, & CB-25

Diagram 2 (Derating)



Line A = OX & OXH Series
Line B = LB, CB, & V Series

Note: Most of the above styles may be ordered with the following options: (F) for custom fusing action; and (TF) for Failsafe Thermal Fuse Applications (see below for TF construction.)

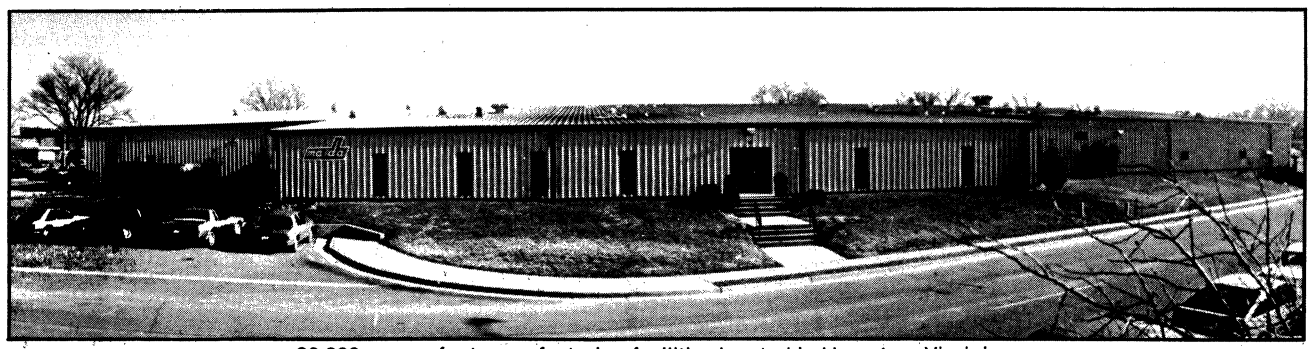


KNOWN FOR FAST DELIVERY - CUSTOM DESIGN IS WELCOMED
E-MAIL: krlbantry@sprintmail.com OUR WEBSITE: http://www.krlbantry.com
KRL/Bantry Components, Inc. 160 Bouchard Street, Manchester, NH 03103-3399
Phone: 603-668-3210 FAX: 603-624-0634

ISO 9001 Registered Firm

METAL OXIDE VARISTORS &
CERAMIC CAPACITORS

MAIDA DEVELOPMENT COMPANY
"DOMESTIC MANUFACTURERS SINCE 1947"



90,000 square foot manufacturing facilities located in Hampton, Virginia

Maida

See our Ceramic Capacitor Listings - Section 1500.

serving the electronics industry as partners in progress for more than fifty years.

Maida Development Company is a domestically owned and operated manufacturer of a wide variety of electronic ceramic components. Since 1947, we have specialized in the custom design and fabrication of ceramic disc capacitors - from ceramic dielectric powder formulation through finished devices - to meet the specific requirements of our customers. Maida's major capacitor products include (1) Class I, Class II, and Class III high voltage disk capacitors, 1 KVDC thru 30 KVDC; (2) capacitors safety-recognized by UL, CSA, and VDE for across-the-line, line-by-pass, and antenna-coupling applications; (3) capacitor/sparkgap combinations.

Maida Development Company also produces a complete line of metal oxide varistors (MOV's) designed for transient voltage suppression and surge energy absorption. We are now the only U.S. manufacturer of these components, with ceramic formulation, powder preparation, fabrication and assembly facilities all located in this country. Maida's varistors are recognized by UL, CSA, and VDE. Please contact Maida's Sales Department to request our full-line varistors catalog.

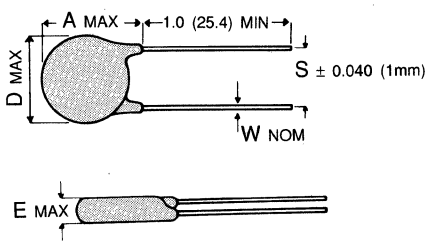
Delivery is both timely and reliable - with either bulk or tape and reel packaging.

Our sales representatives are strategically located throughout the USA and world. Maida welcomes the opportunity to discuss and bid on capacitor requirements not covered by this catalog. Please contact our Engineering Department.

MAXIMUM TRANSIENT POWER RATINGS (Pm)

Series	PM-watts	Series	PM-watts
D58	0.15	D63	0.8
D73	0.25	D65	1.0
D61	0.4	D78	1.2
D69	0.6	D75	1.4

STANDARD DIMENSIONS: inches (mm)



Style Designation: (typical)

D69--ZOV511RA110

Style Designation: (typical)
D69--ZOV511RA110

WHERE:

D-	Coating identification, D means standard flame-retardant fluid bed epoxy.
69-	Size code, 2 numbers. See Dimensions Table.
--	Lead Configuration code, 1 or 2 numbers used for non-standard leads. Standard leads use no code.
ZOV-	Material identifier, zinc oxide varistor.
511-	AC Voltage Rating code, 2 significant figures plus number of zeroes that follow, i.e. 511 is 510 VAC.
RA-	Special instructions code, RA is standard.
110-	Energy Rating code, up to 4 numbers. See Ratings Tables.

Size	A	D	S	W	E				
Code				VAC	50-95	120-180	230-320	420-580	620-1000
D58	.394 (10)	.276 (7)	.197 (5)	.025 (.63)	.197 (5)	.236 (6)	NA	NA	NA
D73	.472 (12)	.354 (9)	.197 (5)	.025 (0.63)	.197 (5)	.236 (6)	.276 (7)	NA	NA
D61	.590 (15)	.472 (12)	.296 (7.5)	.032 (.81)	.197 (5)	.236 (6)	.276 (7)	.354 (9)	NA
D69	.770 (19.5)	.650 (16.5)	.296 (7.5)	.032 (.81)	.197 (5)	.236 (6)	.276 (7)	.354 (9)	.472 (12)
D63	.912 (23)	.787 (20)	.296 (7.5)	.032 (.81)	NA	.236 (6)	NA	NA	NA
D65	1.020 (26)	.905 (23)	.296 (7.5)	.032 (.81)	.197 (5)	.236 (6)	.276 (7)	.354 (9)	.472 (12)
D78	1.8 (45.7)	1.57 (40)	NA	NA	NA	.236 (6)	.276 (7)	.354 (9)	.472 (12)
D75	2.1 (53.3)	1.89 (48)	NA	NA	NA	.236 (6)	.276 (7)	.354 (9)	.472 (12)

20 LIBBY STREET / P.O. BOX 3529 / HAMPTON, VIRGINIA 23663 / (757) 723-0785 / FAX (757) 722-1194
E-MAIL: maidadev@maida.com / WEBSITE: maida.com

METAL OXIDE VARISTORS

MAIDA DEVELOPMENT COMPANY
"DOMESTIC MANUFACTURERS SINCE 1947"

ZINC OXIDE VARISTORS FOR SURGE VOLTAGE PROTECTION - ZOV RATINGS

	MDC STYLE	NOM. SIZE MM	GE/ HARRIS CROSS REF.	MINIMUM MARKING	MAXIMUM CONTINUOUS RATINGS		MAXIMUM ENERGY SINGLE PULSE	PEAK CURRENT SINGLE PULSE	VARRISTOR VOLTAGE VDC@1mA		CLAMPING VOLTAGE @ CURRENT SHOWN		CAPACITANCE pF 1KHZ@25C ±30%
					VAC	VDC	10x1000µsec	8x20 µsec	Vmin	Vmax	VCLmax	ICL	
	D58ZOV110RA00	5	V18ZA05	Z110-00	11	14	0.4	100	16	20	40	1.0	2200
	D73ZOV110RA01	7	V18ZA1	Z110-01	11	14	0.8	250	16	20	36	2.5	3000
	D6121ZOV110RA02	10	V18ZA2	Z110-02	11	14	2.1	500	16	20	36	5.0	6800
	D6921ZOV110RA04	14	V18ZA3	Z110-04	11	14	4.0	1000	16	20	36	10.0	15000
	D6521ZOV110RA10	20		Z110-10	11	14	11.0	2000	16	20	36	20.0	33000
	D58ZOV140RA00	5	V22ZA05	Z140-00	14	18	0.5	100	20	24	48	1.0	2000
	D73ZOV140RA01	7	V22ZA1	Z140-01	14	18	1.2	250	20	24	43	2.5	2500
	D6121ZOV140RA02	10	V22ZA2	Z140-02	14	18	2.5	500	20	24	43	5.0	6200
	D6921ZOV140RA04	14	V22ZA3	Z140-04	14	18	5.0	1000	20	24	43	10.0	12000
	D6521ZOV140RA13	20		Z140-13	14	18	14.0	2000	20	24	43	20.0	30000
	D58ZOV170RA00	5	V27ZA05	Z170-00	17	22	0.6	100	24	30	60	1.0	1800
	D73ZOV170RA01	7	V27ZA1	Z170-01	17	22	1.4	250	24	30	53	2.5	2000
	D6121ZOV170RA03	10	V27ZA2	Z170-03	17	22	3.0	500	24	30	53	5.0	4200
	D6921ZOV170RA05	14	V27ZA4	Z170-05	17	22	6.0	1000	24	30	53	10.0	10000
	D6521ZOV170RA15	20		Z170-15	17	22	18.0	2000	24	30	53	20.0	22000
	D58ZOV200RA00	5	V33ZA05	Z200-00	20	26	0.8	100	30	36	73	1.0	1500
	D73ZOV200RA01	7	V33ZA1	Z200-01	20	26	1.7	250	30	36	65	2.5	1700
	D6121ZOV200RA03	10	V33ZA2	Z200-03	20	26	4.0	500	30	36	65	5.0	2700
	D6921ZOV200RA06	14	V33ZA5	Z200-06	20	26	7.5	1000	30	36	65	10.0	7500
	D6521ZOV200RA20	20		Z200-20	20	26	23.0	2000	30	36	65	20.0	17000
	D58ZOV250RA01	5	V39ZA05	Z250-01	25	31	0.9	100	35	43	86	1.0	1000
	D73ZOV250RA02	7	V39ZA1	Z250-02	25	31	2.1	250	35	43	77	2.5	1200
	D6121ZOV250RA04	10	V39ZA3	Z250-04	25	31	4.6	500	35	43	77	5.0	2200
	D6921ZOV250RA07	14	V39ZA6	Z250-07	25	31	8.6	1000	35	43	77	10.0	5630
	D6521ZOV250RA24	20		Z250-24	25	31	26.0	2000	35	43	77	20.0	15000
	D58ZOV300RA01	5	V47ZA05	Z300-01	30	38	1.1	100	42	52	104	1.0	820
	D73ZOV300RA02	7	V47ZA1	Z300-02	30	38	2.5	250	42	52	93	2.5	1000
	D6121ZOV300RA05	10	V47ZA3	Z300-05	30	38	5.5	500	42	52	93	5.0	2000
	D6921ZOV300RA09	14	V47ZA7	Z300-09	30	38	10.0	1000	42	52	93	10.0	5100
	D6521ZOV300RA30	20		Z300-30	30	38	33.0	2000	42	52	93	20.0	13000
	D58ZOV350RA01	5	V56ZA05	Z350-01	35	45	1.3	100	50	62	123	1.0	750
	D73ZOV350RA02	7	V56ZA2	Z350-02	35	45	3.1	250	50	62	110	2.5	910
	D6121ZOV350RA06	10	V56ZA3	Z350-06	35	45	7.0	500	50	62	110	5.0	1800
	D6921ZOV350RA10	14	V56ZA8	Z350-10	35	45	11.0	1000	50	62	110	10.0	4700
	D6521ZOV350RA35	20		Z350-35	35	45	41.0	2000	50	62	110	20.0	11000
	D58ZOV400RA01	5	V68ZA05	Z400-01	40	56	1.6	100	61	75	150	1.0	680
	D73ZOV400RA03	7	V68ZA2	Z400-03	40	56	3.6	250	61	75	135	2.5	820
	D6121ZOV400RA07	10	V68ZA3	Z400-07	40	56	8.2	500	61	75	135	5.0	1500
★	D6921ZOV400RA12	14	V68ZA10	Z400-12UL	40	56	14.0	1000	61	75	135	10.0	4200
★	D6521ZOV400RA40	20		Z400-40UL	40	56	46.0	2000	61	75	135	20.0	7000
	D58ZOV500RA01	5	V82ZA05	Z500-01	50	66	2.5	400	74	90	165	5.0	220
	D73ZOV500RA02	7	V82ZA2	Z500-02	50	66	5.5	1200	74	90	157	10.0	680
★	D6121ZOV500RA03	10	V82ZA4	Z500-03UL	50	66	12.0	2500	74	90	147	25.0	1200
★	D6921ZOV500RA06	14	V82ZA12	Z500-06UL	50	66	22.0	4500	74	90	147	50.0	1800
★	D6521ZOV500RA42	20		Z500-42UL	50	65	48.0	6500	74	90	135	100.0	5500
	D58ZOV600RA01	5	V100ZA05	Z600-01	60	85	3.0	400	90	110	190	5.0	180
	D73ZOV600RA02	7	V100ZA3	Z600-02	60	81	6.5	1200	90	110	180	10.0	510
★	D6121ZOV600RA03	10	V100ZA4	Z600-03UL	60	81	15.0	2500	90	110	175	25.0	1000
★	D6921ZOV600RA06	14	V100ZA15	Z600-06UL	60	81	28.0	4500	90	110	175	50.0	1500
★	D6521ZOV600RA45	20		Z600-45UL	60	85	50.0	6500	90	110	165	100.0	4800
	D58ZOV750RA01	5	V120ZA05	Z750-01	75	102	4.0	400	108	132	245	5.0	120
	D73ZOV750RA02	7	V120ZA1	Z750-02	75	102	7.8	1200	108	132	230	10.0	330
★	D6121ZOV750RA03	10	V120ZA4	Z750-03UL	75	102	18.0	2500	108	132	210	25.0	750
★	D6921ZOV750RA06	14	V120ZA6	Z750-06UL	75	102	32.0	4500	108	132	210	50.0	1200
★	D6521ZOV750RA55	20		Z750-55UL	75	102	55.0	6500	108	132	200	100.0	3800
	D58ZOV950RA01	5	V150ZA05	Z950-01	95	127	4.5	400	135	165	300	5.0	100
	D73ZOV950RA02	7	V150ZA1	Z950-02	95	127	9.7	1200	135	165	255	10.0	270
★	D6121ZOV950RA03	10	V150ZA4	Z950-03UL	95	127	22.0	2500	135	165	255	25.0	560
★	D6921ZOV950RA06	14	V150ZA8	Z950-06UL	95	127	40.0	4500	135	165	255	50.0	1000
★	D6521ZOV950RA65	20		Z950-65UL	95	127	70.0	6500	135	165	250	100.0	3000

★=UL1449 File E86730 – Transient Voltage Surge Suppression
•=UL1414 File E38785 – Across The Line Applications
⊛=UL497B File E180012 – Isolated Loop Circuit Protectors
□=CSA C22.2 – File LR33468
†=VDE/CECC 42000/42201 – Registration No. 58819
✦=SEV – Authorization No. 96.7 70250.01

20 LIBBY STREET / P.O. BOX 3529 / HAMPTON, VIRGINIA 23663 / (757) 723-0785 / FAX (757) 722-1194
E-MAIL: maidadev@maida.com / WEBSITE: maida.com

METAL OXIDE VARISTORS

MAIDA DEVELOPMENT COMPANY
"DOMESTIC MANUFACTURERS SINCE 1947"

ZINC OXIDE VARISTORS FOR SURGE VOLTAGE PROTECTION - ZOV RATINGS

MDC STYLE	NOM. SIZE MM	GE/ HARRIS CROSS REF.	MINIMUM MARKING	MAXIMUM CONTINUOUS RATINGS		MAXIMUM ENERGY SINGLE PULSE	PEAK CURRENT SINGLE PULSE	VARRISTOR VOLTAGE VDC@1mA		CLAMPING VOLTAGE @ CURRENT SHOWN		CAPACITANCE pF 1KHZ@25C ±30%
				VAC	VDC	10x1000µsec	8x20 µsec	Vmin	Vmax	VCLmax	ICL	
† D58ZOV131RA02	5		Z131-02	130	175	6.5	400	184	224	380	5.0	82
★ □† D73ZOV131RA03	7	V130LA2	Z131-03UL	130	175	13.0	1200	184	224	340	10.0	200
★●□† D6121ZOV131RA04	10	V130LA5	Z131-04UL	130	175	30.0	5000	184	224	340	25.0	420
★●□† D6921ZOV131RA09	14	V130LA10A	Z131-09UL	130	175	57.0	4500	184	224	340	50.0	820
★ □ D6321ZOV131RA70	18		Z131-70UL	130	175	70.0	6500	184	224	340	100.0	1530
★●□† D6521ZOV131RA20	20	V130LA20A	Z131-20UL	130	175	95.0	6500	184	224	340	100.0	2000
★ □ D7877ZOV131RA210	32		Z131-210UL	130	175	210.0	25000	184	224	340	200.0	4700
★ □ D7577ZOV131RA310	40		Z131-310UL	130	175	310.0	40000	184	224	340	300.0	10000
† D58ZOV141RA02	5		Z141-02	140	180	7.0	400	198	242	410	5.0	75
★ □† D73ZOV141RA03	7	V140LA2	Z141-03UL	140	180	14.0	1200	198	242	360	10.0	190
★●□† D6121ZOV141RA04	10	V140LA5	Z141-04UL	140	180	32.0	2500	198	242	360	25.0	390
★●□† D6921ZOV141RA09	14	V140LA10A	Z141-09UL	140	180	60.0	4500	198	242	360	50.0	750
★ □ D6321ZOV141RA75	18		Z141-75UL	140	180	75.0	6500	198	242	360	100.0	1400
★●□† D6521ZOV141RA20	20		Z141-20UL	140	180	100.0	6500	198	242	360	100.0	1900
★ □ D7877ZOV141RA225	32		Z141-225UL	140	180	225.0	25000	198	242	365	200.0	4300
★ □ D7577ZOV141RA330	40		Z141-330UL	140	180	330.0	40000	198	242	365	300.0	9000
† D58ZOV151RA02	5		Z151-02	150	200	8.0	400	212	259	430	5.0	68
★ □† D73ZOV151RA03	7	V150LA2	Z151-03UL	150	200	16.0	1200	212	259	395	10.0	180
★●□† D6121ZOV151RA04	10	V150LA5	Z151-04UL	150	200	35.0	2500	212	259	395	25.0	300
★●□† D6921ZOV151RA09	14	V150LA10A	Z151-09UL	150	200	63.0	4500	212	259	395	50.0	680
★ □ D6321ZOV151RA80	18		Z151-80UL	150	200	80.0	6500	212	259	395	100.0	1300
★●□† D6521ZOV151RA20	20	V150LA20A	Z151-20UL	150	200	110.0	6500	212	259	395	100.0	1800
★ □ D7877ZOV151RA240	32		Z151-240UL	150	200	240.0	25000	212	259	395	200.0	4000
★ □ D7577ZOV151RA360	40		Z151-360UL	150	200	360.0	40000	212	259	395	300.0	8000
† D58ZOV181RA02	5		Z181-02	180	230	8.5	400	255	311	510	5.0	62
★ □† D73ZOV181RA03	7	V175LA2	Z181-03UL	180	230	18.0	1200	255	311	470	10.0	150
★●□† D6121ZOV181RA04	10	V175LA5	Z181-04UL	180	230	40.0	2500	255	311	465	25.0	270
★●□† D6921ZOV181RA09	14	V175LA10A	Z181-09UL	180	230	70.0	4500	255	311	465	50.0	620
★●□† D6521ZOV181RA20	20		Z181-20UL	180	230	27.0	6500	255	311	465	100.0	1600
★ □ D7877ZOV181RA250	32		Z181-250UL	180	230	250.0	25000	255	311	470	200.0	3500
★ □ D7577ZOV181RA390	40		Z181-390UL	180	230	390.0	40000	255	311	470	300.0	7100
D58ZOV231RA08	5		Z231-08	230	300	10.0	400	326	397	620	5.0	51
★ □† D73ZOV231RA20	7	V230LA4	Z231-20UL	230	300	25.0	1200	326	397	595	10.0	120
★●□† D61ZOV231RA35	10	V230LA10	Z231-35UL	230	300	47.0	2500	326	397	595	25.0	210
★●□† D69ZOV231RA70	14	V230LA20A	Z231-70UL	230	300	93.0	4500	326	397	595	50.0	510
★●□† D65ZOV231RA115	20		Z231-115UL	230	300	163.0	6500	326	397	595	100.0	1200
★ □ D7877ZOV231RA300	32		Z231-300UL	230	300	300.0	25000	326	397	595	200.0	2800
★ □ D7577ZOV231RA460	40		Z231-460UL	230	300	460.0	40000	326	397	595	300.0	5600
D58ZOV251RA08	5		Z251-08	250	330	12.0	400	354	432	675	5.0	50
★ □† D73ZOV251RA21	7	V250LA4	Z251-21UL	250	330	26.0	1200	354	432	650	10.0	110
★●□† D61ZOV251RA40	10	V250LA10	Z251-40UL	250	330	60.0	2500	354	432	650	25.0	200
★●□† D69ZOV251RA72	14	V250LA20A	Z251-72UL	250	330	100.0	4500	354	432	650	50.0	500
★●□† D65ZOV251RA130	20	V250LA40A	Z251-130UL	250	330	180.0	6500	354	432	650	100.0	1000
★ □ D7877ZOV251RA330	32		Z251-330UL	250	330	330.0	25000	354	432	650	200.0	2500
★ □ D7577ZOV251RA490	40		Z251-490UL	250	330	490.0	40000	354	432	650	300.0	5000
D58ZOV271RA09	5		Z271-09	275	370	13.0	400	382	466	745	5.0	47
★ □† D73ZOV271RA23	7	V275LA4	Z271-23UL	275	370	28.0	1200	382	466	710	10.0	100
★●□† D61ZOV271RA43	10	V275LA10	Z271-43UL	275	370	65.0	2500	382	466	710	25.0	180
★●□† D69ZOV271RA75	14	V275LA20A	Z271-75UL	275	370	115.0	4500	382	466	710	50.0	470
★●□† D65ZOV271RA140	20	V275LA40A	Z271-140UL	275	370	190.0	6500	382	466	710	100.0	950
★ □ D7877ZOV271RA360	32		Z271-360UL	275	370	360.0	25000	382	466	710	200.0	2200
★ □ D7577ZOV271RA550	40		Z271-550UL	275	370	550.0	40000	382	466	710	300.0	4500
D58ZOV301RA10	5		Z301-10	300	385	15.0	400	425	518	810	5.0	42
★ □† D73ZOV301RA25	7	V300LA4	Z301-25UL	300	385	30.0	1200	425	518	790	10.0	91
★●□† D61ZOV301RA45	10		Z301-45UL	300	385	70.0	2500	425	518	790	25.0	170
★●□† D69ZOV301RA80	14		Z301-80UL	300	385	125.0	4500	425	518	790	50.0	420
★●□† D65ZOV301RA150	20		Z301-150UL	300	385	220.0	6500	425	518	790	100.0	900
★ □ D7877ZOV301RA380	32		Z301-380UL	300	385	380.0	25000	425	518	790	200.0	2000
★ □ D7577ZOV301RA600	40		Z301-600UL	300	385	600.0	40000	425	518	790	300.0	4000
D73ZOV321RA27	7		Z321-27	320	420	32.0	1200	453	553	850	10.0	39
★●□† D61ZOV321RA45	10		Z321-45UL	320	420	71.0	2500	453	553	850	25.0	82
★●□† D69ZOV321RA90	14	V320LA20A	Z321-90UL	320	420	28.0	4500	453	553	850	50.0	390
★●□† D65ZOV321RA160	20	V320LA40B	Z321-160UL	320	420	222.0	6500	453	553	850	100.0	820
★ □ D7877ZOV321RA430	32		Z321-430UL	320	420	430.0	25000	453	553	840	200.0	1900
★ □ D7577ZOV321RA640	40		Z321-640UL	320	420	640.0	40000	453	553	840	300.0	3800

★=UL1449 File E86730 – Transient Voltage Surge Suppression
●=UL1414 File E38785 – Across The Line Applications
❁=UL497B File E180012 – Isolated Loop Circuit Protectors
□=CSA C22.2 – File LR33468
†=VDE/CECC 42000/42201 – Registration No. 58819
✦=SEV – Authorization No. 96.7 70250.01

20 LIBBY STREET / P.O. BOX 3529 / HAMPTON, VIRGINIA 23663 / (757) 723-0785 / FAX (757) 722-1194
E-MAIL: maidadev@maida.com / WEBSITE: maida.com

METAL OXIDE VARISTORS

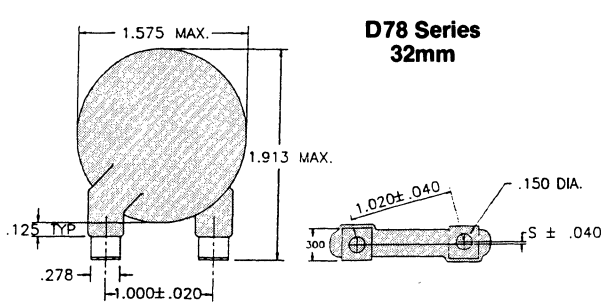
MAIDA DEVELOPMENT COMPANY

"DOMESTIC MANUFACTURERS SINCE 1947"

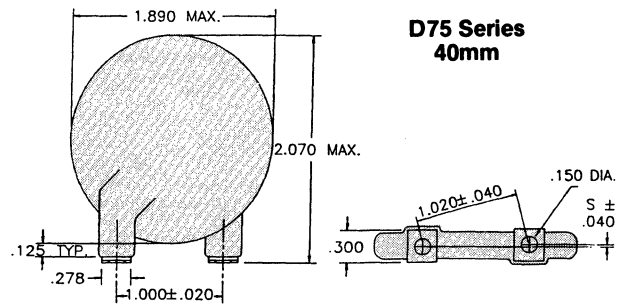
ZINC OXIDE VARISTORS FOR SURGE VOLTAGE PROTECTION - ZOV RATINGS

MDC STYLE	NOM. SIZE MM	GE/ HARRIS CROSS REF.	MINIMUM MARKING	MAXIMUM CONTINUOUS RATINGS		MAXIMUM ENERGY SINGLE PULSE 10x1000µsec	PEAK CURRENT SINGLE PULSE 8x20 µsec	VARRISTOR VOLTAGE VDC@1mA		CLAMPING VOLTAGE @ CURRENT SHOWN		CAPACITANCE pF 1KHZ@25C ±30%
				VAC	VDC			Vmin	Vmax	VCLmax	ICL	
★ □ D7877Z0V391RA550	32		Z391-550UL	390	505	550	25000	552	674	1025	200	1600
★ □ D7577Z0V391RA800	40		Z391-800UL	390	505	800	40000	552	674	1025	300	3300
★ • □ † D61Z0V421RA45	10	V420LA10	Z421-45UL	420	560	74	2500	594	725	1120	25	140
★ • □ † D69Z0V421RA90	14	V420LA20A	Z421-90UL	420	560	142	4500	594	725	1120	50	270
★ • □ † D65Z0V421RA160	20	V420LA40B	Z421-160UL	420	560	230	6500	594	725	1120	100	470
★ □ D7877Z0V421RA500	32		Z421-600UL	420	560	600	25000	594	725	1120	200	1500
★ □ D7577Z0V421RA910	40		Z421-910UL	420	560	910	40000	594	725	1120	300	3000
★ □ D7877Z0V461RA520	32		Z461-520UL	460	615	520	25000	651	795	1240	200	1400
★ □ D7577Z0V461RA780	40		Z461-780UL	460	615	780	40000	651	795	1240	300	2600
★ □ † D61Z0V481RA50	10		Z481-50UL	485	640	80	2500	679	829	1290	25	120
★ • □ † D69Z0V481RA105	14	V480LA40A	Z481-105UL	485	640	143	4500	679	829	1240	50	230
★ • □ † D65Z0V481RA180	20	V480LA80B	Z481-180UL	485	640	255	6500	679	829	1240	100	400
★ □ D7877Z0V481RA550	32		Z481-550UL	485	640	550	25000	679	829	1300	200	1300
★ □ D7577Z0V481RA820	40		Z481-820UL	485	640	820	40000	679	829	1300	300	2700
★ • □ † D61Z0V511RA55	10		Z511-55UL	510	675	83	2500	722	881	1350	25	110
★ • □ † D69Z0V511RA110	14	V510LA40A	Z511-110UL	510	675	157	4500	722	881	1350	50	210
★ • □ † D65Z0V511RA190	20	V510LA80B	Z511-190UL	510	675	182	6500	722	881	1350	100	380
★ □ D7877Z0V511RA580	32		Z511-580UL	510	675	580	25000	722	881	1390	200	1200
★ □ D7577Z0V511RA900	40		Z511-900UL	510	675	900	40000	722	881	1390	300	2500
★ • □ † D61Z0V551RA60	10		Z551-60UL	550	745	85	2500	778	950	1400	25	100
★ • □ † D69Z0V551RA115	14		Z551-115UL	550	745	175	4500	778	950	1400	50	200
★ • □ † D65Z0V551RA200	20		Z551-200UL	550	745	310	6500	778	950	1400	100	350
★ □ D7877Z0V551RA620	32		Z551-620UL	550	745	620	25000	778	950	1500	200	1150
★ □ D7577Z0V551RA960	40		Z551-960UL	550	745	960	40000	778	950	1500	300	2300
★ • □ † D61Z0V581RA65	10		Z581-65UL	580	760	96	2500	821	1002	1500	25	95
★ • □ † D69Z0V581RA120	14	V575LA40A	Z581-120UL	580	760	180	4500	821	1002	1500	50	180
★ • □ † D65Z0V581RA220	20	V575LA80B	Z581-220UL	580	760	325	6500	821	1002	1500	100	340
★ □ D7877Z0V581RA650	32		Z581-650UL	580	760	650	25000	821	1002	1575	200	1100
★ □ D7577Z0V581RA1000	40		Z581-1000UL	580	760	1000	40000	821	1002	1575	300	2200
★ • □ † D69Z0V621RA130	14		Z621-130UL	625	825	190	4500	877	1071	1620	50	150
★ • □ † D65Z0V621RA230	20		Z621-230UL	625	825	342	6500	877	1071	1620	100	320
★ □ D7877Z0V621RA680	32		Z621-680UL	625	825	680	25000	877	1071	1670	200	1000
★ □ D7577Z0V621RA1040	40		Z621-1040UL	625	825	1040	40000	877	1071	1670	300	2100
★ • □ † D69Z0V681RA150	14		Z681-150UL	680	895	215	4500	962	1175	1800	50	120
★ • □ † D65Z0V681RA260	20		Z681-260UL	680	895	383	6500	962	1175	1800	100	300
★ □ D7877Z0V681RA760	32		Z681-760UL	680	895	760	25000	962	1175	1815	200	900
★ □ D7577Z0V681RA1100	40		Z681-1100UL	680	895	1100	40000	962	1175	1815	300	2000
★ □ D7877Z0V751RA800	32		Z751-800UL	750	900	800	25000	1062	1300	2000	200	800
★ □ D7577Z0V751RA1200	40		Z751-1200UL	750	900	1200	40000	1062	1300	2000	300	1800
★ □ D7877Z0V881RA850	32		Z881-850UL	880	1150	850	25000	1245	1520	2290	200	680
★ □ D7577Z0V881RA1300	40		Z881-1300UL	880	1150	1300	40000	1245	1520	2290	300	1500
★ • □ † D69Z0V102RA220	14	V1000LA80A	Z102-220UL	1000	1200	340	4500	1414	1728	2700	50	90
★ • □ † D65Z0V102RA360	20	V1000LA160B	Z102-360UL	1000	1200	625	6500	1414	1728	2700	100	200
★ □ D7877Z0V102RA900	32		Z102-900UL	1000	1200	900	25000	1414	1728	2550	200	600
★ D7577Z0V102RA1400	40		Z102-1400UL	1000	1200	1400	40000	1414	1728	2550	300	1300

★=UL1449 File E86730 – Transient Voltage Surge Suppression
•=UL1414 File E38785 – Across The Line Applications
⊕=UL497B File E180012 – Isolated Loop Circuit Protectors
□=CSA C22.2 – File LR33468
†=VDE/CECC 42000/42201 – Registration No. 58819
✦=SEV – Authorization No. 96.7 70250.01



D78 Series 32mm



D75 Series 40mm

NOTE: Drawings indicate left-hand placement of tab leads; right-hand configuration is available.

20 LIBBY STREET / P.O. BOX 3529 / HAMPTON, VIRGINIA 23663 / (757) 723-0785 / FAX (757) 722-1194
E-MAIL: maidadev@maida.com / WEBSITE: maida.com

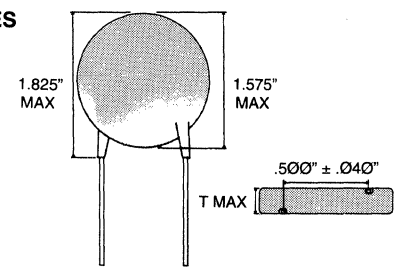
METAL OXIDE VARISTORS

MAIDA DEVELOPMENT COMPANY
"DOMESTIC MANUFACTURERS SINCE 1947"

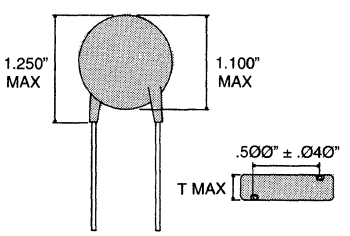
LARGE DIAMETER METAL OXIDE VARISTORS WITH RADIAL WIRE LEADS
D6694 SERIES (25MM) & D7894 SERIES (32MM) – ELECTRICAL CHARACTERISTICS

MDC STYLE	MINIMUM MARK	MAX. CONTINUOUS RATINGS		VARISTOR VOLTAGE VDC@1mA		MAXIMUM ENERGY SINGLE PULSE 8x20 µsec	PEAK CURRENT SINGLE PULSE 8x20 µsec	CLAMPING VOLTAGE @ CURRENT SHOWN		CAPACITANCE pF TYP.
		VAC	VDC	Vmin	Vmax			VCLmax	ICL	
25 MM SERIES										
D6694ZOV131RA140	Z131-140UL	130	175	184	224	140	13000	325	100	3300
D6694ZOV141RA150	Z141-150UL	140	180	198	242	150	13000	345	100	3100
D6694ZOV151RA160	Z151-160UL	150	200	212	259	160	13000	360	100	3000
D6694ZOV181RA200	Z181-200UL	180	230	255	311	200	13000	455	100	2400
D6694ZOV231RA230	Z231-230UL	230	300	326	397	230	13000	590	100	1900
D6694ZOV251RA260	Z251-260UL	250	330	354	432	260	13000	620	100	1800
D6694ZOV271RA280	Z271-280UL	270	360	382	466	280	13000	680	100	1600
D6694ZOV301RA300	Z301-300UL	300	390	425	518	300	13000	760	100	1500
D6694ZOV321RA320	Z321-320UL	320	420	453	553	320	13000	810	100	1400
D6694ZOV341RA320	Z361-320UL	360	470	522	638	320	13000	932	100	1300
D6694ZOV391RA320	Z391-320UL	390	505	552	674	320	13000	1025	100	1200
D6694ZOV421RA320	Z421-320UL	420	560	594	725	320	13000	1060	100	1100
D6694ZOV481RA360	Z481-360UL	480	640	679	829	360	13000	1160	100	910
D6694ZOV511RA380	Z511-380UL	510	675	722	881	380	13000	1280	100	860
D6694ZOV551RA400	Z551-400UL	550	700	778	950	400	13000	1360	100	800
32 MM SERIES										
D7894ZOV131RA210	Z131-210UL	130	175	184	224	210	18000	340	200	4700
D7894ZOV141RA225	Z141-225UL	140	180	198	242	225	18000	365	200	4300
D7894ZOV151RA240	Z151-240UL	150	200	212	259	240	18000	395	200	4000
D7894ZOV181RA250	Z181-250UL	180	230	255	311	250	18000	470	200	3500
D7894ZOV231RA300	Z231-300UL	230	300	326	397	300	18000	595	200	2800
D7894ZOV251RA330	Z251-330UL	250	330	354	432	330	18000	650	200	2500
D7894ZOV271RA360	Z271-360UL	270	360	382	466	360	18000	710	200	2200
D7894ZOV301RA380	Z301-380UL	300	390	425	518	380	18000	790	200	2000
D7894ZOV321RA430	Z321-430UL	320	420	453	553	430	18000	840	200	1900
D7894ZOV391RA550	Z391-550UL	390	505	552	674	550	18000	1025	200	1600
D7894ZOV421RA600	Z421-600UL	420	560	594	725	600	18000	1120	200	1500
D7894ZOV481RA550	Z481-550UL	480	640	679	829	550	18000	1300	200	1300
D7894ZOV511RA580	Z511-580UL	510	675	722	881	580	18000	1390	200	1200
D7894ZOV551RA620	Z551-620UL	550	700	778	950	620	18000	1500	200	1150

D7894 SERIES



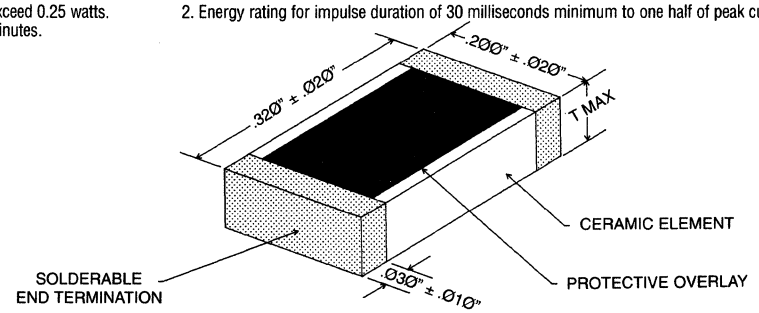
D6694 SERIES



SM SERIES – SURFACE MOUNT VARISTORS

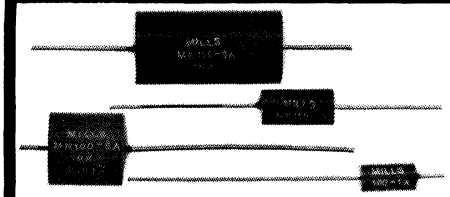
STYLE NUMBER	MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS					
	CONTINUOUS		TRANSIENT		VARRISTOR VOLTAGE (@1.0mA DC)			MAX. CLAMPING VOLTAGE @ TEST CURRENT (8x20µS)		TYPICAL CAPACITANCE 1KHx25°C
	APPLICABLE VOLTAGE (AC)	APPLICABLE VOLTAGE (DC)	ENERGY (10x 1000µS	PEAK CURRENT (8x20µS)	MIN	VNOM	MAX			
	VOLTS	VOLTS	JOULES	AMPERES	VOLTS	VOLTS	VOLTS	VOLTS	AMPERES	PICOFARADS
8S17SM100	10	14	0.80	250	14.4	18.0	21.6	42	5	2000
8S17SM140	14	18[3]	10.0[2]	250	18.7	22.0	26.0	47	5	1600
8S17SM170	17	22	1.0	250	23.0	27.0	31.1	57	5	1300
8S17SM200	20	26	1.2	250	29.5	33.0	36.5	68	5	1100
8S17SM250	25	31	1.5	250	35.0	39.0	43.0	79	5	900
8S17SM300	30	38	1.8	250	42.0	47.0	52.0	92	5	800
8S17SM350	35	45	2.3	250	50.0	56.0	62.0	107	5	700
8S17SM400	40	56	3.0	250	61.0	68.0	75.0	127	5	600
8S17SM500	50	66	4.0	500	74.0	82.0	91.0	135	10	500
8S17SM600	60	81	5.0	500	90.0	100.0	110.0	165	10	400
8S17SM750	75	102	6.0	500	108.0	120.0	132.0	200	10	300
8S17SM950	95	127	8.0	500	135.0	150.0	165.0	250	10	250
8S17SM121	115	153	10.0	500	162.0	180.0	198.0	295	10	200
8S17SM131	130	175	11.0	500	184.0	200.0	228.0	340	10	180
8S17SM141	140	180	12.0	500	198.0	220.0	242.0	360	10	160
8S17SM151	150	200	13.0	500	212.0	240.0	268.0	395	10	150
8S17SM231	230	300	20.0	500	324.0	360.0	396.0	595	10	100
8S17SM251	250	330	21.0	500	354.0	390.0	429.0	650	10	90
8S17SM271	275	369	23.0	500	389.0	430.0	473.0	710	10	80

1. Power dissipation of transients not to exceed 0.25 watts.
2. Energy rating for impulse duration of 30 milliseconds minimum to one half of peak current value.
3. Also rated to withstand 24 volts for 5 minutes.



20 LIBBY STREET / P.O. BOX 3529 / HAMPTON, VIRGINIA 23663 / (757) 723-0785 / FAX (757) 722-1194
E-MAIL: maidadev@maida.com / WEBSITE: maida.com

STANDARDS

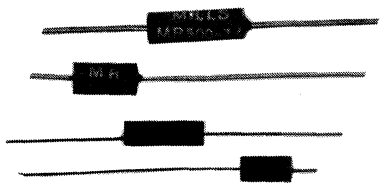


Part No.	Watt	Max. R	Dia.	Length	Lead
MR100-1	.15	100K	.187	.375	#22
MR100-2	.25	1.5M	.250	.500	#22
MR100-3	.30	2.75M	.250	.750	#22
MR100-4	.35	3.0M	.375	.625	#20
MR100-5	.50	4.0M	.375	.828	#20
MR100-6	.50	5.0M	.50	.50	#20

Many other sizes available

- Lead Configuration:
  "A" after Part No. for Axial Leads
  "R" for Radial Leads
  "L" for Lugs
- For high speed applications (minimum distributed L and C) specify MR200 Series.
- For high stability applications specify MR300 Series.

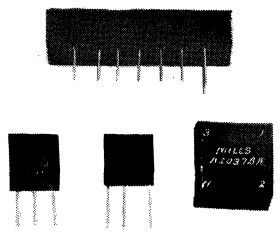
MINIATURE PARTS



Part No.	Watt	Max. R	Dia.	Length	Lead
MR500-1	.04	100K	.080	.210	#20
MR500-2	.05	125K	.080	.375	#24
MR500-3	.04	100K	.125	.125	#24
MR500-4	.05	125K	.100	.210	#24
MR500-5	.10	125K	.125	.187	#24
MR500-6	.10	125K	.125	.250	#24

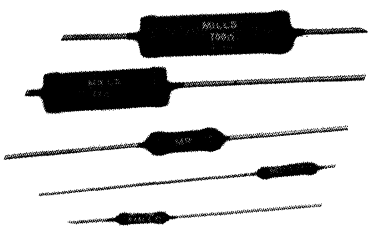
- Tolerance: .005% and up; to .002% in some cases.
- Ask for our Precision Resistor Catalogue.

NETWORKS



- Any configuration you desire.
- Matched 2, 3 or 4 Network configurations available in standard sizes.
- Standard R, 2R, 4R types, etc. available.
- Tolerances: To .005%, closer in some cases; Temperature Coefficient tracking to 1 PPM; Ratio matches to .001%.
- Ask for our Network Flyer.

PRECISION POWER WIREWOUND RESISTORS



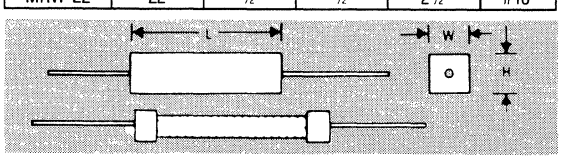
Part No.	Watt	Max. R	Dia.	Length	Lead
MRP-½	½	4.9K	.093	.343	#24
MRP-1	1	10.4K	.093	.406	#24
MRP-3	3	18K	.187	.562	#20
MRP-5	5	90K	.312	1.032	#18
MRP-10	10	370K	.344	1.719	#18

Many other sizes available

- To 15 watts.
- Silicone covered for maximum heat transfer.
- Tolerance: 5%, 1% standard, available to .05%.
- Non-Inductive winding available.
- Ask for our Power Resistor Catalogue.

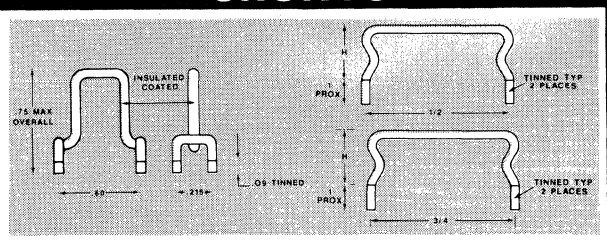
FIBERGLASS CORE WIREWOUND RESISTORS

Part No.	Watt	Dimensions W	H	L	Leads
MRW-5	5	⅜	⅜	⅞	#20
MRW-7	7	⅜	⅜	1⅜	#20
MRW-10	10	⅜	⅜	1⅞	#20
MRW-15	15	½	½	1⅞	#18
MRW-22	22	½	½	2½	#18



AVAILABLE CASED OR UNCASED

SHUNTS



FOUR-LEAD SHUNTS

- Best for close tolerance sensing.
- Resistance values from .005 to .500.
- Tolerance ±5% standard.
- Silicone coated body for good insulation and maximum heat transfer.

TWO-LEAD SHUNTS

- Resistance values per your requirements.
- ½", 1", 1½" centers are standard.
- Ask us about any configuration to suit your needs.

MILLS RESISTOR COMPANY, INC.

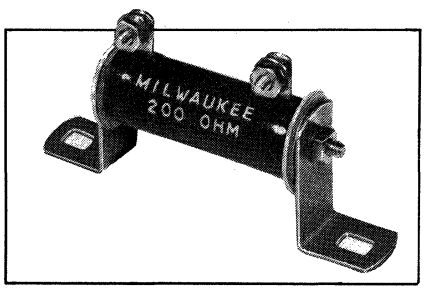
6965 LUTHER DR. #5
SACRAMENTO, CA 95823
(916) 422-5461
FAX (916) 422-1409

CUSTOM ROUNDWIRE POWER RESISTORS

BASIC CONSTRUCTION

MRC can build a resistor to your specifications on any of the basic cores shown. If these do not fit your needs, engineering assistance is available for additional cores. Ratings based on 325°C above 25°C ambient. Consider the following options to meet your requirements, special applications, and size limitations.

- **Special Tolerance**
  Resistance tolerances to ±1%
- **Special Coatings**
  Silcone, or cement



- **Special Taps**
  Most any to fit your specifications
- **Special Windings**
  Aryton-Perry (non-inductive round-wire only)
  Bifilar (non-inductive)

- **Special T.C.**
  Temperature coefficient to 20 ppm/°C
- **Special Terminals**
  Single and double ¼" quick connect
  Metal sleeve ferrule
  Live-bracket
- **Hardware**
  Terminal hardware
  L-bracket mounting
  Spring clip mounting
  Vertical mounting hardware

LOAD BANKS

MRC will custom design and build load banks to your requirements.

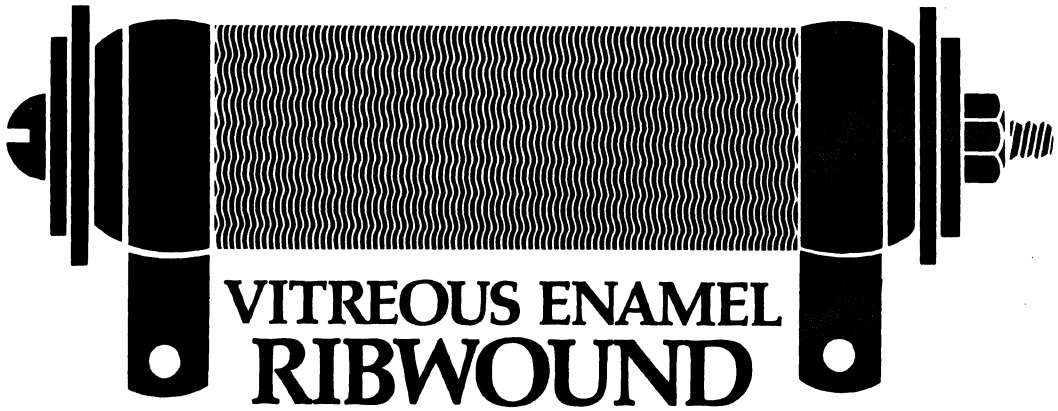
AVAILABLE WATTAGE RATINGS by core size. Ratings based on 325°C above 25°C ambient.

	Core Size	Ohmic Range				
Watts	O.D.xI.D.xL.	Fixed †		Adjustable †		Part No.*
		Min Ω	Max Ω	Min Ω	Max Ω	
8	5/16x3/16x1	.82	13.5K	N.A.	N.A.	5-16-Ω
12	5/16x3/16x1¾	.12	49K	0.27	10.6K	5-28-Ω
11	7/16x5/16x1	1.39	7.2K	N.A.	N.A.	7-16-Ω
15	7/16x5/16x1½	.16	28.7K	N.A.	N.A.	7-24-Ω
20	7/16x5/16x2	.13	53.2K	N.A.	N.A.	7-32-Ω
26	7/16x5/16x3	.11	122K	N.A.	N.A.	7-48-Ω
25	9/16x5/16x2	.22	35K	0.50	19K	9-32-Ω
31	9/16x5/16x2½	.11	55K	0.71	28K	9-40-Ω
50	9/16x5/16x4	.21	119K	1.34	54K	9-64-Ω
75	9/16x5/16x6	.33	207K	2.18	89K	9-96-Ω
24	¾x½x1½	.33	13K	N.A.	N.A.	12-24-Ω
30	¾x½x2	.28	29K	0.66	26K	12-32-Ω
45	¾x½x3	.18	63K	1.21	49K	12-48-Ω
51	¾x½x3½	.22	83K	1.49	61K	12-56-Ω
61	¾x½x4	.27	97K	1.77	73K	12-64-Ω
65	¾x½x4½	.31	122K	2.04	84K	12-72-Ω
75	¾x½x5	.35	134K	2.32	96K	12-80-Ω
90	¾x½x6	.43	172K	2.87	119K	12-96-Ω
100†	¾x½x6½	.47	186K	3.15	131K	12-104-Ω
40	1⅛x¾x2	.48	7.9K	N.A.	N.A.	18-32-Ω

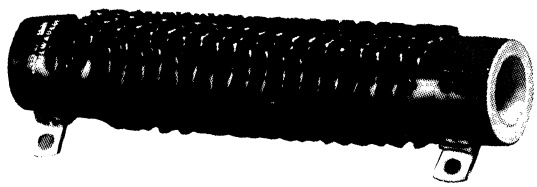
	Core Size	Ohmic Range				
Watts	O.D.xI.D.xL.	Fixed †		Adjustable †		Part No.*
		Min Ω	Max Ω	Min Ω	Max Ω	
80	1⅛x¾x4	.06	53K	0.40	48K	18-64-Ω
95	1⅛x¾x5	.08	79K	.56	79K	18-80-Ω
120	1⅛x¾x6	.11	100K	.71	100K	18-96-Ω
130	1⅛x¾x6½	.12	111K	.78	111K	18-104-Ω
160	1⅛x¾x8	.15	144K	1.00	144K	18-128-Ω
175	1⅛x¾x8½	.16	156K	1.08	156K	18-136-Ω
225†	1⅛x¾x10½	.21	200K	1.38	200K	18-168-Ω
235	1⅛x¾x11¼	.22	216K	1.49	216K	18-180-Ω
240	1⅛x¾x11¾	.24	227K	1.56	227K	18-188-Ω
220	1⅝x1⅛x8½	.21	69K	1.38	69K	26-136-Ω
275	1⅝x1⅛x10½	.27	90K	1.81	90K	26-168-Ω
300	1⅝x1⅛x11¾	.31	104K	2.07	104K	26-188-Ω
500‡	2½x1¾x12	.49	34K	3.24	34K	40-192-Ωc
750‡	2½x1¾x15	.63	44K	4.22	44K	40-240-Ωc
1000‡	2½x1¾x20	.89	62K	5.85	62K	40-320-Ωc
1150‡	3¼x1¾x20	1.140	41K	7.58	41K	52-320-Ωc

† Resistors shown are standard wattages
* Add "A" after part number for adjustable types.
† For resistance values outside the limits shown, consult MRC.
‡ Cement coating standard — Silicone available.
* Unable to find what you need above? The same cores can be wound with ribbon wire for higher wattage capability-See the ribwound **A**•1935.

MRC MILWAUKEE RESISTOR CORPORATION
8920 WEST HEATHER AVE. • MILWAUKEE, WI 53224
P.O. BOX 24200 • TELEPHONE 414/362-8900 • FAX 414/362-9876
CALL US TOLL FREE: 888-616-6666
http://eemonline.com/milwaures



VITREOUS ENAMEL RIBWOUND RESISTORS



BASIC CONSTRUCTION

Crimped ribbon resistance wire is edgewound and then locked to the ceramic core with vitreous enamel. The resistance wire is spot welded to the terminal bands. MRC Ribwounds can be supplied in fixed, adjustable, or tapped styles. Cement or silicone coatings are optional.

HI-OHM RIBWOUNDS AN EXCLUSIVE WITH MRC

In the chart below, note that the maximum ohmic value shown for each wattage is 3 to 4 times higher than that normally available. This development is the result of precision rib winding machines designed specifically by MRC. Unique in the industry, these precision machines produce a winding with extreme uniformity. This allows much closer turns providing significantly higher resistance. Hi-Ohm Ribwounds can replace lower ohmic value roundwire power resistors with savings in size.

STOCK VALUES

OHMS	OHMS	OHMS
0.1	1.25	10.0
0.15	1.5	12.0
0.2	2.0	15.0
0.25	2.5	16.0
0.375	3.0	20.0
0.5	4.0	25.0
0.6	5.0	33.0
0.75	6.0	50.0
1.0	8.0	100.0

Many 300 watt units are stocked in both fixed and adjustable styles. Listed are the more popular 300 watt ohmic values. All other wattage ratings and styles are made to order.

APPLICATIONS

Recommended for use where high energy is to be dissipated in the lower ohmic ranges. With its ability to dissipate greater heat, the ribwound resistor is almost one half the physical size of an equally rated roundwire.

Ribwound wattage ratings are based on a temperature rise of 375°C above an ambient of 40°C.

They can be mounted with spring clips (thru 1⅛" dia.); thrubolt hardware, individual or multiple-stacked bracket assemblies or live-bracket assemblies.

WATTS	CORE SIZE	OHMIC RANGE #		PART NUMBER	
	O.D. x I.D. x L.	FIXED	ADJ.	FIXED	ADJ.
40	9/16x5/16x2	.010-10.6	N.A.	9-32-ΩR	USE SAME PART NUMBER BUT SUBSTITUTE "AR" FOR "R"
50	¾x½x2	.020-8.2	N.A.	12-32-ΩR	
60	¾x½x2½	.010-13.7	N.A.	12-40-ΩR	
75	¾x½x3	.010-19.3	N.A.	12-48-ΩR	
90	9/16x5/16x4	.015-28.3	.014-25.3	9-64-ΩR	
100	¾x½x3½	.012-24.5	.011-20.7	12-56-ΩR	
110	¾x½x4	.015-30.6	.014-26.8	12-64-ΩR	
120	¾x½x4½	.018-36.8	.017-32.9	12-72-ΩR	
135	¾x½x5	.021-42.9	.020-39.0	12-80-ΩR	
150	1⅛x¾x4	.019-44.8	.018-39.0	18-64-ΩR	
160	¾x½x6	.027-55.0	.027-51.3	12-96-ΩR	
160	1⅛x¾x4¼	.021-49.2	.020-43.6	18-68-ΩR	
175	1⅛x¾x4½	.023-53.7	.022-48.1	18-72-ΩR	
180	¾x½x6½	.030-61.3	.030-57.4	12-104-ΩR	
220	1⅛x¾x6	.035-80.6	.035-75.0	18-96-ΩR	

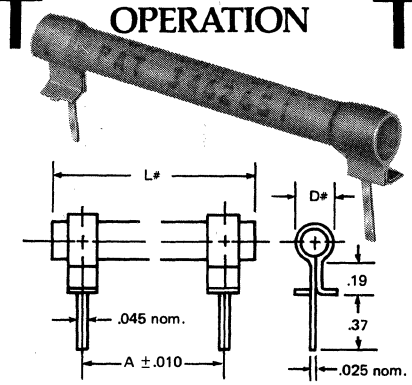
WATTS	CORE SIZE	OHMIC RANGE #		PART NUMBER	
	O.D. x I.D. x L.	FIXED	ADJ.	FIXED	ADJ.
225	1⅛x¾x6⅛	.036-82.8	.036-77.2	18-98-ΩR	USE SAME PART NUMBER BUT SUBSTITUTE "AR" FOR "R"
240	1⅛x¾x6½	.038-89.5	.039-83.9	18-104-ΩR	
†300	1⅛x¾x8½	.054-125	.055-120	18-136-ΩR	
375	1⅛x¾x10½	.069-161	.072-156	18-168-ΩR	
400	1⅛x¾x11¼	.075-175	.078-169	18-180-ΩR	
400	1⅝x1⅛x8½	.061-159	.062-149	26-136-ΩR	
420	1⅛x¾x11¾	.079-184	.082-178	18-188-ΩR	
500	1⅝x1⅛x10½	.081-210	.083-200	26-168-ΩR	
550	1⅝x1⅛x11¾	.093-242	.097-232	26-188-ΩR	
750‡	2½x1¾x12	.128-166	.130-158	40-192-ΩRC	
1000‡	2½x1¾x15	.168-217	.176-209	40-240-ΩRC	
1500‡	2½x1¾x20	.234-303	.248-294	40-320-ΩRC	
2000‡	3¼x1¾x20	.281-391	.300-380	52-320-ΩRC	

Standard resistance tolerance is ±10%—closer on request.
† Stock wattage—see stock list above.
‡ Cement coating is standard rather than vitreous enamel.

MRC MILWAUKEE RESISTOR CORPORATION
8920 WEST HEATHER AVE. • MILWAUKEE, WI 53224
P.O. BOX 24200 • TELEPHONE 414/362-8900 • FAX 414/362-9876
CALL US TOLL FREE: 888-616-6666
http://eemonline.com/milwaures

PCB RESISTORS

MOUNT AND TERMINATE IN ONE OPERATION



- **Built-in Standoffs Keep Board COOL.**
- Mounting feet prevent rocking.
- Power ratings 3 to 20 watts.
- Wide ohmic range.
- One-piece welded terminals.
- Standard pin spacing: 1/10" cc multiples, special spacing on request.
- Rectangular pins .025 x .045 in. (mount in .078" dia. PCB holes).
- Silicone coating.
- Standard tolerances ±5% over 1 ohm, ±10% under 1 ohm & adjustable.
- 20 PPM upon request.
- Wattages based on 275°C rise above an ambient of 25°C.
- Non-inductive available.
- U.S. patent 3,462,651.

FIXED

Watts	L#	A	D#	Min.Ω‡	Max.Ω‡	Part Number
3	1 1/32	0.6	5/16	.86	10K	3.5-13-Ω CXPCB
5	1 5/16	0.9	5/16	.181	19K	3.5-18-Ω CXPCB
7	1 23/32	1.3	5/16	.29	31K	3.5-24-Ω CXPCB
10	2 1/8	1.7	5/16	.4	43K	3.5-30-Ω CXPCB
15	2 1/8	1.7	13/32	.106	65K	5-32-Ω CXPCB
20	2 5/8	2.2	13/32	.142	88K	5-40-Ω CXPCB

ADJUSTABLE

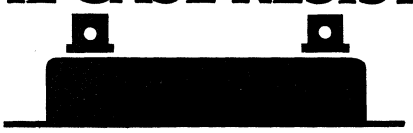
Watts†	L#	A	D#	Min.Ω‡	Max.Ω‡	Part Number
15	2 1/8	1.7	13/32	.69	14K	5-32-Ω A CXPCB
20	2 5/8	2.2	13/32	.93	19K	5-40-Ω A CXPCB

†Non-standard wattages in the range of 3-29 watts are possible—contact M.R.C.
‡For resistances above or below the limits shown, contact M.R.C.
#Maximum measurements.

METAL CASE RESISTORS

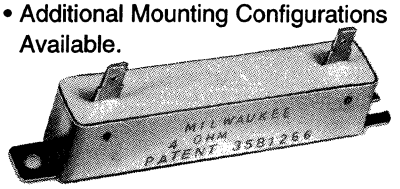
For Motor Starting, Speed Control, Solid State Ignition Systems, Shunts, Potted Circuits, and Voltage Dropping

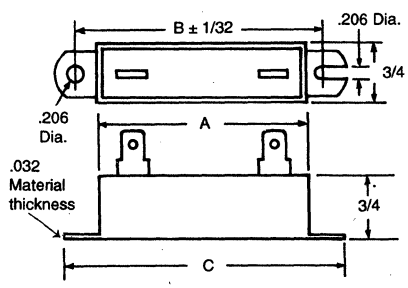
- High Heat Sink Capability.
- Stainless Steel Case.
- Rugged—Shock Resistant.
- Wattage Rating-20 to 100 Watts-based on 275°C rise above 25°C ambient.
- Resistance Range 0.2 ohm to 66,000 ohms (depending on voltage).



- Dielectric Strength—1500 Volts RMS (MUST BE SPECIFIED).
- Terminals—quick connect—screw/solder lugs.

- Ceramic Collar (must be specified).
- Additional Mounting Configurations Available.





Watts Ratings at 275° C rise showing benefit of mounting flush for full heat sink.††		Dimensions			Ohmic Range		Part Number
Without Heat Sink	With Heat Sink	A	B	C	Min.Ω	Max.Ω	(Specify Terminal)
20	45	1	1 7/16	1⅛	1.1	2750	12M16-Ω†
40	70	2½	3	3⅜	0.2	22K	12M40-Ω‡
50	100	3 11/16	4⅛	4 9/16	0.2	66K	12M59-Ω‡

††Ratings based on mounting on steel panel 10" x 10" x .040"; (heat transfer to heat sink is improved by the use of thermal conductive grease or epoxy).
†Standard terminal is 5/16" wide with hole, Type AB.
‡Standard terminal is single quick connect, Type H.

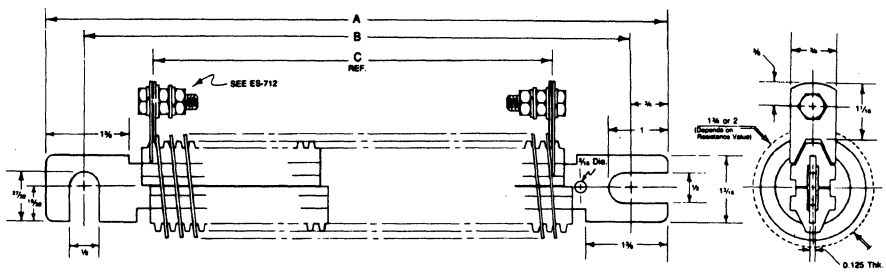
PAT. 3,581,266

MRC MILWAUKEE RESISTOR CORPORATION
8920 WEST HEATHER AVE. • MILWAUKEE, WI 53224
P.O. BOX 24200 • TELEPHONE 414/362-8900 • FAX 414/362-9876
CALL US TOLL FREE: 888-616-6666
http://eemonline.com/milwaures

EDGEWOUND POWER RESISTORS

EDGE·POWER

EDGEWOUND POWER RESISTORS



Form 3			Form 4			Form 5			Form 6			Form 7			Form 8		
600 Watt			800 Watt			1,000 Watt			1,200 Watt			1,400 Watt			1,600 Watt		
A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
12¼	11	8¼	15¼	14	11¼	18¼	17	14¼	21¼	20	17¼	24¼	23	20¼	27¼	26	23¼

Wattage rating based on 375°C rise above an ambient of 40°C

EDGE-POWER resistors complement Milwaukee Resistor's roundwire, ribwound and grid resistors which have been the industry's workhorse of electrical power dissipation for many years.

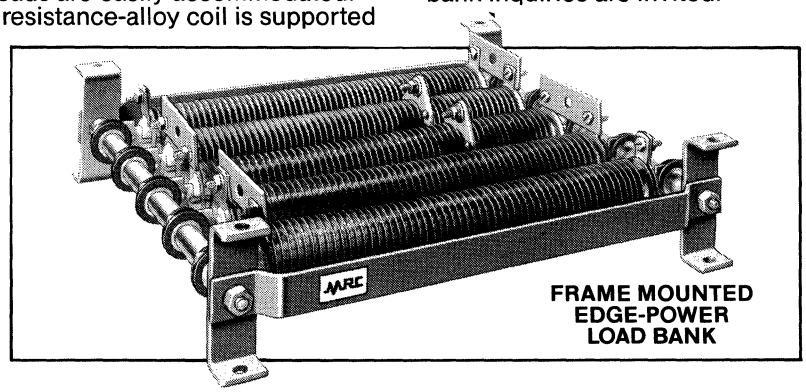
A continuous range of resistor types are now available for your high current applications. EDGE-POWER falls naturally between MRC's ribwound and grid resistors and allows full design versatility from one source.

Because of the open coil construction of EDGE-POWER resistors, heat dissipation is efficient, and reasonable surges/overloads are easily accommodated.

The heavy duty resistance-alloy coil is supported on specially designed porcelain insulators which provide insulation and proper turn-to-turn spacing. The end-slot/side-slot support bar provides versatility in mounting and adapts easily to many existing installations.

Movable tap terminals are available as an option. Terminal hardware for cable attachment is provided as a standard item on all terminals and taps.

Frame mounted load banks (as shown below) can be furnished with taps and jumpers to meet your circuit specifications (series, parallel or combination). Your load bank inquiries are invited.



FRAME MOUNTED EDGE-POWER LOAD BANK

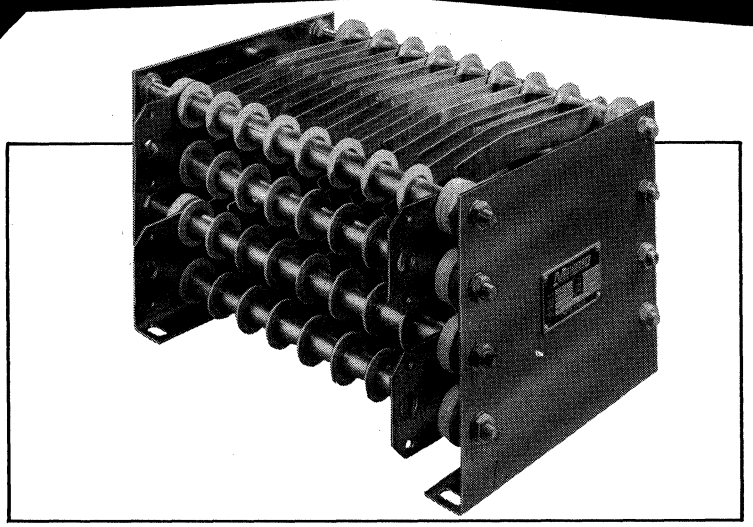
- Overhead Cranes
- Locomotives
- Lift Trucks
- Plating Baths
- Elevators
- Power Supplies
- Arc and Spot Welders
- Battery Lines/ Chargers
- Many Industrial Controls

Typical Applications of **EDGE-POWER** resistors include motor control (starting, plugging, speed control and braking), load dumping, ballast, current limiting, and voltage dropping. Edgewound resistors are commonly found in:

MRC MILWAUKEE RESISTOR CORPORATION

8920 WEST HEATHER AVE. • MILWAUKEE, WI 53224P.O. BOX 24200 • TEL:414/362-8900 • FAX 414/362-9876
CALL US TOLL FREE: 888-616-6666 • http://eemonline.com/milwaures

GRID RESISTORS



...For High Current and High Power Circuits

Milwaukee Grid Resistors are among the most versatile grid resistors developed. They are custom designed with the aid of a computer for specific applications.

Special features that assure longer life include: a patented* grid design that withstands overloads that would destroy conventional grids. Corrosion resistant stainless steel or special alloy elements. All-welded construction to eliminate hot spots and resistance fluctuations. Vibration-proof insulation that allows extended operation at higher voltages.

Taps and independent sections can be easily incorporated into the design to provide added flexibility. MRC grid units can be designed for use with natural convection cooling or with forced ventilation if size reduction is necessary.

They are competitively priced and incorporate more life and greater dependability than usually provided by conventional grid resistors.

*U.S. Patent 3,212,045

Typical Characteristics:

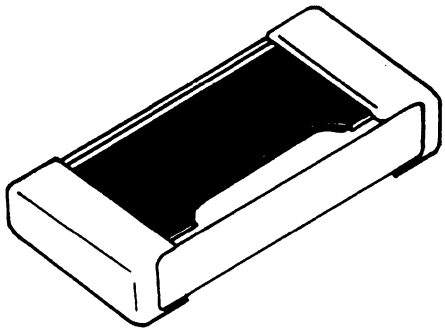
- 375°C temperature rise above an ambient of 40°C.
- Temperature coefficient of 150 ppm/°C.
- Hi potential test at 1500 VRMS—Higher on request.
- Resistances available to approximately 2 Ohms maximum.

Typical Applications:

- Motor starting
- Braking
- Power systems
- Crane controls
- Dummy loads
- Grounding resistors
- Speed controls
- Feedback resistors
- Heaters
- Industrial controls

MRC MILWAUKEE RESISTOR CORPORATION

8920 WEST HEATHER AVE. • MILWAUKEE, WI 53224
P.O. BOX 24200 • TELEPHONE 414/362-8900 • FAX 414/362-9876
CALL US TOLL FREE: 888-616-6666
http://eemonline.com/milwaures

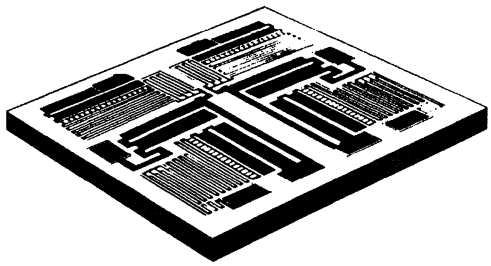


Thick Film Division

Precision, hi-rel chip resistors, multi-layer substrates, attenuators, and resistor networks.

20 David Road, P.O. Box 69
N. Attleboro, MA 02761-0069
508-695-0203 Fax: 508-695-6076
E-mail: msithick@mini-systemsinc.com

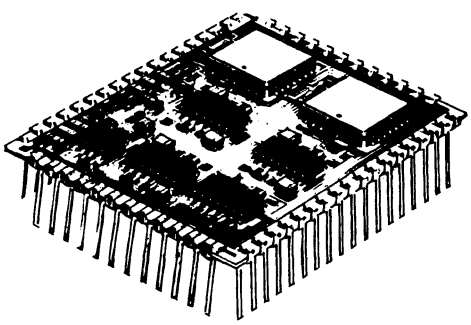
ISO 9001 CERTIFIED
THIN FILM DIVISION



Thin Film Division

Precision, hi-rel ultra-low TCR chip resistors, chip capacitors, and products designed for microwave applications.

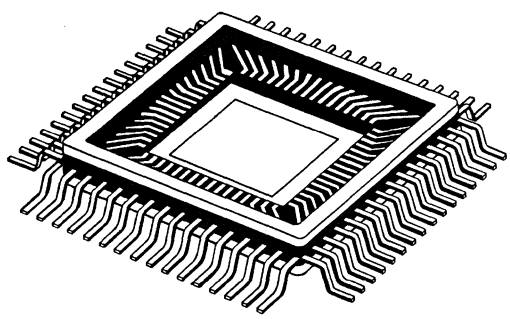
45 Frank Mossberg Drive, P.O. Box 1659
Attleboro, MA 02703-0028
508-226-2111 Fax: 508-226-2211
E-mail: msithin@mini-systemsinc.com



Sunbelt Microelectronics Division

Custom hybrid microelectronic devices, sub-assemblies, and fabrication of hermetic flat pack assemblies.

237 Enterprise Road
Deltona, FL 32725-8001
407-574-0208 Fax: 407-574-8262
E-mail: SBMicro@compuserve.com



Electronic Package Division

Quality glass side wall hermetic packages, chip carriers, and enclosures for semiconductors, ICs, and hybrids; also, microwave package capabilities.

168 E. Bacon Street, P.O. Box 1597
Plainville, MA 02762-0597
508-695-2000 Fax: 508-695-8758
E-mail: msipkg@mini-systemsinc.com

For additional information,
please call, fax, or visit our home page:
http://www.Mini-SystemsInc.com

MSI
MINI-SYSTEMS, INC.

OHMCRAFT™

Writing a new chapter in resistor technology

A uniquely superior process

The shortcomings of traditional resistors

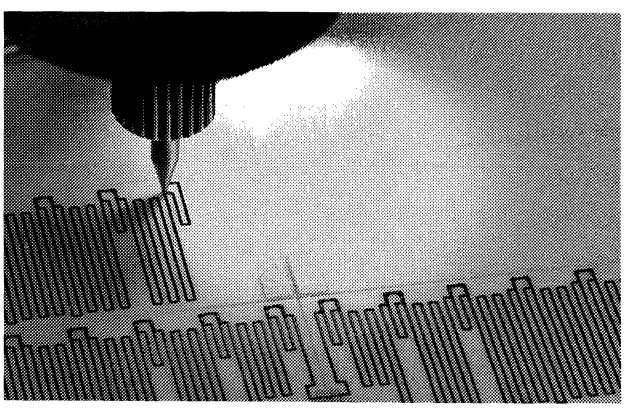
When it comes to making resistors, traditional hybrid technologies have their limitations.

Screen-formed thick-film resistors have wide-ranging values but their short current paths severely compromise their performance characteristics.

Thin-film resistors, while capable of high precision, are expensive to design and manufacture and are severely limited in attainable value.

Both older technologies are burdened by extensive tooling requirements, so proto-typing and pilot runs incur high per-part costs.

Presenting FineFilm™ —a better resistor technology



Made by a patented process, each FineFilm resistor is *drawn in a long serpentine pattern* on a ceramic substrate using thick-film ink. The process is extremely versatile. By controlling the thickness, width, and length of the drawn line as well as ink conductivity we can manufacture resistors of outstanding performance over an extremely wide range of values.

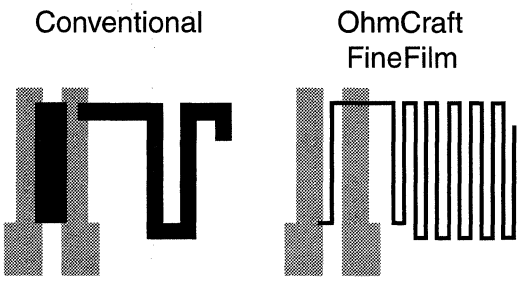
The FineFilm™ equation:

longer, high-aspect trace + lower-conductivity film = unmatched design efficiency, versatility and performance

There are no hard tooling costs in the FineFilm process. New resistor models are created easily using the OhmCraft CAD/CAM program together with the correct precision pen orifice and decade-value ink. Production parts perform identically to prototypes—because they are made identically.

A complete range of products

Divider Design



After the resistors are drawn, conventional manufacturing techniques are used to form a broad spectrum of surface-mount and through-hole parts—including networks and dividers.

FineFilm™ resistors have more going for them

No other process can:

- Fabricate new custom designs within hours of the initial order
- Make prototypes without incurring significant charges for engineering and tooling
- Provide working parts within one day of design

Only FineFilm resistors combine the close tracking, low current noise, high current-voltage linearity, and close resistance tolerance of thin films together with the high durability, wide resistance ranges, and low cost of thick films.

Are FineFilm™ resistors right for you?

If your priorities run to

✓ small size
✓ portability
✓ reliability
✓ performance
✓ low cost
✓ fast turnaround

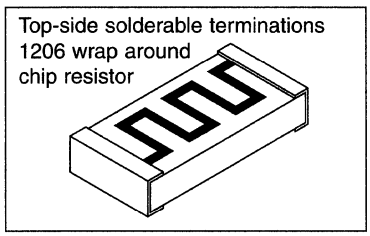
The answer is YES.

Can we meet your requirements? Ask!

Phone: 716-624-2610
Fax: 716-624-2692
E-mail: sales@ohmcraft.com

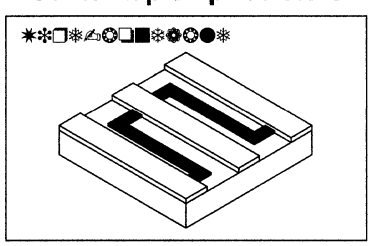
OHMCRAFT™

High-value/high-voltage chip resistors



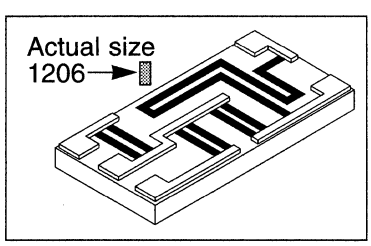
Ohmic values to 5 TΩ
Voltage ratings 5X those of conventional chip resistors
TCR to 25 ppm/°C
Very low voltage dependence
Low noise, inductance, capacitance
Enhanced stability
Six termination styles

Center-tap chip resistors



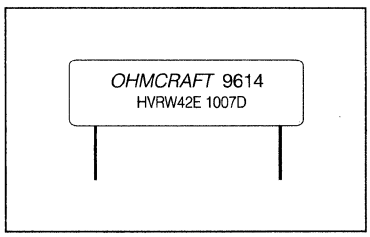
Ratios: 1:1, 2:1, 10:1 standard, custom ratios also available
Ohmic values to 100 MΩ
Matching tolerances to 0.1%
Absolute TCR to ±50 ppm/°C
Tracking TCR to ±5 ppm/°C

Custom surface-mount networks



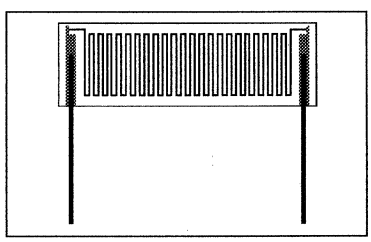
No. of resistors: 2 to 6, typical
Ratios to 1000:1
Ohmic values to 500 MΩ
Matching tolerances to 0.1%
Voltage ratings to 2 KV

High-value/high-voltage leaded resistors



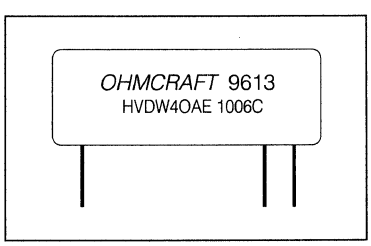
Ohmic values to 5 TΩ
Voltage ratings to 100 KV
TCR to ±25ppm/°C
VCR to 0.1 ppm/volt
Low noise, inductance, capacitance
Excellent stability
Wire or spade terminations

Terohm leaded resistors



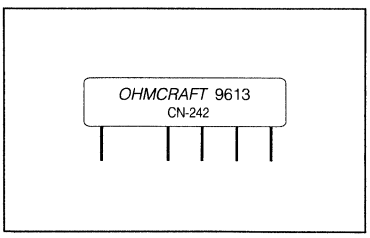
Standard dimensions: 1" x 0.5" and 0.75" x 2"
Ohmic values to 10 TΩ
Tolerances to 0.25%

High-voltage leaded dividers



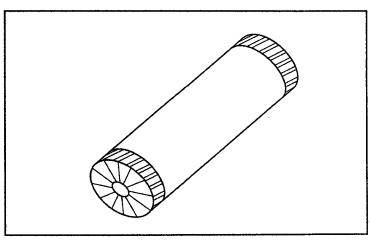
Ohmic values to 2 TΩ
Voltage ratings to 100 KV
Standard ratios: 100:1, 1000:1
Overall tolerances to 0.1%
Tolerance ratios to 0.1%
Absolute TCR to ±25 ppm/°C
Tracking TCR to 5 ppm/°C
VCR to 0.05 ppm/volt

Custom leaded networks



Ohmic values to 10 GΩ
Ratios: 1:1 to 20,000:1
Ratio tolerances to 0.1%
Absolute tolerances to 0.1%

Cylindrical resistors



Ohmic values to 10 GΩ
Voltage ratings to 100 KV
VCR to 0.1 ppm/volt
Power rating: 50 W

Full MIL testing and qualification available for all FineFilm™ resistors

Ask for complete technical information!

OHMCRAFT™

Writing a new chapter in resistor technology
93 Paper Mill Street
Honeoye Falls, NY 14472
Phone: 716-624-2610
Fax: 716-624-2692
E-mail: sales@ohmcraft.com

©1998 by OhmCraft Inc.

MASTER DISTRIBUTORS

"Get It Faster From Master"

Phoenix, Arizona
2425 South 21st St.
Phoenix, AZ 85034
☎ (602) 267-1111
Fax: (602) 267-7070

Northern California
1026 6th Ave.
Oakland, CA 94606
☎ (510) 835-1500
Fax: (510) 835-0398

Southern California
1301 Olympic Blvd.
Santa Monica, CA 90404
☎ (310) 452-1229
Fax: (310) 399-8600

Louisville, Kentucky
842 South 7th St.
Louisville, KY 40203
☎ (502) 568-8888
Fax: (502) 589-9829

Northwest
12506 130th Lane NE
Kirkland, WA 98034
☎ (425) 821-5454
Fax: (425) 821-2929

Austin, Texas
9701 Dessau Rd., #204
Austin, TX 78753
☎ (512) 491-0101
Fax: (512) 491-0111

Miami, Florida
4028 NW 25th St.
Miami, FL 33142
☎ (305) 871-0071
Fax: (305) 871-0072

CABINETS
BUD
Hammond

CAPACITORS
Surge

CIRCUIT BREAKERS
Airpax
Fuji
Heinemann / Eaton
Idec
Master Electronics
Siemens / Potter & Brumfield
Siemens Energy & Automation
Wieland

CONNECTORS & SOCKETS
3M
ADC
Amphenol
Curtis
Custom Connector
Kings Connectors
Master Electronics
Panduit
Pomona
Siemens / Potter & Brumfield
Precicontact
Switchcraft
Vernitron-Beau
Wieland

CONTACTORS/ STARTERS
Deltrol
Fuji
Furnas
Siemens Energy & Automation

COUNTERS
ATC
Curtis Instruments
Hecon
IVO
Kessler-Ellis
Master Electronics
Omron
Redington
Sodeco/Maxmar

DIODES
International Rectifier
Surge

FANS
Aromat / NIAS
ETRI
EBM / Papst
U.S. Toyo
Qualtek

FILTERS
Curtis

FUSES
Bussmann
Ferraz
Littelfuse
USD

INDICATOR LAMPS & LED'S
IDI
JKL
Ledtronics
Lighting Components
Lumex
Sylvania

HEAT SINKS
Wakefield

PHOTO & PROX
Agastat
Electro
Idec
Omron
Opto Switch
Skan-A-Matic

PLC's
Fuji
Idec
Omron

POTS & RESISTORS
Bourns
Clarostat
MEC
Ohmite
Surge

SOLENOIDS
Deltrol
Dormeyer
Guardian

TERMINAL BLOCKS
Auguat / RDI
T&B / Buchanan
Curtis
Kulka / Marathon
Magnum / USD
Marco
Riacon / RIA
Siemens Energy & Automation
USD
Vernitron-Beau
Weidmuller
Wieland

RELAYS
Aleph International
Allied Controls
American Zettler
Aromat / NIAS
AT&T
C.P. Clare
Communications Inst. (CII)
Coto
Crydom Controls
Deltrol
Elec-Trol
Fuji
Genicom
Gentron
Gordos
Guardian
Hamlin
Idec
Line Electric
Magnecraft / MSD
Master Electronics
MEC
Midtex
Omron
Siemens / Potter & Brumfield
Schrack
Siemens Energy & Automation
Sigma
Solid State Optronics
Struthers-Dunn
Takamisawa
Teledyne
Theta-J
Triridge
Wieland

TEST EQUIPMENT
Biddle
Fluke
Simpson Electric
Triplett
Tektronix

TIMERS
Agastat
Amperite
Aromat / NIAS
ATC
Bourns
Crouzet
Curtis Instruments
Guardian
Idec
Industrial Timer
Magnecraft / MSD
Master Electronics
Midtex
Omron
Siemens / Potter & Brumfield
Syrelec

SWITCHES
Apem
Aromat / NAIS
Augat/Alco
Bourns
C&K
Cherry
Cutler-Hammer / Eaton
EECO / Transico
Electro-Mech
Fuji
Idec
McGill
Microswitch
Omron
Oslo
RAFI / C&K
Siemens Energy & Automation
Switchcraft
Tschudin & Heid
Unimax / C&K

TRANSFORMERS & POWER SUPPLIES
ACME
Deltron
Dormeyer
Idec
Magnetek
Microtran
Omron
Power One
Siemens Energy & Automation
SL Waber
Sola
Stancor
Superior
Tamura
Topaz
Triad
Tripp Lite

WIRE, WIRING DEVICES & HARDWARE
Alpha
Arrow Hart / Cooper
Belden
Birtcher
Buchanan
Commscope
Crouse-Hinds
Harvey Hubbell
H.H. Smith
Insultab
Manhattan
Panduit
Pomona
Thomas & Betts
Tyton / Hellerman
Wakefield
Wieland

STOP **ORDERS PLACED BY 5:00 P.M. ARE SHIPPED THE SAME DAY** STOP

"MASTER DISTRIBUTORS Is Your Best Source for..."

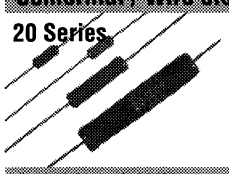
OHMITE®

CLAROSTAT

THE POWER BEHIND RESISTORS

OHMITE®

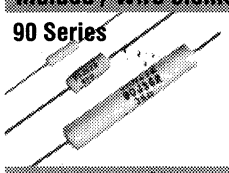
Axial Lead / Vitreous enamel coated / Conformal / Wire element



20 Series

Conformal coated; derating 100% @ 25°C to 0% @ 350°C; overload 5x rated wattage for 5 seconds, 10x for 7 watts & larger. 5% tolerance standard. 1-10 watt sizes.

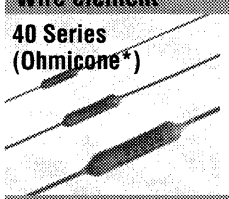
Axial Lead / Vitreous enamel coated / Molded / Wire element



90 Series

Molded body-mounting clips can increase rating, derating 100% @ 25°C to 0% @ 350°C, overload 5x rated wattage for 5 seconds, 10x for 5 watt size and above. 1.5-11 watt sizes.

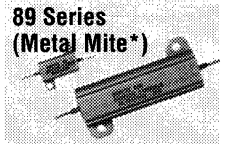
Axial Lead / Silicone ceramic coated conformal / Wire element



40 Series (Ohmicone*)

Conformal coating; derating 100% @ 25°C to 0° @ 275°C, overload 5x rated wattage for 5 seconds, 10x for 5 watt and larger, meets NASA SP-R-0022A and ASTM E-595. Stocked in both 5% and 1% tolerances.

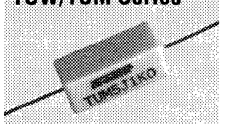
Axial Lead / Aluminum housed / Military approved (Mil-R-18546) / Wire element



89 Series (Metal Mite*)

Housing anodized aluminum; Derating 100% 25°C to 0% 275°C; power rating based on proper heat sink; overload 5x rating for 5 seconds; stability 0.5% ΔR 2000 hours. 5-50 watt sizes.

Axial lead / Ceramic housed / Fiberglass / Wire element



TUW/TUM Series

Short time overload 10x rated load for 5 sec.; 5x for TUM metal oxide type; dielectric 1000VAC, 1 min.; derating100% @70°C to 0% @275°C; flameproof.

Fixed resistance / Horizontal wire leads / Wire element

200 Type (Brown Devil*)

Viterous enamel coated; Wire leads 1.5 inches; Derating 100%-25°C to 0% @ 350°C; Overload 10 times rated power for 5 seconds; Mount with clips or through bolts.

Fixed & Adjustable / Lug terminals / Wire element

270/210 Type

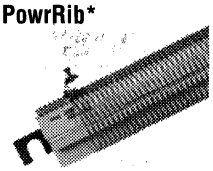
Vitreous enamel or Silicone coated; Overload 10 times wattage for 5 seconds; Derating 100% @ 25°C to 0% @ 350°C; Mounting with clips, thru bolts or brackets; Adjustable units are available in same sizes; Non-Inductive units available; other wattages available.

Ohmite Manufacturing Company
3601 Howard St.
Skokie, Illinois 60076

Tel. 847/675-2600
Fax 847/675-1505

Web: www.ohmite.com • E-mail: ohmite@wwa.com

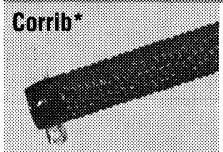
Open-wire / High-current resistors



PowrRib*

Ribbon wire, 2 to 8 sections long for PFE; round wire, 2 to 8 sections long for PFR; higher rating for pulse operations; mounted by slotted bar; overload 10x wattage for 5 seconds; derating 100% @ 25°C to 0% at 400°C; terminals can be changed for intermediate resistance values; extra terminals available to tap units.

Ribbon-wire / Ceramic core / High-current resistors



Corrib*

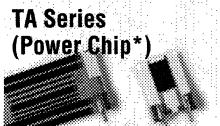
Derating 100% @ 25°C to 0% @ 400°C; overload 10x wattage for 5 seconds; high wattage rating for pulse loads; viterous enamel or silicone coatings; mounting with clips, thru bolts or brackets; other wattages available. 35-1500 watt sizes.

Surface mount power resistors

RW, RP, RF, RC Series

Wirewound, power film, metal film, or carbon composition construction. 0.25-3.50 watt power ratings. Ohmic range of 0.005-22 MegΩ.

Alumina core / Thick film element / Plate resistors



TA Series (Power Chip*)

3-100 watts. Non-Inductive PCB Mounted; Derating 100% @ 25°C to 0% @ 350°C; Overload 5x rated wattage for 5 seconds; lower ohmic values available.

Bare metal element / Current sense resistors

60 Series

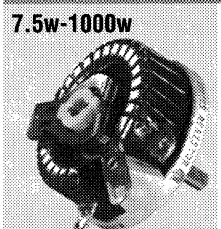
Derating 100% @ 25°C to 0 @ 275°C; overload 5x for 5 sec.; 3% tolerance standard; very low inductance.

Silicone molded / Low ohmic / Wire element

10 Series (Lo-Mite*)

Derating 100% @ 25°C to 0% @ 275°C; overload 5x, 5 seconds; 1% tolerance; low Inductance <.25μH. 2, 3 and 5 watt sizes.

Rheostats / Ceramic core / Wire element



7.5w-1000w

Different shafts available; Off positions & switches; Tandem assembly available; Taper winding available; Motor drives; Enclosures; Tap units; Special terminals; Mil-R-6749 approved; Mil-R-22 approved; Derating 100% @40°C to 0% @ 300°C; locking shafts available; 300° rotation standard. 7.5-1000 watts.

Audio indicators / Panel mount / PC mount / Flange mount

OMT Series (Ohm-O-Tone*)

Full line of panel, flange and PC mounted piezo audible indicators. Operating voltages down to 1.5VDC. Decibel levels up to 110db.

Contact our marketing department for complete catalog and technical specifications

* trademark registered

©1998 Paccom Electronics

PACCOM ELECTRONICS

Tel (800) 848-6983
www.paccom.com

Chip, SIP, Carbon Film, & Metal Film Resistors

Paccom Electronics reserves the right to make changes without notice in the construction and design from the specifications. No warranties are expressed or implied.

Chips & Arrays

RM Series
Thick Film Chip
Glass Passivated
Surface Mount

Resistance Range:
0Ω to 10MΩ

Rated Power @ 70°C:
1/16W to 1W

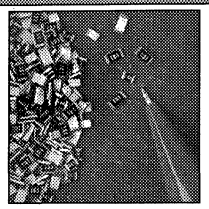
Temp. Coefficient:
±100 to ±200ppm/°C

Resistance Tolerance:
±1%, ±5%

Max Working Voltage:
25Vdc to 200Vdc

Max Overload Voltage:
50Vdc to 400Vdc

Case Sizes:
0402, 0603, 0805, 1206, 1210, 2010, 2512



RL Series
Thick Film Chip
Glass Passivated
Surface Mount

Resistance Range:
0.01Ω to 1Ω

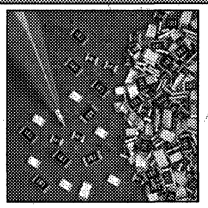
Rated Power @ 70°C:
1/8W to 1W

Temp. Coefficient:
±600ppm/°C

Resistance Tolerance:
±1%, ±2%, ±5%

Case Sizes:
0805, 1206, 1210, 2010, 2512

Low values for current sensing applications



RT Series
Thin Film Chip
Glass Passivated
Surface Mount

Resistance Range (E24):
10Ω to 1MΩ

Rated Power @ 70°C:
1/16W or 1/10W

Temp. Coefficient:
±25 to ±100ppm/°C

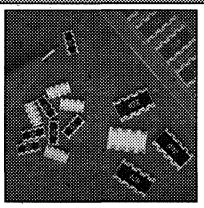
Resistance Tolerance:
±0.1%, ±0.5%

Max Working Voltage:
50Vdc to 100Vdc

Max Overload Voltage:
100Vdc to 200Vdc

Case Sizes:
0603, 0805

SIP Network



RAV Series
Thick Film Array
Convex Terminations
Surface Mount

Resistance Range (E24):
10Ω to 1MΩ

Number of Resistors:
2, 4, or 8

Rated Power Per Element:
1/16W, 1/10W, 1/8W

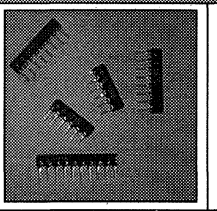
Temp. Coefficient:
±200ppm/°C

Resistance Tolerance:
±1%, ±2%, ±5%

Max Working Voltage:
50Vdc to 200Vdc

Max Overload Voltage:
100Vdc to 500Vdc

Circuit Types:
Common, Isolated



RA Series
Thick Film Network
Conformal Coated
Low/High Profile SIP

Resistance Range:
10Ω to 4.7MΩ

Number of Pins:
4 through 14

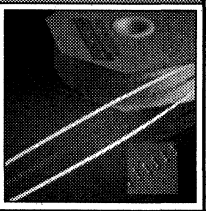
Rated Power Per Pin:
1/8W or 1/4W

Temp. Coefficient:
±100ppm/°C or ±250ppm/°C

Resistance Tolerance:
±1%, ±2%, ±5%

Max Working Voltage:
100Vdc to 200Vdc

Circuit Types:
Common, Dual Common, Isolated, Ladder, Series, Dual Termination, Voltage Divider



SRD Series
Carbon Film
Reduced Size
Axial Lead

Resistance Range:
0Ω to 10MΩ

Rated Power @ 70°C:
1/4W to 1/2W

Temp. Coefficient:
0 to -600ppm/°C

Resistance Tolerance:
±5%

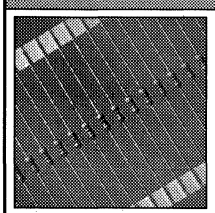
Max Working Voltage:
200Vdc to 350Vdc

Max Overload Voltage:
400Vdc to 700Vdc

Packaging:
Tape/Reel,Tape/Box

Meets EIA-RS 196A
Meets JIS-C-6402

Carbon Film



RD Series
Carbon Film
Standard
Axial Lead

Resistance Range:
0Ω to 22MΩ

Rated Power @ 70°C:
1/4W to 2W

Temp. Coefficient:
+350 to -1,000ppm/°C

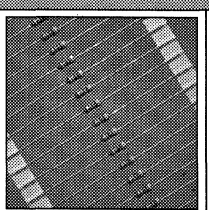
Resistance Tolerance:
±5%

Max Working Voltage:
250Vdc to 500Vdc

Max Overload Voltage:
500Vdc to 1KVdc

Packaging:
Tape/Reel,Tape/Box

Meets EIA-RS 196A
Meets JIS-C-6402



RDW Series
Carbon Film
Weldable
Axial Copper Plated Lead

Resistance Range:
1Ω to 10MΩ

Rated Power @ 70°C:
1/4W to 1/2W

Temp. Coefficient:
+350 to -1,000ppm/°C

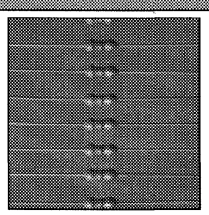
Resistance Tolerance:
±5%

Max Working Voltage:
250Vdc to 350Vdc

Max Overload Voltage:
500Vdc to 700Vdc

Packaging:
Tape/Reel,Tape/Box

*Zero Ohm available



RDF Series
Carbon Film
Flame Proof
Axial Lead

Resistance Range:
10Ω to 4.7MΩ

Rated Power @ 70°C:
1/4W to 1/2W

Temp. Coefficient:
+350 to -1,000ppm/°C

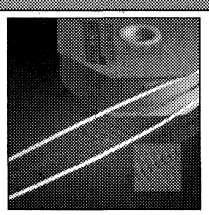
Resistance Tolerance:
±2%, ±5%

Max Working Voltage:
250Vdc to 350Vdc

Max Overload Voltage:
500Vdc to 700Vdc

Packaging:
Tape/Reel,Tape/Box

Metal Film



RN Series
Metal Film
Standard
Axial Lead

Resistance Range:
1Ω to 5.11MΩ

Rated Power @ 70°C:
1/8W to 2W

Temp. Coefficient:
±15 to ±100ppm/°C

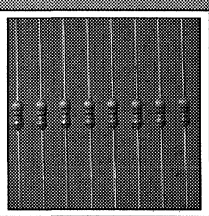
Resistance Tolerance:
±0.1%, ±0.25%, ±0.5%, ±1%

Max Working Voltage:
200Vdc to 500Vdc

Max Overload Voltage:
400Vdc to 1KVdc

Packaging:
Tape/Reel,Tape/Box

Meets UL-1412
MIL-R-10509F



RNF Series
Metal Film
Flame Proof
Axial Lead

Resistance Range:
10Ω to 1MΩ

Rated Power @ 70°C:
1/4W to 2W

Temp. Coefficient:
±50 and ±100ppm/°C

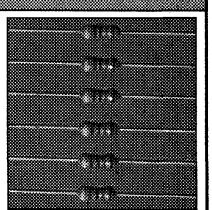
Resistance Tolerance:
±1%, ±2%, ±5%

Max Working Voltage:
250Vdc to 500Vdc

Max Overload Voltage:
500Vdc to 1KVdc

Packaging:
Tape/Reel,Tape/Box

Meets UL-1412



FR Series
Metal Film
Fusible/Safety
Axial Lead

Resistance Range:
1Ω to 10KΩ

Rated Power @ 70°C:
1/4W to 3W

Temp. Coefficient:
±350ppm/°C

Resistance Tolerance:
±2%, ±5%

Max Working Voltage:
200Vdc to 500Vdc

Max Overload Voltage:
400Vdc to 1KVdc

Packaging:
Tape/Reel,Tape/Box

Meets UL-1412

©1998 Paccom Electronics

PACCOM ELECTRONICS

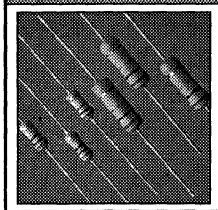
Tel (800) 848-6983
www.paccom.com

Power/Wire Wound Resistors, Inductor & Ferrite Bead Chips

Paccom Electronics reserves the right to make changes without notice in the construction and design from the specifications. No warranties are expressed or implied.

Metal Oxide Film

Wire Wound



MOF Series
Metal Oxide Film
Power/Low Noise
Axial Lead

Resistance Range:
0.3Ω to 200KΩ

Rated Power @ 70°C:
1/2W to 9W

Temp. Coefficient:
±350 ppm/°C Max

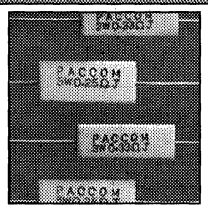
Resistance Tolerance:
±2%, ±5%

Max Working Voltage:
250Vdc to 750Vdc

Max Overload Voltage:
400Vdc to 1KVdc

Packaging:
Tape/Reel,Tape/Box

Meets UL-1412 & MIL-STD-202E



MCR Series
Metal Oxide Film
Cement Encased
Axial Lead

Resistance Range:
28Ω to 200KΩ

Rated Power @ 70°C:
2W to 20W

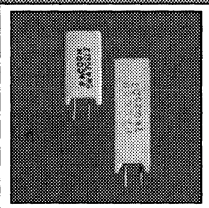
Temp. Coefficient:
±350 to ±400ppm/°C

Resistance Tolerance:
±5%

Load Life:
ΔRmax ±5% +0.05Ω

Insulation Resistance:
>100MΩ

Packaging:
Bulk



MCRR Series
Metal Oxide Film
Cement Encased
Radial Lead

Resistance Range:
28Ω to 100KΩ

Rated Power @ 70°C:
2W to 10W

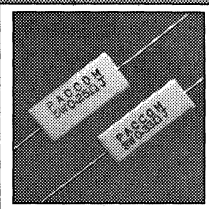
Temp. Coefficient:
±350 to ±400ppm/°C

Resistance Tolerance:
±5%

Load Life:
ΔRmax ±5% +0.05Ω

Insulation Resistance:
>100MΩ

Packaging:
Bulk



WCR Series
Wirewound
Cement Encased
Axial Lead

Resistance Range:
0.1Ω to 1KΩ

Rated Power @ 70°C:
2W to 20W

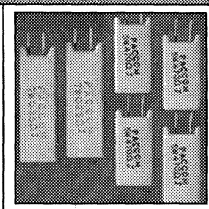
Temp. Coefficient:
±350 to ±400ppm/°C

Resistance Tolerance:
±5%

Load Life:
ΔRmax ±5% +0.05Ω

Insulation Resistance:
>100MΩ

Packaging:
Bulk



WCRR Series
Wirewound
Cement Encased
Radial Lead

Resistance Range:
0.1Ω to 910Ω

Rated Power @ 70°C:
2W to 10W

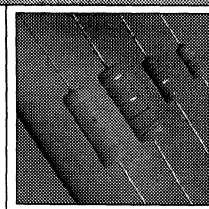
Temp. Coefficient:
±350 to ±400ppm/°C

Resistance Tolerance:
±5%

Load Life:
ΔRmax ±5% +0.05Ω

Insulation Resistance:
>100MΩ

Packaging:
Bulk



WRP Series
Precision Wirewound
Silicone Coated
Axial Lead

Resistance Range:
0.1Ω to 1.5KΩ

Rated Power @ 70°C:
1W to 10W

Temp. Coefficient:
±300 to ±400ppm/°C

Resistance Tolerance:
±1%, ±2%, ±5%

Load Life:
ΔRmax ±5% +0.05Ω

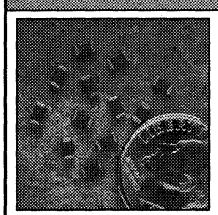
Insulation Resistance:
>100MΩ

Packaging:
Tape/Box, Bulk

Inductor Chips

Ferrite Bead Chips

Databook



IML Series
Inductor
Multilayer
Surface Mount

Inductance Range:
0.22µH to 220µH

L,Q Test Frequency:
0.2MHz to 25MHz

Self Resonant Frequency:
4MHz to 150MHz

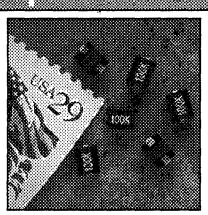
Inductance Tolerance:
±10%, ±20%

Max. D.C. Resistance:
0.65Ω to 4.2Ω

Max. Rated D.C. Current:
5mA to 100mA

EIA Case Sizes:
1206, 1210

Packaging:
Tape/Reel



IWW Series
Inductor
Wirewound
Surface Mount

Inductance Range:
0.10µH to 1,000µH

L,Q Test Frequency:
0.796MHz to 25.2MHz

Self Resonant Frequency:
2MHz to 700MHz

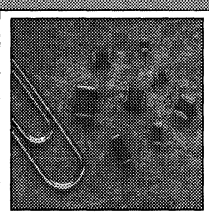
Inductance Tolerance:
±10%, ±20%

Max. D.C. Resistance:
0.22Ω to 50Ω

Max. Rated D.C. Current:
30mA to 450mA

EIA Case Sizes:
1210, 1812

Packaging:
Tape/Reel



FML Series
Ferrite Bead
Multilayer
Surface Mount

Impedence @ 30MHz:
2,000Ω

Impedence @ 50MHz:
1,200Ω

Impedence @ 100MHz:
11Ω to 1,000Ω

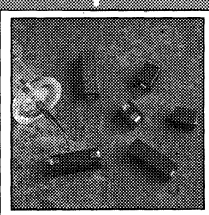
Tolerance:
±25%

Max. D.C. Resistance:
0.10Ω to 1.50Ω

Max. Rated D.C. Current:
100mA to 600mA

EIA Case Sizes:
0603, 0805, 1206, 1210, 1812

Packaging:
Tape/Reel



FMB Series
Ferrite Bead
Molded
Surface Mount

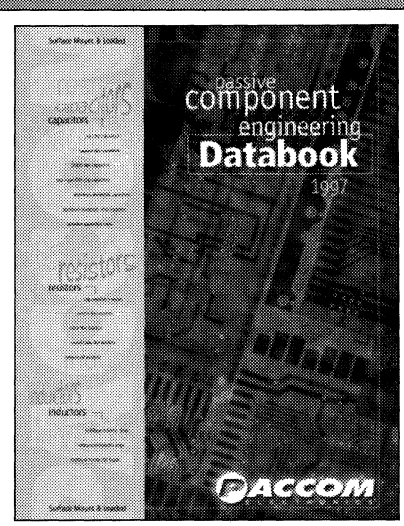
Impedence @ 25MHz:
24Ω and 48Ω

Impedence @ 100MHz:
36Ω and 72Ω

Max. D.C. Resistance:
0.60Ω and 0.90Ω

Case Sizes:
1612, 3018, 3412

Packaging:
Tape/Reel



Databook

240 pages of technical data and specifications on all of the components featured here.

Contents

Resistors:
Leaded & Surface Mount

Capacitors:
Leaded & Surface Mount

Inductors / Ferrite Beads:
Surface Mount

POWER WIREWOUND RESISTORS
AXIAL LEAD - MIL QUALIFIED

PACIFIC RESISTOR CO.

PHONE (818) 345 - 7811 (800) 835 - 3355 FAX (818) 345 - 1507

These Superbly Reliable Resistors meet and exceed MIL - R - 26. Their ALL MOLDED construction provides for exceptional strength and moisture resistance! Resistors are available in any resistance value up to the maximum listed. FAST DELIVERY TIMES! PACIFIC HAS BUILT QUALITY WIREWOUNDS FOR 40 YEARS!

Type A Molded .4 to 13 Watts

Electrical

- **Non Inductive Styles Available**
- **Matched Sets Available**
- **Tolerances:** 5%,3%,1%,.5%,.25% .1%,.05%,.02%
- **Temperature Coefficient:**
  90 PPM< 1 ohms
  50 PPM< 10 ohms
  20 PPM> 10 ohms
- **Special TC's Available**
- **Dielectric Strength:**
  1000VRMS - all except listed below
  500VRMS-04A,05A,B1,B3
- **Insulation Resistance:** not<1000 Meg

Mechanical

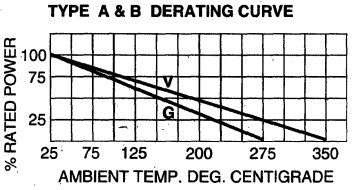
- **Encapsulation:** Molded High Temp. Silicone
- **Core:** Type A-Cerramic
  Type B - Beryllium or Alumina
- **End Caps:** Stainless Steel
- **Leads:** Tinned Copperweld (others available)
- **Construction:** Completely Welded
- **Marking:** Alpha Numeric

PACIFIC .4 to 13 Watts

Type A SPECIFICATIONS

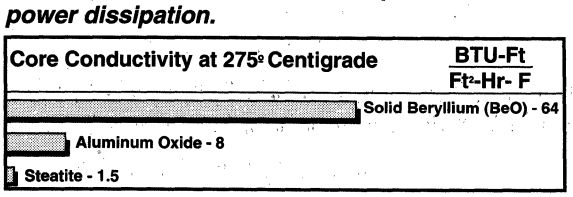
RESISTOR STYLE		POWER RATING		DIMENSIONS				MAX. RES. VAL.	MAX. Work Volts
PACIFIC	MIL	G 275	V 350	LENGTH ±.010	DIA. ±.010	LEADS AWG	LEADS Inch		
04A	-	.4	.75	.250	.090	24	.020	3.5K	30
05A	-	.75	1	.330	.110	24	.020	6.0K	50
15A	RW70	1.25	2	.412	.115	24	.020	7.5K	75
20A	-	1.25	2	.550	.115	24	.020	10K	100
S1A	-	1.75	2.5	.490	.162	22	.025	15K	150
N1A	-	3	3.75	.535	.220	20	.032	20K	200
1A	RW79	3	3.75	.610	.210	20	.032	20K	200
25A	-	4	4.5	.890	.210	20	.032	28K	200
2A	-	3.25	4.5	.535	.270	18	.040	20K	200
3A	-	4	5.5	.656	.270	18	.040	30K	200
5A	RW74	5.5	7.5	.900	.312	18	.040	75K	400
7A	-	7	9	1.187	.312	18	.040	100K	600
10A	RW78/68	10	13	1.825	.405	18	.040	200K	1000
55AC	RW55	7	9	1.250	.470	18	.040	100K	600
56AC	RW56	10	12	2.000	.470	18	.040	200K	1000

TYPE A & B DERATING CURVE



Type B Molded - Exceptional Power to Size Ratio .4 to 10 Watts

These Resistors feature from 1.4 to 4 times HIGHER POWER RATINGS than conventional resistors of equivalent size. In addition to having all of the features of our Type A resistors, Type B resistors have Solid Beryllium or Alumina cores to provide exceptional power dissipation.



Type B SPECIFICATIONS

RESISTOR STYLE		POWER RATING		DIMENSIONS				MAX. RES. VAL.	MAX. Work Volts
PACIFIC	MIL	G 275	V 350	LENGTH ±.010	DIA. ±.010	LEADS AWG	LEADS Inch		
B1	-	1	1.5	.250	.090	24	.020	3.5K	35
B1A	RW81	1		.250	.090	24	.020	3.5K	35
B2	-	1.5	2	.325	.090	24	.020	4.9K	48
B3	-	2.25	3	.412	.115	24	.020	10.4K	85
B3A	RW80	2		.412	.115	24	.020	10.4K	85
B5	-	4	5	.610	.210	20	.032	24.5K	172
B5C	-	5	7	.540	.240	18	.040	32.3K	260
B6	-	6	8	.656	.270	18	.040	47.1K	300
B10	-	7	10	.900	.312	18	.040	96K	470

HOW TO ORDER: (sample part no.) **N1A - 15.4 - 1% - 3W**

Style
Resistance
Tolerance
Watts

N1AN - 15.4 - 1% - 3W

To order **Non Inductive** styles, add suffix **N** to style (e.g.:**N1AN**)

Pacific Resistor Co.
18300 OXNARD ST.
TARZANA, CA 91356

PRECISION POWER RESISTORS

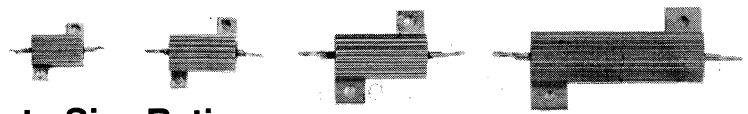
CHASSIS MOUNT - ALUMINUM FINNED
HEAT SINK - MIL QUALIFIED

PACIFIC RESISTOR CO.

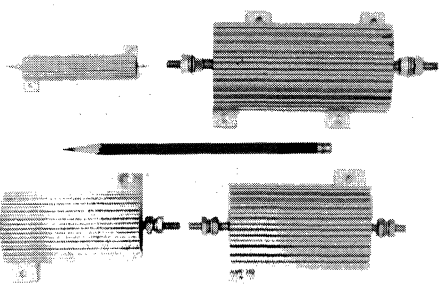
PHONE (818) 345 - 7811 (800) 835 - 3355 FAX (818) 345 - 1507

Pacific's Chassis Mount type CH Resistors are designed for maximum heat dissapation by mounting to metal chassis surfaces for maximum heat transfer. These Superbly RELIABLE resistors are outstanding for their high power dissipation with precision tolerances in minimum physical sizes. FAST DELIVERY TIMES! MIL-R-18546 Qualified. PACIFIC HAS BUILT QUALITY WIREWOUNDS FOR 40 YEARS!

Type CH Chassis Mount
5 to 250 Watts - MIL-R-18546



Type BCH - Exceptional Power to Size Ratio
15 to 35 Watts - Solid Beryllium Core

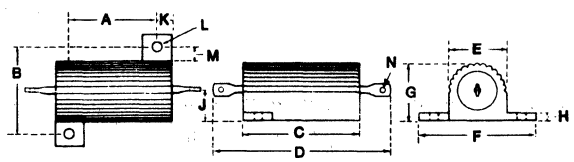


Electrical

- **Long Stable Load Life**
- **Non Inductive Styles Available**
- **Tolerances:** 5%,3%,1%,.5%,.25%, .1%,.05%
- **Temperature Coefficient:**
  90 PPM< 1 ohms, 50 PPM<10 ohms, 20 PPM>10 ohms
- **Special TC's Available**
- **Dielectric Strength:**
  1000 VRMS-5CH,10CH,B5CH,B10CH
  2500 VRMS-25CH,50CH,100CH,B25CH
  5500 VRMS-ALL OTHERS
- **Insulation Resistance:** not<1000 Meg

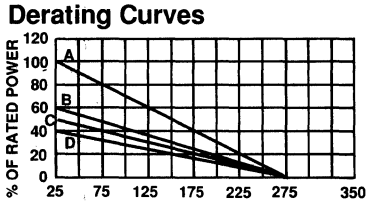
Mechanical

- **Body:** Anodized-Aluminum finned
- **Core:** Type CH- Ceramic, Type BCH - Beryllium
- **End Caps:** Stainless Steel
- **Leads:** Heavy Spaded Lugs - 5 to 70 Watts
  Threaded Stud Terminals- 100 to 250 Watts
- **Construction:** Completely Welded

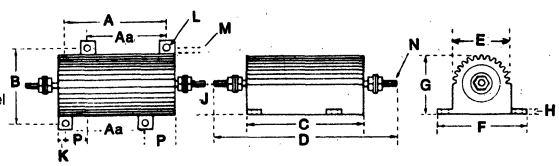


5CH, 10CH, 25CH, 50CH, 100CH, B5CH, B10CH, B25CH

Derating Curves



Derating is required for reduced chassis mounting area and high ambient temps.
A - When Mounted on proper alum. chassis
5CH,B5CH,10CH,B10CH - 4x6x2x.040 alum.
25CH,B25CH - 5x7x2x.040 alum. chassis
50CH,100CH - 12x12x.059 alum. panel
110CH,180CH,250CH - 12x12x.125 alum. panel
B - Unmounted 5CH, B5CH, 10CH, B10CH
C - Unmounted 25CH, B25CH, 100CH, 110CH
D - Unmounted 50CH, 180CH, 250CH



PACIFIC STYLE	MIL-R 18546	COM. WATTS	MAX. RES.	A	Aa	B	C	D	E	F	G	H	J	K	L	M	N	P	Mtg. Screw
5CH	RE60	5	20K	.444	-	.490	.500	1.125	.334	.646	.317	.075	.145	.078	.093	.078	.050	-	2-#2
B5CH	RE60	15	20K	.444	-	.490	.500	1.125	.334	.646	.317	.075	.145	.078	.093	.078	.050	-	2-#2
10CH	RE65	10	30K	.562	-	.625	.750	1.375	.438	.812	.406	.100	.203	.093	.093	.094	.086	-	2-#2
B10CH	RE65	20	30K	.562	-	.625	.750	1.375	.438	.812	.406	.100	.203	.093	.093	.094	.086	-	2-#2
25CH	RE70	25	75K	.719	-	.781	1.062	1.938	.500	1.094	.563	.094	.250	.171	.125	.125	.086	-	2-#2
B25CH	RE70	35	75K	.719	-	.781	1.062	1.938	.500	1.094	.563	.094	.250	.171	.125	.125	.086	-	2-#2
50CH	RE75	50	200K	1.563	-	.844	1.968	2.781	.625	1.156	.625	.094	.281	.196	.125	.125	.086	-	2-#4
100CH	-	70	275K	2.625	-	.844	2.968	3.781	.625	1.156	.625	.094	.281	.196	.125	.125	.086	-	2-#4
110CH	RE77	100	50K	2.750	-	2.250	3.500	5.478	1.800	2.813	1.750	.188	.800	.375	.188	.250	12-24	-	2-#8
180CH	-	180	50K	2.750	-	2.500	3.500	5.478	2.125	3.000	2.188	.250	.950	.375	.188	.200	12-24	-	2-#8
250CH	RE80	250	50K	3.875	3.000	2.500	4.500	7.000	2.125	3.000	2.188	.250	1.000	.312	.188	.200	1/4-20	.875	4-#8

HOW TO ORDER: (sample part no.) **5CH - 21.3 - 1% - 5W**

- **Style**
- **Resistance**
- **Tolerance**
- **Watt**

5CHN - 21.3 - 1% - 5W

To order **Non Inductive** styles, add suffix **N** to style (e.g.:**5CHN**)

Pacific Resistor Co.
18300 OXNARD ST.
TARZANA, CA 91356

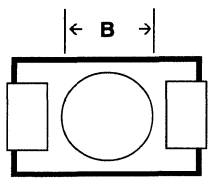
WIREWOUND RESISTORS
SPECIAL PURPOSE DESIGNS

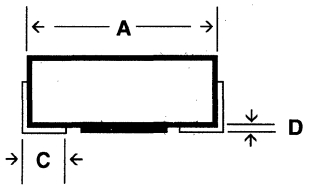
PACIFIC RESISTOR CO.

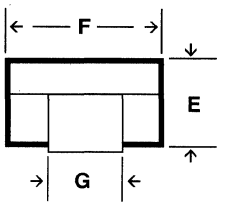
PHONE (818) 345 - 7811 (800) 835 - 3355 FAX (818) 345 - 1507

Surface Mount Wirewounds - 1/2 to 4.5 Watt

POWER, PRECISION POWER, LOW TC, TEMPERATURE SENSING, LOW OHM CURRENT SENSING







Electrical

- **Non Inductive Styles Available**
- **Tolerances:** 5%,3%,1%,.5%,.25 .1%,.05%,.02%,.01%,.005%
- **Standard Temperature Coefficient:**
  90 PPM/C°>.1<1 ohms
  50 PPM/C° >1<10 ohms
  20 PPM/C° >10 ohms

SURFACE MOUNT Specifications (Per ANSI/IPC-SM-72)

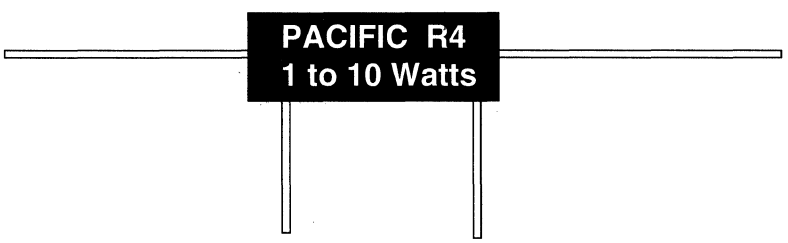
TYPE	WATTS	A Max.	B W x H	C ± .010"	D ± .003"	E Max.	F Max.	G ± .020"
PSM-1/2	0.5	.210	.10 x .005	.040	.006	.110	.130	.060
PSM-1	1	.275	.12 x .005	.070	.006	.130	.150	.070
PSM-2	2	.475	.19 x .005	.100	.006	.180	.250	.120
PSM-4	4	.820	.24 x .005	.190	.006	.280	.295	.150

Four - Terminal Molded Resistors - Radial & Axial Series

Available in a wide range of values and wattages, these resistors are extremely useful in Low Resistance Current-Shunting and Current-Sensing applications where Voltage - Current relationships(i.e.resistance) needs to be accurately specified and be independant of leads resistance effects. PACIFIC'S ALL MOLDED Construction provides for Exceptional moisture resistance and strength! *CUSTOM DESIGNS AVAILABLE*

Electrical

- **Wattages:** 1,3,4,5,7,10
- **Non Inductive Styles Available**
- **Matched Sets Available:** Tracking to .5 PPM
- **Tolerances:** 5%,3%,1%,.5%,.25% .1%,.05%,.02%,.01%
- **Temperature Coefficient:** 50 PPM/C° < 1 ohms, 10 PPM/C° >1 ohms
- **Special TC's Available**



Mechanical

- **Encapsulation:** Molded High Temp. Silicone
- **Leads:** Tinned Copper or Tinned Copperweld
- **Marking:** Alpha Numeric

Ultra Low Ohm Molded Power Resistors

These Superbly Reliable resistors meet and exceed MIL-R-26 and extend to values below it's range. Resistors are made to order and available in any resistance within their range. FAST DELIVERY TIMES!

- **Wattages:** 1,3,4,5
- **Tolerances:** 5%,3%,1%,.5%,.25%
- **Inductance:** 0 micro henries
- **Ideal for Power Amps, Test Equip., Power Supplies** (Switching & Linear), **& Current Sensing.**

- **Current Shunts**
- **High Precision Resistors**
- **Fusing Resistors**
- **Temperature Sensors**
- **Custom Coils**
- **Networks - To Customer Specs.**
- **Matched Sets**
- **High TCR Resistors**
- **Toroids**
- **Delay Lines**

Pacific Resistor Co.

18300 OXNARD ST.
TARZANA, CA 91356

HIGH PRECISION WIREWOUND RESISTORS

PACIFIC RESISTOR

PHONE (818) 345 - 7811 (800) 835 - 3355 FAX (818) 345 - 1507

- Superbly RELIABLE and ACCURATE
- 40 YEARS of Building Quality Resistors
- Meet or Exceed MIL-R-93 and MIL-R-9444
- TC Matching to ± .5 PPM
- Matched Sets
- Tolerances 0.005% to 1%
- Excellent Long-Term Stability
- Resistance Range .1Ω to 30 MegΩ
- Custom Designs Welcome

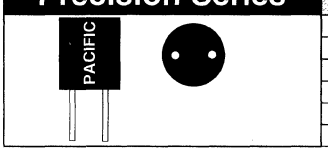
AXIAL PRECISION Subminiature Series

RESISTOR STYLE		COMMERCIAL WATTAGE	MAXIMUM OHMS	MAXIMUM VOLTAGE	DIMENSIONS					
PACIFIC	MIL				LENGTH ±.010	DIAMETER ±.010	LENGTH MM	DIAMETER MM	LEADS AWG	LEADS Inch
112AP	-	.06	50K	75	.210	.100	5.3	2.5	24	.020
118AP	-	.08	250K	100	.260	.125	6.6	3.2	24	.020
122AP	-	.10	500K	100	.375	.125	9.5	3.2	24	.020
124AP	-	.10	500K	100	.312	.156	7.9	4.0	24	.020
128AP	-	.125	600K	150	.250	.187	6.3	4.7	22	.025
130AP	-	.15	1.2 MEG	150	.295	.187	7.5	4.7	22	.025
134AP	-	.175	1.3 MEG	200	.375	.187	9.5	4.7	22	.025
142AP	-	.175	750K	150	.260	.260	6.5	6.5	20	.032
144AP	-	.2	1 MEG	200	.450	.187	11.4	4.7	22	.025
148AP	-	.25	1.2 MEG	250	.465	.210	11.8	5.3	22	.025

AXIAL PRECISION Miniature Series

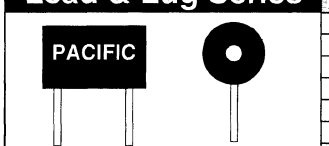
RESISTOR STYLE		COMMERCIAL WATTAGE	MAXIMUM OHMS	MAXIMUM VOLTAGE	DIMENSIONS					
PACIFIC	MIL				LENGTH ±.010	DIAMETER ±.010	LENGTH MM	DIAMETER MM	LEADS AWG	LEADS Inch
152AP	RB56	.20	2 MEG	200	.375	.250	9.5	6.3	20	.032
154AP	RB56	.20	2 MEG	200	.375	.250	9.5	6.3	22	.025
156AP	-	.25	2.5 MEG	300	.500	.250	12.7	6.3	22	.025
160AP	RBR55	.25	2.5 MEG	300	.500	.250	12.7	6.3	20	.032
164AP	RBR54	.35	4.5 MEG	400	.750	.250	19.1	6.3	20	.032
168AP	RBR53	.50	8 MEG	400	.750	.375	19.1	9.5	20	.032
172AP	-	.50	4 MEG	300	.500	.375	12.7	9.5	20	.032
176AP	-	.50	8 MEG	400	.500	.500	12.7	12.7	20	.032
178AP	-	.50	8 MEG	400	.885	.375	22.4	9.5	20	.032
180AP	-	.60	9 MEG	400	.625	.500	15.9	12.7	20	.032
184AP	RBR52	.75	10 MEG	600	1.000	.375	25.4	9.5	20	.032
188AP	RBR57	1.00	18 MEG	800	1.000	.500	25.4	12.7	20	.032
192AP	RB58	1.50	30 MEG	900	1.500	.500	38.1	12.7	20	.032
196AP	-	2.00	30 MEG	900	2.000	.500	50.8	12.7	20	.032

PRINTED CIRCUT Precision Series



RESISTOR STYLE		COMMERCIAL WATTAGE	MAXIMUM OHMS	MAXIMUM VOLTAGE	DIMENSIONS					
PACIFIC	MIL				LENGTH ±.025	DIAMETER ±.025	LEAD SPACING		LEADS AWG	LEADS Inch
231PC	-	.25	500K	300	.312	.250	.150	-	22	.025
253PC	RB71	.25	500K	300	.312	.250	.200	-	22	.025
325PC	-	.25	500K	300	.375	.250	.150	-	22	.025
525PC	-	.50	600K	300	.500	.250	.150	-	22	.025
550PC	-	.70	1 MEG	400	.500	.500	.300	-	22	.025
575PC	RB70	.70	800K	300	.500	.375	.200	-	20	.032

RADIAL PRECISION Lead & Lug Series



RESISTOR STYLE		COMMERCIAL WATTAGE	MAXIMUM OHMS	MAXIMUM VOLTAGE	DIMENSIONS				
PACIFIC	MIL				LENGTH ±.025	DIAMETER ±.025	SPACING ±.015	TERMINAL TYPE	MOUNTING HOLE
200RP	-	.125	500K	100	.250	.250	.200	AWG 22	NONE
214RP	-	.25	1 MEG	150	.425	.250	.277	AWG 22	#2 SCREW
250RP	-	.25	1 MEG	150	.500	.250	.400	AWG 22	NONE
275RP	-	.50	4 MEG	400	.500	.500	.400	AWG 20	#6 SCREW
285RP	-	.50	1 MEG	300	.750	.375	.600	AWG 20	#6 SCREW
324RP	RB08	.50	4 MEG	400	.500	.500	.325	LUG	#6 SCREW
350RP	-	1.00	8 MEG	800	1.00	.500	.850	AWG 20	#6 SCREW
372RP	RB18	2.00	10 MEG	1000	1.250	.750	1.000	LUG	#6 SCREW

FAST RISE SERIES

RESISTOR STYLE		COMMERCIAL WATTAGE	MAXIMUM OHMS	MAXIMUM VOLTAGE	DIMENSIONS					
PACIFIC	MIL				LENGTH ±.010	DIAMETER ±.010	LENGTH MM	DIAMETER MM	LEADS AWG	LEADS Inch
F134AP	-	.175	500K	200	.375	.187	9.5	4.7	22	.025
F160AP	RBR55	.25	1.0 MEG	300	.500	.250	12.7	6.3	20	.032
F164AP	RBR54	.35	1.25 MEG	400	.750	.250	19.1	6.3	20	.032
F168AP	RBR53	.50	5 MEG	400	.750	.375	19.1	9.5	20	.032
F188AP	RBR57	1.00	10 MEG	800	1.000	.500	25.4	12.7	20	.032

Pacific Resistor Co. 18300 OXNARD ST. TARZANA, CA 91356

PRECISION RESISTIVE PRODUCTS, INC.
202 MACK LANE • MEDIAPOLIS, IOWA 52637
(319)394-9131 • FAX (319)394-9280 • E-MAIL info@prpinc.com
PRP HOME PAGE http://www.prpinc.com

DEDICATION TO EXCELLENCE

METAL FILM RESISTORS

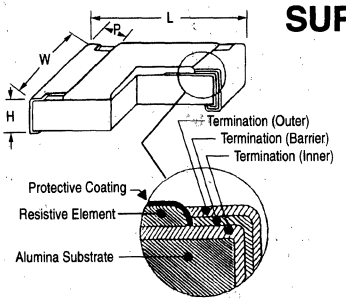
PRC-SERIES

PRECISION SURFACE MOUNT RESISTORS

- **Metal Film**
- **0.1% R Tolerances**
- **10 PPM Temp. Coefficients**
- **6-8 Weeks Delivery**

OPERATING TEMPERATURE RANGE: -55°C T0 +125°C

RESISTANCE TOLERANCE and RESISTANCE RANGE



Temperature Coefficient	E-96 Resistance Values			
(PP/°C)	B(±0.1%)	C(±0.25%)	D(±0.5%)	F(±1.0%)
G (±50)	—	—	10-130K	10-130K
F (±25)	100-130K	10-130K	10-130K	10-130K
C (±10)	100-130K	100-130K	100-130K	—

SURFACE MOUNT RESISTORS

TYPE	BODY LENGTH (L)	BODY WIDTH (W)	BODY # THICK (H)	TERM WIDTH (P)	RATED PWR	MAX CWV	INCH SIZE (REF)
PRC 0603	1.60±0.1 .062±.004	0.80±0.1 .030±.008	0.50±0.1 .020±.004	0.30±0.1 .012±.004	.0625	100	0603
PRC 0805	2.00±0.15 .079±.006	1.25±0.15 .049±.006	0.50±0.15 .020±.006	0.40±0.25 .016±.010	.100	100	0805
PRC 1206	3.20±0.15 .126±.006	1.60±0.15 .063±.006	0.60±0.15 .024±.006	0.50±0.25 .020±.010	.125	200	1206
PRC 1210	3.20±0.15 .126±.006	2.50±0.15 .098±.006	0.56±0.15 .022±.006	0.50±0.25 .020±.010	.250	200	1210
PRC 2010	5.10±0.2 .200±.008	2.50±0.2 .098±.008	0.6±0.1 .024±.004	0.60±0.2 .023±.008	.500	200	2010
PRC 2512	6.50±0.2 .256±.008	3.20±0.2 .126±.008	0.60±0.1 0.24±.004	0.60±0.2 .023±.008	1.00	200	2512

Dimensons: Millimeters / Inches # Dimension "H" is inclusive of termination solder finish

GP-SERIES GENERAL PURPOSE PRECISION METAL FILM RESISTORS

- **Economical • High Performance**
- **Very Stable • Low Noise**

DIMENSIONS

Style	Max. L.	Max. Dia.	CL to CL	Dim. A
GP1/8B	0.170	0.072	0.200	AWG #24
GP1/4	0.280	0.102	0.325	AWG #22
GP1/2	0.400	0.150	0.450	AWG #22
GP3/4	0.600	0.200	0.685	AWG #22
GP1	0.600	0.200	0.685	AWG #20

SPECIFICATIONS

PRP Style	Mil. Style	Resistance Range (Ohms)	Wattage Rating @ 70°C	Wattage Rating @ 125°C	Voltage Rating
GP1/8B	RN50	10—500K	1/8	1/20	200
GP1/4	RN55	2.5—20M	1/4	1/10	300
GP1/2	RN60	2.5—1 M	1/2	1/8	500
GP3/4	RN65	10—1.5M	3/4	1/4	500
GP1	RN70	10—1.5M	1	1/2	500

NOTE: The GP-Series of resistors is conformally coated and fully protected against moisture by a multi-paint coat system and a hard epoxy outer coating. Marking is alpha-numeric and meets the most demanding marking requirements. Special marking is available upon request. Consult the factory concerning failsafe, flameproof, and fusing requirements.

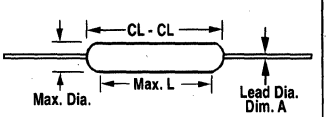
TYPICAL PERFORMANCE	%ΔR
Thermal Shock	±0.05
Low Temperature 0peration	±0.03
Terminal Strength, 5 Lb. Load	±0.02
Resistance To Soldering Heat	±0.04
Dielectric Withstanding Volt	±0.02
Short Time Overload	±0.05
Humidity	±0.20
1000 Hour Load Life @ 125°C	±0.15

TEMPERATURE COEFFICIENTS

TC25 = 0 ± 25 PPM/°C — 20 to + 85°C
TC50 = 0 ± 50 PPM/°C — 20 to + 85°C
TC100 = 0 ± 100 PPM/°C — 20 to + 85°C
TC250 = 0 ± 250 PPM/°C — 20 to + 85°C

RESISTANCE TOLERANCES

±5.0%,±2.0%, ±1.0%, ±0.5% ±.25%, & ±0.1%



LEAD MATERIAL

OFHC with 60/40 Tin/Lead Coating

PR 8351-SERIES HIGH FREQUENCY APPLICATION RESISTORS

DIMENSIONS Inches (mm)

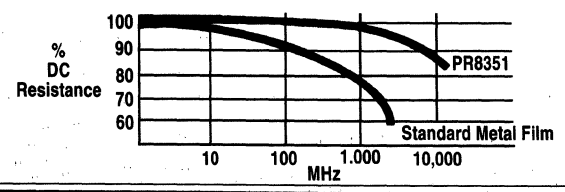
Max. L.	Max. D.	Cl. to CL.	Lead D.
.280" (7.11)mm	.102" (2.59)mm	.325" (8.26)mm	AWG #22 (.64)mm

SPECIFICATIONS

Mil Type	EIA Size	Resistance Range (OHMS)	Wattage rating @70	Wattage rating @125	Useful Frequency * Range
RN55	R07	2.5R to 3.5K	1/4W	1/8W	DC to 5000 MHz

* The impedance vs frequency characteristic and the useful frequency range are both dependent on the application, mounting and circuit layout.

TYPICAL RESISTANCE/FREQUENCY CHARACTERISTICS



TYPICAL PERFORMANCE (EIA RS186)	%ΔR
Thermal Shock	±.05
Low Temperature 0peration	±.05
Thermal Strength, 5 Lb. Load	±.05
Resistance To Soldering Heat	±.05
Dielectric Withstanding Volt	±.02
Short Time Overload	±.05
Humidity	±.20
1000 Hour Load Life	±.25

TEMPERATURE COEFFICIENTS

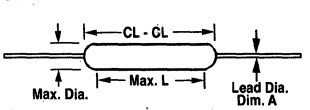
TC25 = 0 ± 25 PPM/°C — 20 to + 85°C
TC50 = 0 ± 50 PPM/°C — 20 to + 85°C
TC100 = 0 ± 100 PPM/°C — 20 to + 85°C

RESISTANCE TOLERANCES

±1.0%, ±0.5%, ±.25%, & ±0.1%

LEAD MATERIAL

OFHC with 60/40 Tin/Lead Coating



PRECISION RESISTIVE PRODUCTS, INC.
202 MACK LANE · MEDIAPOLIS, IOWA 52637
(319)394-9131 · FAX (319)394-9280 · E-MAIL info@prpinc.com
PRP HOME PAGE http://www.prpinc.com

METAL FILM RESISTORS

DEDICATION TO EXCELLENCE

PR-SERIES ULTRA PRECISION METAL FILM RESISTORS

• Low Temperature Coefficients
• Tight Tolerance • High Stability • Low Noise

DIMENSIONS

Style	Max. L.	Max. Dia.	CL to CL	Lead D.
PR1/20B	0.170	0.072	0.200	AWG #24
PR1/10	0.280	0.102	0.300	AWG #22
PR1/8A	0.280	0.102	0.300	AWG #22
PR1/8	0.400	0.150	0.450	AWG #22
PR1/4A	0.416	0.161	0.450	AWG #22
PR 1/4	0.600	0.200	0.685	AWG #22

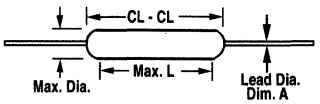
SPECIFICATIONS

Style	Resistance Range (Ohms)	Wattage Rating @ 85°C	Voltage Rating
PR1/20B	10R-300K	1/20	200
PR1/10	10R-500K	1/10	300
PR1/8A	10R-500K	1/8	250
PR1/8	10R-1M	1/8	400
PR1/4A	10R-1M	1/4	400
PR1/4	10R-1M	1/4	500

TYPICAL PERFORMANCE	%ΔR
1000 Hr. Load Life @ 85°C	±0.02
Humidity	±0.04
Thermal Shock	±0.01
Short Time Overload	±0.01
Dielectric Withstanding Volt	±0.01
Noise	<—30dB
Insulation Resistance	>10000 M. Ohm
Shelf Life	<50 PPM/YR

TEMPERATURE COEFFICIENTS
TC25 = 0 ± 25 PPM/°C — 20 to + 85°C
TC20 = 0 ± 20 PPM/°C — 20 to + 85°C
TC15 = 0 ± 15 PPM/°C — 20 to + 85°C
TC10 = 0 ± 10 PPM/°C — 20 to + 85°C
TC5 = 0 ± 5 PPM/°C — 20 to + 85°C

RESISTANCE TOLERANCES
±1.0%, ±0.5%, ±.25%, ±0.1%, ±.05%, ±.02%, & ±.01%

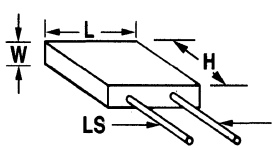


LEAD MATERIAL
OFHC with 60/40 Tin/Lead Coating

RL-SERIES ULTRA PRECISION METAL FILM RESISTORS

• Radial Leads • Small Size
• Low TC • High Stability

DIMENSIONS (INCHES)
H Height ..... 0.300 max.
L Length ..... 0.300 max.
W Width 0.100
LS Lead Spacing 0.150
Lead Gauge ..... #22



SPECIFICATIONS

Style	Temperature Coefficient	Resistance Range (Ohms)	Standard Tolerance	Wattage @ 85°C
RL 1	20 PPM/°C 15 10 5	20 thru 500K	1%, 5%, .25%, .10%, .05%, &.02% .01%	0.1
RL 3	20 PPM/°C 15 10 5 2	20 thru 500K	1%, 5%, .25%, .1% .05%, &.02% .01%	0.3

TYPICAL ENVIRONMENTAL PERFORMANCE	%ΔR
1000 Hr. Load Life	±0.02
Humidity	±0.04
Temperature Cycling	±0.01
Short Time Overload	±0.01
Insulation Resistance	>100 Megohms
Noise Index	<—30dB
Voltage Coefficient	<0.05 PPM/Volt
1 Year Shelf Life	±50 PPM

TEMPERATURE COEFFICIENTS
TC20 = 0 ± 25 PPM/°C — 20 to + 85°C
TC15 = 0 ± 15 PPM/°C — 20 to + 85°C
TC10 = 0 ± 10 PPM/°C — 20 to + 85°C
TC5 = 0 ± 5 PPM/°C — 20 to + 85°C
TC2 = 0 ± 2 PPM/°C — 0 to + 60°C

CUSTOMIZED RESISTORS SETS AND NETWORKS

• Custom Designed • Cost Effective
• Low TCR • High Stability

CUSTOMIZED RESISTOR SETS AND NETWORKS

Because of the high consistency and uniformity of the film deposition process and the high repeatable accuracy of automated trimming equipment, descrete film resistors are available in matched pairs, multivalue sets and discrete networks with high precision and very dependable performance at reasonable cost. Resistance values, tolerances, temperature coefficients, as well as the matching and/or tracking of these parameters, can be specified and meet to exceptionally high degrees. The optimum range for the tightest requirements Is 100 ohms thru 100,000 ohms but 10 ohms thru 1 megohms is a practical range for less stringent requirements.

NOTE:
Cost savings can be realized when relatively tight matching requirements are specified while permitting the absolute parameters of the discrete resistor to have more relaxed specifications. Application engineers are available to assist you in specifying your requirements In the most economical way possible. Please contact the factory for complete information.

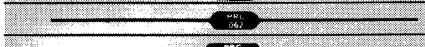
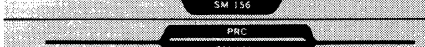
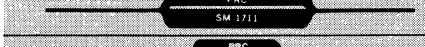
GENERAL SPECIFICATIONS	
Nominal Resistance	10 ohms thru 1 megohm
Resistance Tolerance	±1% thru ±0.01%
Wattage	1/20 watt thru 1 watt
Temperature Coefficient	±100 PPM thru ±5 PPM
Resistance Matching	±1% to ±.005%
Temperature Coef. Tracking	±50 PPM/°C to ±1 PPM/°C

PACKAGING

Matched sets are individually packaged in coin envelopes and identified by customer part number.
Discrete resistor networks are available in S.I.P. and D.I.P. configurations and can be customized in an infinite variety of shapes and sizes to meet customer requirements.

POWER

TYPE SM AXIAL LEAD

ALL DRAWINGS ILLUSTRATE ACTUAL SIZE	PRC Type	RW styles MIL R-26	Max. Power Rating (Watts)	Min. Allowable Resist. (Ohms)	Max. Allowable Resist. (Ohms)	Max. Voltage Rating	Body Dimensions ± .787mm (.031") Length mm	Length (ins.)	Diameter mm	Diameter (ins.)	1.5"L. Lead Diam. Tinned Copper
	SM041	—	1/8W	1.0	10K	25V	6.35	(.250")	1.52	(.060")	.020"
	**SM062**	—	1/4W	1.0	30K	65V	6.35	(.250")	2.03	(.080")	.020"
	SM063	—	1/2W	0.1	50K	110V	7.92	(.312")	2.03	(.080")	.020"
	SM094	RW70	1W	0.1	80K	200V	10.31	(.406")	2.92	(.115")	.025"
	SM156	—	1 1/2W	0.1	400K	375V	13.49	(.531")	4.47	(.176")	.028"
	**SM1711**	—	2W	0.1	900K	670V	20.62	(.812")	4.83	(.190")	.028"
	**SM186**	RW69	3W	0.025	480K	500V	12.7	(.500")	5.26	(.207")	.028"
	SM177	RW79	3W	0.1	540K	500V	14.27	(.562")	4.83	(.190")	.028"
	SM2812	RW74	5W	0.02	1 MEG	1000V	22.23	(.875")	7.92	(.312")	.032"
	SM3114	RW67	6 1/2W	0.1	1.5 MEG	1000V	25.4	(1.000")	7.92	(.312")	.032"
	SM3726	RW78	10W	0.07	4 MEG	1250V	45.21	(1.780")	10.03	(.395")	.032"

"Profit from PRECISION" Power 2-terminal Type SM Resistors:

- For "hard-to-find" power applications.
- 0.02 ohm to 4 Megs (tols. to ±0.05%).
- TCR char: 0±10ppm/°C. (100 ohms and above).
- Stability: To ±0.005%/yr. (Shelf Life)
- 0.125W to 10Watts at 25°C.
- Voltage ratings: To 1250V.
- Temperature span: –65°C. to +275°C.
- Low EMF vs. copper lead construction.
- No minimum quantities required.
- Purchasing information - please specify: Quantity, PRC type, resistance value, tolerance, TCR char. - delivery and special features that may apply.
- Ask about SM-4 four terminal designs.

SHUNTS

TYPE PLV FOUR TERMINAL

	PRC Type	Max. Rating Watts / Amps	Body Dimensions ±.787mm (.031") (H) mm / ins.	(L) mm / ins.	(W) mm / ins.	1" L Lead Diam. Tinned Copper	Std. Min. Res. @ Max. Watts / Special Min. Res. @ Derated Power
	PLV½	0.5W / 3A	4.95 / .195"	8.64 / .340"	3.18 / .125"	.020" #24 AWG	.055Ω @0.5W / .005Ω @ 0.05W
	PLV1	1W / 5A	5.97 / .235"	9.53 / .375"	4.32 / .170"	.020" #24 AWG	.04Ω @1W / .005Ω @ .125W
	PLV2	2W / 8A	6.35 / .250"	9.78 / .385"	5.72 / .225"	.025" #22 AWG	.03Ω @2W / .005Ω @0.3W
	PLV3	3W / 15A	6.35 / .250"	12.7 / .500"	6.35 / .250"	.032" #20 AWG	.013Ω @ 3W / .005Ω @ 1.125W
	PLV5	5W / 15A	7.87 / .310"	15.88 / .625"	7.87 / .310"	.032" #20 AWG	.022Ω @ 5W / .005Ω @ 1.125W

"Profit from PRECISION" Type PLV Shunts: Perfect for current-sensing by voltage drop method.

- 0.5W to 10Watts at 25°C.
- 0.005 ohm to 100 ohms (tols. to ±0.005%).
- TCR char: 0±15ppm/°C. (Std.)
- Stability: To ±0.005%/yr. (Shelf Life)
- Temperature span: –65°C to +275°C.
- Request a free engineering sample.
- Ask about 4-Tab type LVS SMD design.

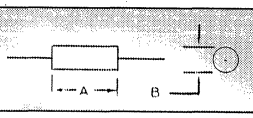
Request General Resistor Catalog/Handbook for complete engineering and purchasing information.

PRC **PRECISION RESISTOR CO., INC.**
10601 75th STREET NO. • LARGO, FL 33777-1427 U.S.A. • TEL: (813) 541-5771 • FAX: (813) 546-9515
• E-MAIL: prc@precisionresistor.com •

AXIAL LEAD TYPE HR

ULTRA

PRC Types	Meets or Exceeds Environmental Conditions of: MIL- R-39005	MIL- R-93	Max. Watts 1% Res. Tol.	Max. Watts 0.01% Res. Tol.	Max Volts	Body Dimensions (A) Length (±.031")	Body Dimensions (B) Diam. (±.062)	Leads Diam. Max.	Resistance (Ohms) Min.	Resistance (Ohms) Max.
HR175N	—	—	.2W	.100W	100V	.312"	.156"	.020"	0.1	100K
HR186N	—	—	.2W	.100W	150V	.375"	.187"	.025"	0.1	150K
HR188N	RBR74	—	.25W	.125W	150V	.500"	.193"	.025"	0.1	200K
HR255N	RBR75	—	.25W	.125W	150V	.295"	.250"	.025"	0.1	316K
HR256N	RBR56	RB56	.25W	.125W	200V	.375"	.250"	.032"	0.1	200K
HR258N	RBR55	RB55	.33W	.150W	300V	.500"	.250"	.032"	0.1	500K
HR2512N	RBR54	RB54	.5W	.25W	300V	.750"	.250"	.032"	0.1	1 MEG
HR3114N	RBR76	—	.5W	.25W	300V	.812"	.312"	.032"	0.1	1.5 MEG
HR3712N	RBR53	RB53	.66W	.33W	300V	.750"	.375"	.032"	0.1	2 MEG
HR3716N	RBR52	RB52	1W	.5W	600V	1.000"	.375"	.032"	0.1	3 MEG
HR5016N	RBR57	RB57	1.5W	.75W	600V	1.000"	.500"	.032"	0.1	5 MEG
HR5024N	—	RB58	2W	1W	900V	1.500"	.500"	.032"	0.1	7.5 MEG
HR5032N	—	RB59	2.5W	1.25W	1200V	2.000"	.500"	.032"	0.1	10 MEG



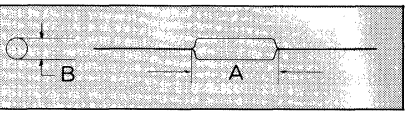
"Profit from PRECISION"
Ultra Wire Wound Type HR Resistors:

- Ideal for precise DC measurements.
- 0.1 ohm to 10 Megs (tols. to ±0.005%).
- TCR: 0±5ppm/°C. Special: To ±1ppm/°C.
- Stability: To ±0.001%/yr. (Shelf Life)
- Temperature span: –65°C to +125°C.
- 100% testing to NIST standards.
- Ask about 2-Tab type HVS surface-mounted designs.

TYPE SX (SILICONE PROTECTION)

PRECISION

PRC TYPE SX Inductive	PRC TYPE SX Non-Inductive	$P=\frac{E^2}{R}$ Max. Watts	$E=\sqrt{PR}$ Max. Volts	Body Dimensions (±.031") A Length	Body Dimensions (±.031") B Diameter	Leads Max. Diam.	Resistance (Ohms) Min.	Resistance (Ohms) Max. Standard	Resistance (Ohms) Max. Special
SX062	SX062N	.04W	35V	.270"	.080"	.020"	1.0	17K	30K
SX063	SX063N	.05W	50V	.332"	.080"	.020"	0.1	20K	50K
SX072	SX072N	.06W	45V	.270"	.090"	.020"	0.1	25K	35K
SX073	SX073N	.07W	65V	.332"	.090"	.020"	0.1	30K	65K
SX093	SX093N	.1W	85V	.332"	.115"	.025"	0.1	35K	75K
SX095	SX095N	.125W	125V	.457"	.115"	.025"	0.1	60K	180K
SX105	SX105N	.166W	165V	.457"	.130"	.025"	0.1	75K	210K
SX106	SX106N	.2W	200V	.520"	.130"	.025"	0.1	100K	280K
SX143	SX143N	.2W	200V	.332"	.160"	.028"	0.1	50K	130K
SX154	SX154N	.25W	250V	.395"	.176"	.028"	0.1	100K	200K
SX155	SX155N	.25W	250V	.457"	.176"	.028"	0.1	100K	300K
SX156	SX156N	.33W	330V	.520"	.176"	.028"	0.1	140K	400K
SX175	SX175N	.33W	330V	.457"	.190"	.028"	0.1	135K	350K
SX158	SX158N	.5W	500V	.645"	.176"	.028"	0.1	450K	600K
SX186	SX186N	.5W	500V	.520"	.207"	.028"	0.01	150K	480K
SX3110	SX3110N	1W	1000V	.770"	.332"	.032"	0.1	750K	1.6 MEG
SX2812	SX2812N	1.25W	1000V	.895"	.300"	.032"	0.1	1 MEG	1.8 MEG
SX3712	SX3712N	1.5W	1000V	.895"	.437"	.032"	0.25	1.5 MEG	2.5 MEG
SX3716	SX3716N	2W	1250V	1.145"	.437"	.032"	0.5	2 MEG	3.5 MEG
SX3724	SX3724N	3W	1250V	1.645"	.437"	.032"	0.5	3 MEG	5 MEG
SX3730	SX3730N	5W	1500V	2.020"	.437"	.032"	0.5	4 MEG	6 MEG



"Profit from PRECISION"
Best-Selling Type SX Resistors:

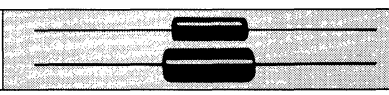
- Ideal for special-purpose applications.
- 0.01 ohm to 6 Megs (tols. to ±0.05%).
- TCR char: 0±10ppm/°C. (Std.)
- Temperature span: –55°C to +125°C.
- Operating voltage ratings: To 1500V.
- Hot-tinned copper wire leads.
- Stability: To ±0.005%/yr. (Shelf Life)

"The quality to resist permanent change is designed in from the start... even if you specify ±1% tolerances."

- Every design engineer should have PRECISION's 12 PAGE RESISTOR GUIDE... Did you request your copy?

1K 3500 ppm "off-the-shelf" compensators*

PLUS TCR

Type PT094 Type PT146	0-.1W 0-.25W	.395" L. .520" L.	.125" D. .187" D.	.025" Lead Dia. .028" Lead Dia.	1K±1% TCR+3500ppm/°C.	

* Ask about new surface mounted rectangular type ST35

PRC100 LABORATORY SERIES

SENSORS

(AXIAL)	Type PRC100 (Std)	0-.25W	.550" L.	.188" D.	100 ohms ±0.12%	TCR+3850ppm/°C.
(PROBE)	Type PRC100.12	0-.1W	.450" L.	.188" D.		

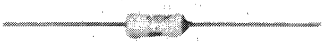
PRC PRECISION RESISTOR CO., INC.
10601 75th STREET NO. • LARGO, FL 33777-1427 U.S.A. • TEL: (813) 541-5771 • FAX: (813) 546-9515
• E-MAIL: prc@precisionresistor.com •

RCD Resistors • Coils • Delay Lines

WORLD'S WIDEST RANGE OF RESISTORS: 0.0002Ω TO 2 x 10^{14}, TO ± 0.0005% ¼ PPM/°C, UP TO 1000W 300KV! APPROXIMATELY 1 BILLION PIECES IN STOCK! LOW PRICES. CONTACT FACTORY FOR NEW 78 PAGE CATALOG. MOST PRODUCTS AVAILABLE ON EXCLUSIVE "SWIFT" PROGRAM (1-week delivery) IF UNAVAILABLE FROM STOCK.

Precision Wirewound Resistors
SA: .05Ω-25M, ⅛-2W, to ±0.005%, 2ppm
MA: Mini sizes, 1/20-½W, .05Ω-1.2M
Q: Economy .01% to .5%, 1/10-1W
PC: Radial lead, .15W-1W, .05Ω-2M

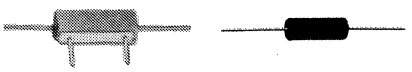
Carbon & Metal Film Resistors
CF/CFS: Carbon film, ⅛-3W & mini sizes
MF/PMF: Precision 1Ω-22M, to .01% 5ppm
HM: Hermetic sealed MF, 1/20W-5W
GP: Std & mini MF, ⅛-2W (flameproof avail.)



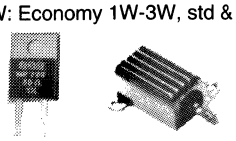
Flameproof Fuse Resistors
BW: Economy film, ¼-3W, .1Ω-100K
FR: Wirewound, ½-50W, .05Ω-25K
TF: Thermal fuse, axial & radial, 1W-60W
TFP: Failsafe pulse withstanding, telecom

Power Wirewound Resistors
100: ½-50W, .01%-10%, .005Ω-1M
200: Mini sizes, 1W-10W
RW: Economy 1W-3W, std & flameproof

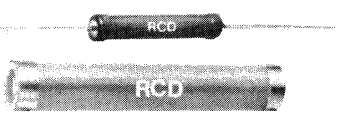
Precision Foil & Thin-Film Resistors
HP: Ultra precision to .001%-⅛ppm
VS: .3W-2W, .005%-1%, 10Ω-10M
BC: High megohm up to 1000M



Low-Ohm Resistor Shunts
ULV/LO/PV: 2-terminal, 1W-20W, .002Ω-1Ω
LVF/LVH: 4-terminal, 1W-20W, .0005Ω-1Ω
Uninsulated Shunts: 284 terminal, 1A-100A



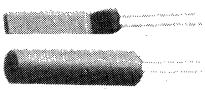
Heat Sink Resistors
600: 5W-1000W, .005Ω-250K, .01%-5%
MP220: 20W, TO220 Package 1Ω-50K



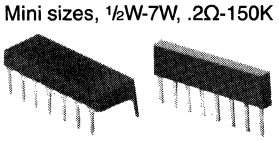
Surge/Pulse Withstand Resistor
PCN: Ceramic comp., 2-270W, 14-30Kjoule
P: Low cost, lightning/cap discharge, telecom
PR: Carbon Comp. Replacements

Metal Oxide Resistors
RSF: ½W-10W, 0.1Ω-510K, 1%-5%
RMF: Mini sizes, ½W-7W, .2Ω-150K

Ceramic Encased Resistors
PW: Axial lead, 2W-25W, low cost
PWB: Mini sizes, 3W-10W
PV: Radial lead, 2W-10W
PWV: Vertical mount, 5W-25W
ULV: Ultra low value, to .005Ω 0.5%
LVF: Four terminal, as low as .0005Ω



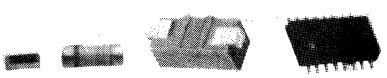
Temp. Sensitive Resistors/RTD's
PTF: Platinum thin film, 100/500/1K, 640°C
PTC: Wirewound RTD elements, Pt/Ni/Nife
PTS: RTD probes with metal sheaths, 500°C
ATB/ATS: WW, +80 to 6000pm, .1Ω-1M
LP: Econ. film. +150 to 7000pm, 1Ω-100K
LPT: Economy platinum, 10Ω-500Ω, 300°C



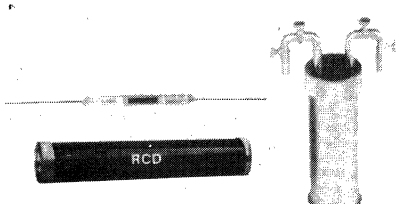
Networks/Hybrids
C/CL: Std & low profile thick film SIPs
C4: Super low profile SIP, .138" Max.
C5, C7 SIP: 50-mil & 70-mil pin spacing
CP: Precision thin film SIP
RC: Resistor/Capacitor networks
Hybrids: Thick film, Thin film, R/2R
VDS: Voltage Dividers

Tubular Power WW Resistors
TS: Silicone coated, 8W-1000W
TV: Vitreous enamel coated, 8W-225W
TSV/TST: Adjustable & tapped versions

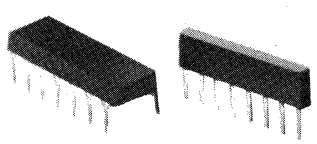
Coils, Inductors, Transformers (See EEM Section 1800)
AL: Economy, 3 sizes, .1µH-2.2mH
P/PF: Molded or shielded, .1µH-10mH
CA/CH: High current chokes, 1A-20A



Surface Mount Products
MC: Thick-film chips, 1/20-3W, 1Ω-22M
MCT: Thick-film chips, Military-grade
BLU: Thin-film chips, to 0.05% 5ppm/°C
MW: Wirewound, 1/2-5W, .005Ω-25K, .01-5%
MGP/MCF: 1/10-½W, MF & CF MELF's
MHM: Hermetically sealed metal film
HR: High-megohm to 10^{12}Ω
SRH: High voltage, 1KV to 5KV
MLP: Temp. sensitive, +450 to 000ppm
MBW: Flameproof fusable resistors
SF: 4-terminal, 0.001Ω to 25KΩ, 1W-5W
SMN: Thick-film networks, 14/16/20-pin
CN/BCN: Thick-and thin-film chip arrays
SN/SM/SW: Thin-film networks, 8 to 20-pin
SD/SDG: Power chokes to 4A
CI/MCI: Chip inductors, 5 sizes
MSI: Molded shielded chip inductors
SMA/SMP: Active & passive delay lines
AT: Attenuators, RF & Microwave
SPT: Pulse transformers
SM Kits: 0805 & 1206, thick & thin chips



Specialty Resistors
A: Resistance standards to ±0.0005%
RG/RH: Hi-voltage to 60kV, ⅛W-16W
RH: Precision high-megohm, to 0.1% 10ppm
UHV: Ultra high value to 2 x 10^{14}Ω
SR: High power thick film to 250W 300KV
HF: Microwave resistors, terminations
ZJ: Zero-ohm jumpers, 2A-20Amp
MFA/MR/MG: Microminiature resistors



Delay Lines (See EEM Section 2350)
SA: Active SIP, 20-1000ns
A: Active DIP, 10-1000ns
SP: Passive SIP, 5-500ns
P: Passive DIP, 0.1-2000ns
E: ECL Active DIP, 10-200ns
TT: Programmable TTL, 3-8 Bit
EC: Programmable ECL, 3-8 Bit

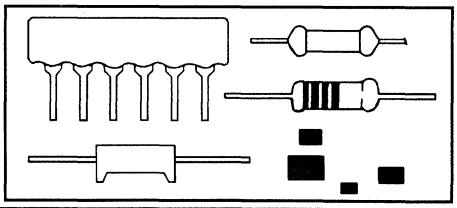
Refer to EEM Section 1800 for RCD coils & inductors and EEM Section 2350 for RCD delay lines.

RCD COMPONENTS INC. *520 E. INDUSTRIAL PARK DR., MANCHESTER, N.H. 03109 USA TEL (603) 669-0054 FAX (603) 669-5455*
www: http//www.rcd-comp.com email: rcdcompinc@aol.com

RFE INTERNATIONAL

RESISTOR PRODUCTS

RFE International Inc., supplies high quality and economically priced resistors to serve the most demanding needs. On-time delivery is assured because of large inventories maintained at the Lake Forest, California warehouse location. Technical support is provided by an engineering staff at the same facility. For over a decade the combination of highest quality and superb service have proven that RFE International Inc. is a valued team member as a supplier of resistors and capacitors to major manufacturers in the world market. Call, write or fax for a complete catalog.



Category	Series	Watts	Size	Resistance Range Ω	Remarks
Surface Mount	(Zero Ω Available in RM10 & RM12)				
(Single Resistor)	RM04	1/16	0402	2.2 ~ 3.3 meg	Tol: 1, 5%
	RM06	1/16	0603	1 ~ 1 meg	Tol: 1, 5%
	RM10	1/8	0805	1 ~ 1 meg	Tol: 1, 5%
	RM12	1/4	1206	1 ~ 1 meg	Tol: 1, 5%
	RM25	1/4	1210	1 ~ 1 meg	Tol: 1, 5%
	RM50	1/2	2010	1 ~ 1 meg	Tol: 1, 5%
	RM1W	1W	2512	1 ~ 1 meg	Tol: 1, 5%
Array & Network	RCN	1/16 & 1/8	See Specifications	1 ~ 1 meg	Tol: 1, 5%
SIP Network	RA12	1/8	4 ~ 10 pin	1 ~ 10meg	Tol: 5%
Carbon Film	CR12, CR25M	1/8, 1/4	3.7 x 1.6mm	0.5 ~ 22 meg	Tol: 2, 5%
Axial Leads	CR25, CR50M	1/4, 1/2	3.7 x 1.6	0.5 ~ 22 meg	Tol: 2, 5%
	CR50S	1/2	6.5 x 2.5	0.5 ~ 22 meg	Tol: 2, 5%
	CR100S	1	9.0 x 3.7	0.5 ~ 22 meg	Tol: 2, 5%
	CR200	2	16.0 x 5.0	0.5 ~ 22 meg	Tol: 2, 5%
Metal Film	MR12 (RN50)	1/8 @ +70°C	3.8 x 1.5	10 ~ 1 meg	50, 100 PPM/°C
Axial Leads	MR25 (RN55)	1/4	6.5 x 2.5	1 ~ 10 meg	25, 50, 100
	MR50 (RN60)	1/2	9.5 x 3.5	10 ~ 4.7 meg	50, 100
±0.5% & 1% Tol.	MR100S (RN65)	1	11 x 4.5	5.11 ~ 2.4 meg	50, 100
	MR200 (RN70)	2	16 x 5.0	5.11 ~ 5.11 meg	50, 100
Fuseable	FM	1/2 ~ 3	6.8 x 2.6 ~ 15 x 55	0.22 ~ 100k	Metal Film
Resistors	FKN	1 ~ 5	9 x 4.5 ~ 19 x 6.5	0.1 ~ 250	Wire Wound-Tubular
	FSQ	2 ~ 10	18 x 7 x 7 ~ 49 x 9 x 10	0.1 ~ 500	Wire Wound Box
High Meg Ohm	HMG	1/4 ~ 2	1/4 ~ 2 watt size	11 meg ~ 100meg	Tol: 2, 5%
Metal Oxide	MOR25	1/4	6.5 x 2.5mm	0.22 ~ 33K	Tol: 5%
	MOR50S	1/2	8.5 x 2.5	0.5 ~ 33K	Tol: 5%
	MOR100S	1	9 x 4	0.5 ~ 1 M	Tol: 5%
Axial Leads	MOR200S	2	11 x 4.5	0.5 ~ 1 M	Tol: 5%
Flame Proof	MOR300S	3	16 x 5.0	0.5 ~ 1 M	Tol: 5%
	MOR500S	5	18 x 6.0	0.5 ~ 100K	Tol: 5%
Wirewound	KNP, ARW, JRW	1 ~ 10	10 x 4 ~ 53 x 8	0.1 ~ 2K	Axial Leads
Tubular	HRW	5~1000	See Specs	0.5 ~ 200K	Terminals
	KNY	2 ~ 10	See Specs	0.1 ~ 2K	Axial Leaded
Wire Wound &	SQP	2 ~ 10	See Specs	0.1 ~ 33K	Axial Leads
Metal Oxide	SQP	15	48 x 12.5 x 11.5	0.5 ~ 1500	Axial Leads
Box Type	SQP	20 & 25	60 x 14 x 13.5	0.5 ~ 1500	Axial Leads
Flame Proof	SQT	5 ~ 10	See Specs	0.01 ~ 100K	Axial Leads
	SQZ	5 ~ 25	See Specs	0.1 ~ 150K	Radial Leads (Zip-in)
	SQM	2 ~ 10	See Specs	0.1 ~ 600	Radial Leads
	SQM	10 ~ 12.5	12 x 16 x 35	0.1 ~ 600	Radial Leads
WireWound	RHA	5	35 x 10 x 10.8	0.02 ~ 6K	Available Both
Metal Clad	RHA	10	49 x 14 x 13.5	0.012 ~ 15K	Inductive
Axial Leads	RHA	25	71 x 16 x 15.1	0.01 ~ 40K	and
Aluminum	RHA	50	110 x 33 x 32	0.2 ~ 20K	Non-Inductive
Housing	RHA	100	140 x 44.5 x 46	0.4 x 50K	
	RHA	250	178 x 63.5 x 55.6mm	0.6 ~ 80K	
Metal Plate	MPV	1 ~ 5	See Specs	0.005 ~ 1.0	Radial: Epoxy
(shunt)	MPR	2 ~ 5	See Specs	0.005 ~ 1.0	Radial: Cement
Non-Inductive	MPA	1 ~ 20	See Specs	0.005 ~ 1.0	Axial: Cement
Zero-Ohm	ZR12/25	1/8 & 1/4	Same size as 1/8 & 1/4 Watt Resistors		Jumper Wire Available

RFE INTERNATIONAL

RFE International Inc. • 20432 Barents Sea Circle, Lake Forest, CA 92630

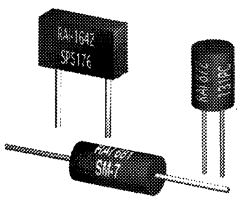
Tel: (949)583-0808 • Fax: (949)583-9898 • E-Mail: rfeint@Compuserve.com

RIEDON

WIREWOUND RESISTORS

Riedon has an enviable 30 year reputation supplying wirewound resistors for demanding power and precision applications. We are known for our fast delivery and outstanding customer support. Contact us for detailed product data and cross-reference information:

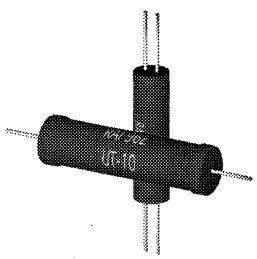
Precision Wirewound Resistors:



Description	P/N	Resistance (ohms)
Axial Lead	SM, 100	to 25M
Printed Circuit	PC	to 1 M
Radial Lead, Lug	RL	to 8 M
Rectangular Series	SM	to 1 M

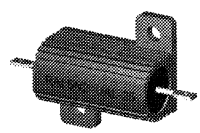
General Features:
- Resistance tolerance to ±0.005%
- Std. TCR to ±10 ppm/°C
- High stability
- All-welded terminations
- Molded high temperature epoxy
- A fast rise time series is available

Power Wirewound Resistors:

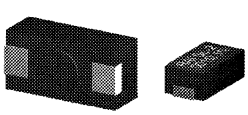


Description	P/N	Resistance (ohms)	Power (watts)
Axial Lead	UT, UB	to 260 K	to 15
AL Housed	UAL	to 250 K	to 50
Lo Ohm	MT	0.003-0.03	to 10
4 Terminal	MT-4T	0.003-up	to 10

General Features:
- Resistance tolerance to ±0.01%
- Std. TCR to ±20 ppm/°C
- High stability
- High surge current tolerance
- All-welded terminations



Surface Mount Power Wirewound Resistors:



Description	P/N	Resistance (ohms)
Wirewound	S	0.01 to 50K
Strip Element	SL*	0.005 to 0.01

* Low profile : 0.1 inches

General Features:
- Resistance tolerance to ±0.005%
- Std. TCR to ±10 ppm/°C
- Power to 4 watts
- High stability
- High surge current tolerance
- All-welded terminations
- Molded high temperature epoxy

Special Wirewound Resistors:

Riedon supplies many custom designs for special requirements. For example, we offer precision resistors with temperature coefficients for sensing and compensation applications, and resistors in TO-style heat sink packages. Please call us for your special requirements, or get details from our Web site, or EEM online.

RIEDON, INC.
300 Cypress Ave. Alhambra, CA 91801
www.riedon.com 626-284-9901 FAX: 626-284-1704

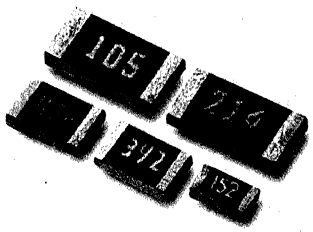
A Partner You Can Trust
SAMSUNG ELECTRO-MECHANICS

HEAD OFFICE & FACTORY
314,MAETAN 3DONG, PALDAL-KU, SUWON,
KYUNGKI-DO, KOREA 442-743
TEL:(82-331)210-6120, 6791
FAX:(82-331)210-5999, 6109

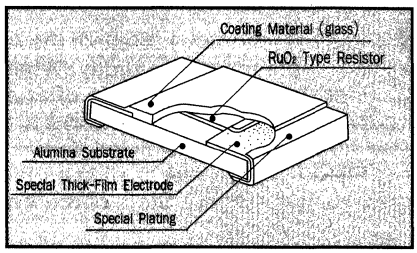
SAMSUNG ELECTRO-MECHANICS AMERICA, INC.
85 TASMAN DRIVE, SAN JOSE, CA.
95134 U.S.A
TEL:(1-408)544-5200~9, 5211~5, 5217~8
FAX:(1-408)544-4967~8

SAMSUNG ELECTRO-MECHANICS GmbH.
SAMSUNG HAUS
AM KRONBERGER HANG 6,
65824 SCHWALBACH/TS, GERMANY
TEL:(49-6196)66-7700, 7000, 7200
FAX:(49-6196)66-7766

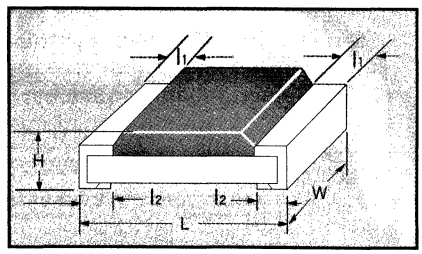
THICK FILM CHIP RESISTOR



STRUCTURE



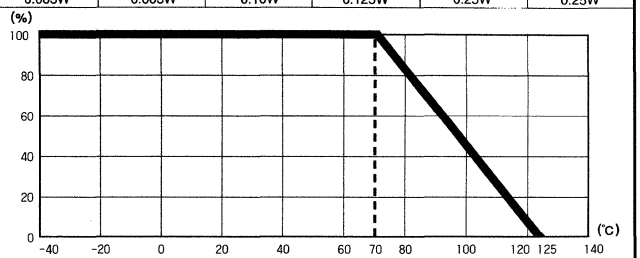
DIMENSIONS



(Unit : mm)

Type	EIA Code	L	W	H	l_1	l_2
RC1005 (1/16W)	0402	1.00 ± 0.05	0.50 ± 0.05	0.35 ± 0.05	0.20 ± 0.10	0.25 ± 0.10
RC1608 (1/16W)	0603	1.60 ± 0.10	0.80 ± 0.15	0.45 ± 0.10	0.30 ± 0.20	0.35 ± 0.10
RC2012 (1/10W)	0805	2.00 ± 0.20	1.25 ± 0.15	0.50 ± 0.10	0.40 ± 0.20	0.35 ± 0.20
RC3216 (1/8W,1/4W)	1206	3.20 ± 0.20	1.60 ± 0.15	0.55 ± 0.10	0.45 ± 0.20	0.40 ± 0.20
RC3225 (1/4W)	1210	3.20 ± 0.20	2.55 ± 0.20	0.55 ± 0.10	0.45 ± 0.20	0.40 ± 0.20

GENERAL SPECIFICATION

Description	RC1005	RC1608	RC2012	RC3216	RC3216	RC3225
Power Rating (W) at 70°C	(1/16W) 0.063W	(1/16W) 0.063W	(1/10W) 0.10W	(1/ 8W) 0.125W	(1/4W) 0.25W	(1/4W) 0.25W
Power Derating Curve						
Resistance Voltage	$\sqrt{\text{Rated Power(W)} \times \text{Normal Resistance Value}(\Omega)}$					
Working Voltage (MAX.)	50(V)	50(V)	100(V)	200(V)	200(V)	200(V)
Overload Voltage (MAX.)	100(V)	100(V)	200(V)	400(V)	400(V)	400(V)
Resistance Range	E24, E12 series marked with 3digits. E96, E48 series marked with 4digits.					
F(±1%), G(±2%)	10Ω ~1MΩ					
J(±5%)	10Ω ~1MΩ	1Ω ~10MΩ				
K(±10%)	10Ω~1MΩ	1Ω ~10MΩ				
Jumper Chip	50mΩ MAX.					
Operating Temperature Range	-55°C ~ +125°C					
Rating Ambient Temperature	+70°C					
Temperature Coefficient	±200, ±300, ppm/°C					

The rated power is the maximum continuous loading power at 70°C ambient temperature.
For ambient temperature's above 70°C the loading power follow the above power derating curve.

FEATURE

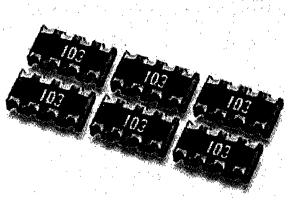
- Very small, thin and light weigt
- Both flow soldering and reflow soldering are applicable
- Owing to the reduced lead inductance, the high frequency characteristic is excellent
- Suitable size and packaging for surface mount assembly

PACKAGING

- All reel taping specifications are in accordance with EIAJ RC-1009
- Standard Quantity:

7 Inch Reel	5,000EA / 1 Reel
13 Inch Reel	20,000EA / 1 Reel

CHIP ARRAY (NETWORK) RESISTOR



DIMENSIONS

Description	RP(RN)164P
Rated Power at 70°C	1/16W
Max Working Voltage	50V
Max Over load Voltage	100V
Resistance Value	E24 series STD
Tolerance	J,K
Range	1Ω ~ 10MΩ
Jumper Chip	Less than 50mΩ
Operating Temp. Range	-55°C ~ +125°C

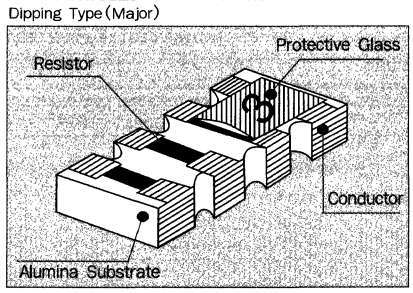
PACKAGING

- All reel taping specifications are in accordance with EIAJ RC-1009
- Standard Quantity:

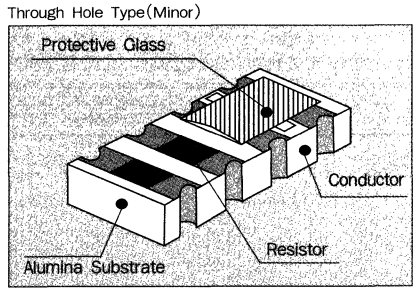
7 Inch Reel	5,000EA / 1 Reel
13 Inch Reel	20,000EA / 1 Reel

STRUCTURE

Dipping Type(Major)



Through Hole Type(Minor)



FEATURE

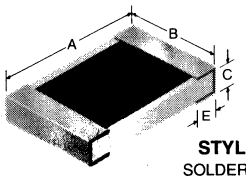
- High density mouting
- Improvement of placement efficiency
- Automatic placement

State of the Art, Inc.
2470 FOX HILL ROAD, STATE COLLEGE, PA 16803-1797
SOURCE CODE: 56235, PHONE: 814-355-8004
ONLINE: resistor.com

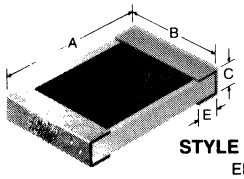
CALL TOLL FREE
800-458-3401
FAX: 814-355-2714

A worldwide leader in thick and thin film resistive technology, State of the Art (SOTA) has the most comprehensive, quality oriented line of resistive products available anywhere today. Whether you design hybrid microelectronic circuits or need reliable space savers on your PC board layout, we offer a broad range of standard and MIL chip resistors, surface mount resistor and RC networks, and custom networks to meet your most stringent specifications. In 1980, State of the Art developed the now industry standard nickel barrier to virtually eliminate solder leaching. In 1987, we became the first military QPL qualified S failure rate level manufacturer, and today we continue to build a product line which has the lowest failure rates in the world. State of the Art means pushing technology as far as it can be pushed. If it can be done, State of the Art can do it.

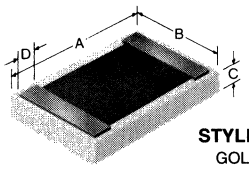
Thick & Thin Film MIL-PRF-55342 Chip Resistors



STYLE B TERMINATION
SOLDERABLE NICKEL BARRIER

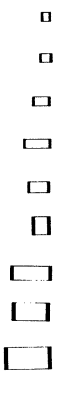


STYLE C & U TERMINATION
EPOXY BONDABLE



STYLE W TERMINATION
GOLD WIRE BONDABLE

ACTUAL SIZE



MIL-PRF-55342 SIZE CODE TABLE | MEASUREMENT IN INCHES

SIZE CODE	LENGTH A	WIDTH B	THICKNESS C	TOP TERMINATION D	BOTTOM TERMINATION E
M55342/02 RM0505	.055 $^{+.006}_{-.006}$	.050 $^{+.005}_{-.005}$	.015 - .033	.005 - .015	.010 - .020
M55342/06 RM0705	.080 $^{+.006}_{-.006}$	.050 $^{+.005}_{-.005}$	.015 - .033	.010 - .020	.010 - .020
M55342/03 RM1005	.105 $^{+.007}_{-.007}$	.050 $^{+.005}_{-.005}$	.015 - .033	.010 - .020	.010 - .020
M55432/04 RM1505	.155 $^{+.007}_{-.007}$	.050 $^{+.005}_{-.005}$	.015 - .033	.010 - .020	.010 - .020
D55342/07* RM1206	.126 $^{+.008}_{-.008}$	.063 $^{+.005}_{-.005}$	.015 - .033	.010 - .025	.010 - .025
M55342/10 RM1010	.105 $^{+.007}_{-.007}$	.100 $^{+.005}_{-.005}$	.015 - .033	.010 - .020	.010 - .020
M55342/05 RM2208	.230 $^{+.007}_{-.007}$	.075 $^{+.005}_{-.005}$	.025 - .033	.015 - .025	.015 - .025
M55342/08 RM2010	.209 $^{+.009}_{-.009}$	.098 $^{+.005}_{-.005}$	.025 - .033	.015 - .025	.015 - .025
M55342/09 RM2512	.259 $^{+.009}_{-.009}$	.124 $^{+.005}_{-.005}$	.025 - .033	.015 - .025	.015 - .025

**RM1206 is specified in MIL-PRF-55342 as D55342/07 rather than M55342/07.*

PART NUMBERING SYSTEM

To order MIL-PRF-55342 chip resistors, follow the part numbering format at the right. The part number **M55342K06B100DS** specifies a .080 x .050 inch, 100Ω ± 1%, ±100 ppm S-level resistor with pretinned nickel barrier wraparound terminations.

M55342 K 06 B 100D S

PRODUCT LEVEL DESIGNATOR
M: 1% per 1000 hrs **R:** 0.01% per 1000 hrs
P: 0.1% per 1000 hrs **S:** 0.001% per 1000 hrs
C: Non-ER **T:** Space Level

RESISTANCE AND TOLERANCE CODE
Three significant digits, with a letter indicating the decimal location, the tolerance, and the value range (Ω, KΩ, MΩ)

A: 0.1%Ω	**D:** 1%Ω	**G:** 2%Ω	**J:** 5%Ω	**M:** 10%Ω
B: 0.1%KΩ	**E:** 1%KΩ	**H:** 2%KΩ	**K:** 5%KΩ	**N:** 10%KΩ
C: 0.1%MΩ	**F:** 1%MΩ	**T:** 2%MΩ	**L:** 5%MΩ	**P:** 10%MΩ

TERMINATION TYPE
R: Pretinned, Wraparound Style
B: Pretinned, Wraparound Barrier (Ni) Style
C: Untinned Platinum/silver, Wraparound (thick film only)
U: Untinned Platinum/gold, Wraparound (thick film only)
W: Gold Wire Bondable

SIZE CODE

02: RM0505	**04:** RM1505	**06:** RM0705	**08:** RM2010	**10:** RM1010
03: RM1005	**05:** RM2208	**07:** RM1206	**09:** RM2512	

TEMPERATURE CHARACTERISTIC
E: ±25 ppm **H:** ±50 ppm **K:** ±100 ppm **M:** ±300 ppm

MILITARY ESTABLISHED RELIABILITY SPECIFICATION MIL-PRF-55342

PACKAGING

MIL-R-55342 individual lot quantities are packed in chip tray carriers ("waffle packs"). Tape and reel packaging to EIA-RS481 can be specified on a standard 7 inch reel or an optional 13 inch reel for the following sizes:

- 8 mm tape — RM0505, RM0705, RM1005, RM1206, RM1010
- 12 mm tape — RM1505, RM2208, RM2010, RM2512

PRODUCT LEVEL DESIGNATION

All product levels are based on the same design as our established reliability parts (S level failure rate design for thick film and R level failure rate design for thin film). Product level C is a Non-Established Reliability part requiring no Group A, B, or C testing. Established Reliability (failure rates based on Group C life testing) product levels M, P, R, and S undergo Group A, B, and C testing per MIL-PRF-55342 on an inspection lot basis. Space product level T requires Group A tests including 100% power conditioning and Group B tests performed on a manufacturing lot basis.

GROUP A INSPECTION
SUBGROUP 1 (SAMPLING)
PRECAP VISUAL INSPECTION
SUBGROUP 2 (100%)
THERMAL SHOCK
POWER CONDITIONING (Space Only)
DC RESISTANCE
SUBGROUP 3 (SAMPLING)
VISUAL INSPECTION
SUBGROUP 4 (SAMPLING)
SOLDERABILITY
SUBGROUP 5 (SAMPLING)
RESISTANCE TO SOLVENTS

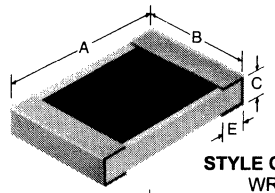
GROUP B INSPECTION
SUBGROUP 1 (SAMPLING)
RESISTANCE TEMPERATURE CHARACTERISTIC (TCR)
SHORT TIME OVERLOAD
SUBGROUP 2 (SAMPLING)
MOUNTING INTEGRITY

State of the Art, Inc.
2470 FOX HILL ROAD, STATE COLLEGE, PA 16803-1797
SOURCE CODE: 56235, PHONE: 814-355-8004
ONLINE: resistor.com

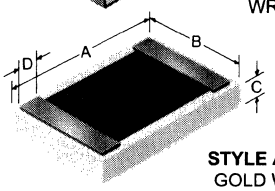
CALL TOLL FREE
800-458-3401
FAX: 814-355-2714

State of the Art is recognized worldwide as a leading manufacturer of exceptionally reliable thick and thin film resistive products. Through a well-rounded ISO9001 based Quality Assurance Program and Continuous Improvement Philosophy, we have earned a reputation of superior reliability. For high reliability applications such as aerospace, satellite, defense, and medical electronics, State of the Art provides optional high reliability screening and testing. We can tailor the reliability program to meet your specific needs. We are dedicated to providing products that meet your demanding requirements and service that exceeds your expectations.

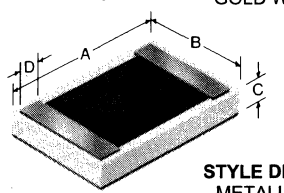
Standard Thick Film Chip Resistors



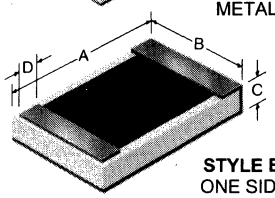
STYLE CP TERMINATION
WRAPAROUND



STYLE AP TERMINATION
GOLD WIRE BONDABLE



STYLE DP TERMINATION
METALLIZED BOTTOM



STYLE EP TERMINATION
ONE SIDE WRAPAROUND

THICK FILM SIZE CODE TABLE | MEASUREMENT IN INCHES

ACTUAL SIZE	SIZE CODE	LENGTH A	WIDTH B	THICKNESS C	TOP TERMINATION D	BOTTOM TERMINATION E	MAXIMUM POWER (mW)	MAXIMUM VOLTAGE (volts)
	0302	.030 $^{+.005}_{-.002}$	.020 $^{+.003}_{-.003}$	.008 - .015	.004 - .012	.006 - .015	35	15
	0402	.040 $^{+.005}_{-.002}$	.020 $^{+.003}_{-.003}$	.008 - .020	.005 - .015	.008 - .015	50	30
	0404	.035 $^{+.005}_{-.002}$	.035 $^{+.003}_{-.003}$	.008 - .020	.004 - .015	.008 - .015	50	25
	0502	.050 $^{+.005}_{-.002}$	.025 $^{+.003}_{-.003}$	.008 - .020	.004 - .015	.007 - .017	60	40
	0504	.050 $^{+.005}_{-.002}$	.040 $^{+.005}_{-.005}$	.015 - .022	.004 - .017	.007 - .017	125	40
	0505	.050 $^{+.007}_{-.002}$	.050 $^{+.005}_{-.005}$	.015 - .022	.005 - .015	.007 - .020	125	40
	0705	.075 $^{+.007}_{-.003}$	.050 $^{+.005}_{-.005}$	.015 - .022	.010 - .020	.010 - .025	200	50
	1005	.100 $^{+.008}_{-.003}$	.050 $^{+.005}_{-.005}$	.015 - .022	.010 - .020	.010 - .025	250	75
	1206	.125 $^{+.010}_{-.005}$	.065 $^{+.005}_{-.007}$	.015 - .022	.010 - .020	.010 - .030	250	100
	1505	.150 $^{+.008}_{-.003}$	.050 $^{+.005}_{-.005}$	.015 - .032	.010 - .020	.010 - .025	330	125
	1010	.100 $^{+.010}_{-.005}$	.100 $^{+.005}_{-.005}$	.015 - .022	.010 - .025	.010 - .025	500	75
	2208	.225 $^{+.010}_{-.005}$	.075 $^{+.008}_{-.005}$	.025 - .032	.010 - .025	.010 - .030	750	175
	2010	.200 $^{+.010}_{-.005}$	.100 $^{+.008}_{-.005}$	.025 - .032	.009 - .029	.015 - .040	1000	150
	2512	.250 $^{+.010}_{-.005}$	.125 $^{+.008}_{-.005}$	.025 - .032	.009 - .029	.015 - .040	2000	200

PART NUMBERING SYSTEM

To order standard grade or high reliability thick film chip resistors, follow the part numbering format at the right. The part number **S0504CPX150J** specifies a standard production .050 x .040 inch, 15 ohm, 5% resistor with pretinned solder over nickel wraparound terminations.

S 0504 CP X 150 J

SPECIAL TERMINATION
G: Gold **PS:** Platinum/silver
Z: Gold over Nickel **PG:** Platinum/gold

TCR CERTIFICATION
10: ±100 ppm **20:** ±200 ppm **30:** ±300 ppm

TOLERANCE
D: 0.5% **F:** 1% **G:** 2% **J:** 5% **K:** 10% **M:** 20%

RESISTANCE VALUE
Three or four digits are used with all leading digits significant. Four digits are used for 1% tolerance or lower; otherwise, three digits are used. The last digit specifies the number of zeros to add. The letter "R" is used to represent the decimal for fractional ohmic values. Example: 5R6 is 5.6 ohms; 10R0 is 10 ohms; 16R9 is 16.9 ohms; etc.

X: Pretinned Solder over Nickel
U: Untrimmed resistor

TERMINATION STYLE
AP: Top-side termination with Bottom Isolated
CP: Wraparound termination
DP: Top-side termination with Bottom Metallized
EP: Single Wraparound with Bottom Metallized

SIZE CODE
See Physical and Mechanical Data

PREFIX
C: Commercial/Industrial (please consult factory)
S: Standard Production
H: High Reliability/Custom Screening

HIGH RELIABILITY SCREENING

We provide optional high reliability screening and testing. Any size or style that we manufacture can be processed and/or tested to meet your reliability requirements. Unless otherwise specified, our standard high reliability program consists of 100% screening and special batch testing according to the Group A and Group B tests established by MIL-PRF-55342.

PACKAGING

Standard grade individual lot quantities are bulk packed in anti-static self-sealing bags. High reliability (H) resistors are packed in chip tray carriers ("waffle packs"). Tape and reel packaging to EIA RS481 can be specified on a standard 7 inch reel or an optional 13 inch reel for the following sizes:

- 8 mm tape — 0502, 0504, 0505, 0705, 1005, 1206, 1010
- 12 mm tape — 1505, 2208, 2010, 2512

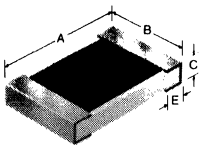
NOTES Size 0705 is usually the most economical. Its use is recommended except where its size is excessive or where power and/or voltage ratings may be exceeded. Size 0504 is available is Styles CP and EP only.

State of the Art, Inc.
2470 FOX HILL ROAD, STATE COLLEGE, PA 16803-1797
SOURCE CODE: 56235, PHONE: 814-355-8004
ONLINE: resistor.com

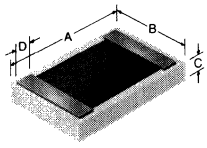
CALL TOLL FREE
800-458-3401
FAX: 814-355-2714

Standard Thin Film Chip Resistors

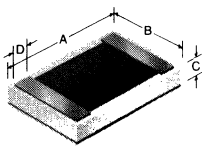
Thin Film on Alumina



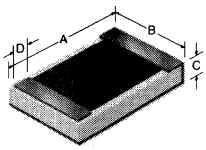
STYLE C TERMINATION
WRAPAROUND



STYLE A TERMINATION
GOLD WIRE BONDABLE

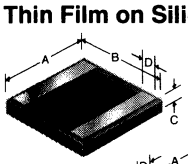


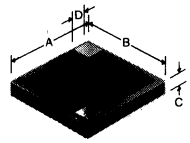
STYLE D TERMINATION
METALLIZED BOTTOM



STYLE E TERMINATION
ONE SIDE WRAPAROUND

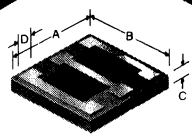
Thin Film on Silicon





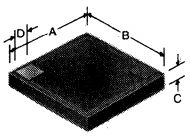
LOW VALUE FORMAT

HIGH VALUE FORMAT



MID-RANGE VALUE FORMAT & CENTER-TAP STYLES

STYLE A TERMINATION LAPPED SILICON BOTTOM
STYLE D TERMINATION METALLIZED BOTTOM (ISOLATED)



STYLE F TERMINATION
BACK CONTACT

THIN FILM ON ALUMINA SIZE CODE TABLE

MEASUREMENT IN INCHES

ACTUAL SIZE	SIZE CODE	LENGTH A	WIDTH B	THICKNESS C	TOP TERMINATION D	BOTTOM TERMINATION E	MAXIMUM POWER (mW)	MAXIMUM VOLTAGE (volts)	MAXIMUM RESISTANCE (ohms)
	0202	.020 $^{+.002}_{-.002}$	.020 $^{+.002}_{-.002}$	.009 - .012	.004 - .006	-	25	20	35K
	0303	.030 $^{+.002}_{-.002}$	.030 $^{+.002}_{-.002}$	.009 - .012	.004 - .006	-	50	30	100K
	0402	.040 $^{+.002}_{-.002}$	.020 $^{+.002}_{-.002}$	.009 - .012	.006 - .008	-	50	40	90K
	0404	.040 $^{+.002}_{-.002}$	.040 $^{+.002}_{-.002}$	.009 - .012	.006 - .008	-	75	40	200K
	0505	.055 $^{+.006}_{-.006}$	.050 $^{+.005}_{-.005}$	.015 - .020	.005 - .015	.010 - .020	125	40	470K
	0705	.075 $^{+.010}_{-.001}$	.050 $^{+.005}_{-.005}$	.015 - .020	.010 - .020	.010 - .025	200	50	1M
	1005	.105 $^{+.007}_{-.007}$	.050 $^{+.005}_{-.005}$	.015 - .020	.010 - .020	.010 - .025	250	75	1M
	1206	.125 $^{+.007}_{-.007}$	.060 $^{+.008}_{-.002}$	.015 - .020	.009 - .019	.010 - .030	300	100	1.5M
	1505	.155 $^{+.007}_{-.007}$	.050 $^{+.005}_{-.005}$	.015 - .020	.010 - .020	.010 - .025	350	125	1.5M
	1010	.105 $^{+.007}_{-.007}$	.100 $^{+.005}_{-.005}$	.015 - .020	.009 - .025	.009 - .025	500	75	1.5M
	2208	.225 $^{+.010}_{-.002}$	.075 $^{+.005}_{-.005}$	.025 - .030	.010 - .025	.010 - .030	750	175	3.5M
	2010	.205 $^{+.010}_{-.005}$	.100 $^{+.003}_{-.007}$	.025 - .030	.015 - .040	.015 - .040	800	150	3.5M
	2512	.255 $^{+.010}_{-.005}$	.125 $^{+.004}_{-.006}$	.025 - .030	.015 - .040	.015 - .040	1500	200	7.3M

THIN FILM ON SILICON SIZE CODE TABLE

MEASUREMENT IN INCHES

ACTUAL SIZE	SIZE CODE	LENGTH A	WIDTH B	THICKNESS C	TERMINATION D	MAXIMUM POWER (mW)	MAXIMUM VOLTAGE (volts)	MAXIMUM RESISTANCE (ohms)
	0202	.020 $^{+.002}_{-.002}$	.020 $^{+.002}_{-.002}$	.009 - .012	.004 - .006	100	100	250K
	0303	.030 $^{+.002}_{-.002}$	.030 $^{+.002}_{-.002}$	.009 - .012	.004 - .006	250	100	1M
	0404	.040 $^{+.002}_{-.002}$	.040 $^{+.002}_{-.002}$	.009 - .012	.004 - .006	350	100	1.5M
	0505	.050 $^{+.002}_{-.002}$	.050 $^{+.002}_{-.002}$	.009 - .012	.004 - .012	500	100	2.5M

PART NUMBERING SYSTEM

To order standard grade or high reliability thin film chip resistors on alumina or silicon, follow the part numbering format below. The part number **S0505CA1001FHB** specifies a standard production .050 x .050 inch, 1000 ohm ± 1% resistor on alumina with a TCR of ±50 ppm and pretinned solder over nickel wraparound terminations.

S 0505 C A 1001 F H B — OPTIONS

TERMINATION MATERIAL
B: Pretinned Solder over Nickel **W:** Gold **A:** Aluminum

TEMPERATURE CHARACTERISTIC
E: ±25 ppm **H:** ±50 ppm **K:** ±100 ppm

TOLERANCE
B: 0.1% **C:** 0.25% **D:** 0.5% **F:** 1% **G:** 2% **J:** 5% **K:** 10% **M:** 20%

RESISTANCE VALUE
Three or four digits are used with all leading digits significant. Four digits are used for 1% tolerance or lower; otherwise, three digits are used. The last digit specifies the number of zeros to add. The letter "R" is used to represent the decimal for fractional ohmic values. Example: 5R6 is 5.6 ohms; 10R0 is 10 ohms; 16R9 is 16.9 ohms; etc.

SUBSTRATE MATERIAL
A: Alumina Ceramic **S:** Silicon

TERMINATION STYLE
A: Top-side termination with Bottom Isolated
C: Wraparound termination
D: Top-side termination with Bottom Metallized
E: Single Wraparound with Bottom Metallized
F: Bottom-side Electrical Contact (Silicon chips only)

SIZE CODE
See Physical and Mechanical Data

PREFIX
S: Standard Production **H:** High Reliability/Custom Screening

OPTIONS AVAILABLE:
- **CTx =** Center-Tapped, x = ratio tolerance. For S0303AS1001JKW-CTF, total R = 1000Ω ±5%, ratio = 1%.
- **MT1 =** Multi-Tap silicon with 7 R1 and 5 R2 configuration, where R1 = 5xR2.
- **MT2 =** Multi-Tap silicon with 10 R1 and 10 R2 configuration, where R1 = 10xR2.

HIGH RELIABILITY SCREENING

We provide optional high reliability screening and testing. Any size or style that we manufacture can be processed and/or tested to meet your reliability requirements. Unless otherwise specified, our standard high reliability program consists of 100% screening and special batch testing according to the Group A and Group B tests established by MIL-PRF-55342.

PACKAGING

Thin film on alumina individual lot quantities are bulk packed in anti-static self-sealing bags. Thin film on silicon and high reliability (H) resistors are packed in chip tray carriers ("waffle packs"). Tape and reel packaging can be specified for the following sizes:

- 8 mm tape — 0505, 0705, 1005, 1206, 1010
- 12 mm tape — 1505, 2208, 2010, 2512

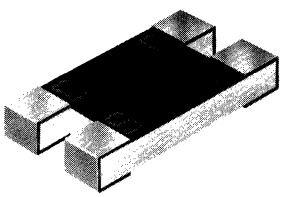
State of the Art, Inc.
2470 FOX HILL ROAD, STATE COLLEGE, PA 16803-1797
SOURCE CODE: 56235, PHONE: 814-355-8004
ONLINE: resistor.com

CALL TOLL FREE
800-458-3401
FAX: 814-355-2714

Special Application Chip Resistors

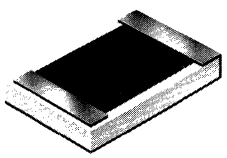
UNTRIMMED RESISTORS

State of the Art manufactures untrimmed thick film chip resistors for applications where the resistance value cannot be specified ahead of time. These chips can then be dynamically trimmed by the customer to provide the desired circuit performance. Untrimmed resistors are typically furnished to within 20% or 10% of a standard resistance value. Parts can then be trimmed to any desired resistance up to approximately double their initial value, or higher with a serpentine trim.



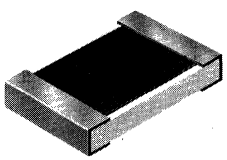
KELVIN RESISTORS

Four-terminal thick film Kelvin resistors provide separate source and sense leads for current sensing applications. With two input, or source, terminals and two sense terminals, the Kelvin chip allows you to sense the output current of a device with minimal effect on the circuit. Kelvin resistors are available in two sizes: 2010 (.200 x .100 inch) and 2512 (.250 x .125 inch). Resistance values can be specified starting at 20 milliohms and up. To order a Kelvin chip, add an FK to the end of a valid part number, as shown in this example, which specifies a standard production .200 x .100 inch chip: S2010CPX0R05J**FK**.



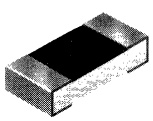
HIGH POWER RESISTORS

High power thick and thin film resistors on beryllium (BeO) are available in seven standard sizes ranging from an 0705 (.075 x .050 inch) to a 3838 (.375 x .375 inch) with power ratings from 4 watts to 200 watts. When properly mounted, these chips can handle many times the power of a conventional chip resistor. Standard terminations include styles D and E, as shown on the preceding pages, with a pretinned nickel barrier finish. Optional flange mount packaging is available for several sizes.



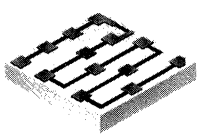
HIGH VALUE RESISTORS

SOTA's high value resistor line features resistance values from 100 megohms to 100 gigohms. These thick film chips are available in 20%, 30%, and 50% tolerances, with limited availability in 5% and 10%. Standard terminations include style A with gold metallization for wire bonding and style C with pretinned nickel barrier finish for soldering or palladium/silver metallization for conductive epoxy attachment. Eight standard sizes are available ranging from an 0502 (.050 x .025 inch) to a 2512 (.250 x .125 inch).



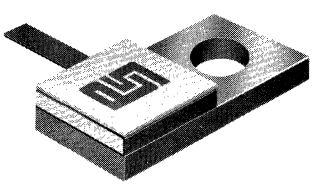
JUMPERS

For circuits with a small number of crossovers, a jumper chip can be more economical than printing a dielectric layer and crossover conductor or using a hole-thru. Thick film jumpers are available in five sizes, all with wraparound terminations. The CP style has palladium/silver terminations for conductive epoxy bonding, and the CPX style has pretinned nickel barrier terminations for soldering applications. The five standard sizes available range from an 0502 (.050 x .025 inch) to a 1206 (.125 x .060 inch).



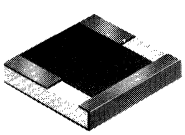
MULTI-TAP RESISTORS

These compact 30 x 30 mil thin film alumina and silicon resistors provide a wide choice of nominal values simply by bonding to the appropriate pad location. Resistance ranges are available to 150 kilohms. Terminations are gold or aluminum for wire bond attachment. Two standard schematics are available as follows: Option MT1 is a 12-resistor multi-tap chip containing seven R1 and five R2 resistors where R1 = 5 x R2; Option MT2 is a 20-resistor multi-tap chip containing 10 R1 and 10 R2 resistors where R1 = 10 x R2.



HIGH FREQUENCY RESISTORS

High frequency resistors are available in thick and thin film construction on either alumina or beryllia chips. Multiple sizes are available in several terminal configurations including flange mounted devices. Power ratings up to 100 watts can be specified. VSWR performance is better than 1.15:1 from DC to 1 GHz and better than 1.3:1 from 1 GHz to 8 GHz. Environmental and electrical testing or other high reliability screening tests can be furnished upon request. Please consult our factory with your specific requirements.



HIGH FREQUENCY CHIP ATTENUATORS

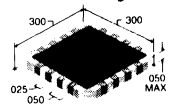
Thick and thin film chip attenuators are available in three sizes: .100 x .050 inch, .150 x .125 inch, and .075 x .060 inch. Attenuation factors of 1 to 20 dB in increments of 0.5 dB are available for the frequency range of DC to 18 GHz. Multiple termination styles can be furnished in gold, palladium/silver, or solder coated nickel barrier. Environmental and electrical testing or other high reliability screening tests can be furnished upon request. Please consult our factory with your specific requirements.

State of the Art, Inc.
2470 FOX HILL ROAD, STATE COLLEGE, PA 16803-1797
SOURCE CODE: 56235, PHONE: 814-355-8004
ONLINE: resistor.com

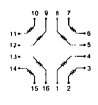
CALL TOLL FREE
800-458-3401
FAX: 814-355-2714

MIL-PRF-914 Surface Mount Resistor Networks

JEDEC Styles

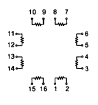


03 Thick Film (16 I/O)



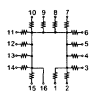
E

Watts/resistor	0.1
Watts/package	0.8
Max Vdc	50



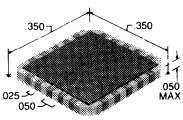
W

Watts/resistor	0.1
Watts/package	0.8
Max Vdc	50

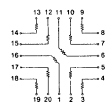


M

Watts/resistor	.05
Watts/package	0.75
Max Vdc	50

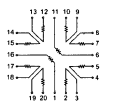


04 Thick Film (20 I/O)



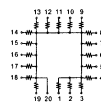
E

Watts/resistor	0.1
Watts/package	1.0
Max Vdc	50



P

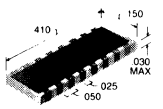
Watts/resistor	0.1
Watts/package	1.0
Max Vdc	50

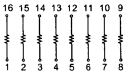


M

Watts/resistor	.05
Watts/package	0.95
Max Vdc	50

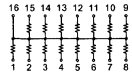
SLAMDIP Style





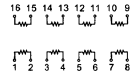
A

Watts/resistor	0.1
Watts/package	0.8
Max Vdc	50



B

Watts/resistor	.055
Watts/package	0.8
Max Vdc	50



C

Watts/resistor	0.1
Watts/package	0.8
Max Vdc	50

05 Thick Film (16 I/O)

PART MARKING— MIL-PRF-914 networks are marked with a three-line code with four digits in each line, as shown in the example above. The code is defined as follows:

Line 1 — Digits 1-3: Date code. Digit 1 = year, digits 2 & 3 = week. Digit 4: TCR.

Line 2 — Digits 1-4: Resistance value. Three significant digits & multiplier.

Line 3 — Digit 1: Tolerance. Digit 2: Schematic configuration. Digit 3: Failure rate. Digit 4: Military JAN certification.

A dot is used to mark the pin 1 location.

MIL-PRF-914 PRODUCTION TESTING

Product levels are based on the same design as established reliability parts at M level failure rate. Product level C is a Non-Established Reliability part requiring no Group A, B, or C testing. Established Reliability level M is subject to Group A, B, and C testing per MIL-PRF-914 as summarized in the tables below.

GROUP A INSPECTION

SUBGROUP 1 (100%)
THERMAL SHOCK
POWER CONDITIONING
DC RESISTANCE

SUBGROUP 2 (SAMPLING)
VISUAL INSPECTION

SUBGROUP 3 (SAMPLING)
SOLDERABILITY

GROUP B INSPECTION

SUBGROUP 1 (SAMPLING)
VISUAL AND MECHANICAL

SUBGROUP 2 (SAMPLING)
TEMPERATURE COEFFICIENT OF RESISTANCE

SUBGROUP 3 (SAMPLING)
RESISTANCE TO SOLVENTS

To order MIL-PRF-914 networks, follow the part numbering format below. The part number **M914D04K1002FMM** specifies a 10 kilohms ±1%, 20-pin thick film network with fused tin/lead terminations, ±100 TCR, schematic M configuration, and 1% per 1000 hours failure rate.

M914 D 04 K 1002 F M M

PRODUCT LEVEL DESIGNATOR
M: 1% per 1000 hours **C:** Non-ER

SCHEMATIC CONFIGURATION
See diagrams above

TOLERANCE
F: 1% **G:** 2% **J:** 5%

RESISTANCE VALUE
Three or four digits are used with all leading digits significant. Four digits are used for 1% tolerance or lower; otherwise, three digits are used. The last digit specifies the number of zeros to add. The letter "R" is used to represent the decimal for fractional ohmic values. Example: 5R6 is 5.6 ohms; 10R0 is 10 ohms; 16R9 is 16.9 ohms; etc.

TEMPERATURE CHARACTERISTIC
K: ±100 ppm **M:** ±300 ppm

SIZE CODE
03: .300 x .300 inch **04:** .350 x .350 inch **05:** .410 x .150 inch

TERMINATION TYPE
D: Fused Tin/Lead Plated **G:** Hot Solder Dip

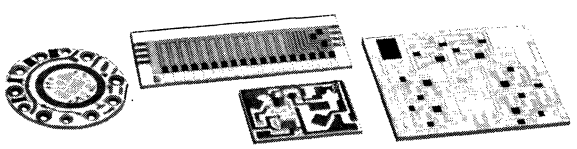
MILITARY ESTABLISHED RELIABILITY SPECIFICATION MIL-PRF-914

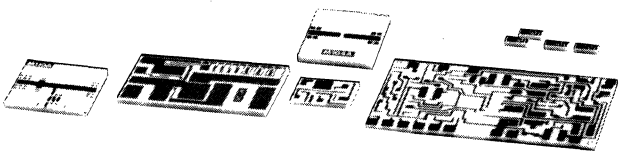
Standard surface mount resistor networks are also available or may be customized for special applications. The JEDEC and SLAMDIP styles above and others, including a 0.200 inch wide SLAMDIP, are available in the standard schematics shown or as customized parts. Custom designs include mixed resistor values, and modified length, width, I/O count, or pitch. Chip capacitors can be mounted on the SMT package to form a low profile RC network. Please check with our factory for complete availability.

Thick & Thin Film Custom Networks

State of the Art produces a variety of custom conductor networks, resistor networks, and resistor/capacitor networks in low and high volume. We can quote and manufacture from a complete network layout or from a schematic with size, component, and output pad location requirements. Our design staff will be glad to assist you in developing your network.

Our thin film custom circuits provide the flexibility needed to meet high density, low TCR, close thermal tracking, and high stability requirements for microwave and other microelectronic applications. Our wide variety of packaging options, styles, and sizes, with in-process screening and quality control, provide the optimum solution to your design challenges. Our expert design staff can help you develop your network.





TAD COMPONENTS, INC.
An ISO 9002 Certified Supplier

Choose from Over 600 Million Pieces of Stock at
http://www.tadcom.com

No Hassle, Real Time, On-Line, Inventory Stock Check and Ordering with TAD! Connect for Direct Success – Resistor Purchasing Made Easy!

Size		± % Tolerance	Values	Rated Power @ 70° C	Resistance Range	Working Voltage	Overload Voltage	TCR	Operating Temp. Range
SURFACE MOUNT THICK FILM STANDARD (R) AND LOW OHMIC RESISTANCE (L)									
0402	R	5	E-24	62.5 mW	10~3.3M	50	100	± 250	-55~+150° C
		1	E-96		10~1M	50	100	± 250	
0603	R	2, 5	E-24	62.5 mW	10~3.3M	50	100	± 200	-55~+150° C
		0.5, 1	E-96		10~1M	50	100	± 100	
0805	R	2, 5	E-24	100 mW	1~10M	150	300	± 200	-55~+150° C
		0.5, 1	E-96		10~1M			± 100	
	L	2	E-24	125 mW	0.10~3.30	0.64	1.28	± 250	-55~+125° C
		5							
		10			0.27~0.91			± 1000/-300	
1206	R	2, 5	E-24	125 mW	1~10M	200	400	± 200	-55~+150° C
		0.5, 1	E-96		10~1M			± 100	
	L	2	E-24	250 mW	0.10~3.30	0.90	1.81	± 250	-55~+125° C
		5							
		10			0.27~0.91			± 1000/-300	
1210	R	2, 5	E-24	250 mW	1~10M	200	400	± 200	-55~+150° C
		0.5, 1	E-96		10~1M			± 100	
	L	2	E-24	0.50W	0.10~3.30	1.28	2.56	± 250	-55~+125° C
		5						± 250	
		10			0.27~0.91			± 1000/-300	
2010	R	2, 5	E-24	500 mW	1~10M	200	400	± 200	-55~+150° C
		0.5, 1	E-96		10~1M			± 100	
	L	10	E-24		0.33~0.91	1.28	2.56	± 1000/-300	
2512	R	2, 5	E-24	1.00 W	1~10M	200	400	± 200	-55~+150° C
		0.5, 1	E-96		10~1M	200	400	± 100	
SURFACE MOUNT CHIP RESISTORS THIN FILM									
0603		0.5	E-96	62.5 mW	10~91	75	150	± 50	-55~+125° C
		0.1, 0.5			100~33K			± 25	
		0.5			36K~330K			± 100	
0805		0.5	E-96	100 mW	10~91	100	200	± 50	
		0.1, 0.5			100~100K			± 25	
		0.5			110~1M			± 100	
1206		0.5	E-96	125 mW	10~91	150	300	± 50	
		0.1, 0.5			100~250K			± 25	
		0.1, 0.5			10~1M			± 100	
TRIMMABLE FLAT CHIP RESISTORS									
0805		+0/-30 and 20	E-24	100 mW	10~1M	150	300	± 200	-55~+150° C
1206				125 mW		200	400		
1210				250 mW		200	400		
2010				500 mW					
2512				1.00 W					
RESISTOR ARRAYS AND NETWORKS ISOLATED AND BUSSED									
CRN10-2		5	E-24	310 mW	10~1M	25	50	± 250	-55~+125° C
CRN10-4		5		310 mW	10~1M	25	50	± 250	
CRN16-2		5		310 mW	10~1M	25	50	± 250	
CRN16-4		2		62.5 mW	47~1M	50	100	± 200	
		5		62.5 mW	10~1M	50	100	± 200	
CRN30-4		2		125 mW	47~1M	50	100	± 200	
		5		125 mW	10~1M	50	100	± 200	
CRN32-4		5		62.5 mW	10~1M	100	200	± 200	
CRN31-8		5		62.5 mW	10~1M	100	200	± 200	
CRN33-8		5		62.5 mW	10~1M	100	200	± 200	
CRN35-8		5		310 mW	100~100K	25	50	± 250	

570 West Lambert Road, Suite M
Brea, CA 92821
714-255-9123 • 800-508-1521
714-255-9291 fax
Internet: http://www.tadcom.com
Email: sales@tadcom.com

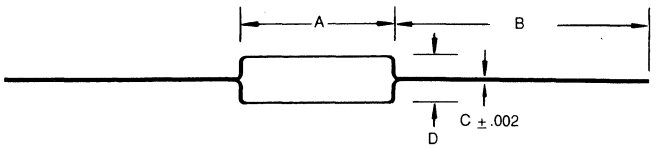
ELECTRO TECHNIK
TEPRO
2608 Enterprise Road, Clearwater FL 33763
(800) 346-5164 • Fax # (727) 791-7425

ESTABLISHED RELIABILITY POWER RESISTORS MIL-R-39007 (RWR) STYLES — TYPE "RWR"/"TE"

TEPRO TYPE	MIL TYPE	RATING (WATTS)	A ±.031	B MIN	C ±.002	D ±.031	MIN. VALUE TEPRO	MIN. VALUE MIL	MAX. VALUE TEPRO	MAX. VALUE MIL
TE.125		.125	.219	1.50	.020	.078	.01	N/A	3K	N/A
TE.25		.25	.312	1.50	.020	.078	.01	N/A	6K	N/A
TE.5		.5	.406	1.50	.020	.093	.01	N/A	10K	N/A
TE1	RWR81	1	.250	1.50	.020	.085	.01	0.1	3.5K	1K
TE1A		1	.406	1.50	.025	.093	.01	N/A	10K	N/A
TE1.5	RWR82	1.5	.312	1.50	.020	.078	.01	0.1	5K	1.3K
TEA2		2	.500	1.50	.032	.187	.01	N/A	28K	N/A
TE2	RWR80	2	.406	1.50	.020	.094	.01	0.1	10K	3.16K
TE3B	RWR71	2	.812	1.50	.032	.187	.01	0.1	16K	12.1K
TE2B	RWR89	3	.560	1.50	.032	.187	.01	0.1	32K	4.12K
TE5	RWR74	5	.875	1.50	.040	.312	.01	0.1	90K	12.1K
TE5C		5	1.00	1.50	.040	.312	.01	N/A	115K	N/A
TE7	RWR84	7	.875	1.50	.040	.312	.01	0.1	90K	12.4K
TE10	RWR78	10	1.78	1.50	.040	.375	.01	0.1	275K	39.2K
TE10C		10	2.00	1.50	.040	.468	.01	N/A	450K	N/A

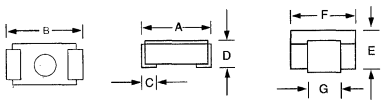
FEATURES
- Miniature size
- High stability
- High-temperature silicone protected
- Non-inductive windings available
- Tolerance to ±0.01%
- Maximum power: size ratio
- Optimum heat dissipation

VARIATION
- Special tolerance
- Special TC
- Lead length and diameter
- Weldable leads
- Molded types available



SURFACE MOUNT RESISTORS — TYPE "TKW"/"TKF"

FEATURES
- Temperature coefficient to ±2 PPM/°C
- Wirewound or Metal Film available
- Non-inductive windings available
- High temperature molding



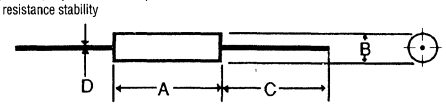
MODEL	A	B	C	D	E	F	G
TKW-5	188±.005 (4.77±.127)	.200±.020 (5.08±.508)	.040±.010 (1.02±.254)	.096±.015 (2.44±.381)	.090±.005 (2.29±.127)	.125±.005 (3.18±.127)	.060±.010 (1.27±.254)
TKW-1	.238±.005 (6.05±.127)	.250±.020 (6.35±.508)	.045±.010 (1.14±.254)	.110±.015 (2.79±.381)	.104±.005 (2.64±.127)	.150±.005 (3.81±.127)	.065±.005 (2.49±.127)

HIGH PRECISION RESISTORS MIL-R-93 (RB) STYLES — TYPE "TB"

TEPRO TYPE	MIL-R-93	DIMENSIONS (inches) A ±.031	B ±.015	C ±.125	D ±.002	MAXIMUM VOLTAGE (VOLTS)	MAXIMUM RESISTANCE (OHMS)	POWER (watts) TEPRO	POWER (watts) MIL
TB-34		.300	.100	1.50	.020	100	150K	.100	.050
TB-35		.250	.125	1.50	.020	150	300K	.125	.065
TB-40		.500	.187	1.50	.025	300	1 Meg.	.350	.175
TB-55	RB-56	.345	.250	1.50	.032	300	1 Meg.	.350	.175
TB-60	RB-55	.500	.250	1.50	.032	400	2 Meg.	.500	.250
TB-65	RB-54	.750	.250	1.50	.032	500	3.5 Meg.	.750	.375
TB-70	RB-53	.750	.375	1.50	.032	600	4 Meg.	.900	.450
TB-75	RB-52	1.000	.375	1.50	.032	750	5 Meg.	1.500	.750
TB-80	RB-57	1.000	.500	1.50	.032	850	10 Meg.	1.750	.850
TB-58	RB-58	1.500	.500	1.50	.032	950	15 Meg.	2.000	1.000

FEATURES
- Meets specifications of MIL-R-93
- Standard accuracies to ±.005%
- Standard TCR ±20 PPM, available to ±1 PPM
- All welded construction
- Epoxy encapsulated, superior moisture protection
- Exceptional resistance stability

VARIATIONS
- Matched tolerances and T.C. tracking in sets
- Positive temperature coefficients
- Pre-conditioning, temp. cycling, burn-in
- Improved rise times
- Four-terminal and radial lead construction



ALUMINUM HOUSED, CHASSIS MOUNT RESISTORS MIL-R-18546 APPROVED TYPE "TM" — TYPE "TM"

GENERAL SPECIFICATIONS
Applicable Mil spec: Mil-R-18546, Mil-R-39009
Standard Tolerances: 0.05 to 5%
Dielectric Strength: 1000 VAC TM-5, TM-10, TM-25
2000 VAC TM-50
3000 VAC TM-100, TM-250
Insulation Resistance: 10000 megohms minimum.
Temperature Coefficients: 10 ohms and above:
±20 PPM
1 ohm to 9.9 ohms: ±50 PPM
Below 1 ohm: ±90 PPM
Terminal Strength: 5-lb. pull test TM-5, TM-10
10-lb. pull test all others

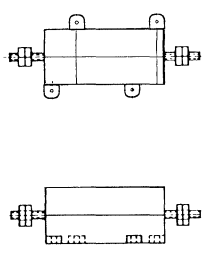
FEATURES
- Chassis mount for heat sink effect
- Silicone protected windings
- Miniature size
- Non-inductive windings
- High stability
- Optimum power to size ratio
- Higher ambients
- Withstand severe environments

ELECTRICAL SPECIFICATIONS

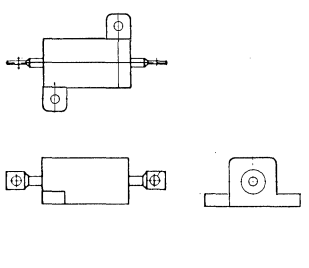
TEPRO TYPE	MIL TYPE	POWER RATING/WATTS TEPRO	POWER RATING/WATTS MIL	RESISTANCE RANGE OHMS
TM5	RE60	7.5	5	0.005 - 20K
TM10	RE65	12.5	10	0.005 - 40K
TM25	RE70	25	20	0.005 - 90K
TM50	RE75	50	30	0.005 - 250K
TM100	RE77	100	75	0.01 - 500K
TM250	RE80	250	120	0.01 - 700K

VARIATIONS
- Special TC on request
- Closer tolerances to .01%
- Special terminals
- Flexible leads

TM-100, TM-250



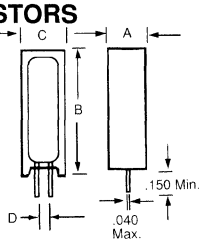
TM-5, TM-10, TM-25, TM-50



VERTICAL MOUNT POWER RESISTORS — TYPE "TCV"

FEATURES
- Radial leads for PC Mount
- Space saving design
- Ceramic Encased
- Continuous full power operation
- Fire proof construction
- All welded wirewound assembly or high grade Metal Film element depending on application

VARIATIONS
- Tolerance to .01%
- Temperature coefficients to +5 PPM
- Fusing applications



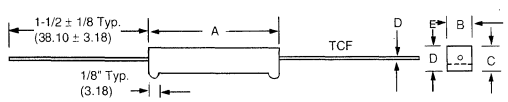
DIMENSIONS (inches)

TEPRO TYPE	POWER @ 25°C	A ±.040	B ±.062	C ±.032	D ±.015	RESISTANCE RANGE
TCV2	2	.300	.80	.450	.200	.01-20K Ohm
TCV3	3	.300	.80	.450	.200	.01-20K Ohm
TCV5	5	.350	1.0	.520	.200	.01-30K Ohm
TCV10	10	.400	1.500	.500	.200	.01-50K Ohm

PRECISION POWER WIREWOUNDS FOR PULSE AND SURGE APPLICATIONS — TYPE "TC"

FEATURES
- Ceramic Encased
- Flame proof construction
- Continuous full power operation
- All welded construction

VARIATIONS
- Tolerance to .01%
- Temperature coefficients to +5 PPM
- Special fusing for fuse designs
- Available with or without stand offs



STANDARD CONFIGURATIONS AND ELECTRICAL SPECIFICATIONS

TEPRO TYPE	POWER @ 25°C	RESISTANCE RANGE	DIMENSIONS (mm) A ±.03(.8)	B ±.03(.8)	C ±.03(.8)	D Diameter	E ±.03(.8)
TC2	2	.001 - 20K	.69(17.5)	.275(6.99)	.275(6.99)	.032(.8)	.32(8.13)
TC3	3	.001 - 20K	.88(22.3)	.310(7.87)	.310(7.87)	.032(.8)	.38(9.65)
TC5	5	.001 - 40K	.88(22.3)	.380(9.65)	.350(8.89)	.032(.8)	.41(10.4)
TC7	7	.001 - 45K	1.39(35.3)	.380(9.65)	.350(8.89)	.032(.8)	.47(11.9)
TC10	10	.001 - 50K	1.88(47.7)	.380(9.65)	.350(8.89)	.032(.8)	.47(11.9)

ELECTRO TECHNIK

TEPRO

2608 Enterprise Road, Clearwater FL 33763
(800) 346-5164 • Fax # (727) 791-7425

LINE FEED PROTECTOR — TYPE "TCVF"

FEATURES
- Continuous full power operation (2 watts)
- Meets TR-1089 (Above 50 ohms)
- Radial lead
- High stability
- Flame proof construction
- Withstands lightning surges (50 each of Fig. 1, Fig. 2)
- Fuses open safely under overpower conditions
- Space saving vertical mount

VARIATIONS
- Tolerances to .05%
- Matching & binning available
- Special temperature or fusing characteristics available

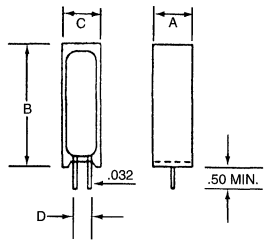
LIGHTNING SURGE CAPABILITIES

RESISTIVE RANGE	10 X 1000*	10 X 360*
1 to 9.9Ω	250V	650V
10 to 29.9Ω	500V	850V
30 to 99.0Ω	600V	1000V
100 to 1600Ω	1000V	1500V

* 10 microseconds - Maximum rise time to peak voltage. 360 or 1000 microseconds - Minimum decay time to one half peak.

DIMENSIONS (inches)

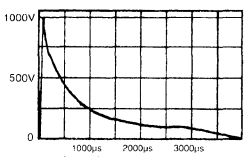
TEPRO TYPE	POWER @ 25°C	A ±.040	B ±.062	C ±.032	D ±.015	RESISTANCE RANGE
TCVF2	2	.300	.800	.450	.200	1 - 10K Ohm



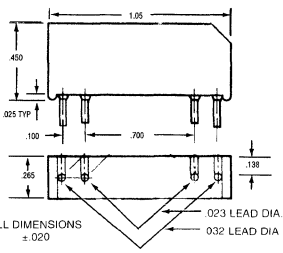
LINE FEED PROTECTOR — TYPE "TPRO"

FEATURES
- Continuous full power operation (2 watts)
- Meets TR-1089 (Above 50 ohms)
- Radial lead
- High stability
- Flame proof construction
- Withstands lightning surges (50 each of Fig. 1, Fig. 2)
- Fuses open safely under overpower conditions

VARIATIONS
- Tolerances to .05%
- Matching & binning available
- Special temperature or fusing characteristics available



1000 Volts - 10 x 360µsec



LIGHTNING SURGE CAPABILITIES

RESISTIVE RANGE	10 X 1000*	10 X 360*
1 to 9.9Ω	250V	650V
10 to 29.9Ω	500V	850V
30 to 99.0Ω	600V	1000V
100 to 1600Ω	1000V	1500V

* 10 microseconds - Maximum rise time to peak voltage. 360 or 1000 microseconds - Minimum decay time to one half peak.

PRECISION LOW OHM, FOUR TERMINAL CURRENT SHUNT RESISTORS — TYPE "TP"

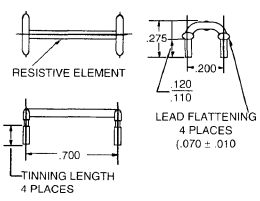
FEATURES
- Miniature size
- Continuous full power operation
- Radial lead for PC boards
- Four terminals for current sensing
- High stability

VARIATIONS
- Tolerance to .05%
- Special TC
- Lead length and diameter
- Body and lead configurations

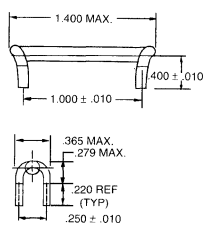
STANDARD CONFIGURATIONS AND ELECTRICAL SPECIFICATIONS

TEPRO TYPE	POWER RATING WATTS	MIN VALUE	MAX VALUE	LEAD WIRE
TP1	1	.002	.05	.040, .051
TP2	5	.001	.002	.081

TP1



TP2

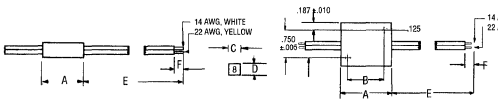


ALUMINUM HOUSED, PRECISION LOW OHM, 4 TERMINAL CURRENT SHUNT RESISTORS — TYPE "TL"

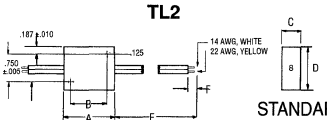
FEATURES
- Chassis mount for heat sink effect
- Silcone protected windings
- Miniature size
- Non-inductive windings
- High stability
- Optimum power to size ratio
- Higher ambients
- Withstand severe environments
- Flexible leads
- 4 terminals for current sensing

VARIATIONS
- Special TC on request
- Closer tolerances to .05%
- Special lead lengths

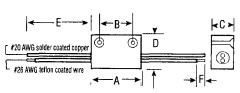
TL1



TL2



TL 3, TL 4



STANDARD CONFIGURATIONS AND ELECTRICAL SPECIFICATIONS

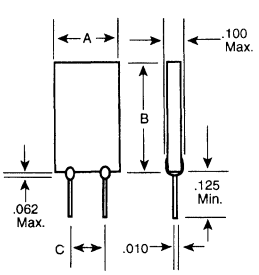
TEPRO TYPE	A ±.031	B ±.031	C ±.015	D ±.015	E ±.125	F ±.062	POWER (Watts)	RESISTANCE RANGE (Ohms)
TL1	1.00	N/A	.312	0.312	6.00	.250	3	.001 - 5K
TL2	1.50	1.00	.500	1.125	9.00	.250	5	.001 - 10K
TL3	0.625	0.400	.312	0.450	1.50	.250	5	.001 - 10K
TL4	1.03	0.788	.312	0.450	1.50	.250	7	.001 - 10K

THICK FILM RADIAL LEAD — TYPE "T"

FEATURES
- High power density
- Space saving design
- Optimum heat dissipation
- Non-inductive

TEPRO TYPE	25°C POWER RATING WATTS	PHYSICAL DIMENSIONS A ±.010	B ±.031	C ±.031
T3	3	0.50	0.6	0.2
T5	5	0.50	1.0	0.2
T7	7	0.75	1.0	0.3
T10	10	1.00	1.0	0.3

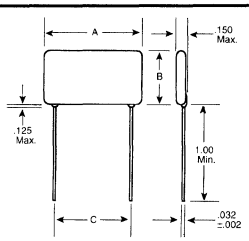
GENERAL SPECIFICATIONS
Dielectric Strength: 500 VDC all styles
Insulation Resistance: 10000 megohms minimum
Terminal Strength: 5-lb. pull test for all styles
Solderability: Continuous satisfactory coverage when tested in accordance with MIL-R-10509
Element: High temperature fired cermet film
Substrate: High purity 96% alumina
Coating: Hi-temp glass
Termination: Solder-coated copper
Tolerances: .25, .5, 1, 3, 5, 10%
Temperature Coefficient: 100 PPM/°C
Resistances: 1 ohm to 100 megohms
Voltage Coefficient: ±5 PPM/V
Maximum Operating Voltage: 350 VAC, 500 VDC



THICK FILM HIGH VOLTAGE RESISTORS — TYPE "THV"

GENERAL SPECIFICATIONS
Dielectric Strength: 750 VDC all styles
Insulation Resistance: 10000 megohms minimum
Terminal Strength: 5-lb. pull test for all styles
Solderability: Continuous satisfactory coverage when tested in accordance with MIL-R-10509
Element: High temperature fired cermet film
Substrate: High purity 96% alumina
Coating: Flameproof epoxy
Termination: Solder-coated copper, 60/40
Tolerances: .25, .5, 1, 3, 5, 10%
Temperature Coefficient: 100 PPM/°C

FEATURES
- Conformal epoxy coating
- Shock & moisture resistant
- High voltage stability
- Low inductance
- Operating temperature -55°C to 150°C



TEPRO TYPE	25°C POWER RATING WATTS	MAX. DC VOLTAGE	PHYSICAL DIMENSIONS A ±.031	B ±.031	C ±.031
THV-1	1	10KV	1.03	.28	0.90
THV-2	2	10KV	1.03	.53	0.90
THVB-2	2	20KV	2.03	.28	1.90
THV-3	3	15KV	1.53	.53	1.40
THV-4	4	20KV	2.03	.53	1.90
THV-5	5	25KV	2.53	.53	2.40
THV-10	10	25KV	2.53	1.28	2.40

ELECTRO TECHNIK

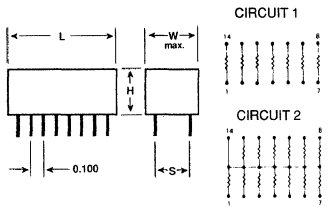
TEPRO

2608 Enterprise Road, Clearwater FL 33763
(800) 346-5164 • Fax # (727) 791-7425

ULTRA PRECISION THIN FILM DIP NETWORKS

TYPE "DN"

TEPRO TYPE	NUMBER PINS	DIMENSIONS (inches) L ±.01	W ±.01	H ±.01	S MAX
DN-708-1	8	0.530	0.410	0.250	0.300
DN-714-1	14	0.790	0.410	0.250	0.300
DN-716-1	16	0.890	0.410	0.250	0.300
DN-808-2	8	0.530	0.480	0.460	0.300
DN-814-2	14	0.760	0.480	0.460	0.300
DN-816-2	16	0.860	0.480	0.460	0.300



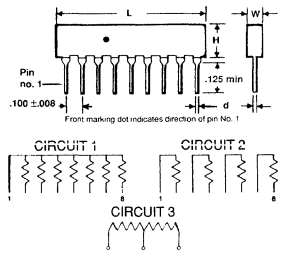
FEATURES
- Temperature Coefficients to ±1 ppm/°C
- Tolerances to ±0.01%
- Superior TCR tracking to ±.5 ppm/°C
- Ratios available to .0025%
- Custom circuit schematics available

ULTRA PRECISION THIN FILM SIP NETWORKS

TYPE "SN"

SPECIFICATIONS
- Elements: Vacuum deposited Nickel-Chrome alloy
- Terminals: Tinned copper leads, solderable/ weldable per Mil-Std-1276, Type "C"
- Operating Temperature Range: -55°C to -125°C
- Insulation Resistance: greater than 10^9 MΩ
- Dielectric Strength: 300 VRMS (Min.)
- Voltage Coefficient: 5 ppm/volt (Max.)
- Noise factor: Below -20 db

FEATURES
- Temperature Coefficients to ±1 ppm/°C
- Tolerances to ±0.01%
- Superior tracking to ±.5 ppm/°C
- Ratios available to .0025%
- Custom circuit schematics available
- 3 through 11-pin packages



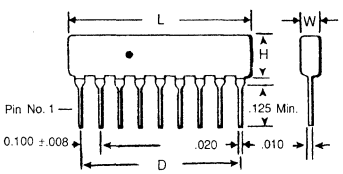
TEPRO TYPE	NUMBER PINS	DIMENSIONS (inches) L ±.01	W ±.01	H ±.01	D ±.002
SN-603-3	3	.320	.120	.350	.016
SN-604-1	4	.420	.120	.350	.025
SN-605-1	5	.520	.120	.350	.025
SN-606-1	6	.620	.120	.350	.025
SN-607-1	7	.720	.120	.350	.025
SN-608-1	8	.820	.120	.350	.025
SN-609-1	9	.920	.120	.350	.025
SN-610-1	10	1.020	.120	.350	.025
SN-611-1	11	1.120	.150	.400	.025

RESISTOR/CAPACITOR NETWORK

TYPE "RC"

FEATURES
- Standard resistance range: 10Ω to 2.2 Meg.
- Standard tolerances: ±1%, 2%, 5%
- Standard TC: ±200 ppm (10 ppm available)
- Single resistor wattage ratings up to 0.5 Watt
- Multiple resistance values available within a single pack
- Capacitors available:
  NPO: 10 pf - 4700 pf, ±5% & ±10%
  X7R: 500 pf - 0.1 µf, ±10 & 20%
- Diodes available
- Custom circuits available

TEPRO TYPE	NUMBER PINS	DIMENSIONS (inches) L MAX.	W MAX.	H MAX.	D ±.01
RC-04	4	.400	.130	.350	.300
RC-05	5	.500	.130	.350	.400
RC-06	6	.600	.130	.350	.500
RC-07	7	.700	.130	.350	.600
RC-08	8	.800	.130	.350	.700
RC-09	9	.900	.130	.350	.800
RC-10	10	1.000	.130	.350	.900
RC-11	11	1.100	.130	.350	1.000
RC-12	12	1.200	.130	.350	1.100

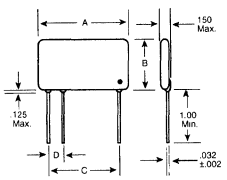


THICK FILM HIGH VOLTAGE DIVIDER NETWORKS

TYPE "THVD"

GENERAL SPECIFICATIONS
Dielectric Strength: 750 VDC all styles
Insulation Resistance: 10000 megohms minimum
Terminal Strength: 5-lb. pull test for all styles
Solderability: Continuous satisfactory coverage when tested in accordance with MIL-R-10509
Element: High temperature fired cermet film
Substrate: High purity 96% alumina
Coating: Flameproof epoxy
Termination: Solder-coated copper, 60/40

FEATURES
- Conformal epoxy coating
- Shock & moisture resistant
- High voltage stability
- Low inductance
- Operating temperature -55°C to 150°C
- Resistance ratio 1:1 to 2000:1
- Ratio tolerances .25% to 2%
- Temperature coefficient tracking 25 PPM



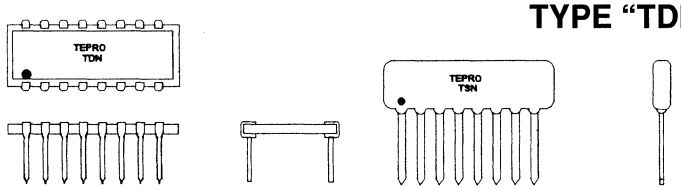
TEPRO TYPE	25°C POWER RATING WATTS	MAX. DC VOLTAGE	PHYSICAL DIMENSIONS A ±.062	B ±.062	C ±.031	D ±.031
THVD-2	3	10KV	1.03	1.03	0.90	.20
THVD-3	4	15KV	1.53	1.03	1.40	.20
THVD-5	7	20KV	2.03	1.03	1.80	.20

STANDARD AND CUSTOM THICK FILM SIP AND DIP NETWORKS

TYPE "TSN" SIP
TYPE "TDN" DIP

FEATURES
- Resistance element: Noble metal cermet film
- Substrate material: 96% alumina - std
- Resistance range: 10 ohms to 20 Megohms - std
- Resistance tolerance: ±1% and ±5% - std
- Temperature Coefficient:
  <50 ohms ±100 ppm/°C
  50 ohms - 1 Megohms ±50 ppm/°C
  1 Megohm - 20 Megohm ±200 ppm/°C
- Power rating, watts: .125W per resistor to max of 2W per module
- Operating temperature: -55°C to 150°C
- Lead material: Solder coated copper
- Overcoating: Polymer or glass

VARIATIONS
- Custom circuits
- One or two sided
- Via holes available
- Chip capacitors mountable
- Resistance matching
- TCR matching
- Ratio matching
- Surface mount leads
- Variable pitch lead spacing
- Custom substrate dimension
- Custom substrate thickness
- Circuit trace crossovers
- Surge capability
- High thermally conductive BeO substrates available

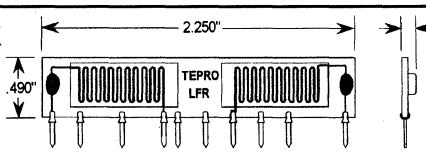


Several predesigned popular circuit configurations are available as "Standards"
For custom quotes fax your sketch to (813) 791-7425

THICK FILM SURGE RESISTOR NETWORK

TYPE "LFR"

FEATURES
- Glass encapsulated thick film cermet fired to 96% alumina substrates
- Precision laser trimmed to tolerance
- Standard SIP package on .100" pitch
- Custom pinouts available



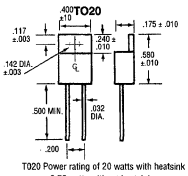
- For lightning surge protection applications particularly in telecommunications switching circuits.
- Designed as fail-safe for nearby personnel and equipment
- Available in both thermally fused and non-fused styles

TO-220 STYLE THICK FILM HEAT SINK DEVICE

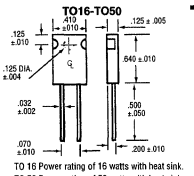
TYPE TO

FEATURES
- TO-220 style package
- Miniature size
- Maximum power: size ratio
- High stability
- Optimum heat dissipation
- High temperature molding
- Non-inductive
- Copper heat sink molded into TO 50 package*

TYPE	POWER RATING	DIELECT. STRENGTH VAC	MAX VOLTAGE	RESISTANCE (OHMS) MIN	MAX
TO-20	20 watts	1000	200	0.1	20K
TO-16	16 watts	1500	300	0.1	20K
TO-50*	50 watts	1500	300	0.1	20K



T020 Power rating of 20 watts with heatsink
2.75 watts without heatsink.



TO 16 Power rating of 16 watts with heat sink.
TO 50 Power rating of 50 watts with heat sink.
TO 16, TO 50 2.25 watts without heat sink.

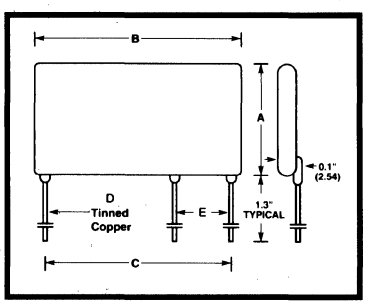
Victoreen Components

Phone: 440-248-9300 Fax: 440-248-9301

www.victoreen.com

SLIM-MOX® Resistors

- Wide resistance range to 5,000 megohms
- Voltage rating to 20KV
- Low voltage coefficient
- Noninductive resistor design
- Low capacitance
- High dielectric and low outgassing epoxy coating
- Silicone and glass dielectric coatings are available
- Resistance tolerances range from 0.5, 1, 5, 10, and 20%*



NOTE: If you need something other than what we publish, call 216-248-9300 and ask!

SLIM-MOX RESISTOR DIVIDER SERIES

Victoreen Type	Resistance Range	Power @25°C	Max. Voltage Rating	Max. Ratio	C max	E Lead Spacing
SLIM-MOX103RD	1M to 5,000M	0.75 W	5.0 KV	1,000:1	0.65" (16.51)	0.20" (5.08)
SLIM-MOX104RD	1M to 5,000M	1.0 W	10.0 KV	1,000:1	0.90" (22.86)	0.20" (5.08)
SLIM-MOX106RD	1M to 5,000M	1.5 W	12.0 KV	1,000:1	1.40" (35.56)	0.20" (5.08)
SLIM-MOX108RD	1M to 5,000M	2.0 W	15.0 KV	1,000:1	0.90" (22.86)	0.60" (15.24)
SLIM-MOX204RD	1M to 5,000M	1.5 W	10.0 KV	1,000:1	0.90" (22.86)	0.20" (5.08)
SLIM-MOX206RD	1M to 5,000M	2.0 W	12.0 KV	2,500:1	1.40" (35.56)	0.20" (5.08)
SLIM-MOX208RD	1M to 5,000M	2.5 W	20.0 KV	4,000:1	1.90" (48.26)	0.40" (10.16)
SLIM-MOX210RD	1M to 5,000M	3.0 W	25.0 KV	5,000:1	2.40" (60.96)	0.20" (5.08)
SLIM-MOX306RD	1M to 5,000M	3.0 W	12.0 KV	2,500:1	1.40" (35.56)	0.30" (7.62)
SLIM-MOX308RD	1M to 5,000M	3.5 W	20.0 KV	4,000:1	1.90" (48.26)	0.30" (7.62)
SLIM-MOX310RD	1M to 5,000M	4.0 W	25.0 KV	5,000:1	2.40" (60.96)	0.20" (5.08)
SLIM-MOX408RD	1M to 5,000M	4.5 W	20.0 KV	5,000:1	1.90" (48.26)	0.30" (7.62)
SLIM-MOX410RD	1M to 5,000M	5.0 W	25.0 KV	5,000:1	2.40" (60.96)	0.20" (5.08)

Ratio tolerances available 0.5, 1, 3% Temperature Coefficient tracking –50 PPM/°C

SLIM-MOX RESISTOR SERIES

Victoreen Type	Resistance Range (Ohms)	Power @25°C	Max. Voltage Rating	Physical Dimensions A max	B max	C max	D max
SLIM-MOX100	100 ohms to 500M	0.25 W	1.5 KV	0.30" (7.62)	0.30" (7.62)	0.10" (2.54)	0.025" (.635)
SLIM-MOX101	100 ohms to 250M	0.50 W	2.0 KV	0.34" (8.64)	0.33" (8.38)	0.20" (5.08)	0.025" (.635)
SLIM-MOX102	200 ohms to 5,000M	1.0 W	5.0 KV	0.34" (8.64)	0.58" (14.73)	0.40" (10.16)	0.032" (.813)
SLIM-MOX103	250 ohms to 5,000M	1.25 W	7.5 KV	0.34" (8.64)	0.83" (21.08)	0.60" (15.24)	0.032" (.813)
SLIM-MOX104	500 ohms to 5,000M	1.5 W	10.0 KV	0.34" (8.64)	1.08" (27.43)	0.90" (22.86)	0.032" (.813)
SLIM-MOX106	750 ohms to 5,000M	2.0 W	15.0 KV	0.34" (8.64)	1.58" (40.13)	1.40" (35.56)	0.032" (.813)
SLIM-MOX108	1K to 5,000M	2.5 W	20.0 KV	0.34" (8.64)	2.08" (52.83)	1.90" (48.26)	0.032" (.813)
SLIM-MOX202	500 ohms to 5,000M	1.5 W	5.0 KV	0.59" (14.99)	0.58" (14.73)	0.40" (10.16)	0.032" (.813)
SLIM-MOX204	1K to 5,000M	2.0 W	10.0 KV	0.59" (14.99)	1.08" (27.43)	0.90" (22.86)	0.032" (.813)
SLIM-MOX206	2K to 5,000M	2.5 W	15.0 KV	0.59" (14.99)	1.58" (40.13)	1.40" (35.56)	0.032" (.813)
SLIM-MOX208	2K to 5,000M	3.0 W	20.0 KV	0.59" (14.99)	2.08" (52.83)	1.90" (48.26)	0.032" (.813)
SLIM-MOX210	3K to 5,000M	3.5 W	25.0 KV	0.59" (14.99)	2.58" (65.53)	2.40" (60.96)	0.032" (.813)
SLIM-MOX306	2K to 5,000M	3.5 W	15.0 KV	0.84" (21.34)	1.58" (40.13)	1.40" (35.56)	0.032" (.813)
SLIM-MOX308	4K to 5,000M	4.0 W	20.0 KV	0.84" (21.34)	2.08" (52.83)	1.90" (48.26)	0.032" (.813)
SLIM-MOX310	5K to 5,000M	4.5 W	25.0 KV	0.84" (21.34)	2.58" (65.53)	2.40" (60.96)	0.032" (.813)
SLIM-MOX404	3K to 1,500M	3.0 W	10.0 KV	1.09" (27.69)	1.08" (27.43)	0.90" (22.86)	0.032" (.813)
SLIM-MOX408	5K to 5,000M	5.0 W	20.0 KV	1.09" (27.69)	2.08" (52.83)	1.90" (48.26)	0.032" (.813)
SLIM-MOX410	5K to 5,000M	5.5 W	25.0 KV	1.09" (27.69)	2.58" (65.53)	2.40" (60.96)	0.032" (.813)

SLIM-MOX High Megohm Resistor Kit

- Excellent engineering kits
- Fourteen different style/resistance combinations
- Five resistors of each style/resistance combination; 70 resistors in all
- All resistors are 1% tolerance
- Resistors can be used in parallel or series circuits to achieve any resistance value within the resistance range
- Comes with sturdy storage case

STYLE	RESISTANCE	VOLTAGE RATING	POWER RATING
SLIM-MOX102	1 Meg	5.0 KV	1.0 W
SLIM-MOX102	5 Meg	5.0 KV	1.0 W
SLIM-MOX104	5 Meg	10.0 KV	1.5 W
SLIM-MOX102	10 Meg	5.0 KV	1.0 W
SLIM-MOX108	10 Meg	20.0 KV	2.5 W
SLIM-MOX102	50 Meg	5.0 KV	1.0 W
SLIM-MOX104	50 Meg	10.0 KV	1.5 W
SLIM-MOX104	100 Meg	10.0 KV	1.5 W
SLIM-MOX108	100 Meg	20.0 KV	2.5 W
SLIM-MOX102	500 Meg	5.0 KV	1.0 W
SLIM-MOX108	500 Meg	20.0 KV	2.5 W
SLIM-MOX102	1,000 Meg	5.0 KV	1.0 W
SLIM-MOX104	1,000 Meg	10.0 KV	1.5 W
SLIM-MOX108	1,000 Meg	20.0 KV	2.5 W

ENVIRONMENTAL SPECIFICATONS

Characteristic	Test Method	Requirement
Humidity	MIL-STD-202, Method 103B Condition B	±0.25%
Dielectric Withstanding Voltage	MIL-STD-202, Method 301 750V	±0.25%
Insulation Resistance	MIL-STD-202, Method 302 Condition A or B	> 10,000 M or greater dry
Thermal Shock	MIL-STD-202, Method 107G Condition B, B-1, or F	±0.20%
Load Life	MIL-STD-202, Method 108A Condition D	±1.0%
Resistance To Solvents	MIL-STD-202, Method 215G	No degradation of coating or marking
Terminal Strength	MIL-STD-202, Method 211A Condition A or B	±0.25%
Shock (Specified Pulse)	MIL-STD-202, Method 213B Condition I	±0.25%
Vibration, High Frequency	MIL-STD-202, Method 204D Condition D	±0.20%
Power Conditioning	MIL-R-49462A, Par 4.8	±0.50%
Solderability	MIL-STD-202, Method 208F	> 95% Coverage

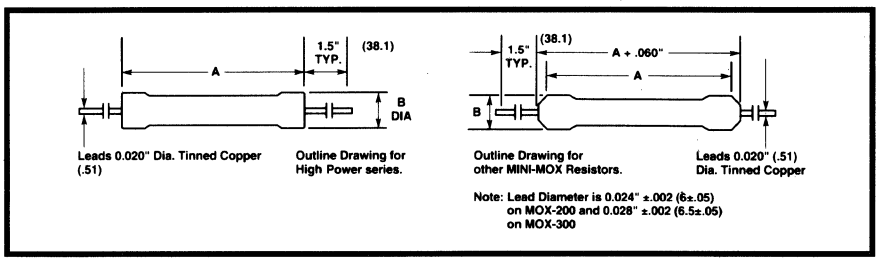
Victoreen Components

Phone: 440-248-9300 Fax: 440-248-9301

www.victoreen.com

MINI-MOX® Resistors

- Wide resistance range 1K ohm to 100,000 megohms
- Voltage rating to 6KV
- Power rating to 1.5 watts
- Silicone or epoxy coatings are available
- Metal oxide resistive element
- Tape and reel packaging available
- Specials are available, call 216-248-9300!



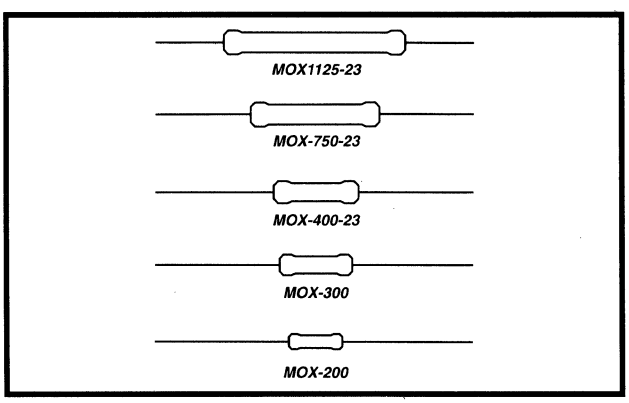
MINI-MOX HIGH TEMP SERIES						
					Physical Dimensions	
Victoreen Type	Resistance Range (Ohms)	Power @70°C	Maximum Voltage Rating	Available Tolerances	A max	B max
MOX-250-22	250 ohms to 125,000M	0.175 W	1,250 V	5% to 20%	0.300" (7.62)	0.140" (3.56)
MOX-400-22	500 ohms to 300,000M	0.35 W	2,500 V	1% to 20%	0.520" (13.21)	0.140" (3.56)
MOX-750-22	750 ohms to 600,000M	0.70 W	5,000 V	1% to 20%	0.820" (20.83)	0.140" (3.56)
MOX1125-22	1K to 1,000,000M	1.40 W	7,500 V	1% to 20%	1.210" (30.73)	0.140" (3.56)

Not all tolerances are available over entire resistance range. Contact Victoreen Inc. for details.

MINI-MOX COMMERCIAL SERIES						
					Physical Dimensions	
Victoreen Type	Resistance Range (Ohms)	Power @25°C	Maximum Voltage Rating	Available Tolerances	A max	B max
MOX-200	1M to 1,000M	0.125 W	500 V	0.1% to 20%	0.300" (7.62)	0.105" (2.67)
MOX-300	1M to 1,000M	0.25 W	1,000 V	0.1% to 20%	0.435" (11.05)	0.145" (3.68)
MOX-250-23	250 Ohms to 125,000M	0.35 W	1,000 V	2% to 20%	0.365" (9.27)	0.165" (4.19)
MOX-400-23	500 Ohms to 300,000M	0.25 W	2,500 V	0.25% to 20%	0.540" (13.72)	0.165" (4.19)
MOX-750-23	1K to 600,000M	0.50 W	4,000 V	0.25% to 20%	0.860" (21.84)	0.165" (4.19)
MOX1125-23	1K to 1,000,000M	1.00 W	6,000 V	0.25% to 20%	1.250" (31.75)	0.165" (4.19)

MINI-MOX High Megohm Resistor Kit

- Excellent engineering kits
- Fourteen different style/resistance combinations
- Five resistors of each style/resistance combination; 70 resistors in all
- All resistors are 1% tolerance
- Resistors can be used in parallel or series circuits to achieve any resistance value within the resistance range
- Comes with sturdy storage case



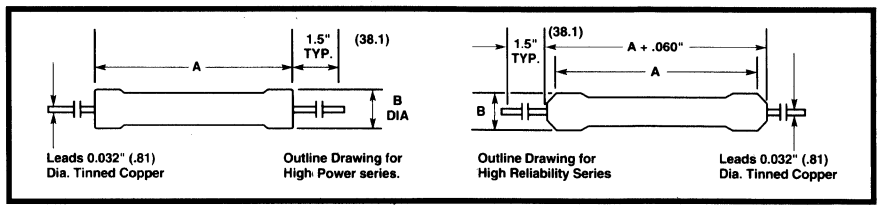
STYLE	RESISTANCE	VOLTAGE RATING	POWER RATING
MOX-300	1 Meg	1,000 V	0.50 W
MOX-200	2 Meg	500 V	0.25 W
MOX-400-23	5 Meg	2,500 V	0.75 W
MOX-300	10 Meg	1,000 V	0.50 W
MOX-200	20 Meg	500 V	0.25 W
MOX-300	30 Meg	1,000 V	0.50 W
MOX-400-23	50 Meg	2,500 V	0.75 W
MOX1125-23	100 Meg	6,000 V	1.50 W
MOX-400-23	200 Meg	2,500 V	0.75 W
MOX-300	300 Meg	1,000 V	0.50 W
MOX-400-23	500 Meg	2,500 V	0.75 W
MOX-750-23	1,000 Meg	4,000 V	1.00 W
MOX-750-23	2,000 Meg	4,000 V	1.00 W
MOX1125-23	10,000 Meg	6,000 V	1.50 W

ENVIRONMENTAL SPECIFICATONS		
Characteristic	Test Method	Requirement
Humidity	MIL-STD-202, Method 103B Condition B	±0.25%
Dielectric Withstanding Voltage	MIL-STD-202, Method 301 750V	±0.25%
Insulation Resistance	MIL-STD-202, Method 302 Condition A or B	> 10,000 M or greater dry
Thermal Shock	MIL-STD-202, Method 107G Condition B, B-1, or F	±0.20%
Load Life	MIL-STD-202, Method 108A Condition D	±2.0%
Resistance To Solvents	MIL-STD-202, Method 215G	Acceptable for Commercial Series only
Terminal Strength	MIL-STD-202, Method 211A Condition A or B	±0.25%
Shock (Specified Pulse)	MIL-STD-202, Method 213B Condition I	±0.25%
Vibration, High Frequency	MIL-STD-202, Method 204D Condition D	±0.20%
Power Conditioning	MIL-R-49462A, Par 4.8	±0.50%
Solderability	MIL-STD-202, Method 208F	> 95% Coverage

Victoreen Components
Phone: 440-248-9300 Fax: 440-248-9301
www.victoreen.com

MAXI-MOX™ Resistors

- Wide resistance range 1K ohm to 10,000 megohms
- Voltage rating to 37.5KV
- Power rating to 12.5 watts
- Metal oxide resistance element
- Specials are available, call 216-248-9300!



ENVIRONMENTAL SPECIFICATONS		
Characteristic	**Test Method**	**Requirement**
Humidity	MIL-STD-202, Method 103B Condition B	±0.25%
Dielectric Withstanding Voltage	MIL-STD-202, Method 301 750V	±0.25%
Insulation Resistance	MIL-STD-202, Method 302 Condition A or B	> 10,000 M or greater dry
Thermal Shock	MIL-STD-202, Method 107G Condition B, B-1, or F	±0.20%
Load Life	MIL-STD-202, Method 108A Condition D	±2.0%
Resistance To Solvents	MIL-STD-202, Method 215G	Acceptable for High Temp Series only
Terminal Strength	MIL-STD-202, Method 211A Condition A or B	±0.25%
Shock (Specified Pulse)	MIL-STD-202, Method 213B Condition I	±0.25%
Vibration, High Frequency	MIL-STD-202, Method 204D Condition D	±0.20%
Power Conditioning	MIL-R-49462A, Par 4.8	±0.50%
Solderability	MIL-STD-202, Method 208F	> 95% Coverage

Not all tolerances are available over entire resistance range. Contact Victoreen Inc. for details.

MAXI-MOX COMMERCIAL						
					Physical Dimensions	
Victoreen Type	**Resistance Range (Ohms)**	**Power @25°C**	**Maximum Voltage Rating**	**Available Tolerances**	**A max**	**B max**
MOX-1-13	250 ohms to 300,000M	2.0 W	10 KV	.025, .5, 1, 2, 5	1.140" (28.96)	0.345" (8.76)
MOX-2-13	500 ohms to 700,000M	3.0 W	20 KV	.025, .5, 1, 2, 5	2.140" (54.36)	0.345" (8.76)
MOX-3-13	750 ohms to 1,000,000M	4.0 W	30 KV	.025, .5, 1, 2, 5	3.140" (79.76)	0.345" (8.76)
MOX-4-13	1K to 1,000,000M	5.0 W	40 KV	.025, .5, 1, 2, 5	4.140" (105.16)	0.345" (8.76)
MOX-5-13	1.25K to 1,000,000M	6.0 W	50 KV	.025, .5, 1, 2, 5	5.140" (130.56)	0.345" (8.76)

MAXI-MOX HIGH TEMP. SERIES						
					Physical Dimensions	
Victoreen Type	**Resistance Range (Ohms)**	**Power @70°C**	**Maximum Voltage Rating**	**Available Tolerances**	**A max**	**B max**
MOX-1-12	250 ohms to 300,000M	2.5 W	10 KV	1, 2, 5	1.120" (28.45)	0.310" (7.87)
MOX-2-12	500 ohms to 700,000M	5.0 W	20 KV	1, 2, 5	2.120" (53.85)	0.310" (7.87)
MOX-3-12	750 ohms to 1, 000,000M	7.5 W	30 KV	1, 2, 5	3.120" (79.24)	0.310" (7.87)
MOX-4-12	1K to 1,000,000M	10.0 W	40 KV	1, 2, 5	4.120" (104.65)	0.310" (7.87)
MOX-5-12	1.25K to 1,000,000M	12.5 W	50 KV	1, 2, 5	15.120" (130.05)	0.310" (7.87)

MAXI-MOX™ Resistor Dividers

FEATURES

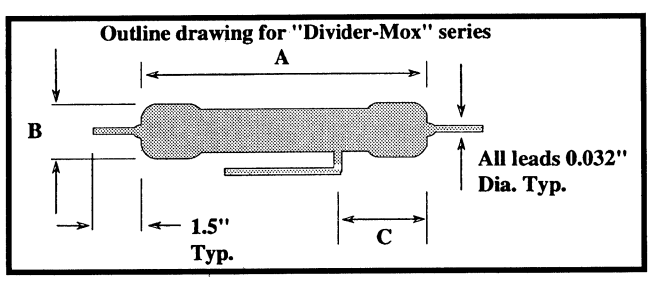
- Wide resistance ranges
- Voltage rating to 30KV
- Power rating to 4.0 watts
- TC tracking to less than 50ppm

CHARACTERISTICS

- Resistance Range: 1M to 4,000M
- Power Rating: 1.0W to 4.0W
- Voltage Rating: 7.5KV to 30.0KV
- Ratio Tolerances: 1% and looser
- Operating Temp: -55°C to +110°C

A complete description of the Divider-Mox is required. See example below:

R_T = 500 MegOhm 5%
R_1 = 499.5 MegOhm 5%
R_2 = 500 K Ohm 1%
Ratio = R_T / R_2 = 1,000 : 1, 1%



GENERAL SPECIFICATIONS							
					Physical Dimensions: Inches (mm)		
Victoreen Type	**Resistance Range (Ohms)**	**Power @25C**	**Voltage Rating**	**Maximum Ratio**	**A max**	**B max**	**C +/- 0.1**
MOX-2RD	1M to 1,000M	1.0 W	7.5 KV	5,000 : 1	2.140" (54.36)	0.345" (8.76)	0.50" (12.70)
MOX-3RD	1M to 2,000M	2.0 W	15.0 KV	10,000 : 1	3.140" (79.76)	0.345" (8.76)	0.75" (19.05)
MOX-4RD	1M to 3,000M	3.0 W	22.0 KV	10,000 : 1	4.140" (105.16)	0.345" (8.76)	0.75" (19.05)
MOX-5RD	1M to 4,000M	4.0 W	30.0 KV	10,000 : 1	5.150" (130.56)	0.345" (8.76)	0.75" (19.05)

Victoreen Components
Phone: 440-248-9300 Fax: 440-248-9301
www.victoreen.com

POWER-MOX™ Resistors

- Wide resistance range to 7,000 megohms
- Voltage rating to 60KV
- Power rating to 75 watts
- 0.4" diameter ferrule, 1/4-20 threaded end cap, or radial bands
- Available resistance tolerance 0.5, 1, 2, 5%
- Typical voltage coefficient 1 PPM/Volt
- Temperature range –65°C to +180°C
- Metal oxide resistive element
- Specials are available, call 216-248-9300!

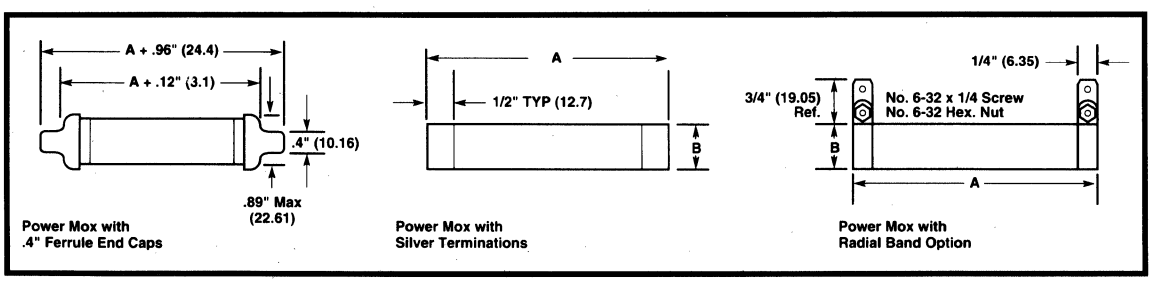
VICTOREEN POWER-MOX Resistors are for very high power or very high voltage applications. POWER-MOX Resistors are also available as voltage dividers.

POWER-MOX RESISTOR SERIES

Victoreen Type	Resistance Range (Ohms)	Power @ 25°C	Maximum Voltage Rating	Available Tolerances	Physical Dimensions A typical	Physical Dimensions B max
MOX-F	20K to 3,000M	25 W	20 KV	.5, 1, 2, 5	3.0" (76.2)	0.770" (19.56)
MOX-G	20K to 5,000M	40 W	30 KV	.5, 1, 2, 5	4.5" (114.3)	0.770" (19.56)
MOX-H	20K to 7,000M	50 W	45 KV	.5, 1, 2, 5	6.0" (152.4)	0.770" (19.56)
MOX-J	20K to 7,000M	75 W	65 KV	.5, 1, 2, 5	8.0" (203.2)	0.770" (19.56)

POWER-MOX RESISTOR DIVIDER SERIES

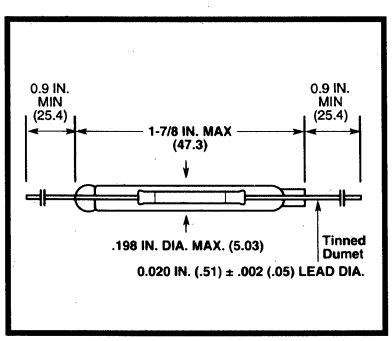
Type	Resistance Range (ohms)	Power @ 25°C	Maximum Voltage Rating	Max Ratio	Ratio Tolerances
MOX-FRD	20K - 2,500M	15 W	15 KV	5,000:1	1, 2, 5
MOX-GRD	20K - 4,000M	30 W	25 KV	5,000:1	1, 2, 5
MOX-HRD	20K - 6,000M	40 W	35 KV	5,000:1	1, 2, 5
MOX-JRD	20K - 6,000M	60 W	50 KV	5,000:1	1, 2, 5



RX-1M Resistor

Precision, Glass Encapsulated Resistor

- Improved temperature stability
- Improved voltage stability
- Resistance values to 1,000,000 megohms
- Metal oxide resistive element
- Available in 0.5, 1, 2, 5, and 10% tolerances



Victoreen is pleased to introduce a hermetically sealed, precision, metal oxide resistor which is based upon the reliable RX-1 construction.

The use of the metal oxide resistive elements provides vastly improved temperature and voltage coefficient performance characteristics as shown below.

SPECIFICATIONS:

Resistance Range: 1 megohm to 1,000,000 megohm
Voltage Rating: 1,000 volts
Power Rating: 1/2 watt at 25°C
Temperature Coefficient:
1 megohm thru 1,500 megohm 100 PPM/°C
1,501 megohm thru 1,000,000 megohm 250 PPM/°C
Voltage Coefficient: 5 PPM/Volt maximum

Handling and Cleaning of RX-1M Resistors:
These glass encapsulated resistors, especially the higher value ones, require extraordinary cleanliness. The resistors should be handled by the leads, unless rubber gloves are worn. Fingerprints on the surface of the resistor will attract contaminants and moisture, which will cause a parallel resistance path, reducing the resistance value of the device. If cleaning should be necessary, use isopropyl alcohol and lightly wipe dry with lint free tissues such as Kimwipes.

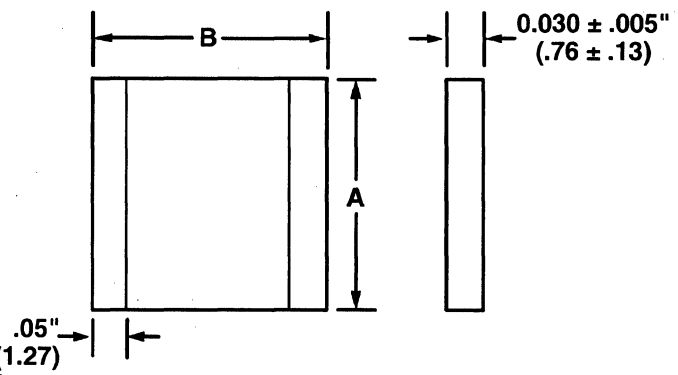
Victoreen Components

Phone: 440-248-9300 Fax: 440-248-9301

www.victoreen.com

Macrochip Resistors

Outline drawing for a "High Megohm Macrochip" series



FEATURES

- Non-Inductive design
- Low voltage coefficient
- Five sizes available
- Surface mount
- Palladium silver terminations

CHARACTERISTICS

- Resistance Range: 50 Ohm to 5,000M
- Power Rating: 0.125W to 2.0W
- Voltage Rating: 2.0KV to 10.0KV
- Tolerance: 0.5% to 20%
- Operating Temp: -55°C to +180°C

MACRO CHIP SERIES: General Specifications

Victoreen Type	Resistance Range (Ohms)	Power @ 25°C	Voltage Rating	Physical Dimensions A ± .01"	Physical Dimensions B ± .01"
MC2512	50 ohms to 1,000M	0.125	2.0KV	0.25" (6.35)	0.12" (3.048)
MC101	100 ohms to 1,000M	0.5 W	2.0KV	0.25" (6.35)	0.25" (6.35)
MC102	200 ohms to 5,000M	1.0 W	5.0KV	0.25" (6.35)	0.50" (12.70)
MC103	250 ohms to 5,000M	1.25 W	7.5KV	0.25" (6.35)	0.75" (19.05)
MC104	1K to 5,000M	1.5 W	10.0KV	0.25" (6.35)	1.00" (25.40)
MC202	500 to 5,000M	1.5 W	5.0KV	0.50" (12.70)	0.50" (12.70)
MC204	1K to 5,000M	2.0 W	10.0KV	0.50" (12.70)	1.00" (25.40)

STANDARD TEMPERATURE COEFFICIENT

Type	50PPM/°C	100PPM/°C
MC101	100 ohms - 100 Meg	101 Meg - 1,000 Meg
MC102	200 ohms - 250 Meg	251 Meg - 5,000 Meg
MC103	250 ohms - 100 Meg	101 Meg - 5,000 Meg
MC104	500 ohms - 450 Meg	451 Meg - 5,000 Meg
MC202	500 ohms - 200 Meg	201 Meg - 5,000 Meg
MC204	1K - 375 Meg	376 Meg - 5,000 Meg

VISHAY DALE

WIREWOUND RESISTORS

- **Surface Mount**
- **Axial Lead and Housed**
- **Military, Commercial, Industrial, Special Purpose**

EEM DESCRIPTIONS

WIREWOUND RESISTORS:

- Strip
- Surface Mount
- Chip
- Wirewound
- Ceramic Core
- Disk, Rod & Tube
- Flame Retardant
- Four Terminal
- Voltage Sensitive
- High Frequency
- Integral Heat Dissipator
- High Temperature
- High Voltage
- Hot Molded
- Low Temp Coefficient
- Ballast
- Microwave
- Non-Inductive
- Pressure Sensitive
- Plug-In
- Power
- Precision
- Surge
- Tapped
- Fuse
- Military
- Zero-Ohm

FLASHFAX℠

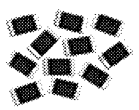
Fax 1-800-835-4272 for literature.

Or call Vishay's FlashFax℠ Service
at 1-800-487-9437.
Request document 9999.
This is a listing of data sheets you can order by fax in a flash!

37 Wirewound Resistor data sheets are available.

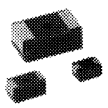
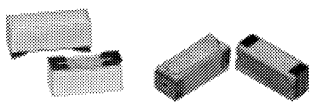
INTERNET

SURFACE MOUNT



Enlargement

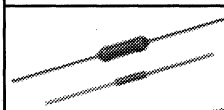
Power Metal Strip® Resistors - **WSL, WSR, WSF**

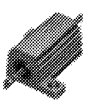



Precision Power **WSC-1/2, -1, -2**

Commercial Power, Special **CP-2M**

LEADED





Precision Power **RS, G**

Low Value Precision Power **LVR-1, -3, -5**

Aluminum Housed **RH**

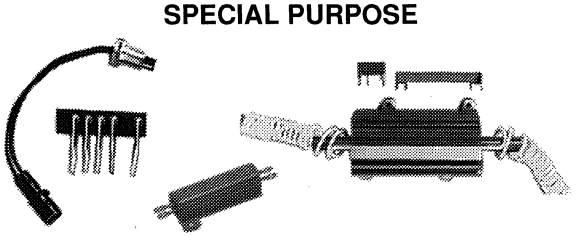
MILITARY

- **ESS/W/N, EGS/W/N,** MIL-R-39007, E-Rel, Type RWR
- **ERH, ENH,** MIL-R-39009, E-Rel, Type RER
- **RH, NH,** MIL-R-18546 Qualified, Type RE
- **RS, G,** MIL-R-26 Qualified, Type RW

INDUSTRIAL, COMMERCIAL

- **HL, NHL, HLM, HLW, HLZ, HLA, HLT:** Industrial power, tubular, flat, miniature, tapped, edgewound, adjustable, non-inductive
- **CW, CA, CP, CPW, CPL, CPSL, CPCL, CPR:** Commercial power, axial, four leaded, radial, vertical mount, coated, fireproof inorganic construction

SPECIAL PURPOSE



Vishay Dale 1122 23rd Street, Columbus, NE 68601-3647 • **Phone** (402) 563-6506 • **Fax** 402-563-6418 • **Internet** www.vishay.com
Major Vishay Brands Dale • Draloric • Foil Resistors • Measurements Group • Roederstein • Sfernice • Sprague • Thin Film • Vitramon

FILM RESISTORS, ARRAYS, and NETWORKS

- **Surface Mount**
- **Axial Lead**
- **Military, Commercial, Industrial, Special Purpose**

EEM DESCRIPTIONS

FILM RESISTORS:

- Surface Mount
- Precision
- Low Temperature Coefficient
- Metal Oxide
- Non-Inductive
- Power
- Strip
- Surge
- Tapped
- Tin Oxide
- Zero-Ohm
- Military
- Fuse
- High Temperature
- High Voltage
- Metal Film
- Metal Glazed
- Ceramic Metal
- Flame Retardant
- Chip
- Carbon Film
- Ceramic Core
- High Megohm
- Decade
- Deposited Carbon
- Disk, Rod and Tube
- Four Terminal
- Glass
- High Frequency

FLASHFAX℠

Fax 1-800-835-4272 for literature.

Or call Vishay's FlashFax℠ Service
at 1-800-487-9437.
Request document 9999.
This is a listing of data sheets you can order by fax in a flash!

Film Resistor data sheets and
Network data sheets are available.

INTERNET

SURFACE MOUNT

Thick Film Chip Resistors

CRCW

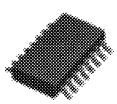
RCM
MIL-R-55342 Qualified

RC, RCWP, RCW

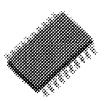
Chip Resistor Arrays

CRA06/CRA12 Series

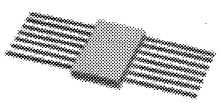
Thick Film Resistor Networks



SOMC



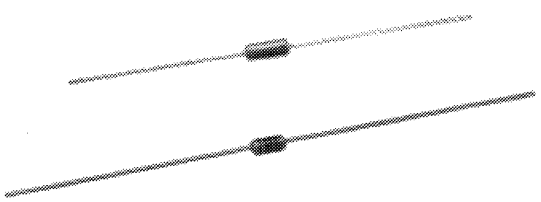
SOGC



DFM (MIL-R-83401)
DFP (Commercial)

LEADED

Film Resistors



- MIL-R-55182/-39017/-22684/-10509 models
- Industrial: standard, power, precision, low TC, tight tolerance, low resistance, high value, flameproof, fusible, high voltage, pulse withstanding and many other special purpose models.
(Also metal alloy/oxide, carbon film.)

Networks
(Coated/Molded, SIPs/DIPs)

- MIL-R-83401, Type RZ
- Commercial: Thick Film Resistor, Capacitor, Resistor/Capacitor, Custom Module and Substrates.

Vishay Dale 2300 Riverside Blvd., Norfolk, NE 68701-2242 • **Phone** (402) 371-0080 • **Fax** 402-644-4206 • **Internet** www.vishay.com
Major Vishay Brands Dale • Draloric • Foil Resistors • Measurements Group • Roederstein • Sfernice • Sprague • Thin Film • Vitramon

Precision Hermetic Metal Film Resistors 940

VISHAY ANGSTROHM

- **Superior Moisture Performance**
- **"S" Failure Rate Level** is demonstrated (Less than 0.001% failures). Capable of meeting Space Failure Rate Level.
- Used in **hostile applications** involving corrosive environments (salt water, chemicals) as well as extreme conditions (high temperature, pressure, space). Each resistor is leak tested to 3,000 PSI.
- Provides the **excellent electrical performance** of Nichrome film without concern for performance degradation.
- Resistor is encased with thick walled, **high purity glass that meets shock and vibration requirements** but still allows visual inspection of the filmed/spiralled surface at any time.
- **Thermal EMF** is minimized by uniform spiralling over the entire body of the resistor.
- **Extensive value range** (10 ohm – 4.99 Megohm).
- Angstrohm can provide a resistor in applications where **outgassing** is a concern (space, vacuum).

PRECISION HERMETIC METAL FILM RESISTORS

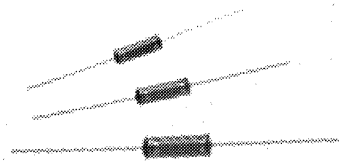
Receive More Information NOW!

To get complete product information faxed to you, phone **1- 800-7-VISHAY** (784-7429) and enter the index number of the products that interest you.

Index Number 950 **Precision Hermetic Metal Film Resistors** All documents this section

Military/Established Reliability MIL-R-55182 Qualified Type RNR and RNN

MODELS HN and HS



Index Number 951

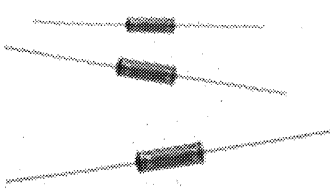
FEATURES
- Qualified to MIL-R-55182 Characteristics C and E
- Terminal Type RNR shall be used as a substitute for RNC for Characteristics C and E
- Performance exceeds requirements of MIL-R-55182
- Excellent high frequency performance and long term stability
- Hermetic glass enclosure is impervious to harmful environments
- Inert gas filled, very low noise and high reliability

ELECTRICAL SPECIFICATIONS
Resistance Tolerance: ± 0.1%, ± 0.5%, ± 1.0%.
Temperature Coefficient: Military Code E = 0 ± 25ppm/°C. Military Code C = 0 ± 50ppm/°C.
Failure Rate: M = 1.0%. P = 0.1%. R = 0.01%. S = 0.001%.
Operating Temperature Range: -65°C to + 175°C.

MECHANICAL SPECIFICATIONS
Termination: RNR = Solderable leads. RNN = Weldable Leads.

Commercial

MODEL GSR



Index Number 952

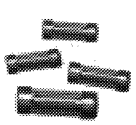
FEATURES
- Excellent high frequency performance and long term stability
- Hermetic glass enclosure is impervious to harmful environments
- Inert gas filled
- Very low noise

ELECTRICAL SPECIFICATIONS
Resistance Tolerance: ±0.1%, ±0.5%, ±1.0%, ±2.0%.
Temperature Coefficient: ±15 ppm/°C, ±25ppm/°C, ±50ppm/°C.
Operating Temperature Range: -65°C to +175°C. (See Derating Curve.)
Dielectric Strength: 450 VAC for GSR55, GSR60. 900 VAC for GSR65, GSR70.
Insulation Resistance: 10,000 Megohm minimum dry, 100 Megohm minimum after moisture.

MECHANICAL SPECIFICATIONS
Termination: S = Solderable leads. (Gold plated nickel) W = Weldable Leads. (Nickel)

Commercial, Hermetically Sealed Surface Mountable, MELF Resistors

MODEL SMH



Index Number 953

FEATURES
- The SMH is designed to meet the electrical performance of MIL-R-55182, through hole specification, and is manufactured on the QPL line.
- Excellent long term stablity and high frequency performance
- Hermetically sealed construction
- Very low noise

- *Soon to be available; consult factory for availability.*

VISHAY ANGSTROHM • 18400 Precision Place • P.O. Box 1827 • Hagerstown, MD 21740 USA • Phone (301) 739-8722 • Fax (310) 797-6852 • www.vishay.com

VISHAY
FOIL RESISTORS

Precision Surface Mountable Resistors

7 Technical Reasons to Specify Vishay Bulk Metal® Foil 590

1. Extremely Low Temperature Coefficient of Resistance 591
2. Tight Resistance Tolerance 592
3. Excellent Load-Life Stability 593
4. High Speed 594
5. Low Noise 595
6. Low Thermal EMF 596
7. Non-Measurable Voltage Coefficient 597

Short History of Vishay Index Number 599

Receive More Information NOW!

To get complete product information faxed to you, phone **1-800-7-VISHAY** (784-7429) and enter the index number of the products that interest you.

Aerospace/Instrumentation

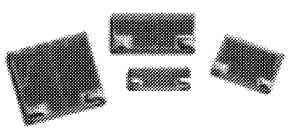
SMR1D, SMR3D

- **Performance Similar to Time Tested S102 Through Hole Resistor**
- **Temperature Coefficient of Resistance — Nominal TCR** +0.6 ppm/°C (0°C to +25°C); –0.6 ppm/°C (+25°C to +60°C)
- **Value Range** 5 Ω to 80K Ω
- **Tight Tolerances** available to 0.01 percent
- **Power** 0.6 watts @ +70°C
- **Excellent Long Term Stability** ±0.02%
- **Low Thermal EMF** 0.1 µV/°C max.
- **Low Noise, High Frequency Operation**
- **Matched Sets Available**

Index Number 562

Aerospace/Instrumentation

VSM Series



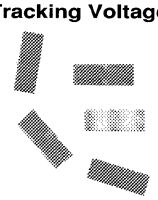
NEW SIZE AVAILABLE - VSM0805

- **Temperature Coefficient of Resistance**
  Nominal TCR: +0.6 ppm/°C (0°C to +25°C)
  –0.6 ppm/°C (+25°C to +60°C)
  +2.2 ppm/°C (–55°C to +25°C)
  –1.8 ppm/°C (+25°C to +125°C)
  TCR Tracking: to 0.5 ppm/°C available
- **Resistance Range** 5 Ω to 150K Ω
- **Tolerance** to 0.01%
- **Load-Life Stability** 0.025% Max Δ R under full rated power @ +70°C for 2,000 hrs
- **Shelf Life Stability** 50 ppm/yr (0.005%) Max Δ R non-hermetically sealed
- **Voltage Coefficient** <0.00001%/volt (<0.1 ppm/V)
- **Current Noise** <0.010 µV(rms)/volt of applied voltage
- **Noninductive** <0.08 µH

Index Number 561

Miniature, Ultimate Tracking Voltage Dividerr

Model VSMD1505



- **Ratio Tracking** to 0.1 ppm/°C
- **Ratio Match Tolerance** to 0.005%
- **Absolute Tolerance** to 0.01%
- **Nominal Temperature Coefficient** of Resistance
- -0.6 ppm/°C (25°C to +65°C)
- **Resistance Value Ratios 1:1 to 20:1**
- **Non Inductive Planar Design**
- **Lowest Current Noise** Available
- **Load Life** (Ratio Stability) <±0.001%

Index Number XXX

Aerospace/Instrumentation Power Resistor

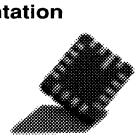
Model VCS2516 Current Sensing

- **Low Ohmic Values** 0.01 Ω to 1.0 Ω
- **Resistance Tolerance** to 1.0%
- **Temperature Coefficient of Resistance** 10 ppm/°C max., available to 5 ppm/°C on special orders
- **Power Rating** 1 watt at +85°C
- **Current Rating** 5 Amperes maximum
- **Tin/Lead Coated Terminations Standard**
- **Gold Plated Terminations Available on Special Order**

Index Number 563

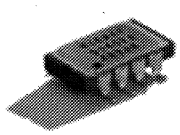
Aerospace/Instrumentation

Leadless Chip Carriers (LCC)
Models VSM85, VSM86, VSM87, VSM88 and VSM89



Index Number 670

Gull Wing Configuration
Models VSM42, VSM45 and VSM46



Index Number 660

Networks

VISHAY Model VSM networks incorporate all the performance features of VISHAY Bulk Metal® foil technology in a product ready for surface mounting. They offer small package sizes, tight resistance matching, and close tracking. In addition, hermetic sealing enhances the standard high stability of VISHAY resistors. Surface mount networks are available with Bulk Metal® Foil chips or state-of-the-art thin film chips.

Additional surface mount networks to be available soon.

VISHAY RESISTORS • 63 Lincoln Highway • P.O. Box 4004 • Malvern, PA 19355-0988 • (610) 644-1300 • FAX (610) 296-0657 • Sales FAX (610) 640-9081
www.vishay.com

PRECISION BULK METAL® FOIL TECHNOLOGY

VISHAY FOIL RESISTORS

Precision Surface Mountable Resistors

7 Technical Reasons to Specify Vishay Bulk Metal® Foil 590

1. Extremely Low Temperature Coefficient of Resistance 591
2. Tight Resistance Tolerance 592
3. Excellent Load-Life Stability 593
4. High Speed 594
5. Low Noise 595
6. Low Thermal EMF 596
7. Non-Measurable Voltage Coefficient 597

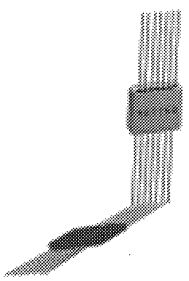
PRECISION RESISTORS FOR SURFACE MOUNTING

Receive More Information NOW!

To get complete product information faxed to you, phone **1-800-7-VISHAY** (784-7429) and enter the index number of the products that interest you.

Aerospace/Industrial

Model 1490

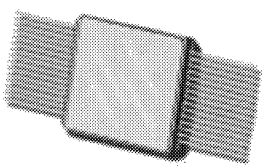


- **Resistance Range** Bulk Metal Foil: 1 Ω to 30K Ω; Thin Film: 30K Ω to 500K Ω
- **Resistance Tolerance** Bulk Metal Foil: ±0.005% Tightest; ±1.0% Loosest; Thin Film: ±0.02% Tightest; ±1.0% Loosest
- **Temperature Coefficient of Resistance** (–55°C to +125°C) Bulk Metal Foil: ±5 ppm/°C, Absolute; Thin Film: ±15 ppm/°C, Absolute
- **TCR Tracking** Bulk Metal Foil: to 0.5 ppm/°C; Thin Film: to 3 ppm/°C
- **Power Rating** V15X5 0.1 watt; V5X5 0.05 watt; Total Package 1 watt
- **Load-Life Stability** (1,000 hours @ +70°C) Bulk Metal Foil: ±0.015% ΔR maximum; Thin Film: ±0.1% ΔR maximum
- **Hermeticity** $< 5 \times 10^{-7}$ cc/sec

Index Number 642

Aerospace/Industrial

Model 1476



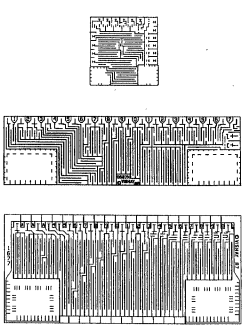
The 30 pin 1" x 1" flatpack is the largest ceramic package offered by VISHAY. It will accommodate up to 225 V5X5 (50 x 50 mils) or 75 V15X5 (150 x 50 mils) resistor chips and offers the maximum pin availability in the lowest profile. It should be selected when Model 1460 has been determined to be unsuitable.

- **Hermeticity** $< 5 \times 10^{-7}$ cc/sec
- **Power Rating** 2.40 watt @ +70°C (total package)
- **Most chips, most pins, most power**

Index Number 641

Hybrids

Models V5X5, V15X5 and V15X10

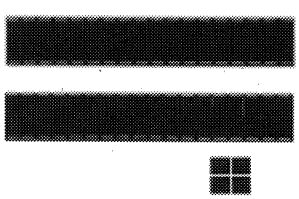


- **Temperature Coefficient of Resistance**
  Nominal TCR +0.6 ppm/°C (0°C to +25°C); –0.6 ppm/°C (+25°C to +60°C); +2.2 ppm/°C (–55°C to +25°C); –1.8 ppm/°C (+25°C to +125°C)
  TCR Tracking to 0.5 ppm/°C
- **Load-Life Stability** 0.05% maximum ΔR under full rated power @ +70°C for 2,000 hours
- **Shelf Life Stability** 0.005% ΔR/yr. max. (normal package); 0.0005% ΔR/yr. (hermetically sealed)
- **Power Rating** 0.05 to 0.15 watts/resistor @ +70°C
- **Resistance Value** 5 Ω to 80K Ω
- **Resistance Tolerance**
  Absolute to ±0.01% (User trimmable to ±0.005%)
  Resistance Ratio Matching to 0.01%

Index Number 571

Hybrids

Custom Chip Networks and Resistor Arrays



- **Temperature Coefficient of Resistance**
  Nominal TCR +0.6 ppm/°C (0°C to +25°C); –0.6 ppm/°C (+25°C to +60°C); +2.2 ppm/°C (–55°C to +25°C); –1.8 ppm/°C (+25°C to +125°C)
  TCR Tracking 0.5 ppm/°C
- **Load-Life Stability** 0.05% maximum ΔR under full rated power @ +70°C for 2,000 hours
- **Power Rating** from 0.05 watts/resistor (at +70°C ambient temperature)
- **Resistance Tolerance**
  Absolute as tight as ±0.02% (User trimmable to ±0.005%)
  Resistance Ratio Matching as tight as 0.01%

Index Number 572

VISHAY RESISTORS • 63 Lincoln Highway • P.O. Box 4004 • Malvern, PA 19355-0988 • (610) 644-1300 • FAX (610) 296-0657 • Sales FAX (610) 640-9081
www.vishay.com

VISHAY FOIL RESISTORS

Precision Fixed Resistors

7 Technical Reasons to Specify Vishay Bulk Metal® Foil 590

1. Extremely Low Temperature Coefficient of Resistance 591
2. Tight Resistance Tolerance 592
3. Excellent Load-Life Stability 593
4. High Speed 594
5. Low Noise 595
6. Low Thermal EMF 596
7. Non-Measurable Voltage Coefficient 597

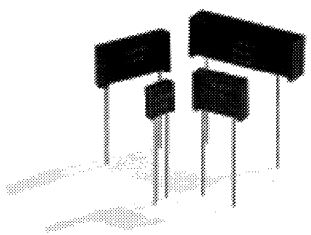
Receive More Information NOW!

To get complete product information faxed to you, phone **1-800-7-VISHAY** (784-7429) and enter the index number of the products that interest you.

PRECISION RESISTORS FOR THROUGH HOLE MOUNTING

Aerospace/Instrumentation

"S" Series Models S102 thru S106

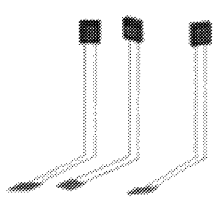


- **S102K Series Maximum Temperature Coefficient of Resistance**
  ±2.5 ppm/°C (0°C to +25°C and +25°C to +60°C)
  ±2.5 ppm/°C (–55°C to +25°C and +25°C to +125°C)
- **S102C Series Nominal Temperature Coefficient of Resistance**
  +0.6 ppm/°C (0°C to +25°C); –0.6 ppm/°C (+25°C to +60°C);
  +2.2 ppm/°C (–55°C to +25°C); –1.8 ppm/°C (+25°C to +125°C)
- **Selected TCR Tracking** to 0.5 ppm/°C (matched sets)
- **Shelf Life Stability** 25 ppm maximum for 1 year
- **Power Rating** 0.6 to 2.0 Watts at +70°C; 0.3 to 1.0 Watts at +125°C (depending on model)
- **Load-Life Stability** <150 ppm ΔR (2,000 hrs. at rated power)
- **Resistance Tolerance** (Initial Resistance Accuracy)
  ±0.005% tightest to ±1.0% loosest (depends on resistor value)
- **Resistance Range** 0.5 Ω to 1M Ω
- **Current Noise** 0.010 μV (RMS)/Volt of Applied Voltage
- **Thermal EMF** 0.1 μV/°C Maximum; 0.05 μV/°C Typical; 1 μV/watt (Model S102C, S102K)
- **Rise/Decay Time** 1.0 nanosec @ 1K Ω

Index Number 501

Aerospace/Instrumentation

Model S102TF



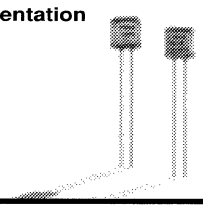
Model S102TF resistors incorporate state-of-the-art thin film elements into the Vishay S102 form factor, thereby extending the existing range capability.

- **Resistance Range** 150K Ω to 7M Ω
- **Resistance Tolerance** ±0.02% tightest; ±1% loosest
- **Temperature Coefficient of Resistance** ±15 ppm/°C (–55°C to +125°C)
- **Power Rating** 0.5 watts @ +70°C
- **Load-Life** ± 0.05% Δ R maximum (2,000 hrs. @ +125°C)

Index Number 502

Aerospace/Instrumentation

Model VHP100, VHP101

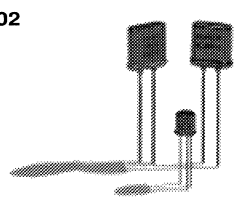


- **Absolute Resistance Change** <10 ppm (+15°C to +45°C) VHP101
- **Essentially Zero TCR** almost zero resistance/temperature effect
- **No Humidity Effect** hermetically-sealed against moisture
- **Thermal EMF** lowest in the industry
- **Excellent Stability**
- **Essentially Noninductive Performance**

Index Number 511

Aerospace/Instrumentation

Models VHS555, VHS102 and VH102K



- **VH102K Series**
  Maximum Temperature Coefficient of Resistance
  ±2.5 ppm/°C (0°C to +25°C and +25°C to +60°C)
  ±2.5 ppm/°C (–55°C to +25°C and +25°C to +125°C)
- **VHS102 Series**
  Nominal Temperature Coefficient of Resistance
  +0.6 ppm/°C (0°C to +25°C); –0.6 ppm/°C (+25°C to +60°C);
  +2.2 ppm/°C (–55°C to +25°C); –1.8 ppm/°C (+25°C to +125°C)
- **VHS555 Temperature Coefficient of Resistance** ±5 ppm/°C (–55°C to +125°C);
- **Selected TCR Tracking** to 0.5 ppm/°C (matched sets)
- **Load-Life Stability** 0.0025% maximum ΔR at 0.1 watt, +60°C, 2,000 hours (VHS555)
- **Power Rating** 0.6 Watts at +70°C; 0.3 Watts at +125°C
- **Resistance Tolerance** (Initial Resistance Accuracy) ±0.005% tightest to ±1.0% loosest
- **Resistance Range** 1 Ω to 250K Ω

Index Number 512

VISHAY RESISTORS • 63 Lincoln Highway • P.O. Box 4004 • Malvern, PA 19355-0988 • (610) 644-1300 • FAX (610) 296-0657 • Sales FAX (610) 640-9081
www.vishay.com

VISHAY
FOIL RESISTORS

Precision Fixed Resistors

7 Technical Reasons to Specify Vishay Bulk Metal® Foil 590

1. Extremely Low Temperature Coefficient of Resistance 591
2. Tight Resistance Tolerance 592
3. Excellent Load-Life Stability 593
4. High Speed 594
5. Low Noise 595
6. Low Thermal EMF 596
7. Non-Measurable Voltage Coefficient 597

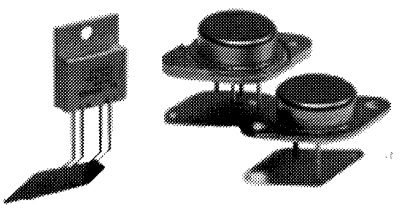
PRECISION RESISTORS FOR THROUGH HOLE MOUNTING

Receive More Information NOW!

To get complete product information faxed to you, phone **1-800-7-VISHAY** (784-7429) and enter the index number of the products that interest you.

Aerospace/Instrumentation

Models VHP-3, VHP-4 and VPR247



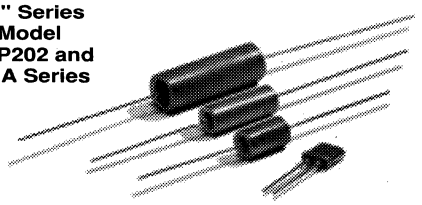
Hermetically Sealed Power and Current Sensing Resistors

- **Temperature Coefficient of Resistance**
  Nominal TCR
  +0.6 ppm/°C (0°C to +25°C); –0.6 ppm/°C (+25°C to +60°C);
  +2.2 ppm/°C (–55°C to +25°C); –1.8 ppm/°C (+25°C to +125°C)
  Standard TCR Spread from Nominal
  ±1.5 ppm/°C (0°C to +25°C and +25°C to +60°C);
  ±2.0 ppm/°C (–55°C to +25°C and +25°C to +125°C)
  Maximum TCR Spread from Nominal
  ±2.5 ppm/°C (0°C to +25°C and +25°C to +60°C);
  +2.3 ppm/°C (–55°C to +25°C and +25°C to +125°C)
- **Selected TCR Tracking** 0.5 ppm/°C
- **Load-Life Stability**
  0.01% Max ΔR, 3 watts on heat sink at +25°C, 2000 hrs.
  0.05% Max ΔR, 10 watts on heat sink at +25°C, 2000 hrs.
  0.05% Max ΔR, 3 watts in still air at +25°C, 2000 hrs.
- **Shelf Life Stability** 5 ppm/year
- **Power Rating** 10 W, heat sink, +25°C; 3 W, free air, +25°C
- **Resistance Tolerance** (Initial Resistance Accuracy) ±0.01% tightest to ±5.0% loosest
- **Resistance Range** 0.05 Ω to 80K Ω
- **Current Noise** <0.010 μV (RMS)/Volt of Applied Voltage
- **Thermal EMF** 0.1 μV/°C (lead effect), 2.5 μV/watt (power effect)
- **Noninductive Design** Standard

Index Number 520

Metrology/Laboratory

"H" Series Model VHP202 and VHA Series

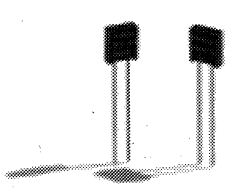


- **Nominal Temperature Coefficient of Resistance**
  +0.6 ppm/°C (0°C to +25°C); –0.6 ppm/°C (+25°C to +60°C);
  +2.2 ppm/°C (–55°C to +25°C); –1.8 ppm/°C (+25°C to +125°C)
  (For TCR <1 ppm/°C & Tracking <0.5 ppm/°C see VHP100)
- **Load-Life Stability** 0.002% Max ΔR at 0.1 W and +60°C, no burn-in
- **Power Rating** 0.3 to 2.5 watt at + 25°C (depending on model)
- **Resistance Tolerance** (Initial Resistance Accuracy) ±0.001% tightest
- **Resistance Range** 5 Ω to 3.3M Ω
- **Current Noise** <0.010 μV (RMS)/Volt of Applied Voltage
- **Thermal EMF** 0.1 μV/°C Max; 0.05 μV/°C Typ; VHP202, 1 μV/W
- **The most precise and stable resistors available**
- **Impervious to harmful environments – oil filled**

Index Number 525

Military

Models M122/1 and RNC90Y



- **QPL product with established reliability**
- **Best Load-Life Stability** 0.05% ΔR for 2,000 hrs. @ +125°C
- **Best TCR** M122/1: ±2.5 ppm/°C; RNC90Y: ±5.0 ppm/°C (–55°C to +125°C)
- **Best Shelf Life** 0.0025% (25 ppm) for 3 years
- **Best Thermal EMF** 0.05 μV/°C
- **Qualified Resistance Range** 25.5 Ω to 50K Ω for M122/1;
  4.99 Ω to 121K Ω for RNC90Y
- **Resistance Tolerance** to ±0.005%
- **Specially conditioned non-QPL resistors available** *(See Improved Performance Tested)*

Index Number 530

Vishay Improved Performance Tested (IPT)

The response of military and non military grade resistors to environmental stresses can be made better by "Improved Performance Testing" (IPT). The IPT part will see burn-in and cycling that removes the "knee" from the normal drift of non IPT parts. Users should be aware that IPT testing renders the part non QPL and so a 3XXXXX part number will be assigned by Vishay. Consult Applications Engineering for details and ordering advice.

Index Number 530

VISHAY RESISTORS • 63 Lincoln Highway • P.O. Box 4004 • Malvern, PA 19355-0988 • (610) 644-1300 • FAX (610) 296-0657 • Sales FAX (610) 640-9081
www.vishay.com

VISHAY FOIL RESISTORS

Precision Fixed Resistors

7 Technical Reasons to Specify Vishay Bulk Metal® Foil 590

1. Extremely Low Temperature Coefficient of Resistance 591
2. Tight Resistance Tolerance 592
3. Excellent Load-Life Stability 593
4. High Speed 594
5. Low Noise 595
6. Low Thermal EMF 596
7. Non-Measurable Voltage Coefficient 597

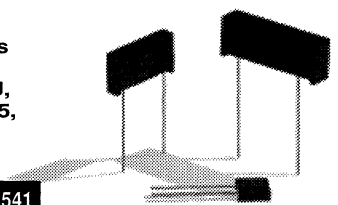
Receive More Information NOW!

To get complete product information faxed to you, phone **1-800-7-VISHAY** (784-7429) and enter the index number of the products that interest you.

PRECISION RESISTORS FOR THROUGH HOLE MOUNTING

Industrial

VSR Series Models VSR, VSRJ, VSR4, VSR5, and VSR6

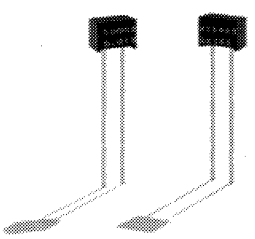


- **Temperature Coefficient of Resistance** ±4 ppm/°C (0°C to +60°C); ±8 ppm/°C (–55°C to +125°C)
- **Resistance Range** 0.5 Ω to 1M Ω
- **Standard Resistance Tolerances** 0.01%, 0.02%, 0.05%, 0.1%, 0.25%, 0.50%, 1.0%
- **Long Term Stability** Typical Foil Performance
- **Low Noise**
- **Noninductive** 0.08 µH Typical
- **Thermal EMF** 0.1 µV/°C Max; 0.05 µV/°C Typical

Index Number 541

Industrial

Model VRM

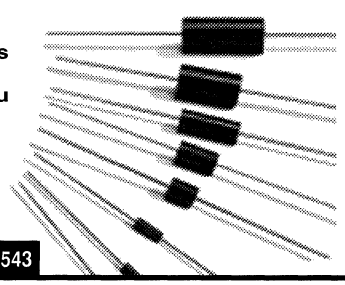


- **Temperature Coefficient of Resistance** ±4 ppm/°C (0°C to +60°C); ±8 ppm/°C (–55°C to +125°C) *(TCR to ±5 ppm/°C, –55°C to +125°C available.)*
- **Resistance Range** 5 Ω to 50K Ω
- **Tolerance** 5 Ω to 50K Ω: 0.1%, 0.25%, 0.5%, 1.0%; 50 Ω to 50K Ω: 0.01%, 0.02%, 0.05%, 0.1%, 0.25%, 0.5%, 1.0%
- **Power Rating** 0.25 W @ +70°C; 0.125 W @ +125°C
- **Load-Life Stability** 0.05% Max Δ R @ rated power and temperature for 2,000 hrs.
- **Noninductive** <0.08 µH
- **Thermal EMF** <0.1 µV/°C
- **Long Term Stability** 0.0025% (25 ppm) per year under low power & room temp. conditions
- **Voltage Coefficient** <0.1 ppm/V
- **Max Working Voltage** 250 volts
- **Shelf Life** 0.0025% (25 ppm) per year

Index Number 542

Industrial

VTA Series Models VTA56 thru VMTB60



- **Resistance Range** 5 Ω to 750K Ω
- **Thermal EMF** 0.1 µV/°C maximum; 0.05 µV/°C typical
- **Power Rating** 0.25 W to 1.0 W @ +70°C
- **Long Term Stability** 0.0025% (25 ppm) per year under low power & room temp. conditions
- **Load-Life Stability** (for 2,000 hours) 0.05% Max. ΔR at rated power and temperature
- **Temperature Coefficient of Resistance** ±8 ppm/°C (–55°C to +125°C); ±4 ppm/°C (0 to + 60°C)
- **Resistance Tolerances** 0.01%, 0.02%, 0.05%, 0.1%, 0.25%, 0.5%, 1.0%
- **Noninductive**
- **Voltage Coefficient** <0.1 ppm/V
- **Terminal Type** Solderable (type C of MIL-STD-1276)

Index Number 543

Matched Sets

- **Resistance Match** 0.005% to 1% (to 0.001% in hermetically sealed version)
- **Temperature Coefficient Tracking** to 0.5 ppm/°C
- **Resistance Values** 1 Ω to 250K Ω
- **Resistance Tolerance** 0.005% to 1% (to 0.001% in hermetically sealed version)
- **S102K Series Maximum Temperature Coefficient of Resistance** ±2.5 ppm/°C (0°C to +25°C and +25°C to +60°C); ±2.5 ppm/°C (–55°C to +25°C and +25°C to +125°C)
- **S102C Series Nominal Temperature Coefficient of Resistance** +0.6 ppm/°C (0°C to +25°C); –0.6 ppm/°C (+25°C to +60°C); +2.2 ppm/°C (–55°C to +25°C); –1.8 ppm/°C (+25°C to +125°C)
- **Selected TCR Tracking** to 0.5 ppm/°C (matched sets)
- **Thermal EMF** 0.1 µV/°C maximum
- **Inductance** 0.1 µH maximum
- **Capacitance** 1.0 pF maximum
- **Lead Wires** #22 AWG tinned copper, 0.875" minimum length

Index Number 556

VISHAY RESISTORS • 63 Lincoln Highway • P.O. Box 4004 • Malvern, PA 19355-0988 • (610) 644-1300 • FAX (610) 296-0657 • Sales FAX (610) 640-9081
www.vishay.com

PRECISION BULK METAL® FOIL TECHNOLOGY

VISHAY FOIL RESISTORS

Precision Current Sensing Resistors

There are many power resistors on the market. Until now precision power resistors with tight toleraces and low TCR were not generally available. Using Bulk Metal® foil technology Vishay has developed a series of current sensors and shunts and, in the past few years, Vishay Resistive Systems has extended the ohmic range of its precision resistors down to a few milliohms with the continuous development of Vishay Bulk Metal® foil technology.

Typical Performance Specifications

- **Low TCR** available to 1 ppm/°C
- **Excellent Shelf and Load Stability** down to 0.005% per year shelf life and 0.01% load life stability
- **Low Thermal EMF** below 0.1 µV/°C
- **Low Reactance** below 0.5 pF and 0.8 µH
- **Low Noise** less than –42 dB
- **Tight Resistance Tolerance** to 0.01%

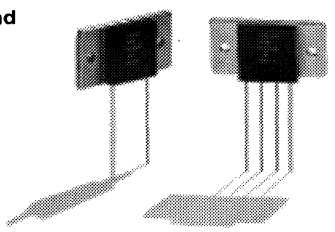
PRECISION RESISTORS FOR THROUGH HOLE MOUNTING

Receive More Information NOW!

To get complete product information faxed to you, phone **1-800-7-VISHAY** (784-7429) and enter the index number of the products that interest you.

Current Sensing / Reference

Models VFP-3 and VFP-4



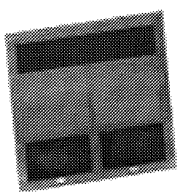
Power and Current Sensing Resistors

- **Temperature Coefficient of Resistance— Nominal TCR** +0.6 ppm/°C (0°C to +25°C); –0.6 ppm/°C (+25°C to +60°C); +2.2 ppm/°C (–55°C to +25°C); –1.8 ppm/°C (+25°C to +125°C)
- **Selected TCR Tracking** to 0.5 ppm/°C (matched sets)
- **Power Rating** 10 W on heat sink at +25°C; 3 W, free air at +25°C
- **Load-Life Stability** 0.05% Maximum ΔR, 3 watts at +25°C 0.05% Maximum ΔR, 10 watts on heat sink at +25°C
- **Resistance Tolerance** ±0.01% tightest to ±5.0% loosest
- **Resistance Range** 0.05 Ω to 80K Ω
- **Current Noise** <0.010 µV (RMS)/Volt of Applied Voltage
- **Thermal EMF** 0.5 µV/°C Maximum (lead effect), 4 µV/watt (power effect)
- **Noninductive Design** Standard
- **Shelf Life Stability** 25 ppm/year

Index Number 553

Current Sensing / Reference

Model V3PR



These power plate resistors can dissipate up to 25 watts per sq. inch of resistive area when properly heat sinked. They are made of foil on 0.025" thick high alumina and therefore are a near zero volume power resistor. Current straps can be soldered to the copper terminal pads and voltage probes can be added for Kelvin connection.

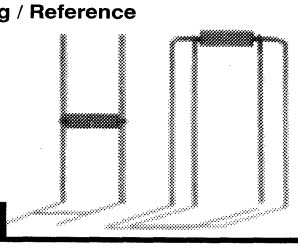
Thermal response time is extremely fast due to the short thermal path through the ceramic to the heat sink. Thus momentary overloads are possible without generating a dangerous internal hot spot.

Series V3PR Precision Power Plate Resistors are available in 2 basic configuration styles based on resistance value, trimmability, frequency response and flexibility of design.

Index Number 554

Current Sensing / Reference

Model VCS101, VCS103 and VCS401



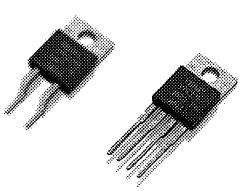
Power and Current Sensing Resistors

- **Low Ohmic Values** 0.005 Ω to 0.25 Ω
- **Resistive Tolerance** to ±0.1%
- **Temperature Coefficient of Resistance** ±20 ppm/°C at 0.1 Ω, available to ±5 ppm/°C (No derating at specific temperatures.)
- **Power Rating** To 1.5 Watts at +25°C (free air)
- **Maximum Operating Temperature** +175°C
- **Noninductive Design**

Index Number 555

Current Sensing / Reference

Models VPR220 and VPR221 (Now available in Surface Mount version: VPR220S and VPR221S



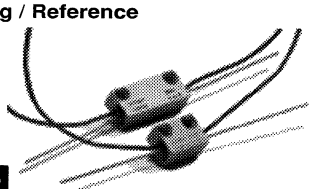
Power and Current Sensing Resistors

- **Power** 8 watts chassis mounted (per MIL-R-39009) No Derating Required
- **Load-Life Stability** 0.05% maximum ΔR at rated power and temperature for 2,000 hours
- **Temperature Coefficient of Resistance** to ±5 ppm/°C
- **Resistance Range** 0.5 to 10K Ω
- **Tolerance** To 0.01%
- **Low Thermal EMF** 0.15 µV/°C maximum (lead effect)
- **Noninductive Construction**
- **Resistive Element Isolated from the Tab**

Index Number 551

Current Sensing / Reference

Models VPR-5 and VPR-7



Power and Current Sensing Resistors

- **Temperature Coefficient of Resistance** ±5 ppm/°C Standard (Above 10 Ohms) ±10 ppm/°C Standard (Below 10 Ohms) *(Lower TCR's available on request.)*
- **Tolerance** To 0.01%
- **Shelf Life** 25 ppm/year
- **Noninductive** <0.08 µH
- **Low Thermal EMF** <0.1 µV/°C

Index Number 552

VISHAY RESISTORS • 63 Lincoln Highway • P.O. Box 4004 • Malvern, PA 19355-0988 • (610) 644-1300 • FAX (610) 296-0657 • Sales FAX (610) 640-9081
www.vishay.com

VISHAY
FOIL RESISTORS

Precision Resistor Networks

7 Technical Reasons to Specify Vishay Bulk Metal® Foil 600

1. Extremely Low Temperature Coefficient of Resistance 601
2. Excellent Load-Life Stability 602
3. Tight Resistance Tolerance 603
4. Low Current Noise 604
5. High Speed 605
6. Low Thermal EMF 606
7. Non-Measurable Voltage Coefficient 607

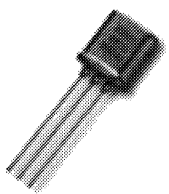
Receive More Information NOW!

To get complete product information faxed to you, phone **1-800-7-VISHAY** (784-7429) and enter the index number of the products that interest you.

PRECISION RESISTORS FOR THROUGH HOLE MOUNTING

Aerospace/Instrumentation

Models VHD200 and VHD144



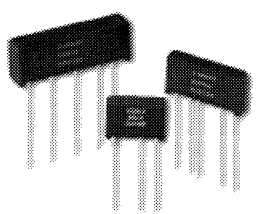
Small Package, Ultimate Tracking Voltage Dividers

- **Temperature Coefficient of Resistance**
  Nominal TCR: 0.6 ppm/°C (0 to 60°C); 2.0 ppm/°C (–55°C to +125°C)
  TCR Tracking: VHD200 to 0.1 ppm/°C; VHD144 to 0.5 ppm/°C
- **Ratio Stability** <0.001% (10 ppm) under load life conditions
- **Ratio Tolerance** VHD200 to 0.001% (10 ppm); VHD144 to 0.005% (50 ppm)
- **Thermal EMF** 0.05 µV/°C (typical); 0.10 µV/°C (maximum) between leads
- **Rise Time** to 1 ns, no ringing
- **Noise Factor** < –40 dB
- **Noninductive** <0.08 µH

Index Number 720

Molded and Potted

Models 300190 thru 300212



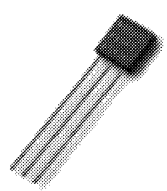
Unitized 2, 3 and 4R Resistor Networks Configurations with Various Lead Outs

- **Resistance range each resistor** 50 Ω to 250K Ω (To 10 Ω with looser specifications.)
- **Absolute tolerance each resistor**
  ±1.0%, ±0.5%, ±0.25%, ±0.1%, ±0.05%, ±0.02%, ±0.01%, ±0.005%
- **Nominal TCR each resistor** ±2 ppm/°C (–55°C to +125°C) and ±0.6 ppm/°C (0 to +60°C)
- **Nominal tolerance ratio matching between resistors** from 0.1 ppm/°C to 4 ppm/°C
- **Thermal EMF** 0.04µV/°C between leads
- **Inductance** 0.08 µH
- **Capacitance** 0.5 pf

Index Number 710

Molded and Potted

Models 300144 and 300145



Small Package, Ultimate Tracking, Voltage Dividers

- **Temperature Coefficient of Resistance**
  Nominal TCR: 0.6 ppm/°C (0 to 60°C); 2.0 ppm/°C (–55°C to +125°C)
  TCR Tracking: to 0.5 ppm/°C
- **Ratio Stability** <0.001% (10 ppm) under load life conditions
- **Ratio Tolerance** to 0.005%
- **Thermal EMF** 0.05 µV/°C (typical); 0.10 µV/°C (maximum) between leads
- **Rise Time** to 1 ns, no ringing
- **Noise Factor** < –40 dB
- **Noninductive** <0.08 µH

Index Number 720

Molded and Potted

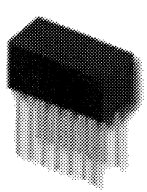
Model VSR144
(low cost version of 300144)

- **Temperature Coefficient of Resistance**
  Nominal TCR: ±4 ppm/°C (0 to 60°C); ±8 ppm/°C (–55°C to +125°C)
  TCR Tracking: to 3.0 ppm/°C
- **Ratio Stability** <0.001% (10 ppm) under load life conditions
- **Ratio Tolerance** to 0.05%
- **Thermal EMF** 0.05 µV/°C (typical); 0.10 µV/°C (maximum) between leads
- **Rise Time** to 1 ns, no ringing
- **Noise Factor** < –40 dB
- **Noninductive** <0.08 µH

Index Number 721

Molded and Potted

Models 375 and 500



Dual-In-Line R-2R Binary Ladder Networks

The standard FSA of Vishay Networks is better than ±0.005% over an ambient temperature range of 0° to +60°C. Stated in terms of ppm deviation (1 ppm = 0.0001%), this means that - for the worst case - the deviation of the actual signal output from expected output, for any combination of bits, will not exceed a total of 50 ppm over this temperature span. Over the full –55°C to +125°C range, standard FSA of Vishay Networks will not exceed 100 ppm (0.01%). On special order, FSA to ±0.001% @ +25°C can be supplied.

Because of the inherent stability of Vishay resistor elements, these networks will maintain this accuracy over a period of at least 5 years, when operated with a maximum of 0.1 watt applied to any resistor. Standard Vishay R-2R binary resistance ladder networks are available in 4-bit to 15-bit voltage-fed configurations with values of R between 100 ohms and 50K ohms.

Index Number 730

VISHAY RESISTORS • 63 Lincoln Highway • P.O. Box 4004 • Malvern, PA 19355-0988 • (610) 644-1300 • FAX (610) 296-0657 • Sales FAX (610) 640-9081
www.vishay.com

PRECISION BULK METAL® FOIL TECHNOLOGY

VISHAY FOIL RESISTORS

Precision Resistor Networks

7 Technical Reasons to Specify Vishay Bulk Metal® Foil 600

1. Extremely Low Temperature Coefficient of Resistance 601
2. Excellent Load-Life Stability 602
3. Tight Resistance Tolerance 603
4. Low Current Noise 604
5. High Speed 605
6. Low Thermal EMF 606
7. Non-Measurable Voltage Coefficient 607

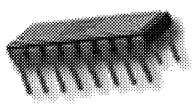
PRECISION RESISTORS FOR THROUGH HOLE MOUNTING

Receive More Information NOW!

To get complete product information faxed to you, phone **1-800-7-VISHAY** (784-7429) and enter the index number of the products that interest you.

Military

Models 1445Q 14 Pin and 1446Q 16 Pin



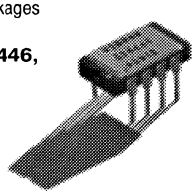
Index Number 626

Dual-In-Line, Military (Hermetically Sealed) Characteristics C and Y of MIL-R-83401

- **Hermetically Sealed for maximum environmental protection** — 100% leak protection
  - Gross Leak: No bubbles
  - Fine Leak: $<5 \times 10^{-7}$ cc/sec
  - (Mil-Std-220, Method 112, Test C, Procedure 111A)
- **Ceramic Package** 94% Aluminum (Al_2O_3)
- **Lid** Gold plated Kovar
- **Solder** Tin/Gold
- **Leads** Alloy 42 (Iron Nickel) with 50 µ" gold plating (Mil-Std-1276, Type G-22-A1)
- **Gold ball wire bonding**
- **Foil Chips V15x5**

Aerospace/Instrumentation

Dual-In-Line Packages
Models
621 **1442, 1445, 1446,**
624 **1457 and**
625 **1460**



Index Number 620

Aerospace, Instrumentation, Industrial Networks in Various Packages

Resistance Range	V5x5	(0.050" x 0.050")	5 Ω to 10K Ω
	V15x5	(0.150" x 0.050")	5 Ω to 33K Ω
	V15x10	(0.150" x 0.100")	33K Ω to 80K Ω
	VTF 15x5	(0.150" x 0.050")	30K Ω to 500K Ω

	Bulk Metal® Foil Chips			
Temperature Coefficient of Resistance TCR	0 to +25°C	+25 to +60°C	–55 to +25°C	+25 to +125°C
Nominal TCR	+0.6 ppm/°C	–0.6 ppm/°C	+2.2 ppm/°C	–1.8 ppm/°C
Standard TCR spread from nominal (3 σ limit)	±1.5 ppm/°C		±2.0 ppm/°C	
Maximum TCR spread from nominal (worst case)	±2.5 ppm/°C		±2.3 ppm/°C	

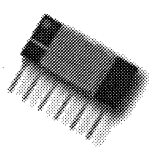
	Vishay Thin Film Chips			
Nominal TCR	±15 ppm/°C	±15 ppm/°C	±15 ppm/°C	±15 ppm/°C
TCR Tracking	–55 to +125°C			
Without Selection				
Bulk Metal Foil	all within 5.0 ppm/°C			
Thin Film	all within 30 ppm/°C			
With Selection				
Bulk Metal Foil	all within 0.5 ppm/°C			
Thin Film	all within 10 ppm/°C			

Resistance Tolerance (tightest)	**Absolute**	**Match**
Bulk Metal Foil		
50 Ω to 80K Ω	±0.005%	0.002%
10 Ω to 50 Ω	±0.01%	0.005%
5 Ω to 10 Ω	±0.05%	0.02%
Thin Film	±0.02%	0.01%

Max Working Voltage and Power Rating	**Power @ +70°C**	**Max Voltage**
V5x5	0.05 W	25 V
V15x5	0.10 W	60 V
V15x10	0.15 W	100 V
VTF15x5	0.10 W	60 V

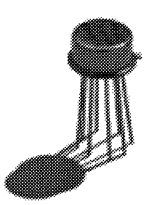
Rise/Decay Time @ 1 Kh	1 ns
Current Noise	< 0.0025 µV/V
Voltage Coefficient	< 0.1 µV/V
Insulation Resistance	> 10,000M Ω
Dielectric Withstanding Voltage	200 V

Single-In-Line Packages
Models 1461, 1462, 1463, 1464 and 1466



Index Number 631

Transistor Outline (TO) Packages
Models 1401, 1403, 1413, 1417, 1419, 1421 and 1422



Index Number 610

VISHAY RESISTORS • 63 Lincoln Highway • P.O. Box 4004 • Malvern, PA 19355-0988 • (610) 644-1300 • FAX (610) 296-0657 • Sales FAX (610) 640-9081
www.vishay.com

VISHAY FOIL RESISTORS

Network Express Prototype Service 997

Custom Bulk Metal® Foil Networks in 2 Weeks With No NRE Charges

Vishay Resistors' **NETWORK EXPRESS** prototype service keeps your project on schedule by reducing the long lead time associated with custom networks. Vishay Resistors can build your custom network and ship prototypes in two weeks with no NRE. **NETWORK EXPRESS** will help you speed your design to market.

Vishay Resistors' Bulk Metal® foil technology is used in the design of these precision networks. By using this technology, these prototypes exhibit all of the outstanding performance features of individual Bulk Metal® foil resistors.

- Extremely Low TCR
- Tight Resistance Tolerance
- Excellent Load-Life Stability
- High Speed
- Low Noise
- Low Thermal EMF
- Non-Measurable Voltage Coefficient

Networks Worksheet 996

Receive More Information NOW!

VISHAY NETWORKS EXPRESS PROTOTYPES FAX

To discuss your requirements, call (610) 644-1300 or
copy this page and FAX your requirements to (610) 640-4487.

NETWORK EXPRESS PROTOTYPE SERVICE

TO: Vishay Resistors
63 Lincoln Highway
P.O. Box 4004
Malvern, PA 19355-0988 USA
Phone: (610) 644-1300

FAX NO: (610) 640-4487 App. Eng.

FROM: _____

DATE: _____ **PHONE:** _____ **FAX:** _____

NUMBER ___ **OF** ___ **PAGES** **PROTOTYPE QTY.** _____ **PRODUCTION QTY.** _____

PACKAGE TYPE:
All Hermetic

			Max. Resistors Per Package Max 33K Ω Per Resistor	Your Resistor Count	Your Package Choice ✓
8 Pin DIP	(0.300 x 0.520)	☐ Standard ☐ Gull-Wing	4	_____	☐
14 Pin DIP	(0.300 x 0.740)	☐ Standard ☐ Gull-Wing	10	_____	☐
16 Pin DIP	(0.300 x 0.780)	☐ Standard ☐ Gull-Wing	12	_____	☐
14 Pin Flatpack	(0.430 x 0.430)		12	_____	☐
16 Pin LCC	(0.295 x 0.360)		4	_____	☐
20 Pin LCC	(0.360 x 0.360)		4	_____	☐
28 Pin LCC	(0.460 x 0.460)		10	_____	☐
8 Pin To-5	(0.370 dia)		3	_____	☐
12 Pin To-8	(0.610 dia)		9	_____	☐

- **Consult factory for other packages, more resistors per package, etc.**
- **Fax to factory for analysis/quotation or to discuss your specific requirements call Applications Engineering (610) 644-1300.**

SCHEMATIC:
Hand draw your schematic here or attach your drawing. Identify the reference resistor and ohmic value of each resistor as well as your pin outs. (Mfg. may require some modifications)

REFERENCE RESISTOR IS: _____

SPECIFICATION	Vishay's Best	Your Requirement
Ratio Tolerance (over 1K)	0.005%	
Absolute Tolerance (over 1K)	0.005%	
TCR Tracking (–55°C to +125°C)	±3 ppm/°C (over 1 K)	
Absolute TCR (–55°C to +125°C)	±5 ppm/°C (over 1 K)	
Maximum Wattage[1]	100 mW/element	

[1] Based on V15 x 5 Element

These specifications are based on quick turn around and do not necessarily reflect the technical capabilities available.

VISHAY RESISTORS • 63 Lincoln Highway • P.O. Box 4004 • Malvern, PA 19355-0988 • (610) 644-1300 • FAX (610) 296-0657 • Sales FAX (610) 640-9081
www.vishay.com

eem SI UNITS

RELATIVE QUANTITY SYMBOLS

$\neq$	not equal to
$\approx$	approximately equal to
$\propto$	proportional to
$<$	smaller than
$\leq$	smaller than or equal to
$\ll$	much smaller than
$>$	larger than
$\geq$	larger than or equal to
$\gg$	much larger than
$\equiv$	identical to or equivalent
$\uparrow$	increases
$\downarrow$	decreases

PREFIXES FOR SI UNITS

Multiple	Prefix	Symbol
10^{12}	tera	T
10^{9}	giga	G
10^{6}	mega	M
10^{3}	kilo	k
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p

Quantity	Symbol	SI Unit	Symbol	Derivation
acceleration	a	m s^{-2}	—	velocity/time
acceleration due to gravity	g	m s^{-2}	—	velocity/time
amount of substance	n	mole	mol	mole fraction (n) used
amplification factor	μ	*a ratio*	—	—
angle	$\theta_1,\varphi_1,\alpha_1$	—	—	—
angle of incidence	i	degree or radian	°	—
angle of refraction	r	degree or radian	°	—
angle, Bragg	θ	number	—	—
angle, critical	c	degree or radian	°	—
anode slope resistance	R_A	ohm	Ω	$\Delta V_a / \Delta I_a$
area	A	metres squared	m^2	$l \times b$
atomic number	Z	a number	—	number of protons
Avogadro constant	L, N_A	number	—	—
breadth	b	metre	m	fundamental unit
capacitance	C	farad	F	charge/p.d.
charge, electric	Q	coulomb	C	current × time
charge on electron	e	coulomb	C	$1{\cdot}6 \times 10^{-19}$ C
conductance	G	ohm^{-1}	Ω^{-1}	reciprocal of resistance
current, electric	I	ampere	A	fundamental unit
decay constant	λ	*a ratio*	—	—
density	ρ	kg m^{-3}	—	m/V
distance along path	s	metre	m	fundamental unit
efficiency	η	*a ratio*	—	work output/work input
electrochemical equiv.	z	g C^{-1}	—	mass/charge
electromotive force	E	volt	V	energy/charge
electron	e	—	—	—
energy	E	joule	J	N m
energy, kinetic	E_k	joule	J	N m. $E_k = 1/2mv^2$
energy, potential	E_p	joule	J	N m. $E_p = mgh$
Faraday constant	F	coulomb mol^{-1}	C mol^{-1}	96,500 C mol^{-1}
field strength, electric	E	V m^{-1}	—	potential gradient: p.d./dist.
field-strength magnetic	H	ampere-turns	—	current × no. of turns
flux, magnetic	Φ	weber	Wb	e.m.f/rate of change of flux
flux density	B	tesla	T	flux/area
focal length	f	metre	m	—
force	F	newton	N	kg m s^{-2}
free energy	ΔG	joule	J	—
frequency	f	hertz	Hz	oscillations/time
gas constant	r	joule	J	energy
half-life,radioactivity	$t_{1/2}$	second	s	fundamental unit
heat capacity	C	J K^{-1}	—	quantity of heat/temp. rise
heat of reaction	ΔH	joule	J	heat energy
heat capacity, specific	c	J K^{-1} kg^{-1}	—	heat capacity/mass
heat, quantity of	q	joule	J	energy

SI UNITS

Quantity	Symbol	SI Unit	Symbol	Derivation
height	h	metre	m	fundamental unit
image distance	υ	metre	m	fundamental unit
inductance, mutual	M	henry	H	induced e.m.f./rate of change of current
inductance, self	L	henry	H	—
intensity of radiation	I	*a number*	—	—
latent heat	L	joule	J	quantity of heat
latent heat, specific	l	J kg^{-1}	—	quantity of heat
latent heat, molar	L_m	joule mol^{-1}	J	quantity of heat
length	l	metre	m	fundamental unit
magnetizing force	H	ampere-turns	—	—
magnetic moment	m	Wb m	—	torque in unit magnetic field
magnification, linear	m	*a ratio*	—	—
mass	m	kilogramme	kg	fundamental unit
mass number	A	*a number*	—	number of neutrons + protons
molar volume	V_m	(dm^3)	—	volume of 1 mole
molar solution	M	*a ratio*	—	moles/dm^3
moment of force	—	N m	—	force × perp. distance
neutron number	N	*a number*	—	number of neutrons
number	n	—	—	—
number of molecules	N	—	—	—
number turns on coil	n	*a number*	—	—
number order spectrum	p	*a number*	—	—
object distance	u	metre	m	fundamental unit
peak current	I_O	ampere	A	see current
peak e.m.f.	E_O	volt	V	see e.m.f.
period	T	second	s	fundamental unit
permeability	μ	H m^{-1}	—	henry/metre
permeability, vacuum	μ_o	H m^{-1}	—	
permeability, relative	μ_r	*a ratio*	—	$\mu = \frac{\mu}{\mu_o}$
permittivity	ε	F m^{-1}	—	farad/metre
permittivity, vacuum	ε_o	F m^{-1}	—	farad/metre
permittivity, relative	ε_r	*a ratio*	—	$\varepsilon_r = \frac{\varepsilon}{\varepsilon_o}$
potential, electric	V	volt	V	energy/charge
potential difference	V	volt	V	energy/charge
power	P	watt	W	J s^{-1}
pressure	p	pascal	Pa	N m^{-2}: force/area
radius	r	metre	m	fundamental unit
reactance	X	ohm	Ω	E_o/I_o
refractive index	n	*a ratio*	—	—
resistance	R	ohm	Ω	p.d./current
resistivity, electrical	ρ	ohm-metre	—	resistance × length
relative density	d	*a ratio*	—	ρ_{sub}/ρ_{water}
r.m.s. current	$I_{r.m.s}$	ampere	A	see current
r.m.s. voltage	$V_{r.m.s}$	volt	V	see e.m.f.
slit separation	s	metre	m	fundamental unit
tension	T	newton	N	see force
temperature, Celsius	θ	degree C	°C	from kelvin
temp. interval	θ	degree	° or K	—
temp. absolute	T	kelvin	K	fundamental unit
thickness	d	metre	m	fundamental unit
time	t	second	s	fundamental unit
torque	T	Nm	—	see moment
turns ratio	T	*a ratio*	—	n_{sec}/n_{prim}
(unit of electricity)	—	kW h	—	kilowatt × hour
velocity	u,υ	ms^{-1}	—	distance/time
velocity, angular	ω	$second^{-1}$	s^{-1}	angle/time
velocity, e.m.waves	c	m s^{-1}	—	—
velocity of sound	υ	m s^{-1}	—	—
volume	V	metre cubed	m^3	l × b × h
wavelength	λ	metre	m	fundamental unit
work	w	joule	J	force x distance (Nm)
weight	W	newton	N	kg m s^{-2}or mg

VISHAY TECHNO

T H I C K F I L M T E C H N O L O G Y

High Voltage Resistors, Dividers, R/2R Ladder Networks, QPL and Custom Resistor Networks

These highly technical products are useful in applications ranging from consumer and industrial products to those qualified for military programs. There is a Vishay Techno part available for almost every category of application. Custom design feature unlimited schematics and fast turnaround.

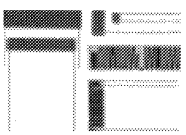
Receive More Information NOW!

To get complete product information faxed to you, phone **1-800-7-VISHAY** (784-7429) and enter the index number of the products that interest you.

VISHAY TECHNO

High Voltage Resistor and Dividers

Model TR and TD

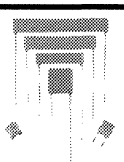


- 30,000 Volts capability
- **Very low voltage coefficient** to 0.1 ppm/V
- **Outstanding stability** under adverse conditions
- Stable cermet resistive element bonded to a high-purity alumina substrate
- **Tough epoxy-based coating** and high voltage stability
- Designs built from customer supplied schematics
- Dividers available leaded or non-leaded
- **Typical resistance ratios of 1000:1, 2000:1, etc.**
- TCR tracking to ±10 ppm/°C depending on values

Index Number 2001

High Voltage Resistors

Model FHV



- **Non-inductive design**
- **Matched sets** available
- Ratio dividers available
- **Special testing** available
- **Low T.C.**: ±200 ppm/°C standard, ±100 ppm/°C and ±50 ppm/°C available.
- Tolerance: ±10%, ±5%, ±2%, ±1% Standard tolerance and/or T.C. matching available upon request. 1%tolerance not available above 1 Gigohm.

Index Number 2002

Single-In-Line, Coated, 4 Bits to 8 Bits R/2R Ladder Networks

Model TxxS

- **Ladder Network Accuracy** on Linearity: ±1/2 LSB.
- **Ladder Network Resistance Tolerance: ±2%.**
- Temperature Coefficient of Resistance: ±100 ppm/°C.
- Operating Temperature Range: -55°C to +125°C.
- **Power Dissipation Rating at +70°C Ambient**: 50 mW/element.
- Standard Resistance Values (R): 5 kilohms, 10 kilohms, 25 kilohms, 50 kilohms and 100 kilohms.

Index Number 2003

Molded SIPS, DIPS, Coated SIPS

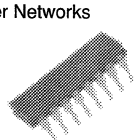
Custom Networks

- **Fast turnaround time**
- **Unlimited schematics** possible
- Design through production
- **Processed to MIL-PRF-83401**
- **High temperature solder joints**
- Made in the U.S.A.
- **Wide resistance range**
- **Ultra high precision laser trimming**
- Double sided printing and through holes/VIAs
- **High density** circuit designs
- Tighter parameters available
- **High power ratings** available
- **Custom resistor, capacitor, diode and inductor network combinations**

Index Number 2004

Dual-In-Line, 8 Bit R/2R Ladder Networks

Models T16L08 and T16LR8

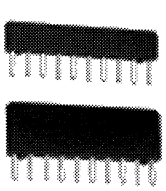


- **Ladder Network Accuracy**: ±1/2 LSB from 0°C to +70°C.
- **Ladder Network Resistance Tolerance: ±2%.**
- Temperature Coefficient of Resistance: ±100 ppm/°C.
- Operating Temperature Range: 0°C to +70°C.
- **Power Dissipation Rating at +70°C Ambient**: 50 mW for individual resistor and 1.8 W total package rating.
- Standard Resistance Values (R): 25 kilohm, 50 kilohm, 100 kilohm.

Index Number 2005

QPL MIL-PRF-83401 Qualified Single-In-Line, Resistor Networks

M83401/ 04,05,06,07,08,09; C and G Schematics

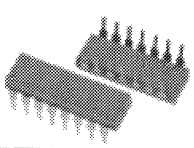


- **0.36 watt to 1.8 watt at +70°C**
- **Qualified to MIL-PRF-83401**
- Designed for automatic insertion
- **Withstands thermal stress** from -65°C to +125°C
- **Conforms to IC package** configurations
- **High temperature solder joints**
- Techno's capabilities include designing special resistor networks from customer supplied schematics. We welcome the opportunity to work with customer engineers during the initial design phase.

Index Number 2006

QPL MIL-PRF-83401 Qualified Dual-In-Line, Resistor Networks

M8340101 and M8340102; A and B Schematic



- **1.3 watt to 1.6 watt at +70°C**
- **Qualified to MIL-PRF-83401**
- Designed for automatic insertion
- Withstands thermal stress from -65°C to +125°C
- Conforms to IC package configurations
- **High temperature solder joints**
- Techno's capabilities include designing special resistor networks from customer supplied schematics. We welcome the opportunity to work with customer engineers during the initial design phase.

VISHAY TECHNO • 63 Lincoln Highway • P.O. Box 4004 • Malvern, PA 19355-0988 • (610) 644-1300 • FAX (610) 296-0657 • Sales FAX (610) 640-9081 • www.vishay.com

T H I C K F I L M T E C H N O L O G Y

VISHAY TECHNO

RC, R, C, RCD, Custom Networks, Chips, and Wirewound Resistors

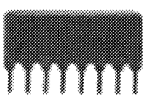
These highly technical products are useful in applications ranging from consumer and industrial products to those qualified for military programs. There is a Vishay Techno part available for almost every category of application. Custom design feature unlimited schematics and fast turnaround.

Receive More Information NOW!

To get complete product information faxed to you, phone **1-800-7-VISHAY** (784-7429) and enter the index number of the products that interest you.

Coated SIP Resistor/Capacitor Networks

Model TRC

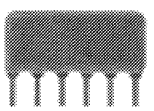


- **Highly stable thick film resistors**
- **NPO or X7R capacitors for line terminator**
- Wide operating temperature range
- **Special Resistor/Capacitor schematics** available

Index Number 2007

Coated SIP Capacitor Networks

Models TCN



- **NPO or X7R capacitors for line terminator**
- **Wide operating temperature range**
- Special capacitor schematics available

Index Number 2008

Thick Film Chip Resistors

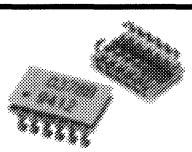
Model CR

- **Space qualified**
- Flow solderable
- **Custom sizes available**
- Burn-in and data available
- **Automatic placement capability**
- Top and wraparound terminations
- **Tape and reel** packaging available
- **Internationally standardized sizes**

Index Number 2009

Surface Mount DIPS, Small Outline

Custom Networks

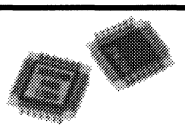


- **Highly stable thick film resistors**
- **NPO or X7R capacitors** for line terminator
- **Wide operating temperature range**, -55°C to +125°C

Index Number 2010

Quads, Surface Mount R, R-C, RCD

Custom Networks

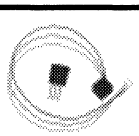


- **Highly stable thick film resistors**
- **NPO or X7R capacitors** for line terminator
- Wide operating temperature range,-55°C to +125°C
- **TCR tracking = ±50 ppm/°C**

Index Number 2011

3/8" [9.52mm] Sp. **Wirewound** Trimmers

Models 117S, 126S, 151S, 176S

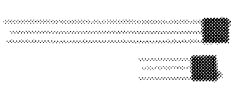


- **Precious metal wiper**
- 1.0 watt to +85°C
- **TCR ±50 ppm/°C**
- Solderable leads
- **Military quality at affordable prices**

Index Number 2012

1/4" [6.35mm] Sp. **Wirewound** Trimmers

Models 12S, 14S, 15S, 17S, 18S

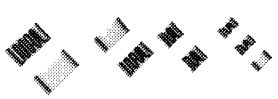


- **Precious metal wiper**
- 0.25 watt to +85°C
- **TCR <50 ppm/°C**
- Solderable leads
- **Special configurations available**
- **Military quality** at affordable prices

Index Number 2013

Thick Film High Voltage Chip Resistors

Model CRHV



- **High Voltage**
- Outstanding Stability
- Flow solderable
- Custom sizes available
- Automatic placement capability
- Tape and reel packaging available
- Internationally standardized sizes
- Top and wraparound terminations

Index Number 2014

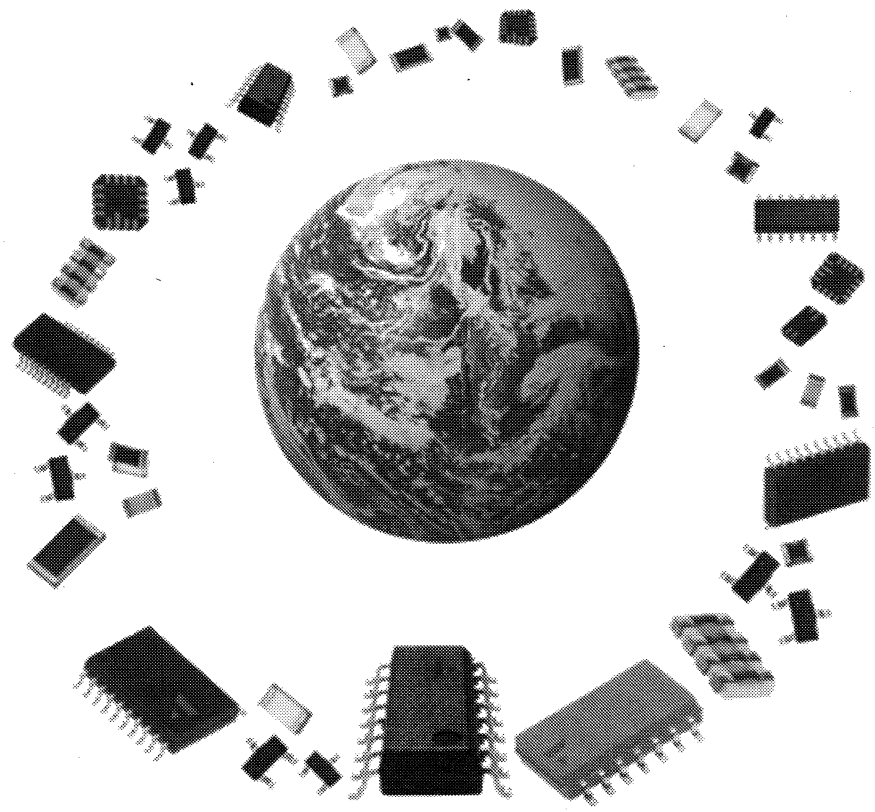
VISHAY TECHNO

VISHAY TECHNO • 63 Lincoln Highway • P.O. Box 4004 • Malvern, PA 19355-0988 • (610) 644-1300 • FAX (610) 296-0657 • Sales FAX (610) 640-9081 • www.vishay.com

4700

VISHAY

THIN FILM



Thin Film technology has emerged as the technology of choice by design engineers like yourself. Thin Film performance, specifications, miniaturization and component integration make it a natural selection.

In order to serve you better, Vishay is proud to present our series of Thin Film Technical Flow Charts, which we believe will help you choose the best product for your analog or digital application with a minimal investment of your time.

The sophistication of Thin Film technology is increasing with the integration of resistors and capacitors in a single network which can be found on the RC flow chart.

Vishay is committed to providing you with the best technology, quality and service available.

For complete information, ask for our Global Thin Film Technology Data Book, containing the widest breadth and depth of Thin Film products available. Contact us at (610) 407-4800 or fax at 640-9081.

We look forward to working with you on your next challenging application.

www.vishaythinfilm.com

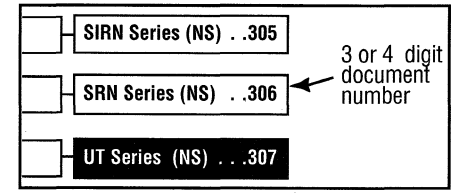
Vishay Thin Film is now on the World WideWeb. Visit www.vishaythinfilm.com to view all of our current technical and product information. You can easily download .pdf files to print our datasheet from your own computer.

INSTAFAX

The Vishay INSTAFAX Instant Info-Line provides up to date information 24 hours a day, 7 days a week. See the instructions below. To Reach Vishay Thin Film Resistors, call (610) 407-4800.

Step 1 - Dial 1-800-7-VISHAY (784-7429) [International calls, dial (617) 431-9430]. Welcome to Vishay's Instant Info-Line.

Step 2 - Consult the flow charts to find the 3 or 4 digit document number of the product you want. When prompted, enter the document number, or enter 999 for a complete listing.

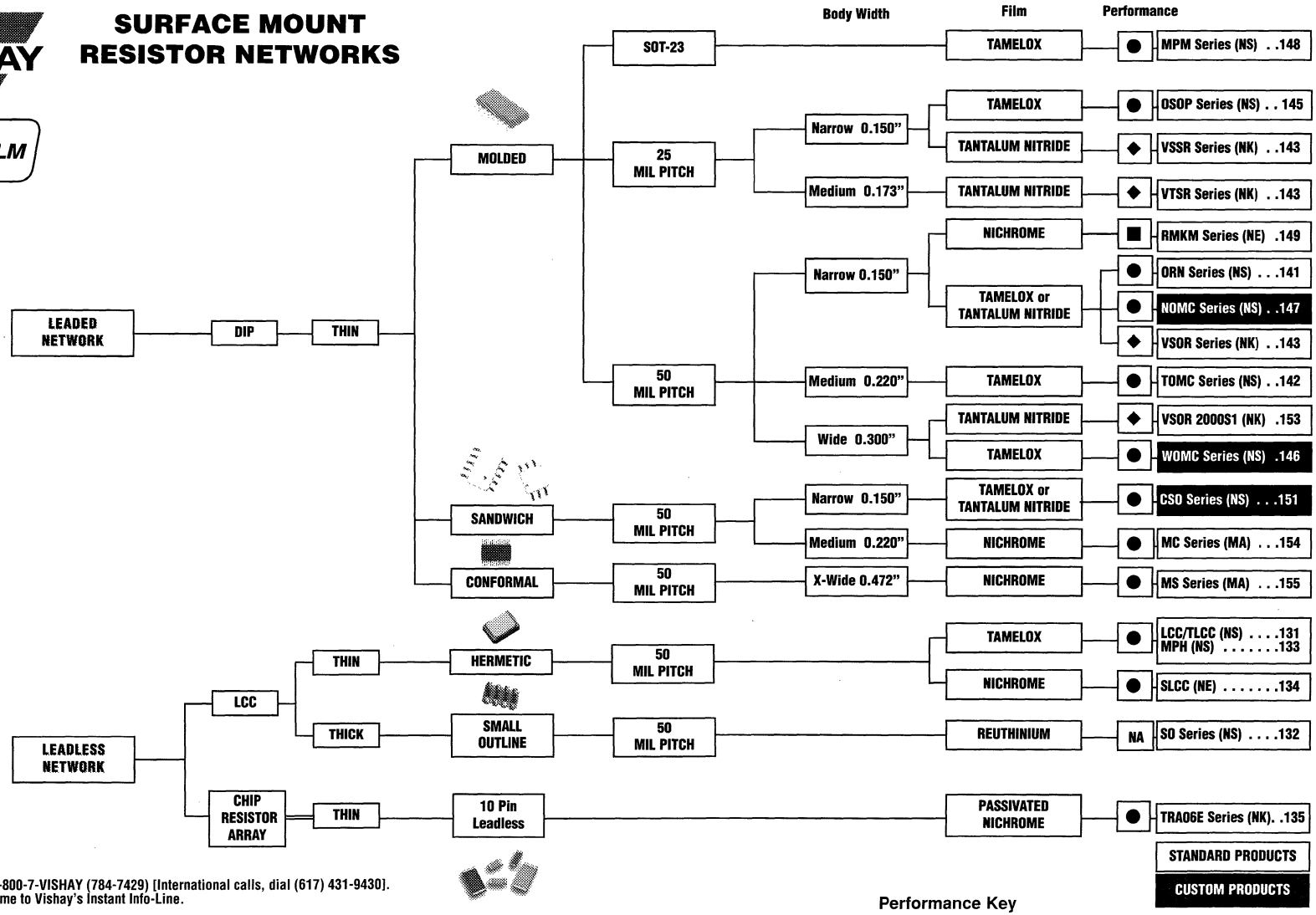


Step 3 - Enter the area code and fax number where you want the documents delivered.

Step 4 - Respond to the voice prompt with your name and phone number. Your documents will be sent immediately.

VISHAY THIN FILM

SURFACE MOUNT RESISTOR NETWORKS



Step 1 Dial 1-800-7-VISHAY (784-7429) [International calls, dial (617) 431-9430]. Welcome to Vishay's Instant Info-Line.

Step 2 Consult the photos to find the 3 digit document number of the product you want. When prompted, enter the document number.

Step 3 Enter the area code and fax number where you want the documents delivered.

Step 4 Respond to the voice prompt with your name and phone number. Your documents will be sent immediately.

Performance Key

▲

	ABS	TRACKING
TCR	10	1
	ABS	RATIO
TOL	0.05	0.01

■

	ABS	TRACKING
TCR	10	2
	ABS	RATIO
TOL	0.1	0.025

●

	ABS	TRACKING
TCR	25	2
	ABS	RATIO
TOL	0.1	0.1

◆

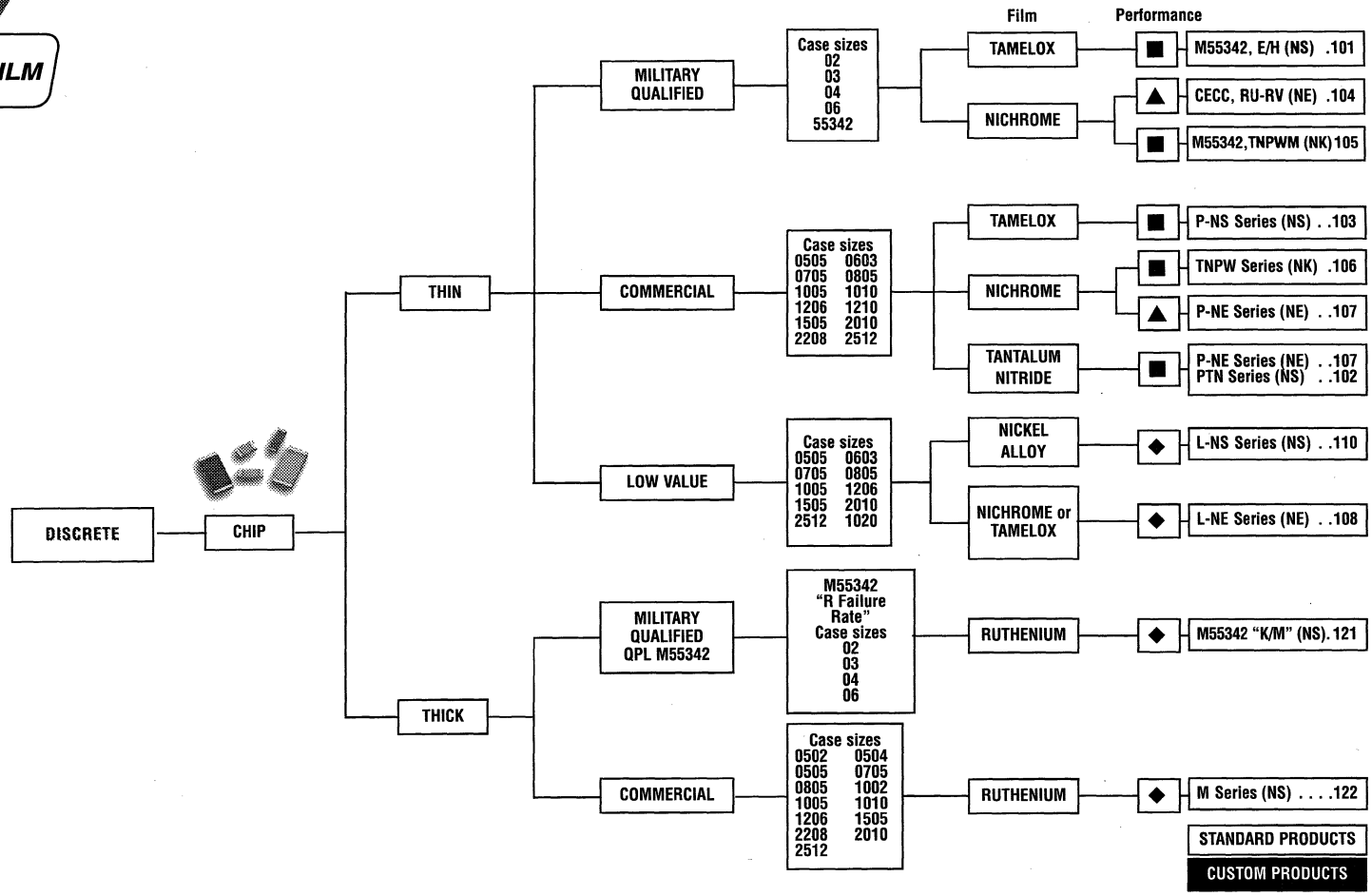
	ABS	TRACKING
TCR	50	5
	ABS	RATIO
TOL	1.0	0.025

Vishay © Copyright 1997 All Rights Reserved

VISHAY

THIN FILM

SURFACE MOUNT RESISTORS CHIPS



Step 1 Dial 1-800-7-VISHAY (784-7429) [International calls, dial (617) 431-9430]. Welcome to Vishay's Instant Info-Line.

Step 2 Consult the photos to find the 3 digit document number of the product you want. When prompted, enter the document number.

Step 3 Enter the area code and fax number where you want the documents delivered.

Step 4 Respond to the voice prompt with your name and phone number. Your documents will be sent immediately.

Performance Key

▲	ABS
TCR	10
	ABS
TOL	0.05

■	ABS
TCR	25
	ABS
TOL	0.1

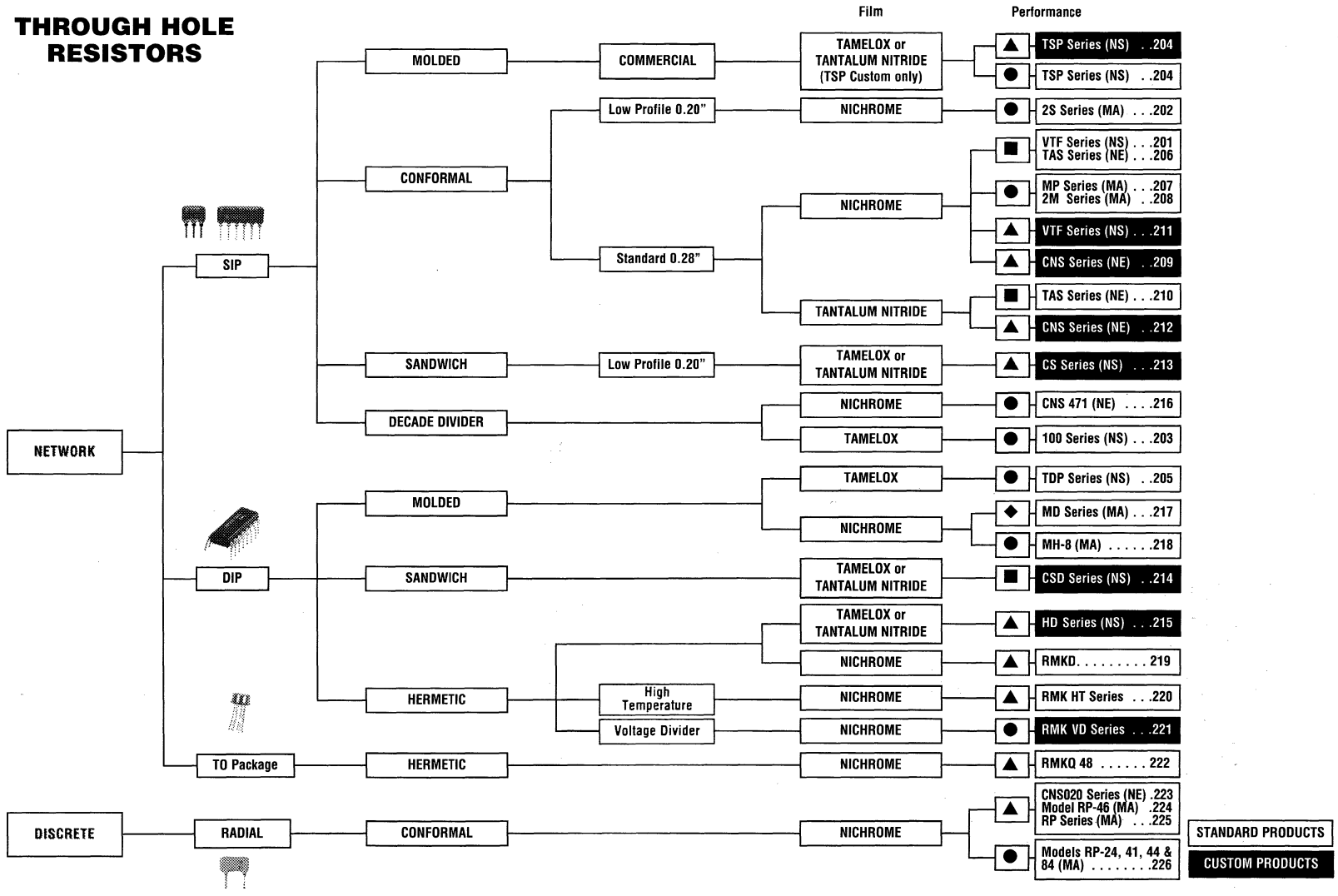
●	ABS
TCR	25
	ABS
TOL	0.5

◆	ABS
TCR	300
	ABS
TOL	1.0

Vishay © Copyright 1997 All Rights Reserved

VISHAY THIN FILM

THROUGH HOLE RESISTORS



Step 1 Dial 1-800-7-VISHAY (784-7429) [International calls, dial (617) 431-9430]. Welcome to Vishay's Instant Info-Line.

Step 2 Consult the photos to find the 3 digit document number of the product you want. When prompted, enter the document number.

Step 3 Enter the area code and fax number where you want the documents delivered.

Step 4 Respond to the voice prompt with your name and phone number. Your documents will be sent immediately.

Performance Key

▲	ABS	TRACKING
TCR	10	1
	ABS	RATIO
TOL	0.05	0.01

■	ABS	TRACKING
TCR	10	2
	ABS	RATIO
TOL	0.1	0.025

●	ABS	TRACKING
TCR	25	2
	ABS	RATIO
TOL	0.1	0.1

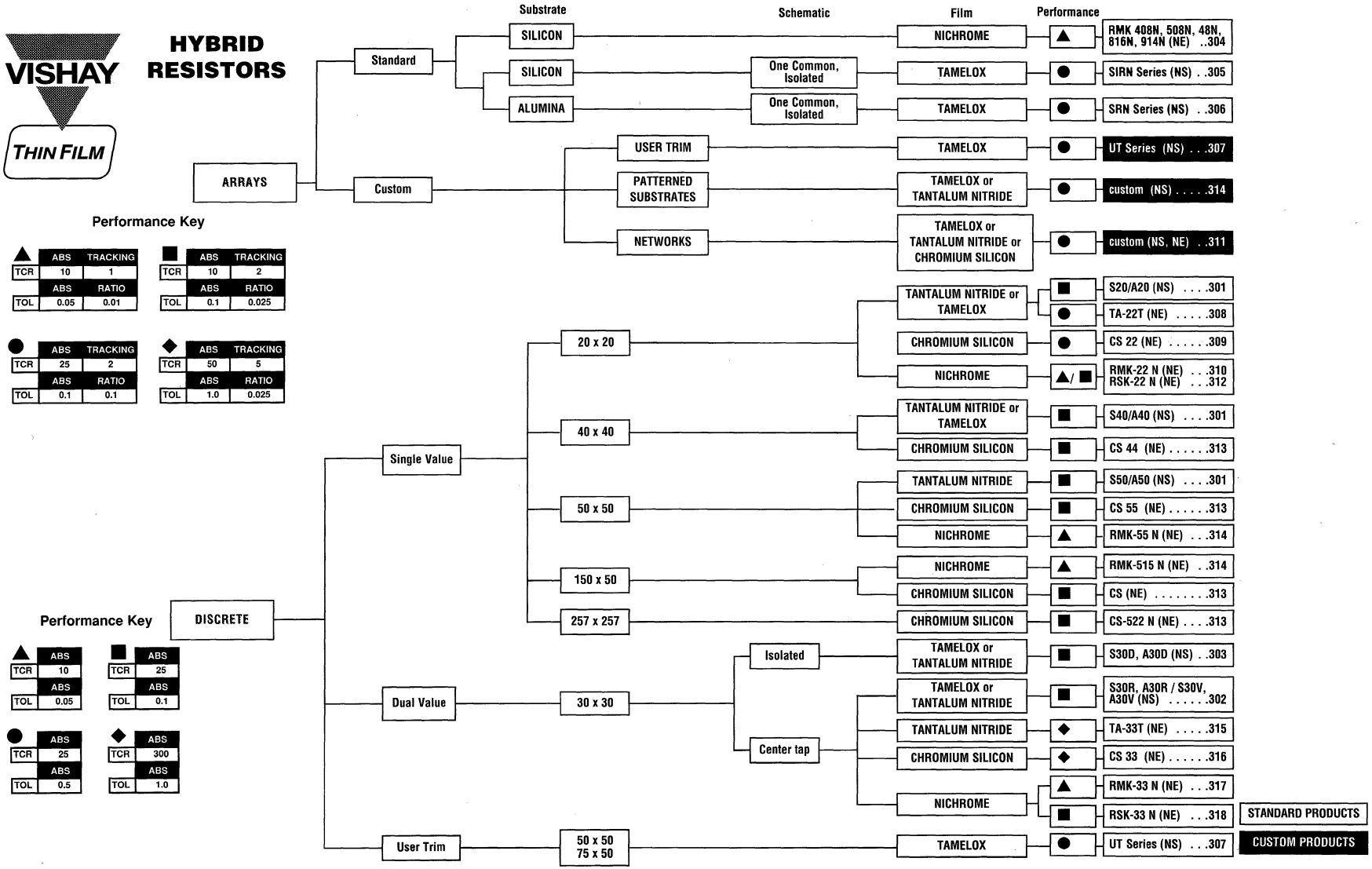
◆	ABS	TRACKING
TCR	50	5
	ABS	RATIO
TOL	1.0	0.025

Vishay © Copyright 1997 All Rights Reserved

VISHAY

THIN FILM

HYBRID RESISTORS



Performance Key

ABS TRACKING TCR 10 1 ABS RATIO TOL 0.05 0.01

ABS TRACKING TCR 25 1 ABS RATIO TOL 0.1 0.1

ABS TRACKING TCR 25 0.5 ABS RATIO TOL 0.5 0.5

ABS TRACKING TCR 300 1.0 ABS RATIO TOL 1.0 1.0

Step 1 Dial 1-800-7-VISHAY (784-7429) [International calls, dial (617) 431-9430]. Welcome to Vishay's Instant Info-Line.

Step 2 Consult the photos to find the 3 digit document number of the product you want. When prompted, enter the document number.

Step 3 Enter the area code and fax number where you want the documents delivered.

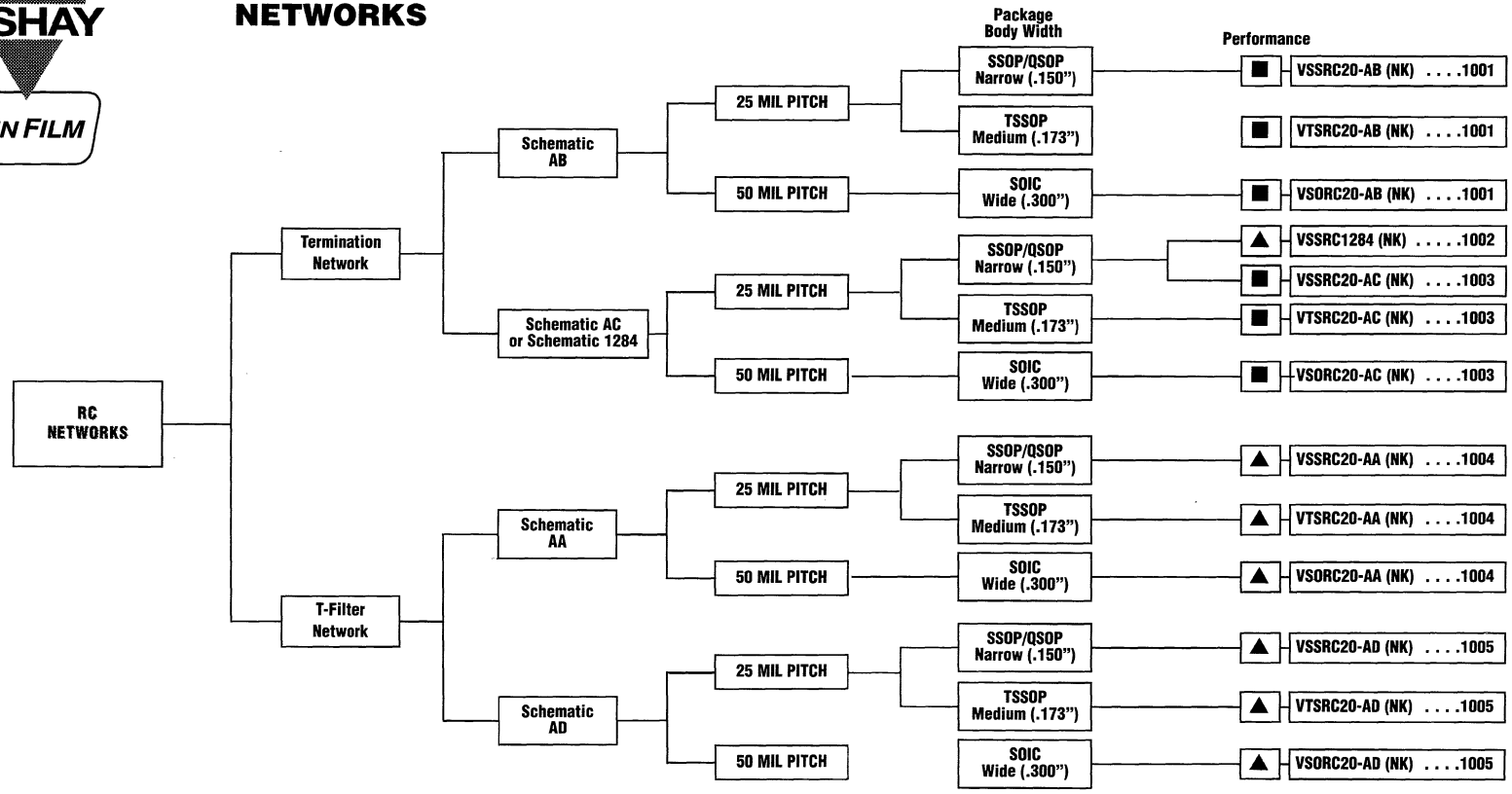
Step 4 Respond to the voice prompt with your name and phone number. Your documents will be sent immediately.

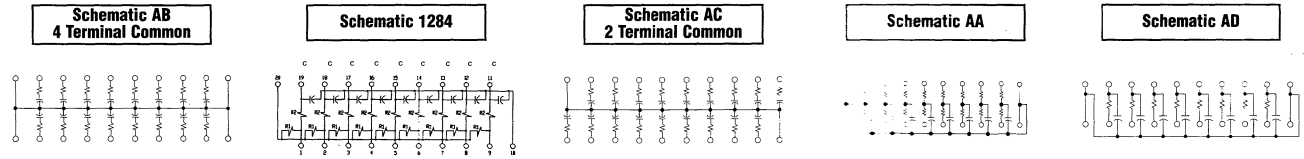
Vishay © Copyright 1997 All Rights Reserved

See us on the World Wide Web at http://eemonline.com EEM 1999

VISHAY THIN FILM

RC SURFACE MOUNT NETWORKS





Step 1 Dial 1-800-7-VISHAY (784-7429) [International calls, dial (617) 431-9430]. Welcome to Vishay's Instant Info-Line.

Step 2 Consult the photos to find the 3 digit document number of the product you want. When prompted, enter the document number.

Step 3 Enter the area code and fax number where you want the documents delivered.

Step 4 Respond to the voice prompt with your name and phone number. Your documents will be sent immediately.

Performance Key

▲

	TCR	TOLERANCE
RESISTOR	200	5%
	TCC	TOLERANCE
CAPACITOR	200	10%

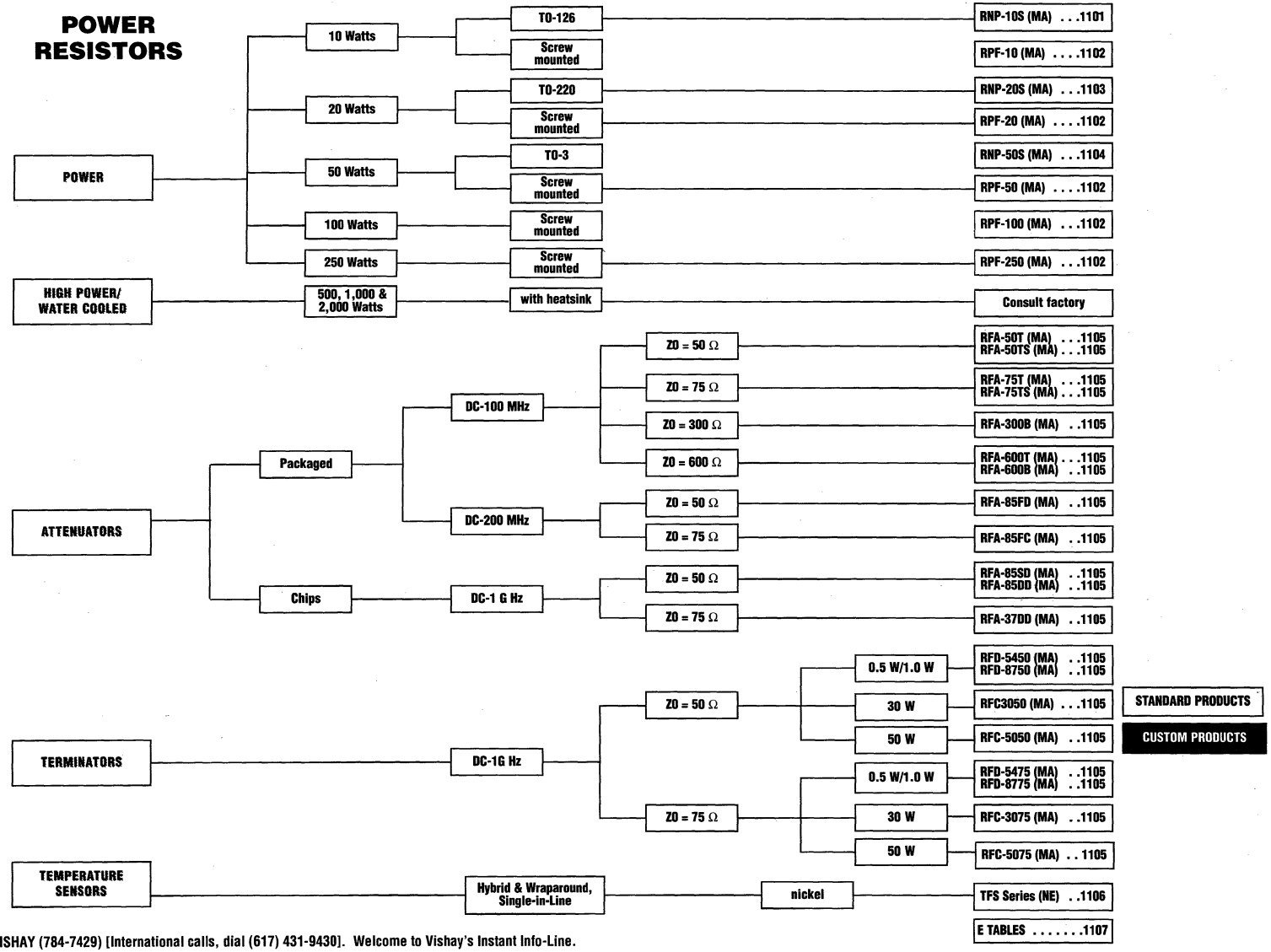
■

	TCR	TOLERANCE
RESISTOR	200	10%
	TCC	TOLERANCE
CAPACITOR	200	20%

Vishay © Copyright 1997 All Rights Reserved

VISHAY THIN FILM

POWER RESISTORS



Step 1 Dial 1-800-7-VISHAY (784-7429) [International calls, dial (617) 431-9430]. Welcome to Vishay's Instant Info-Line.
Step 2 Consult the photos to find the 3 digit document number of the product you want. When prompted, enter the document number.
Step 3 Enter the area code and fax number where you want the documents delivered.
Step 4 Respond to the voice prompt with your name and phone number. Your documents will be sent immediately.

Vishay © Copyright 1997 All Rights Reserved

VISHAY THIN FILM

Quick-Net® Prototypes Fax Form

Custom Thin Film Networks in 2 weeks with no NRE charges

For your Quick-Net Prototype, fill out this form and FAX to Vishay at (716) 283-5932, or call and talk to a Vishay engineer at (716) 283-4025.

DATE: _____ FROM: _____

NUMBER OF PAGES: _____

TO: Vishay Quick-Net Team
2160 Liberty Dr.
Niagara Falls, NY 14304 USA
FAX NO.: (716) 283-5932

PHONE: _____
FAX: _____

YOUR PART NUMBER: _____ VISHAY P.N. _____ QUANTITY REQUIRED _____

Package Type Package	Max. Resistors per package*	Your Resistor Count	Your Package Choice	Quantity Required
Single-In-Line	2 thru 9		☐	
8 PIN Hermetic DIP	10		☐	
14 PIN Hermetic DIP	12		☐	
16 PIN Hermetic DIP	15		☐	
18 PIN Hermetic DIP(20 PIN also avail.)	12		☐	
14 Lead Flatpack 1/4 x 3/8	8		☐	
14 Lead Flatpack 3/8 x 3/8	12		☐	
16 Lead Flatpack 1/4 x 3/8	12		☐	
16 Lead Flatpack 3/8 x 3/8	14		☐	
16, 20, 24 Terminal Leadless Chip Carrier	8,12		☐	
14, 16-Lead Gull Wing SMT	7, 8		☐	
TO5 (8 or 10 PIN)**	--		☐	
TO8 (12 or 16 PIN)**	--		☐	
SO Ceramic (16, 20, 24 or 28 PIN)**	--		☐	
SO8, SO14, SO16**	--		☐	

SCHEMATIC:

Hand draw your schematic here or attach your drawing. Identify the reference resistor and ohmic value of each.

REFERENCE RESISTOR IS: _____

TO: _____

SPECIFICATIONS*:	Your requirements
Quick-Net's Best*	
Best Ratio Tolerance Available (over 1K Ω) 0.01%	
Best Absolute Tolerance 0.1%	
Best TCR Tracking (-55°C to +125°C) ±25 ppm/°C	
Maximum Wattage: 25 mW/element	

*Resistance Range may be expanded by adding resistors in series, however the number of resistors per package will decrease. Three thru ten pin SIPs (isolated or common)

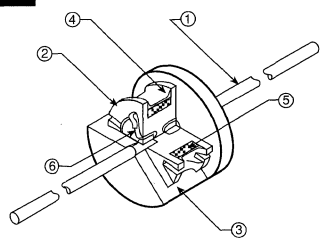
**These special packages require 4 to 6 weeks delivery.

VISHAY ULTRONIX

PRECISION WIREWOUND TECHNOLOGY

CONSTRUCTION IS THE KEY TO OUR PERFORMANCE

Index Number 900



1. *Welded Lead-Tab Assembly, (Molded in Place).*
2. *Molded Thermosetting Alkyd Polyester Bobbin.*
3. *Molded Thermosetting Alkyd Polyester Encapsulation.*
4. *Stress Relief Coating.*
5. *Resistance Wire.*
6. *Sandwich-Welded Termination.*

All Welded Construction: The combination of all welded construction and compatible materials provide the most reliable means of interconnects possible.

Butt Weld of Tab to Lead: A tab material of 800 alloy (the same as the resistance wire) is butt welded to the lead and molded deep into the resistor bobbin. This design parameter assures the least possible D.C. transients due to thermal EMF.

Bobbin Design: The ratio of the height of the Pi wall to the width of the Pi and to the diameter of the bobbin mandrel are critical to the basic stability of a wirewound resistor. These parameters are optimized for each wire size, wattage size and range of resistor values.

Encapsulation Material: Both the bobbin and the final encapsulation material are alkyd polyesters. The resulting resistor is virtually a homogeneous mass with compatible coefficients of expansion. All types are unaffected by application of solvents.

PRECISION WIREWOUND RESISTORS

VISHAY RESISTORS

In addition to MIL-R-39005 and commercial wirewound resistors, VISHAY offers a full range of special precision wirewound products (some formerly produced by Elliott Jordan). This makes VISHAY a very unique source for high performance precision wirewound resistors, with the experience to meet your requirements.

Combining Elliott Jordan's technology with our 40 year background in wirewound production, lets you access almost any wirewound requirement – military or commercial, standard or custom.

You'll find VISHAY offers precision wirewounds with the exact combination of accuracy, stability and value you need for critical applications. And we can provide the package you want.

WINDING FORMS

To ensure minimum stresses on the resistor winding due to environmental changes, the winding forms, or bobbins, are molded of an alkyd polyester which has thermal expansion characteristics compatible with those of the resistance-wire alloys and terminals.

RESISTANCE WIRE

The optimum resistance wire for a particular resistor design is selected for its resistivity (ohms/CMF, ohms/circular mil-foot), its temperature coefficient of resistance (TCR) over the operating temperature range, its low-thermal EMF properties compared to copper, and other contributing characteristics.

For most resistor applications, wire alloys are selected for low TCR (0 ±10ppm/°C or less); however, VISHAY also manufactures resistors wound with wire offering TCRs to +6000 ppm/°C. The resistance wire is coated with a high-temperature resilient-enamel insulation. The resistance wire is tested, categorized and inventoried by resistivity and temperature coefficient of resistance.

LEADS AND LEAD MATERIAL

High structural strength and lead integrity is assured by molding the leads into the bobbin. The standard lead material is hot solder dipped oxygen-free copper. Special lead materials such as nickel can be provided. Special platings such as gold are also available when specified.

TERMINATION

Proper termination of the resistance wire to the resistor leads is the heart of quality resistor manufacturing. VISHAY employs a layer or sandwich-type termination. The resistance wire is sandwiched between two layers of a ribbon material, made mechanically solid, and welded with an exact pressure/heat/time-weld profile. Welding and weld inspection are performed under microscope.

ENCAPSULATION

After the resistor is wound, calibrated, aged and terminated, the resistance winding is coated with a resilient buffer material to protect the windings during *encapsulation,* and to further isolate the winding from mechanical stresses. The resistor is *encapsulated* using an alkyd polyester selected for its mechanical, electrical and thermal characteristics. To further reduce stresses in the winding, the *encapsulation* material is selected so that the thermal-expansion characteristic is matched to those of the bobbin and resistance element.

MARKING

Standard markings are the VISHAY logo, part number (may be abbreviated on very small-size resistors), resistance value, resistance tolerance and date code. All markings are made with permanent epoxy ink which is resistant to most common cleaning solvents used on printed circuit boards and assemblies.

VISHAY ULTRONIX, INC., 63 Lincoln Highway • P.O. Box 4004 • Malvern, PA 19355-0988 • Phone (610) 725-8977 • Fax (610) 725-0567 • www.vishay.com

PRECISION WIREWOUND TECHNOLOGY

Precision WireWound Resistors

RESISTOR TOLERANCE

A vital factor in the manufacture of precision wirewound resistors is the ability to measure and calibrate the resistance, during production, with a high degree of accuracy and dependability. VISHAY uses resistance bridges which are traceable to NIST standards.

Standard available resistance tolerances are ±1%, ±0.5%, ±0.25%, ±0.1%, ±0.05%, ±0.02% and ±0.01%. For accuracies of ± 0.005% and tighter, contact the factory.

For minimum resistance guide, refer to individual model data sheets in this catalog.

RESISTANCE RANGE

The maximum resistance values for each resistor style and type are listed in this catalog. A value of 10 Megohm can be considered common on large sizes, although resistors of 50 Megohm have been produced. Low values, depending on the size of the resistor, can run into the fractional ohm.

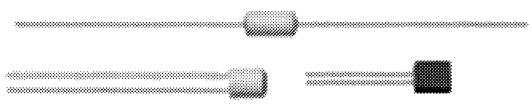
Receive More Information NOW!

To get complete product information faxed to you, phone **1-800-7-VISHAY** (784-7429) and enter the index number of the products that interest you.

PRECISION WIREWOUND RESISTORS

Commercial Discrete WireWound Resistors

Axial and Radial Models

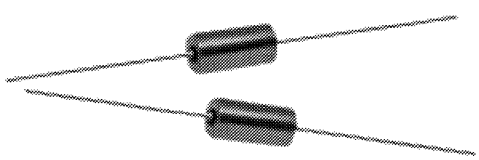


- Excellent long-term stability
- Inherent low temperature coefficient
- Extremely low Thermal EMF
- Minimum Values: 0.1 ohm for ±1% and ±0.5%. 10 ohm for ±0.1% and tighter.
- Resistance Tolerance: ±0.005% to ±1%,
- Standard temperature range: -10°C to +80°C.
- Working temperature range: -60°C to +145°C.
- All Welded Construction: The combination of all welded construction and compatible materials provide the most reliable means of interconnects possible.

Index Number 906

Model HSxxxA

Hermetically Sealed, Ultra-High Stability

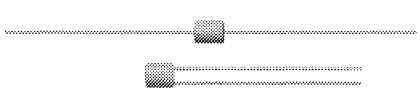


- Accuracy to ±25 ppm absolute
- Shelf life to 10 ppm/year
- Temperature coefficient to ±3 ppm/°C, -10°C to +80°C
- Low voltage coefficient
- Low noise
- Extremely low thermal EMF
- Available in 4 terminal on HS500 Series

Index Number 910

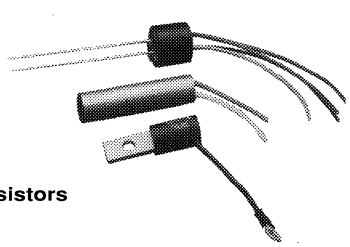
Military Established Reliability

MIL-R-39005, Type RBR
MIL-R-93, Type RB,
QPL Approved



- All welded construction
- Molded thermosetting plastic bobbin
- Wide ohmic range combined with tight tolerances
- Temperature Coefficient: (MIL spec requirements) Less than 1 Ω, ± 90 ppm/°C. 1 Ω to <10 Ω, ±30 ppm/°C. 10 Ω to <100 Ω, ±15 ppm/°C, 100 Ω and above, ±10ppm/°C.
- Dielectric Strength: 750 V RMS, one minute.
- Short Time Overload: Twice rated power.

Index Number 915



Temperature Sensitive Resistors

- Custom TCR to ±2% tolerance
- Absolute resistance tolerance to ±0.1%
- Fast thermal transition
- Physical configurations to your specifications
- Excellent TCR linearity
- Excellent repeatability
- High reliability and linear resistance vs. temperature characteristics

Index Number 930

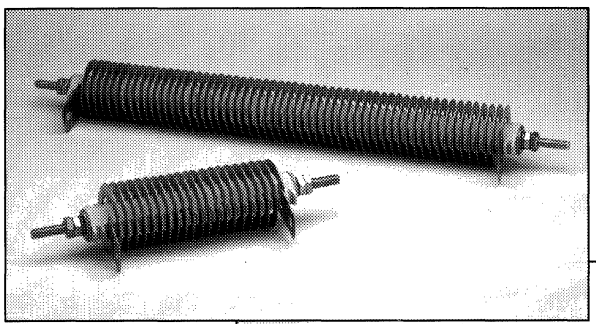
VISHAY ULTRONIX, INC., 63 Lincoln Highway • P.O. Box 4004 • Malvern, PA 19355-0988 • Phone (610) 725-8977 • Fax (610) 725-0567 • www.vishay.com

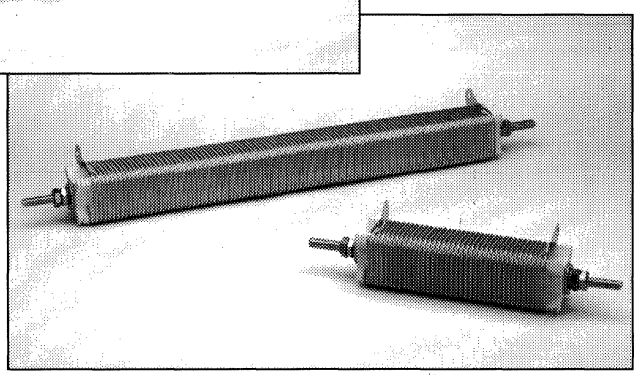
Ward Leonard Resistors

Power Resistors

Coiled Power by Ward Leonard Resistors

Edgeohm and Hexohm Power Resistors





Application

Take a step up with the power of Edgeohm and Hexohm resistors. High element mass gives Edgeohm the ability to handle high current, intermittent duty applications beyond the level of Ribflex resistors. They are also suitable for continuous duty service where low resistance and high current are required. For lower current needs, Ward Leonard offers Hexohm resistors.

Construction

Edgeohm resistors are constructed with the highest quality helical wound resistance alloy, manufactured in accordance with Ward Leonard Resistor's stringent manufacturing specifications. The helix is wound on a threaded ceramic core ensuring a fixed mechanical distance is maintained between turns even under extreme overload conditions. Terminations to the resistance element are made by welding or silver brazing depending on application requirements. Hexohm resistors are made using quality resistance wire alloys and meet the same stringent manufacturing specifications. All resistors are supported by a threaded steel rod passing through the center of the ceramic core, and insulated using mica washers increasing dielectric strength of the resistor assembly.

Options

Twenty-three ampere ratings in four wattage ranges are available in no tap or fixed tap forms. Adjustable taps are offered for some forms. Contact Ward Leonard Resistors for information on stackable rack mounted resistor bank enclosers.

Voltage

Standard Edgeohm and Hexohm resistors are designed to operate at 600 volts maximum between terminals. For greater voltages, connect two or more resistors in series so voltage drop across any individual resistor is 600 volts or less. Voltage between resistor terminals and ground should not exceed 250 volts. Insulated supports must be used if greater voltages are applied. Contact factory for insulated supports and special 1000 volt units.

Resistance Tolerance

Standard Tolerance is ±10% for all forms.

Power Rating

Choose from 280-440, 425-700, 600-950, and 750-1220 watt range forms. These are continuous duty ratings based on a temperature rise of 375 deg. C (675 F) in a 40 deg. C ambient.

Coefficient of Resistivity

The factor for coefficient of resistivity is negligible for most applications and can be ignored when selecting a resistor. Contact factory for additional information if needed.

Price Quotes and lead times available by calling, faxing, or email.
609-461-1900 • Fax 609-461-8216 • email wlresis@ibm.net

Ward Leonard Resistors • A Division of C.T. Gamble Industries
605 Perkins Lane, Delanco, NJ 08075 • 609-461-1900 • Fax 609-461-8216 • email wlresis@ibm.net

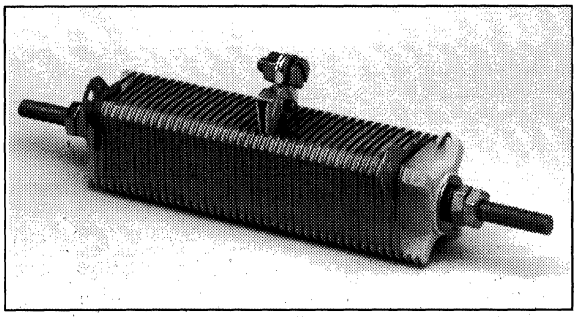
For Technical Assistance Please Call 1-800-486-9273

Power Resistors

Ward Leonard Resistors

Coiled Power by Ward Leonard Resistors

Edgeohm and Hexohm Power Resistors (cont'd)

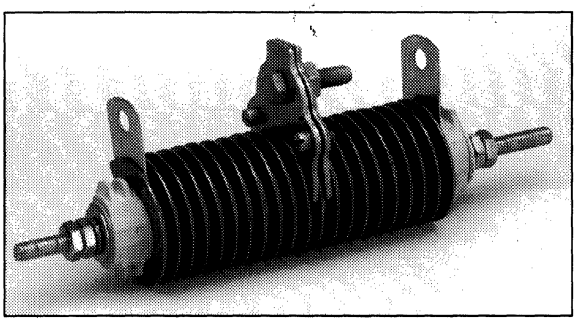


Length 2

Wattage Rating: 280-440 watts
Amperes Range: 6.5-96.0 amps
Resistance Range: 0.049-6.4 ohms

Form B Type (with adjustable tap type WLR55G1)

Amperes	Ohms	WL Form No Taps	WL Form 3 Taps 1/4 Spacing	Amperes	Ohms	WL Form No Taps	WL Form 3 Taps 1/4 Spacing
96.0	0.049	WLRF2A1	WLRF2U1	25.0	0.70	WLRC2C7	WLRC2V4
86.0	0.061	WLRF2A2	WLRF2U2	17.8	0.84	WLRB2E4	WLRB2V5
76.0	0.079	WLRF2A3	WLRF2U3	15.8	1.1	WLRB2E5	WLRB2V6
68.0	0.099	WLRF2A4	WLRF2U4	14.1	1.3	WLRB2E6	WLRB2V7
60.0	0.13	WLRF2A5	WLRF2U5	12.7	1.7	WLRB2E7	WLRB2V8
54.0	0.16	WLRF2A6	WLRF2U6	11.5	2.1	WLRB2E8	WLRB2V9
50.0	0.18	WLRC2C1	WLRC2U7	10.3	2.6	WLRB2E9	WLRB2W1
45.0	0.22	WLRC2C2	WLRC2U8	9.2	3.2	WLRB2F1	WLRB2W2
42.0	0.25	WLRC2C3	WLRC2U9	8.2	4.0	WLRB2F2	WLRB2W3
36.0	0.33	WLRC2C4	WLRC2V1	7.3	5.1	WLRB2F3	WLRB2W4
32.0	0.42	WLRC2C5	WLRC2V2	6.5	6.4	WLRB2F4	WLRB2W5
29.0	0.54	WLRC2C6	WLRC2V3				



Length 3

Wattage Rating: 425-700 watts
Amperes Range: 6.5-96.0 amps
Resistance Range: 0.075-10.0 ohms

Form C Type (with adjustable tap type WLR40G1)

Amperes	Ohms	WL Form No Taps	WL Form 5 Taps 1/6Spacing	WLR From 5 Taps 1/10 Spacing	WLR Form 9 Taps 1/10 Spacing	Amperes	Ohms	WL Form No Taps	WL Form 5 Taps 1/6Spacing	WLR From 5 Taps 1/10 Spacing	WLR Form 9 Taps 1/10 Spacing
96.0	0.075	WLRF3A1	WLRF3UI			25.0	1.1	WLRC3C7	WLRC3V4		
86.0	0.094	WLRF3A2	WLRF3U2			17.8	1.3	WLRB3E4		WLRB3F5	WLRB3G6
76.0	0.12	WLRF3A3	WLRF3U3			15.8	1.6	WLRB3E5		WLRB3F6	WLRB3G7
68.0	0.15	WLRF3A4	WLRF3U4			14.1	2.1	WLRB3F6		WLRB3F7	WLRB3G8
60.0	0.19	WLRF3A5	WLRF3U5			12.7	2.6	WLRB3E7		WLRB3F8	WLRB3G9
54.0	0.24	WLRF3A6	WLRF3U6			11.5	3.2	WLRB3E8		WLRB3F9	WLRB3H1
50.0	0.28	WLRC3C1	WLRC3U7			10.3	4.0	WLRB3E9		WLRB3G1	WLRB3H2
45.0	0.35	WLRC3C2	WLRC3U8			9.2	5.0	WLRB3F1		WLRB3G2	WLRB3H3
42.0	0.40	WLRC3C3	WLRC3U9			8.2	6.2	WLRB3F2		WLRB3G3	WLRB3H4
36.0	0.52	WLRC3C4	WLRC3V1			7.3	7.9	WLRB3F3		WLRB3G4	WLRB3H5
32.0	0.67	WLRC3C5	WLRC3V2			6.5	10.0	WLRB3F4		WLRB3G5	WLRB3H6
29.0	0.85	WLRC3C6	WLRC3V3								

Ward Leonard Resistors • A Division of C.T. Gamble Industries
605 Perkins Lane, Delanco, NJ 08075 • 609-461-1900 • Fax 609-461-8216 • email wlresis@ibm.net

For Technical Assistance Please Call 1-800-486-9273

Ward Leonard Resistors

Power Resistors

Coiled Power by Ward Leonard Resistors

Edgeohm and Hexohm Power Resistors (cont'd)

Length 4

Wattage Rating: 600-950 watts • Amperes Range: 6.5-96 amps • Resistance Range: 0.1-13 ohms

Amperes	Ohms	WL Form No Taps	WL Form 4 Taps 1/8Spacing	WL From 7 Taps 1/8 Spacing	WL Form 5 Taps 1/10 Spacing	WLForm 9 Taps 1/10 Spacing	Amperes	Ohms	WL Form No Taps	WL Form 4 Taps 1/8Spacing	WL From 7 Taps 1/8 Spacing	WL Form 5 Taps 1/10 Spacing	WLForm 9 Taps 1/10 Spacing
96.0	0.1	WLRF4A1	WLRF4U1	WLRF4U7			25.0	1.5	WLRC4C7			WLRC4D5	WLRC4E3
86.0	0.13	WLRF4A2	WLRF4U2	WLRF4U8			17.8	1.8	WLRB4E4			WLRB4F5	WLRB4G6
76.0	0.16	WLRF4A3	WLRF4U3	WLRF4U9			15.8	2.2	WLRB4E5			WLRB4F6	WLRB4G7
68.0	0.21	WLRF4A4	WLRF4U4	WLRF4V1			14.1	2.8	WLRB4E6			WLRB4F7	WLRB4G8
60.0	0.26	WLRF4A5	WLRF4U5	WLRF4V2			12.7	3.5	WLRB4E7			WLRB4F8	WLRB4G9
54.0	0.33	WLRF4A6	WLRF4U6	WLRF4V3			11.5	4.3	WLRB4E8			WLRB4F9	WLRB4H1
50.0	0.40	WLRC4C1			WLRC4C8	WLRC4D6	10.3	5.4	WLRB4E9			WLRB4G1	WLRB4H2
45.0	0.47	WLRC4C2			WLRC4C9	WLRC4D7	9.2	6.7	WLRB4F1			WLRB4G2	WLRB4H3
42.0	0.55	WLRC4C3			WLRC4D1	WLRC4D8	8.2	8.5	WLRB4F2			WLRB4G3	WLRB4H4
36.0	0.70	WLRC4C4			WLRC4D2	WLRC4D9	7.3	11.0	WLRB4F3			WLRB4G4	WLRB4H5
32.0	0.90	WLRC4C5			WLRC4D3	WLRC4E1	6.5	13.0	WLRB4F4			WLRB4G5	WLRB4H6
29.0	1.2	WLRC4C6			WLRC4D4	WLRC4E2							

Length 5

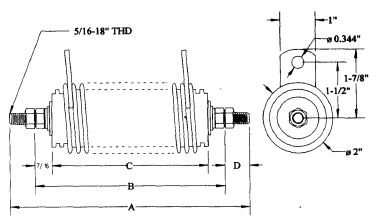
Wattage Rating: 750-1220 watts • Amperes Range: 6.5-96 amps • Resistance Range: 0.13-17.0 ohms

Amperes	Ohms	WL Form No Taps	WL Form 5 Taps 1/10 Spacing	WL Form 9 Taps 1/10 Spacing	Amperes	Ohms	WL Form No Taps	WL Form 5 Taps 1/10 Spacing	WL Form 9 Taps 1/10 Spacing
96.0	0.13	WLRF5A1	WLRF5A7	WLRF5B4	25.0	1.9	WLRC5C7	WLRC5D5	WLRC5E3
86.0	0.16	WLRF5A2	WLRF5A8	WLRF5B5	17.8	2.2	WLRB5E4	WLRB5F5	WLRB5G6
76.0	0.21	WLRF5A3	WLRF5A9	WLRF5B6	15.8	2.8	WLRB5E5	WLRB5F6	WLRB5G7
68.0	0.26	WLRF5A4	WLRF5B1	WLRF5B7	14.1	3.5	WLRB5E6	WLRB5F7	WLRB5G8
60.0	0.34	WLRF5A5	WLRF5B2	WLRF5B8	12.7	4.5	WLRB5E7	WLRB5F8	WLRB5G9
54.0	0.42	WLRF5A6	WLRF5B3	WLRF5B9	11.5	5.4	WLRB5E8	WLRB4F9	WLRB5H1
50.0	0.50	WLRC5C1	WLRC5C8	WLRC5D6	10.3	6.8	WLRB5E9	WLRB5G1	WLRB5H2
45.0	0.60	WLRC5C2	WLRC5C9	WLRC5D7	9.2	8.5	WLRB5F1	WLRB5G2	WLRB5H3
42.0	0.70	WLRC5C3	WLRC5D1	WLRC5D8	8.2	11.0	WLRB5F2	WLRB5G3	WLRB5H4
36.0	0.90	WLRC5C4	WLRC5D2	WLRC5D9	7.3	13.0	WLRB5F3	WLRB5G4	WLRB5H5
32.0	1.2	WLRC5C5	WLRC5D3	WLRC5E1	6.5	17.0	WLRB5F4	WLRB5G5	WLRB5H6
29.0	1.5	WLRC5C6	WLRC5D4	WLRC5E2					

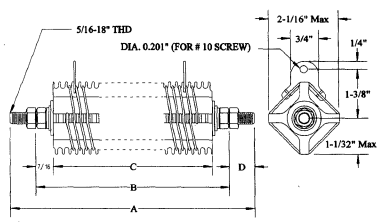
Length	A in.	B in.	C in.	D in.	Shipping wt. lbs*
2	9-3/8	7	6-1/8	1-3/16	2
3	12-3/8	10	9-1/8	1-3/16	3
4	15-3/8	13	12-1/8	1-3/16	4
5	18-3/8	16	15-1/8	1-3/16	5

*Weights for Form B deduct 1 lbs

WLR Edgeohm Resistor Dimensions
Form C and F



WLR Hexohm Resistor Dimensions
Form B



Ward Leonard Resistors • A Division of C.T. Gamble Industries
605 Perkins Lane, Delanco, NJ 08075 • 609-461-1900 • Fax 609-461-8216 • email wlresis@ibm.net

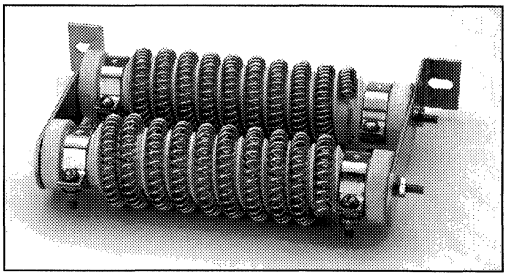
For Technical Assistance Please Call 1-800-486-9273

Power Resistors

Ward Leonard Resistors

Coiled Power by Ward Leonard Resistors

Heliohm Power Resistors



Ward Leonard offers these wattage per linear inch efficient wirewound resistors.

Features

- Corrosion Resistant
- 45 standard choices from 0.25 to 250 Ohms
- Flat buss style terminal construction
- Many mounting options
- Rugged construction

Continuous AMP Rating	OHMS	Part Number	Continuous AMP Rating	OHMS	Part Number
32.0	0.25	WLRHR25	7.3	7.0	WLRH7R0
31.0	0.30	WLRHR30	7.2	7.5	WLRH7R5
30.0	0.33	WLRHR33	7.1	8.0	WLRH8R0
29.0	0.35	WLRHR35	7.0	8.5	WLRH8R5
27.0	0.50	WLRHR50	6.8	8.6	WLRH8R6
22.0	0.70	WLRHR70	6.2	10.0	WLRH10R
18.0	1.0	WLRH1R0	6.1	11.0	WLRH11R
15.5	1.4	WLRH1R4	5.9	11.5	WLRH11R5
15.0	1.5	WLRH1R5	5.8	12.0	WLRH12R
13.3	1.9	WLRH1R9	5.3	15.0	WLRH15R
13.0	2.0	WLRH2R0	4.6	20.0	WLRH20R
12.5	2.2	WLRH2R2	3.6	27.0	WLRH27R
12.0	2.5	WLRH2R5	3.0	36.0	WLRH36R
10.8	3.2	WLRH3R2	2.5	45.0	WLRH45R
10.5	3.5	WLRH3R5	2.0	62.0	WLRH62R
10.0	4.0	WLRH4R0	1.8	80.0	WLRH80R
9.2	4.6	WLRH4R6	1.6	100	WLRH100
8.8	4.8	WLRH4R8	1.4	125	WLRH125
8.5	5.0	WLRH5R0	1.3	150	WLRH150
8.0	5.5	WLRH5R5	1.2	175	WLRH175
7.7	5.8	WLRH5R8	1.1	200	WLRH200
7.6	6.0	WLRH6R0	1.0	250	WLRH250
7.4	6.5	WLRH6R5			

Applications

- Motor starting and speed control
- Neutral grounding
- Light ballasts
- A.C. compressor buffers
- Excellent as heaters

Construction

- Nickel-copper, nickel-chrome or stainless steel wire wound in a double helix around the core
- Ceramic core with spiral groove holds coiled wire
- Stainless steel, 90° terminals

Voltage

Standard is 600 volts maximum to ground.

Wattage Rating

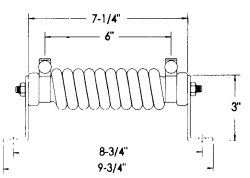
Wattages listed in table on front page are maximums for continuous duty allowing a 375°C temperature rise.

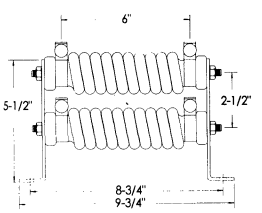
Ohmic Values

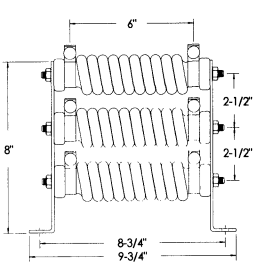
Ohms values listed in table on front page are at 25°C ± 10%.

Ordering Information

List the Ward Leonard part number from the table on the front page with the appropriate quantities for each. List any mounting brackets required. Inquiries are welcome regarding special resistance values, frames, screened enclosures, heat shields and packages.







Ward Leonard Resistors • A Division of C.T. Gamble Industries
605 Perkins Lane, Delanco, NJ 08075 • 609-461-1900 • Fax 609-461-8216 • email wlresis@ibm.net

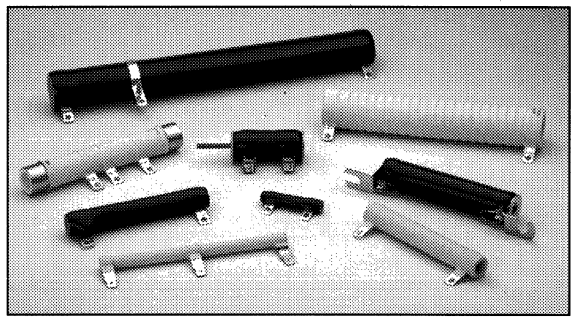
For Technical Assistance Please Call 1-800-486-9273

Ward Leonard Resistors

Power Resistors

Coiled Power by Ward Leonard Resistors

Vitrohm and Centohm Tubular Resistors



Features

- Centohm, Vitreous Enamel or silicone coated.
- Copper-Nickel or Nickel-Chrome windings
- Ceramic core
- Wide range of power ratings
- Wide range of sizes
- Operation in adverse conditions
- Welded or silver brazed construction

Size	Length (in.)	Core O.D. (in.)	Core I.D. (in.)	Min. Ohms*	Max. Ohms*	Terminal Style	Adj. Band
8/5	1	5/16	7/32	0.5	12K	211	609
10/8	1-1/2	5/16	7/32	0.5	28K		
12/10	1-3/4	5/16	7/32	0.5	36K		
15/12	1-1/2	7/16	5/16	0.5	40K	211	612
20/15	2	7/16	5/16	0.5	62K		
25/20	2	9/16	25/64	0.5	70K	219	
30/25	2	5/8	29/64	0.5	77K		
35/30	3	9/16	25/64	0.5	100K		
26/18	3	7/16	5/16	0.5	100K	211	612
47/37	3-1/2	3/4	1/2	0.5	210K	219	

Size	Length (in.)	Core O.D. (in.)	Core I.D. (in.)	Min. Ohms*	Max. Ohms*	Terminal Style	Adj. Band
50/35	4	9/16	25/64	0.5	185K	219	612
60/45	4	3/4	1/2	0.5	245K		
70/50	4-1/2	3/4	1/2	0.5	275K		
80/75	6	9/16	3/8	0.5	150K		
100/70	6-1/2	3/4	1/2	0.5	450K		
120/100	6	1-1/8	3/4	0.5	250K	252	615
130/120	6-1/2	1-1/8	3/4	0.5	500K		
160/130	7-1/2	1-1/8	3/4	0.5	650K		
180/160	8-1/2	1-1/8	3/4	0.5	750K		
225/200	10-1/2	1-1/8	3/4	0.5	900K		

* Ohmic ranges shown are for fixed resistors. Adjustable versions will have a somewhat narrower range.

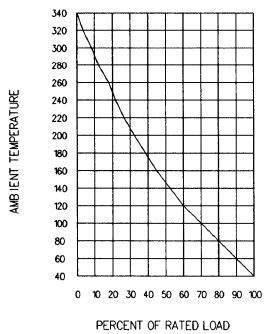
Specifications

Maximum Voltage Rating: Recommended at 495 V RMS (700 peak) per linear inch of core length

Watt Rating: Wattages listed are for single resistors, based on a maximum hot spot temperature rise of 300°C (540°F) in free air (ambient not above 40°C). Chart at right shows derating curve for ambient temperatures above 40°C.

Resistance Tolerance: Fixed resistors are ±5% standard and ±10% below 1 ohm. Adjustable resistors are +10%/-5% standard. Tighter resistance tolerances are available.

Standard Temperature Coefficient: ±170 ppm/°C typical, will vary higher or lower for some Ohmic values. Contact Ward Leonard Resistors for specific information.



Ordering Information

180/160 - F C - 40K5

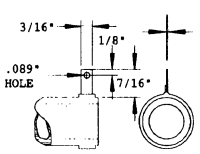
Size:

Fixed (F) or Adjustable (A):

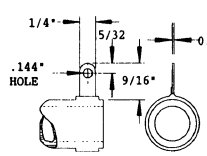
Coating: Vitreous Enamel (blank)
Centohm (C)
Silicone (S)

Ohmic Value: Use "R" for decimal and "K" for 1000 multiplier

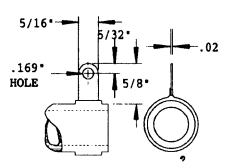
The example above would be a 180/160 Watt size, fixed terminal Tubular Resistor, with Centohm coating and an Ohmic value of 40,500Ω.



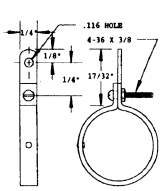
211



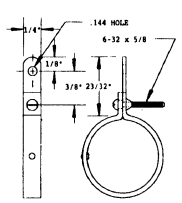
219



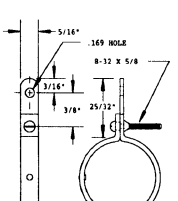
252



609



612



615

Ward Leonard Resistors • A Division of C.T. Gamble Industries
605 Perkins Lane, Delanco, NJ 08075 • 609-461-1900 • Fax 609-461-8216 • email wlresis@ibm.net

For Technical Assistance Please Call 1-800-486-9273

Power Resistors

Ward Leonard Resistors

Coiled Power by Ward Leonard Resistors

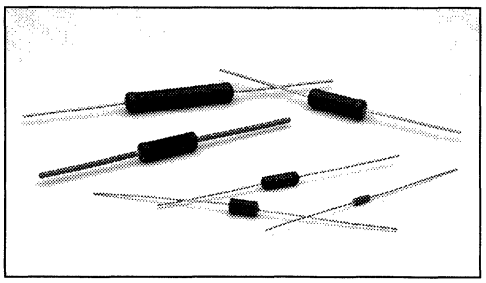
Silicone Coated Wirewound Resistors

Standard Features

- Ni-Cr or Cu-Ni elements
- High temperature silicone coating
- Welded construction
- Designed to meet MIL-R-26 requirements
- Leads are hot solder dipped Copperweld.

Special Features

- Noninductive design
- Special harsh environment coating
- Temperature coefficients from ±20-6000ppm/°C
- Optional terminal diameters and materials (see Material Specifications)



CTG Type	MIL-R-26 Type	CTG Power Rating 275°C	CTG Power Rating 350°C	Maximum Resistance	Max. Cont Working Voltage	Nominal Dimensions Length "A"	Nominal Dimensions Diameter "B"	Lead Dia
CG1A	RW 81	.4	.52	3K	25V	.250±.031	.085±.020	.020
CG1	—	.75	1.00	4K	35V	.312±.032	.085±.020	.020
CG2	RW 70	1.00	1.50	8K	52V	.406±.031	.094±.031	.020
CG3	—	1.00	1.10	9K	50V	.531±.063	.094±.031	.020
CG12	—	1.5	1.70	10K	70V	.406±.031	.156±.063	.020
CG18	—	2.00	—	12K	120V	.375±.063	.156±.031	.032
CG5	RW 69	2.50	3.00	20K	150V	.500±.063	.188±.063	.032
CG4	—	3.00	3.50	20K	135V	.812±.063	.188±.031	.032
CG6	RW79	3.00	—	20K	140V	.560±0.62	.250±.062	.032
CG7	—	4.00	5.00	35K	235V	.625±0.62	.250±.062	.040
CG8	RW 74	5.00	—	50K	365V	.875±0.62	.312±.031	.040
CG8B	—	5.00	—	40K	300V	.835±0.62	.187±.031	.032
CG15	RW 55	5.00	7.00	120K	500V	1.375±0.94	.469±.094	.032
CG13	—	6.00	7.50	87K	300V	1.00±0.62	.312±.032	.040
CG9	—	7.00	8.00	100K	520V	1.218±0.62	.312±.031	.040
CG10	RW 78	10.00	—	175K	875V	1.780±0.62	.375±.031	.040
CG10B	—	10.00	—	125K	720V	1.750±0.62	.312±.0321	.040
CG11	RW 56	10.00	14.00	175K	800V	2.00±0.94	.469±.094	.040
CG33	—	15.00	20.00	275K	1000V	2.875±0.94	.500±.094	.040

Electrical Specifications

Power Ratings: Based on a 25°C ambient and either a 275°C max. "U" characteristic) or a 350°C max. ("V" characteristic) hotspot temperature. Note: Characteristic "U" will result in 0.5% max.ΔR in 2000 hour load life; characteristic "V" will result in a 3% max. ΔR in 2000 hours load life.

Resistance Tolerances: 5%, 1%, 0.5%, 0.25% 0.1%, 0.05%

Note: If noninductive (Aytron Perry) option is chosen, resistance must be multiplied by 1/2 and derate maximum working voltage to 70% of listed values.

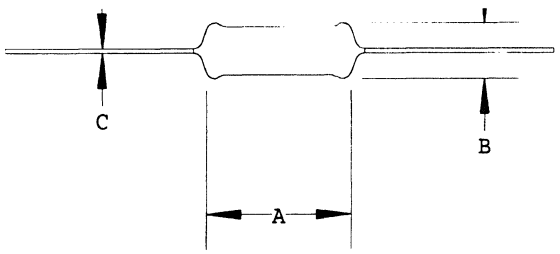
Standard Temperature Coefficient of Resistance: ≤1Ω=±90ppm/°C; 1Ω<10Ω=±50ppm/°C; ≥10Ω=±20ppm/°C

Note: Contacts factory for special T.C. requirements.

Dielectric Strength: 500 Vac for CG1A thru CG4; 1000Vac for all other types.

Short Time Overload: Based on "U" characteristic, 5 seconds at 5x rated power for ≤3 watt; 5 seconds at 10x rated power for ≥4 watt.

Insulation Resistance: 1000MΩ min. dry; 100MΩ after moisture test.



Resistor Dimensions

Material Specifications

Core: Steatite or Alumina

Element: Ni-Cr or Cu-Ni

End Cap: Stainless steel

Leads: Hot solder dipped Copperweld (standard). Contact factory for information on optional lead diameters.

Standard Coating: High temperature silicone

Mechanical Specifications

Solderability: Leads hot solder dipped

Terminal Strength: 5 lb. pull test for types CG1A thru CG4; 10 lb. pull test for all other types.

Ordering Information

CG(N) 6 J 10K

1. CTG Type
   Noninductive Option
   (Add N) where shown.
2. Tolerance Designator
   "J" = 5% (Standard)
   "H" = 3%
   "F" = 1%
   "D" = 0.5%
   "Q" = 0.25%
   "B" = 0.1%
3. Resistance in Ohms, use "K" for 1000 muliplier; use "R" for decimal points

Resistor Example:
Standard CG6, 10K ±5% = CG6J10K

Tape and Reel packaging available.

Ward Leonard Resistors • A Division of C.T. Gamble Industries
605 Perkins Lane, Delanco, NJ 08075 • 609-461-1900 • Fax 609-461-8216 • email wlresis@ibm.net

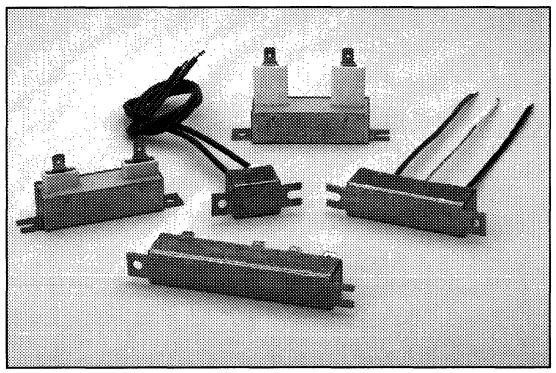
For Technical Assistance Please Call 1-800-486-9273

Ward Leonard Resistors

Power Resistors

Coiled Power by Ward Leonard Resistors

Metalohm Wirewound Resistors



Features

- Rugged UL and CSA approved Centohm potting
- Flameproof and inorganic
- Higher power rating due to heat sink capability
- All welded construction
- Nonhygroscopic
- High surge construction

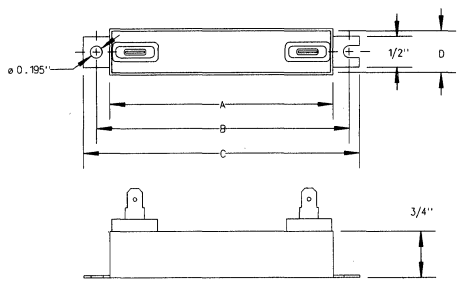
Options

- Noninductive versions (Aryton-Perry windings)
- Terminal sleeves to increase dielectric strength and maximize creepage distance
- Variety of terminal choices
- Potted or soldered wire leads including quick connect, ring, spade terminals
- Tapped models

Style	Watts		Dimensions (inches)				Ohmic Range**	
	Without Heat Sink	With Heat Sink*	A	B	C	D	Min.	Max.
20/45M	20	45	1	1-7/16	1-7/8	3/4	0.05	6K
40/70M	40	70	2-9/16	3	3-7/16	3/4	1.0	25K
HV40/70M	40	70	2-9/16	3	3-7/16	7/8	1.0	25K
50/100M	50	100	3-11/16	4-1/8	4-9/16	3/4	1.5	47.5K
60/115M	60	115	5-9/16	6	6-7/16	3/4	2.5	81K

* Based on a 12" x 12" x 1/8" Aluminum heat sink, using a thermal compound, in a 25°C ambient.

** Standard winding ranges only listed, other values available. Consult factory for more information.



Electrical Specifications

Wattage: Based on a 275°C "U" characteristic derating curve.

Temperature Coefficient: ≥18Ω, 0±90PPM/°C
8Ω<18Ω, 0±50PPM/°C
≤8Ω, 0±180PPM/°C
(T.C. for some watt/resistance combinations may be lower)

Resistance Tolerance: See ordering Information

Dielectric Strength: Terminal to case, depends on terminal style (1500V minimum).

Creepage: Terminal style 277, 1.2 inches
Terminal styles 278/276, 0.4 inches/0.7 inches
Terminal styles 211/252/279, 0.15 inches

Termination Wires

- Stranded, available in any insulation rated 125°C or higher (may require terminal style 297).
- Custom cut/stripped lengths
- Can be potted or pre-soldered to terminal styles 211 or 252
- Quick connect (fully or partially insulated), ring or spade terminations available

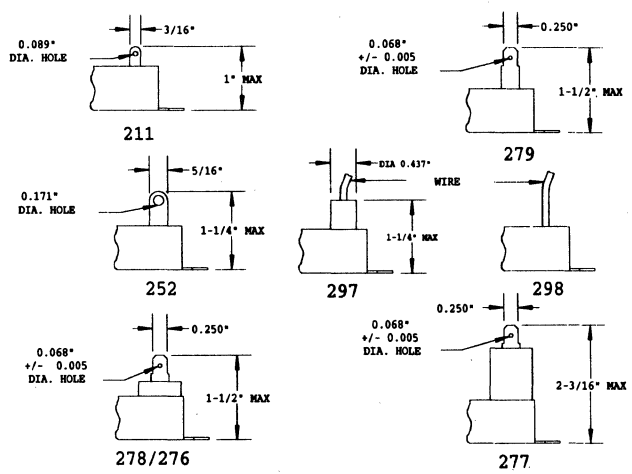
Dielectric Sleeves

- Steatite ceramic construction
- Style 276 meets UL/NEMA 2500V RMS for 1 minute requirement
- Available as terminal styles 276, 277, 278 and 297

Ordering Information

40/70MN-J 10K5-278

. CTG Type
Noninductive Option (Omit if not desired)
Tolerance Designator
"K" = ±10% (Standard)
"J" = ±5%
"H" = ±3%
"G" = ±2%
"F" = ±1%
Ohmic Value:
(Use R for decimal point, K for 1000 muliplier)
Terminal Type:



Ward Leonard Resistors • A Division of C.T. Gamble Industries
605 Perkins Lane, Delanco, NJ 08075 • 609-461-1900 • Fax 609-461-8216 • email wlresis@ibm.net

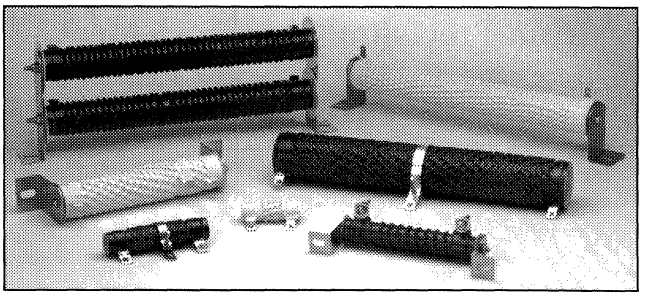
For Technical Assistance Please Call 1-800-486-9273

Power Resistors

Ward Leonard Resistors

Coiled Power by Ward Leonard Resistors

Ribflex Power Resistors



Features

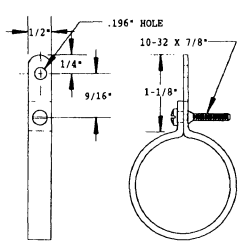
- High power dissipation for a relatively small size.
- Continuous duty ratings from 35 to 2000 Watts available
- Centohm or Vitreous Enamel coating
- Spot welded or silver brazed construction
- Maximum temperature rise of 375°C
- Nickel-Chrome or Copper-Nickel resistive element

Full Watt Rating	Core	Core Length (inches)	Fixed or Tapped			Tapped	Standard Terminal	Adjustable		
			Min. Ohms	Max. Ohms with Single Step	Max. Ohms with Max. Steps	Max. No. Steps		Min. Ohms	Max. Ohms	Standard Adjustable Band
35	T	2	0.02	2.0	2.0	1	252	N/A	N/A	N/A
75	B	3-1/2	0.04	6.0	6.0	1		0.2	6.0	626
110	B	4-1/2	0.04	9.0	7.0	2	262	0.3	9.0	
125	B	5	0.05	10.0	9.0	2		0.4	10.0	
160	B	6-1/2	0.06	15.0	11.0	3		0.5	15.0	
120	WX	4	0.05	9.0	7.0	2		0.3	9.0	624
145	WX	5	0.06	13.0	11.0	2		0.5	13.0	
175	WX	6	0.07	16.0	12.0	3		0.6	16.0	
235	WX	8	0.09	24.0	15.0	5		0.8	24.0	
155	D	4-1/4	0.05	12.0	10.0	2		0.4	12.0	
225	D	6-1/8	0.08	18.0	13.0	3		0.7	18.0	
240	D	6-1/2	0.09	22.0	17.0	3		0.8	22.0	
300	D	8-1/2	0.11	33.0	23.0	5		1.0	33.0	
375	D	10-1/2	0.15	40.0	30.0	5		1.4	40.0	
420	D	11-3/4	0.18	50.0	40.0	5		1.5	50.0	
400	V	8-1/2	0.20	45.0	30.0	5		1.4	45.0	
500	V	10-1/2	0.26	57.0	42.0	5		1.9	57.0	
550	V	11-3/4	0.30	66.0	50.0	5		2.1	66.0	
*380	X	6	0.13	78.0	54.0	3	289	0.2	78.0	
*750	X	12	0.15	166.0	148.0	5		0.2	166.0	
*1000	X	15	0.17	217.0	199.0	5		0.2	217.0	
*1500	X	20	0.23	303.0	287.0	5		0.27	303.0	
*2000	Y	20	0.28	391.0	360.0	5		0.30	391.0	

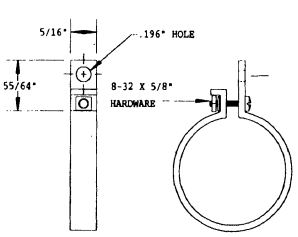
* Centohm coating is standard rather than Vitreous enamel.

Specifications

Wattage Rating: Continuous duty rating is based on a maximum temperature rise of 375°C (675°F), in a fress air ambient temperature not to exceed 40°C.
Maximum Voltage: $\sqrt{IR}$
Resistance Tolerance: ±10% for fixed and adjustable types, ±15% for tapped and multi-section types.
Temperature Coefficient: ±170ppm/°C typical, will vary higher or lower for some Ohmic values. Contact Ward Leonard Resistors for specific information.



624



626

Ordering Information

240 - RF C - 20K5

Size:
Type: Fixed (F)
Adjustable (S)
Coating: Centohm (C)
Vitreous Enamel (V)
Ohmic Value: Use "R" for decimal and "K" for 1000 multiplier

Example above would be a 240 Watt, fixed terminal Ribflex Resistor, with Centohm coating and an Ohmic value of 20,500Ω.

Ribflex Resistors are supplied with the terminals and adjustable band types listed in the chart. Several other terminal and adjustable band types are available. The Ribflex line of resistors is also available in multi-section, as well as tapped versions. A complete line of mountings and enclosures can be obtained to meet almost any requirement.
Call for more information.

Ward Leonard Resistors • A Division of C.T. Gamble Industries
605 Perkins Lane, Delanco, NJ 08075 • 609-461-1900 • Fax 609-461-8216 • email wlresis@ibm.net

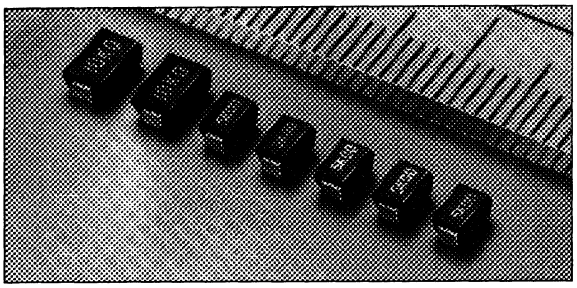
For Technical Assistance Please Call 1-800-486-9273

Ultra Precision Metal Foil Resistors

Fixed Resistors • Resistors Networks • Thermosensitive Resistors

Ultra-Precision Chip Resistor

(Face Bonded)

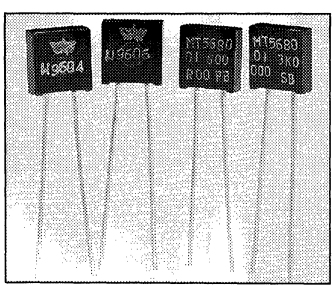


TCR, Resistance Range, Tolerance, Rated Power

Type	TCR (ppm/°C) -55°C — +125°C	Resistance Range (Ω)*	Resistance Tolerance (%)	Rated power (W) At 125°C
MP	0±10	30—100	±0.1	0.1
	0±5	100—30K	±0.05	
MQ	0±10	30—100	±0.1	0.125
	0±5	100—60K	±0.05	

*Select resistance values in E-24 and E-96 series.

Hi-Rel Precision Resistor



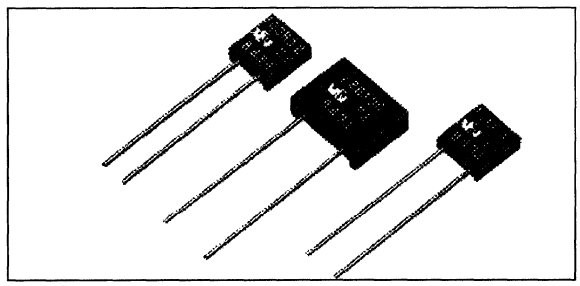
TCR, Resistance Range, Tolerance, Rated Power

Type	TCR (ppm/°C) -55°C~+125°C	Resistance Range (Ω)	Resistance Tolerance (%)*	Rated Power (W) at 25°C
MAN (QPL Qualification Pending)	±5	5 ~ 30Ω	±1 ~ ±0.1	0.3 (0.2 at 150KΩ or above)
	±1, ±2.5 & ±5	30 ~ 200K	±1 ~ ±.005	

*Symbols parenthesized are for the type number composition. Resistance figures are the values obtained by measuring the leads at point 12.7 ± 3.2mm away from the root, but, in case of resistance below 10Ω, the value 1.6 ± 0.6mm

Ultra-Precision Resistor

(Transfer Bonded)



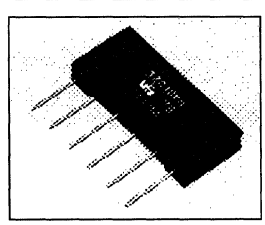
TCR, Resistance Range, Tolerance, Rated Power

Type	TCR	Resistance Range (Ω)	Resistance Tolerance (%)*	Rated Power (W)
MA MC	Char.W	1—5	± 0.5 (D) ± 1 (F)	0.3 (0.2 at 150KΩ) or above)
	Char. X	5—30	± 0.1 (B) ± 0.5 (D) ±1 (F)	
	Char. X Char. Y Char. Z	30—200K	± 0.005 (V) ± 0.01 (T) ± 0.02 (Q) ± 0.05 (A) ± 0.1 (B) ± 0.5 (D) ± 1 (F)	
MB	Char. X	5—30	± 0.1 (B) ± 0.5 (B) ± 1 (F)	0.5 (0.3 at 200KΩ) or above)
	Char. X Char. Y Char. Z	30—400K	± 0.005 (V) ± 0.01 (T) ± 0.02 (Q) ± 0.05 (A) ± 0.1 (B) ± 0.5 (D) ± 1 (F)	
MD	Char. X	5—30	± 0.1 (B) ± 0.5 (D) ± 1 (F)	0.125
	Char. X Char. Y	30—100	± 0.05 (A) ± 0.1 (B) ± 0.5 (D) ± 1 (F)	
	Char. X Char. Y Char. Z	100—120K	± 0.01 (T) ± 0.02 (Q) ± 0.05 (A) ± 0.1 (B) ± 0.5 (D) ± 1 (F)	

*Symbols parenthesized are for type number composition. Resistance figures are the values obtained by measuring the leads at point 12.7 ± 3.2mm away from the root, but, in case of resistance below 10 ohm, the value at 1.6± 00.6mm.

Ultra-Precision Resistor Network

(Case-encapsulated type)



TCR, Resistance Range, Tolerance, Rated Power

Type	TCR (ppm/°C)*1 -55°C— +125°C	Resistance Range Element (Ω)	Max. Resistance Value Package (Ω)	Resistance Tolerance(%) *2 Absolute	Resistance Tolerance(%) *2 Matching	Rated Power Package (W) at 70°C
SC	0 ± 5	30—120K	1200K	±0.01(T) ±0.02(Q) ±0.05(A) ±0.1 (B) ±0.5 (D) ±1 (F)	±0.01(T) ±0.02(Q) ±0.05(A) ±0.1 (B) ±0.5 (D) ±1 (F)	1.5

*1 TCR tracking is dependent on resitance ratio.
*2 Symbols parenthesized are for type number composition.

Call or write for our complete catalog.

WILBRECHT
ELECTRONICS, INC.

1400 Energy Park Drive Suite 18 • St. Paul, MN 55108
Phone: 612/659-0919 • FAX: 612/659-9204

W O R L D P R O D U C T S

WALSIN METAL OXIDE VARISTORS – SINCERA (VZ SERIES)

PART NUMBER	CONTINUOUS RATED VOLTAGE		VARISTOR VOLTAGE (@ 1mA DC)		MAXIMUM PEAK CURRENT	MAX CLAMPING VOLTAGE @ TEST CURRENT		Rated Single Pulse Transient Energy		Typical CAPACITANCE
	(AC rms)	(DC)	Min.	Max.	(8/20μS)	(8/20μS)		(2mS)	(10/1000μS)	@ 1KHz
	Volts	Volts	Volts	Volts	Amps	Volts	Amps	Joules	Joules	Picofarads
VZ05D180KBS	11	14	16	20	100	36	1	0.4	0.6	2200
VZ07D180KBS					250	36	2.5	0.8	1	3000
VZ10D180KBS					500	36	5	1.5	2.1	6800
VZ14D180KBS					1000	36	10	3.5	4	15000
VZ05D220KBS	14	18	20	24	100	43	1	0.6	0.8	1800
VZ07D220KBS					250	43	2.5	0.9	1.3	2500
VZ10D220KBS					500	43	5	2	2.5	6200
VZ14D220KBS					1000	43	10	4	5	12000
VZ05D270KBS	17	22	24	30	100	53	1	0.7	0.9	1500
VZ07D270KBS					250	53	2.5	1.0	1.4	2000
VZ10D270KBS					500	53	5	2.5	3	4200
VZ14D270KBS					1000	53	10	5	6	10000
VZ05D330KBS	20	26	30	36	100	65	1	0.9	1.2	1200
VZ07D330KBS					250	65	2.5	1.2	1.7	1700
VZ10D330KBS					500	65	5	3	4	2700
VZ14D330KBS					1000	65	10	6	7.5	7500
VZ05D390KBS	25	31	35	43	100	77	1	1.1	1.3	850
VZ07D390KBS					250	77	2.5	1.5	2.1	1200
VZ10D390KBS					500	77	5	3.5	4.6	2200
VZ14D390KBS					1000	77	10	7	8.6	5600
VZ05D470KBS	30	38	42	52	100	93	1	1.4	1.6	700
VZ07D470KBS					250	93	2.5	1.8	2.5	1000
VZ10D470KBS					500	93	5	4.5	5.5	2000
VZ14D470KBS					1000	92	10	8.5	10	5100
VZ05D560KBS	35	45	50	62	100	110	1	1.5	1.9	560
VZ07D560KBS					250	110	2.5	2.2	3.1	910
VZ10D560KBS					500	110	5	5.5	7	1800
VZ14D560KBS					1000	110	10	10	11	4700
VZ05D680KBS	40	56	61	75	100	135	1	1.8	2.3	480
VZ07D680KBS					250	135	2.5	2.5	3.8	820
VZ10D680KBS					500	135	5	6.5	8.2	1500
VZ14D680KBS					1000	135	10	12	14	4200
VZ05D820KBS	50	66	74	90	400	135	5	2.4	3	220
VZ07D820KBS					1200	135	10	3.5	5.5	680
VZ10D820KBS					2500	135	25	8	12	1200
VZ14D820KBS					4500	135	50	15	22	1800
VZ20D820KBS					10000	135	100	37	48	5500
VZ05D101KBS	60	85	90	110	400	165	5	2.4	3.5	180
VZ07D101KBS					1200	165	10	4	6.5	510
VZ10D101KBS					2500	165	25	10	15	1000
VZ14D101KBS					4500	165	50	20	30	1500
VZ20D101KBS					10000	165	100	38	50	4800
VZ05D121KBS	75	102	108	132	400	200	5	3	5	120
VZ07D121KBS					1200	200	10	5	7.8	330
VZ10D121KBS					2500	200	25	12	18	750
VZ14D121KBS					4500	200	50	22	34	1200
VZ20D121KBS					10000	200	100	40	55	3600
VZ05D151KBS	95	127	135	165	400	250	5	3.5	5.5	100
VZ07D151KBS					1200	250	10	6.5	9.7	270
VZ10D151KBS					2500	250	25	16	22	560
VZ14D151KBS					4500	250	50	30	45	1000
VZ20D151KBS					10000	250	100	50	70	2500
VZ05D181KBS	120	160	162	198	400	320	5	4.2	8	91
VZ07D181KBS					1200	300	10	8.8	12	220
VZ10D181KBS					2500	300	25	18.5	27.5	470
VZ14D181KBS					4500	300	50	33	53	910
VZ20D181KBS					10000	300	100	60	85	7200
VZ05D201KBS	130	175	180	220	400	340	5	5	8.5	82
VZ07D201KBS					1200	340	10	10	13	200
VZ10D201KBS					2500	340	25	20	30	420
VZ14D201KBS					4500	340	50	38	60	820
VZ20D201KBS					10000	340	100	70	95	2000
VZ05D221KBS	140	180	198	242	400	360	5	6	9	75
VZ07D221KBS					1200	360	10	11	14	190
VZ10D221KBS					2500	360	25	23	32	390
VZ14D221KBS					4500	360	50	40	60	750
VZ20D221KBS					10000	360	100	75	100	1800
VZ05D241KBS	150	200	216	264	400	395	5	6.5	10	68
VZ07D241KBS					1200	395	10	11	16	180
VZ10D241KBS					2500	395	25	25	35	300
VZ14D241KBS					4500	395	50	45	66	680
VZ20D241KBS					10000	395	100	82	110	1500

(UL, CSA & VDE approval) SEV - Pending

SEE OUR OTHER DATA PAGES IN SECTIONS 1500, 1850, 2460, 4300 AND 4800

WORLD PRODUCTS INC.
19654 8TH ST. EAST, SONOMA, CA 95476 PHONE (707) 996-5201 FAX (707) 996-3380
Internet: www.worldproducts.com • E-Mail: ppgsales@worldproducts.com

W O R L D P R O D U C T S

WALSIN METAL OXIDE VARISTORS – SINCERA (VZ SERIES) *(continued)*

PART NUMBER	CONTINUOUS RATED VOLTAGE		VARISTOR VOLTAGE (@ 1mA DC)		MAXIMUM PEAK CURRENT	MAX CLAMPING VOLTAGE @ TEST CURRENT		Rated Single Pulse Transient Energy		Typical CAPACITANCE
	(AC rms)	(DC)	Min.	Max.	(8/20μS)	(8/20μS)		(2mS)	(10/1000μS)	@ 1KHz
	Volts	Volts	Volts	Volts	Amps	Volts	Amps	Joules	Joules	Picofarads
VZ05D271KBS	180	230	243	297	400	475	5	7.5	11	62
VZ07D271KBS					1200	455	10	12	18	150
VZ10D271KBS					2500	455	25	30	40	270
VZ14D271KBS					4500	455	50	52	72	620
VZ20D271KBS					10000	455	100	90	127	1300
VZ05D301KBS	195	250	270	330	400	525	5	8	11.5	56
VZ07D301KBS					1200	505	10	13	19	140
VZ10D301KBS					2500	505	25	32	42.5	250
VZ14D301KBS					4500	505	50	56	78	600
VZ20D301KBS					10000	505	100	100	135	1250
VZ05D331KBS	210	275	297	363	400	540	5	8.5	11.7	54
VZ07D331KBS					1200	540	10	14	20	130
VZ10D331KBS					2500	540	25	33.5	44.5	230
VZ14D331KBS					4500	545	50	63	87	560
VZ20D331KBS					10000	545	100	110	148	1200
VZ05D361KBS	230	300	324	396	400	595	5	9	13	51
VZ07D361KBS					1200	595	10	15	25	120
VZ10D361KBS					2500	595	25	35	47	210
VZ14D361KBS					4500	595	50	70	98	510
VZ20D361KBS					10000	595	100	120	163	1100
VZ05D391KBS	250	330	351	429	400	650	5	10	15	50
VZ07D391KBS					1200	650	10	17	26	110
VZ10D391KBS					2500	650	25	40	60	200
VZ14D391KBS					4500	650	50	72	102	500
VZ20D391KBS					10000	650	100	130	180	1000
VZ05D431KBS	275	370	387	473	400	710	5	11	16	47
VZ07D431KBS					1200	710	10	20	28	100
VZ10D431KBS					2500	710	25	45	65	180
VZ14D431KBS					4500	710	50	75	115	470
VZ20D431KBS					10000	710	100	140	190	910
VZ05D471KBS	300	385	423	517	400	775	5	13	19	42
VZ07D471KBS					1200	775	10	21	30	91
VZ10D471KBS					2500	775	25	46	70	170
VZ14D471KBS					4500	775	50	80	125	420
VZ20D471KBS					10000	775	100	150	220	820
VZ05D511KBS	320	420	459	551	400	865	5	15	21	39
VZ07D511KBS					1200	850	10	23	32	82
VZ10D511KBS					2500	840	25	47	71	160
VZ14D511KBS					4500	840	50	82	128	390
VZ20D511KBS					10000	840	100	152	222	750
VZ05D561KBS	360	470	504	616	400	960	5	17	25	36
VZ07D561KBS					1200	960	10	27	39	75
VZ10D561KBS					2500	910	25	48	72	160
VZ14D561KBS					4500	920	50	85	139	360
VZ20D561KBS					10000	910	100	154	226	680
VZ05D621KBS	390	505	558	682	400	1040	5	19	27	33
VZ07D621KBS					1200	1040	10	29	43	68
VZ10D621KBS					2500	1025	25	49	73	150
VZ14D621KBS					4500	1025	50	88	142	330
VZ20D621KBS					10000	1025	100	158	228	620
VZ05D681KBS	420	560	612	748	400	1120	5	21	30	30
VZ07D681KBS					1200	1120	10	31	45	62
VZ10D681KBS					2500	1120	25	50	74	140
VZ14D681KBS					4500	1120	50	90	142	270
VZ20D681KBS					10000	1120	100	160	230	560
VZ10D751KBS	460	615	675	825	2500	1240	25	51	75	130
VZ14D751KBS					4500	1240	50	100	143	250
VZ20D751KBS					10000	1240	100	175	255	420
VZ10D781KBS	485	640	702	858	2500	1290	25	52	80	120
VZ14D781KBS					4500	1240	50	105	148	230
VZ20D781KBS					10000	1240	100	180	265	400
VZ10D821KBS	510	675	738	902	2500	1350	25	55	85	110
VZ14D821KBS					4500	1350	50	110	157	210
VZ20D821KBS					10000	1350	100	190	282	510
VZ10D911KBS	550	745	819	1001	2500	1400	25	60	93	100
VZ14D911KBS					4500	1400	50	120	175	200
VZ20D911KBS					10000	1400	100	215	310	470
VZ10D102KBS	625	825	900	1100	2500	1650	25	65	102	91
VZ14D102KBS					4500	1620	50	130	190	150
VZ20D102KBS					10000	1620	100	230	342	420
VZ10D112KBS	680	895	962	1175	2500	1815	25	70	115	82
VZ14D112KBS					4500	1800	50	140	215	120
VZ20D112KBS					10000	1800	100	250	383	390
VZ14D182KBS	1000	1465	1620	1980	4500	2970	50	240	340	91
VZ20D182KBS					10000	2970	100	400	625	250

** Also Ask About Our High Energy "E" Series*

(UL, CSA & VDE approval) SEV - Pending

SEE OUR OTHER DATA PAGES IN SECTIONS 1500, 1850, 2460, 4300 AND 4800

WORLD PRODUCTS INC.
19654 8TH ST. EAST, SONOMA, CA 95476 PHONE (707) 996-5201 FAX (707) 996-3380
Internet: www.worldproducts.com • E-Mail: ppgsales@worldproducts.com

W O R L D P R O D U C T S

CHIP VARISTORS / 2012 SERIES (REFERENCE 0805 TYPE)

PART NUMBER	WORKING VOLTAGE		VARISTOR VOLTAGE (1mA DC)	MAXIMUM CLAMPING VOLTAGE at 5A (8/ 20 μS)	MAXIMUM SURGE CURRENT (8/ 20 μS)	MAXIMUM SURGE ENERGY (10/ 1000 μS)	CAPACITANCE (at f = 1 MHz)
	Vw(DC)	Vw(DC)	VB	Vc	Is	Ws	CP (typ)
	V	V	V	V	A	J	pF
VA-A2012-3R5 □□	3.5	2.5	3.7 ~ 5.5	14	120	0.3	3800
VA-A2012-5R5 □□	5.5	4.0	7.1 ~ 9.3	16	120	0.3	2800
VA-A2012-080 □□	8.0	5.7	9.6 ~ 11.5	23	120	0.3	3200
VA-A2012-110 □□	11.0	7.8	12.7 ~ 15.5	27	120	0.4	3200
VA-A2012-140 □□	14.0	10.0	15.9 ~ 20.3	30	120	0.4	1800
VA-A2012-180 □□	18.0	12.7	21.5 ~ 28.0	40	100	0.4	1300
VA-A2012-260 □□	26.0	18.4	29.0 ~ 38.5	56	100	0.4	650

VA3216 SERIES

PART NUMBER	WORKING VOLTAGE		VARISTOR VOLTAGE (1mA DC)	MAXIMUM CLAMPING VOLTAGE at 5A (8/ 20 μS)	MAXIMUM SURGE CURRENT (8/ 20 μS)	MAXIMUM SURGE ENERGY (10/ 1000 μS)	CAPACITANCE (at f = 1 MHz)
	Vw(DC)	Vw(AC)	VB	Vc	Is	Ws	CP (typ)
	V	V	V	V	A	J	pF
VA-A3216-3R5 □□	3.5	2.5	3.7 ~ 5.5	14	150	0.4	7800
VA-A3216-5R5 □□	5.5	4.0	7.1 ~ 9.3	16	150	0.4	4700
VA-A3216-080 □□	8.0	5.7	9.6 ~ 11.5	23	150	0.4	5500
VA-A3216-110 □□	11.0	7.8	12.7 ~ 15.5	27	150	0.6	2800
VA-A3216-140 □□	14.0	10.0	15.9 ~ 20.3	30	150	0.6	3800
VA-A3216-180 □□	18.0	12.7	21.5 ~ 28.0	40	150	0.6	2400
VA-A3216-260 □□	26.0	18.4	29.0 ~ 38.5	56	150	0.6	1400
VA-A3216-330 □□	33.0	23.3	36.0 ~ 45.0	72	150	0.6	950
VA-A3216-420 □□	42.0	30.0	46.0 ~ 56.0	86	150	0.6	900
VA-A3216-560 □□	56.0	40.0	58.0 ~ 76.0	110	150	0.6	650
VA-A3216-680 □□	68.0	48.1	76.0 ~ 90.0	130	150	0.6	450

CHIP SURGE ABSORBERS

PART NUMBER	WORKING VOLTAGE		VARISTOR VOLTAGE (1mA DC)	MAXIMUM CLAMPING VOLTAGE (1/ 30 ns)	MAXIMUM SURGE CURRENT (1/ 30 ns)	CAPACITANCE (at f = 1 MHz)
	Vw(DC)	Vw(DC)	VB	Vc	Is	CP
	V	V	V	V	A	pF
SA-B2012-101-03 □□	100	70	115 ~ 150	300	6	
SA-B2012-151-03 □□	150	110	173 ~ 216	400	6	Max.3pF
SA-B2012-201-03 □□	200	140	230 ~ 288	600	5	
SA-B2012-301-03 □□	300	210	345 ~ 431	700	5	
SA-B3216-101-03 □□	100	70	115 ~ 150	300	6	
SA-B3216-151-03 □□	150	110	173 ~ 216	400	6	Max.3pF
SA-B3216-201-03 □□	200	140	230 ~ 288	600	6	
SA-B3216-301-03 □□	300	210	345 ~ 431	700	5	
SA-C2012-500-01 □□	50	35	57 ~ 72	250	4	
SA-C2012-101-01 □□	100	70	115 ~ 150	300	4	
SA-C2012-151-01 □□	150	110	173 ~ 216	400	4	Max.1pF
SA-C2012-201-01 □□	200	140	230 ~ 288	600	4	
SA-C2012-301-01 □□	300	210	345 ~ 431	700	3	
SA-C3216-500-01 □□	50	35	57 ~ 72	250	4	
SA-C3216-101-01 □□	100	70	115 ~ 150	300	4	
SA-C3216-151-01 □□	150	110	173 ~ 216	400	4	Max.1pF
SA-C3216-201-01 □□	200	140	230 ~ 288	600	4	
SA-C3216-301-01 □□	300	210	345 ~ 431	700	3	

* *Also See Us For Our Low Capacitance "VA" Series.*

ORDERING INFORMATION

VA	-	A	2012	-	3R5	J	T
(1)		(2)	(3)		(4)	(5)	(6)

1) ***Series***
2) ***Material***
3) ***Dimensions***
The first two digits: length(mm)
The last two digits: width (mm)
4) ***Working Voltage***
5) ***Termination***
J : Nickel barrier
P : Silver-palladium
6) ***Packing***
B : Bulk pack
T : Tape & Reel (ø178mm [7 inches])
L : Tape & Reel (ø254mm [10 inches])

WORLD PRODUCTS INC.
19654 8TH ST. EAST, SONOMA, CA 95476 PHONE (707) 996-5201 FAX (707) 996-3380
Internet: www.worldproducts.com • E-Mail: ppgsales@worldproducts.com

POTENTIOMETERS/RHEOSTATS

Manufacturer	Starting EEM Page No.	Resistive Element Material								Features							
										Mechanical Adjustment		Motion		Mounting			
		Carbon Ceramic	Carbon Film	Carbon Comp.	Cermet	Conductive Plastic	Hybrid	Metal Film	Wirewound	Single Turn	Multiturn	Linear	Nonlinear	Thru Panel	Servo	PCB	Surface
Bourns, Inc.	A•2012				√	√			√	√	√	√	√				
C & K Components, Inc.	A•2021									√	√						
Data Instruments	A•2022					√			√		√	√					
Dynamation Transducers Corp.	A•2023					√					√	√	√				
ETI Systems	A•2026					√	√			√	√	√					
ISL Products Int'l, Limited	A•2031	√	√	√	√				√	√	√	√					
JDK Controls, Inc.	A•2032					√						√					
Mallory-Duracap International	A•2036								√				√				
Midori America Corp.	A•2037					√						√					
Noble USA	A•2038	√	√					√				√	√	√			√
Novotechnik U.S., Inc.	A•2039	√			√	√			√		√	√					
Precision Control Manufacturing, Inc.	A•2040								√		√	√					
Shokai Far East Limited	A•2041	√	√	√	√	√			√		√	√	√				
Spectrol Electronics Corp.	A•2042				√	√			√	√	√	√	√				
State Electronics	A•2043	√	√	√	√	√		√	√		√	√					
Vernitron Sensor Systems	A•2044				√	√			√	√	√	√					
Vishay Angstrohm	A•2045	√							√	√				√		√	
Vishay Components Supply Div.	A•2046				√	√		√			√	√	√	√	√	√	√
Vishay Foil Resistors	A•2047							√								√	

* MIL Spec. § Surface Mount.

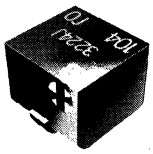
TRIMMERS

Manufacturer	Starting EEM Page No.	Resistive Element Material								Features							
										Mechanical Adjustment		Motion		Mounting			
		Carbon Ceramic	Carbon Film	Carbon Comp.	Cermet	Conductive Plastic	Hybrid	Metal Film	Wirewound	Single Turn	Multi-turn	Linear	Non-linear	Thru Panel	Servo	PCB	Surface
Bourns, Inc.	A•2012													√		√	√
C&K Components, Inc.	A•2021															√	√
Data Instruments, Inc.	A•2022													√	√		√
Dynamation Transducers Corp	A•2023					√					√	√	√	√	√		√
ETI Systems	A•2026													√			
ISL Products Int'l, Limited	A•2031													√	√	√	√
JDK Controls Inc.	A•2032													√	√		
Mallory-DuraCap International	A•2036													√			
Midori America Corp.	A•2037													√			
Noble USA	A•2038	√	√					√				√	√	√			√
Novotechnik U.S., Inc.	A•2039													√	√		√
Precision Control Manufacturing, Inc.	A•2040													√			
Shokai Far East	A•2041													√	√	√	
Spectrol Electronics Corp.	A•2042													√	√	√	√
State Electronics	A•2043													√		√	
Vernitron Sensor Systems	A•2044													√	√		√
Vishay Components Supply Div.	A•2046				√	√		√			√	√	√	√	√	√	√
Vishay Foil Reistors	A•2047							√								√	

* MIL Spec. § Surface Mount.

BOURNS, INC., • 1200 COLUMBIA AVE. • RIVERSIDE, CA 92507
For technical assistance call (909) 781-5500.
www.bourns.com

SURFACE MOUNT TRIMMERS



Model 3224
4mm Square SMD Package Multiturn Cermet Sealed

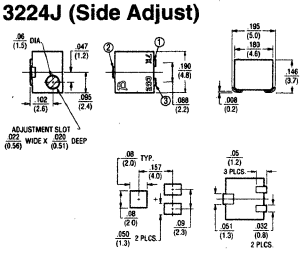
- **J-hook and gull-wing configurations**
- **Compatible with surface mount processes**
- **Low CRV – 1%**
- **Pick and place centering design, with flush adjustment**
- **4mm design meets EIA/EIAJ/IPC/VRCI/SMD standard trimmer footprint**
- **Model 3214 available in 5 turn**

Electrical Characteristics
Standard Resistance Range
.....10 to 2 megohm
(see standard resistance table)
Resistance Tolerance.....±10% std.
Absolute Minimum Resistance
.....1% or 2.0 ohms
(whichever is greater)
Contact Resistance Variation
.....1% or 3 ohms max.
Resolution .....Essentially Infinite
Insulation Resistance .....500 vdc.
100 megohms min.
Dielectric Strength
Sea Level.....600 vac (1 minute)
Adjustment Angle .....11 turns nom.

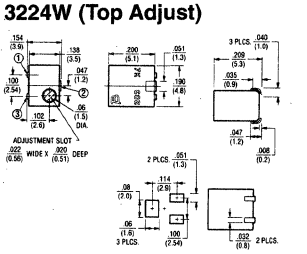
Environmental Characteristics
Power Rating (300 volts max.)
85°C .....0.25 watt
150°C .....0 watt
Temperature Range
.....-65°C to +150°C
Temperature Coefficient
.....±100ppm/°C
Humidity.....MIL-STD 202 Method 106
TRS ±2%; IR 10 megohms
Vibration.....20G TRS ±1%; VRS ±1%
Shock .....100G TRS ±1%; VRS ±1%
Load Life
...@ 85°C rated power 1,000 hours
TRS 3 ohms or 3%
(whichever is greater)
Rotational Cycling.....200 cycles
TRS 3 ohms or 3%
(whichever is greater)
Thermal Shock.....5 cycles
TRS ±2%; VRS ±1%

Physical Characteristics
Mechanical Stop.....Wiper idles
Torque .....180g-cm max.
Weight .....Approximately 0.01 oz.
Marking.....Manufacturer's code
resistance code and date code

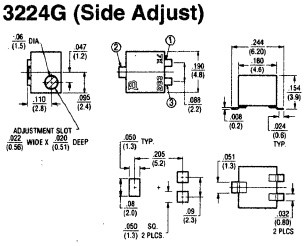
3224J (Side Adjust)



3224W (Top Adjust)



3224G (Side Adjust)



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
50,000	503
100,000	104
200,000	204
500,000	504
1,000,000	105
2,000,000	205

Special resistances available.

HOW TO ORDER

3224 J - 1 - 502 E

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-2 = Wave Solderable
Resistance Code
Embossed Tape Designator
Style J, G: E = 500 pcs./7" reel (standard)
Style W: E = 250 pcs./7" reel (standard)

Consult factory for other available options.
Specifications are subject to change without notice.

Model 3364
SMD 4mm Square Single-turn Cermet Industrial Open Frame

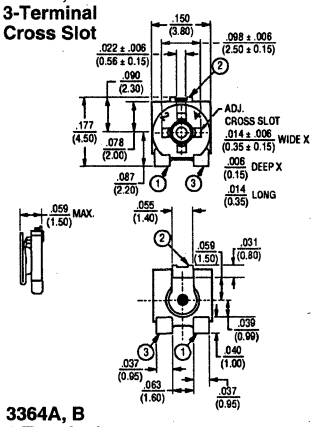
- **Cross-slot rotor designs suitable for automatic adjustment equipment**
- **Supplied in 12mm embossed tape, compatible with automatic pick-and-place assembly equipment**
- **Front and rear adjust versions available**

Electrical Characteristics
Standard Resistance Range
.....100 ohms to 1 megohm
(see standard resistance table)
Resistance Tolerance .....±25% std.
End Resistance
<1K .....20 ohms max.
≥1K.....2%
Contact Resistance Variation
(Voltage Divider) .....5% max.
Resolution.....Infinite
Adjustment Angle .....260°± 20°

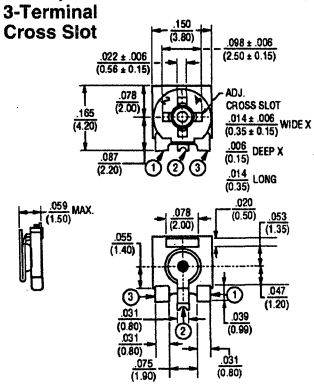
Environmental Characteristics
Power Rating (50 volts max.)
70°C.....0.2 watt
Temperature Range
.....-40°C to +100°C
Temperature Coefficient
.....±250ppm/°C
Humidity .....500 hours (5% ΔTR)
Load Life .....500 hours
0.2 watt @ 70°C (5% ΔTR)
Rotational Life
.....20 cycles (15% ΔTR)

Physical Characteristics
Torque .....20 to 200g-cm
Mechanical Angle.....Continuous
Marking.....Resistance code,
manufacturer's full part number
and date code on packaging
Terminals .....Solder coated
Standard Packaging
.....1000 pcs./7" reel
Reflow solder processing
recommended

3364W, X 3-Terminal Cross Slot



3364A, B 3-Terminal Cross Slot



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code	Part Marking
100	101	12
200	201	22
500	501	52
1,000	102	13
2,000	202	23
5,000	502	53
10,000	103	14
20,000	203	24
50,000	503	54
100,000	104	15
200,000	204	25
500,000	504	55
1,000,000	105	16

Popular values listed in boldface.Special resistances available.

HOW TO ORDER

3364 X - 1 - 103 E

Model
Style
Orientation of parts in tape:
Styles W, A, C, U, K Terminals toward sprocket holes
Styles X, B, D, V, J Terminals away from sprocket holes
Standard Product
Resistance Code
Embossed Tape Designator
E = 1000 pcs./ 7" reel (-1 standard)
G = 5000 pcs./ 14.5" reel (-1 optional)

Consult factory for other available options.
Specifications are subject to change without notice.

BOURNS, INC., • 1200 COLUMBIA AVE. • RIVERSIDE, CA 92507
For technical assistance call (909) 781-5500.
www.bourns.com

SURFACE MOUNT TRIMMERS

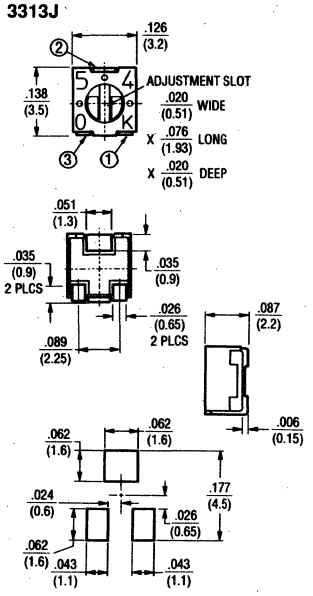
Model 3313
3mm Square SMD Package Single-turn Cermet Sealed

- **100 cycle rotational and seal life**
- **Rotor stop for "in-circuit" adjustment**
- **Low CRV – 1% typical, 2% max.**
- **Compatible with all surface mount manufacturing processes**

Electrical Characteristics
Standard Resistance Range
.....10 ohms to 2 megohms
(see standard resistance table)
Resistance Tolerance .....±20% std.
(tighter tolerance available)
End Resistance
.....1% or 3 ohms max.
(whichever is greater)
Contact Resistance Variation
.....2% or 3 ohms
(whichever is greater)
Adjustability
Voltage Divider .....±0.1%
Rheostat .....±0.2%
Resolution.....Infinite
Insulation Resistance .....500 vdc.
100 megohms min.
Dielectric Strength
Sea Level.....500 vac
70,000 Feet .....350 vac
Adjustment Angle.....220° nom.
Environmental Characteristics
Power Rating (200 volts max.)
70°C.....0.125 watt
125°C.....0 watt
Operating Temperature Range
.....-55°C to +125°C
Temperature Coefficient
.....≤100 ohms ± 150ppm/°C;
>100 ohms ± 100ppm/°C
Seal Test .....85°C Fluorinert*
Humidity....MIL-STD 202, Method 106
(no vibration) TRS ±3%; IR 10 megohms
Vibration 20G
TRS ±1%; VRS ±1%
Shock 100G
TRS ±1%; VRS ±1%
Load Life .....1000 hours
@ 70°C Rated Power; TRS ±3%
Rotational Life .....100 cycles
TRS ±3%
Thermal Shock.....5 cycles
TRS ±2%; VRS ±1%
Physical Characteristics
Mechanical Angle .....250° nom.
Torque.....50g-cm max.
Stop Strength .....200g-cm min.
Flammability.....U.L. 94V-0
Weight.....Approx. 0.01 oz.
Marking.....Resistance code
and date code
Standard Packaging ...1000 pcs./7" reel

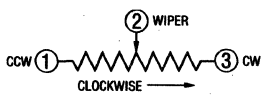
*Fluorinert™ is a registered trademark of 3M Co.

3313J



TOLERANCES: ± .010 (.25) EXCEPT WHERE NOTED
DIMENSIONS: ± IN. (MM)

Rotor positioned at approximate resistance mid-point



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Part Marking Code	Resistance Code
10	A1	100
20	21	200
50	51	500
100	A2	101
200	22	201
500	52	501
1,000	A3	102
2,000	23	202
5,000	53	502
10,000	A4	103
20,000	24	203
50,000	54	503
100,000	A5	104
200,000	25	204
500,000	55	504
1,000,000	A6	105
2,000,000	26	205

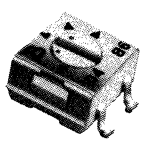
Special resistances available.

HOW TO ORDER

3313 J - 1 - 502 E

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
Resistance Code
Embossed Tape
E = 1000 pcs./7" Reel (Standard)
G = 3000 pcs./13" Reel (Optional)

Consult factory for other available options.
Specifications are subject to change without notice.

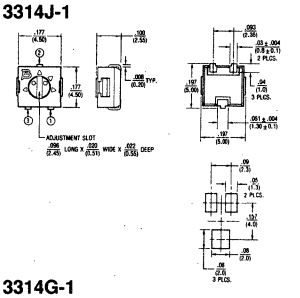


Model 3314
4mm Square SMD Package Single-turn Cermet Sealed

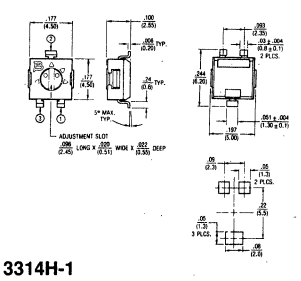
- **J-hook, gull-wing and pinned configurations**
- **Very low CRV – 1%**
- **Compatible with all surface mount soldering processes**

Electrical Characteristics
Standard Resistance Range
.....10 ohms to 2 megohms
(see standard resistance table)
Resistance Tolerance .....±20% std.
(tighter tolerance available)
End Resistance
.....1% or 2 ohms max.
(whichever is greater)
Contact Resistance Variation
.....1% or 3 ohms
(whichever is greater)
Resolution.....Infinite
Insulation Resistance .....500 vdc.
10 megohms min.
Dielectric Strength
Sea Level .....500 vac (1 minute)
Adjustment Angle.....210° nom.
Environmental Characteristics
Soldering Heat
.....260° C, 10 seconds, TRS ±1%
Power Rating (300 volts max.)
70°C.....0.25 watt
125°C.....0 watt
Temperature Range...-55°C to +125°C
Temperature Coefficient
.....±100ppm/°C
Humidity.....90-98% RH,
10 cycles, 240 hours
TRS ±2%; IR 10 megohms
Vibration .....20G TRS ±1%; VRS ±1%
Shock.....100G TRS ±1%; VRS ±1%
Load Life
..(@ 70°C Rated Power 1000 Hours)
TRS ±3%
Rotational Life .....100 cycles
TRS ±3%
Thermal Shock.....5 cycles
TRS ±2%; VRS ±1%
Physical Characteristics
Mechanical Angle .....240° nom.
Torque.....180g-cm typical
Stop Strength .....300g-cm typical
Pushover Strength (S Style)
.....2 kilograms (4.4 lbs.) minimum
Weight .....Approximately 0.01 oz.
Marking.....Manufacturer's code,
resistance code and date code
Standard Packaging
J & G .....500 pcs./7" reel
S.....200 pcs./7" reel
H.....50 pcs./tube

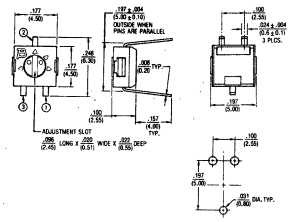
3314J-1



3314G-1



3314H-1



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
50,000	503
100,000	104
200,000	204
500,000	504
1,000,000	105
2,000,000	205

Special resistances available from 10 ohms to 2 megohms.

HOW TO ORDER

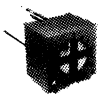
3314 G - 1 - 502 E

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-2 = Cross Slot Rotor (Styles J, G & H)
Resistance Code
Embossed Tape Designator
(Applicable to Styles J, G and S only)
Style J & G:
E = 500 pcs./7" reel (standard)
G = 3000 pcs./13" reel (optional)
Style S:
E = 200 pcs./7" reel (standard)
G = 1000 pcs./13" reel (optional)

Consult factory for other available options.
Specifications are subject to change without notice.

BOURNS, INC., • 1200 COLUMBIA AVE. • RIVERSIDE, CA 92507
For technical assistance call (909) 781-5500.
www.bourns.com

TRIMMERS



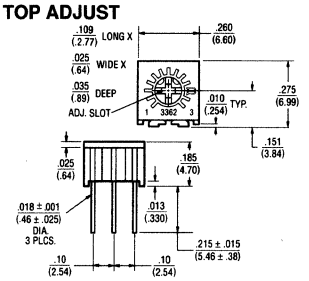
Model 3362
1/4" Square Single-turn Cermet Sealed

- **Multi-finger wiper to minimize CRV**
- **Withstands harsh environments and immersion cleaning processes**
- **Rotor designed for automatic machine adjust interface**
- **Miniature package**

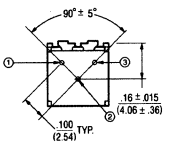
Electrical Characteristics
Standard Resistance Range
.....20 to 2 megohms
(see standard resistance table)
Resistance Tolerance .....±10% std.
Absolute Minimum Resistance
.....1% or 2 ohms
(whichever is greater)
Contact Resistance Variation
.....1.0% or 3 ohms max.
(whichever is greater)
Adjustability
Voltage.....±0.05%
Resistance .....±0.15%
Resolution.....Infinite
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level.....900 vac
80,000 Feet .....350 vac
Adjustment Angle.....240° nom.
Environmental Characteristics
Power Rating (300 volts max.)
70°C.....0.50 watt
125°C.....0 watt
Temperature Range ...-55°C to +125°C
Temperature Coefficient ....±100 ppm/°C
Seal Test .....85°C Fluorinert*
Humidity....MIL-STD-202 Method 103
96 hours (2% ΔTR; 10 Megohms IR)
Vibration ...30G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life...1,000 hours 0.5 watt @ 70°C
(3% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)
Rotational Life .....200 cycles
(4% ΔTR; 3% or 3 ohms,
whichever is greater, CRV)
Physical Characteristics
Mechanical Angle.....270°C
Torque .....3.0 oz.-in. max.
Stop Strength.....7.0 oz.-in. min.
Terminals.....Solderable pins
Weight .....0.02 oz.
Marking...Manufacturer's trademark, resistance code, terminal numbers, manufacturer's model number, style and date code
Standard Packaging ...50 pcs. per tube

*Fluorinert™ is a registered trademark of 3M Co.

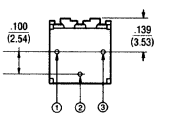
COMMON DIMENSIONS
TOP ADJUST



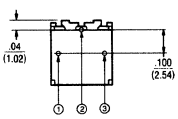
3362H



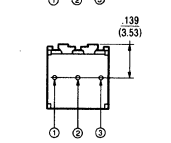
3362P



3362R



3362U



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105
2,000,000	205

Special resistances available from 20 to 2 megohms.

HOW TO ORDER

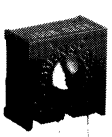
3362 U - 1 - 502

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
Resistance Code

Also available in tape & reel or ammo pack packaging.

Consult factory for other available options.

Specifications are subject to change without notice.



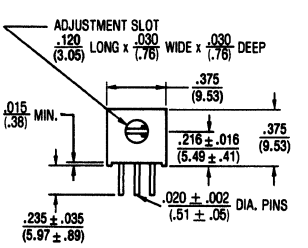
Model 3386
3/8" Square Single-turn Cermet Sealed

- **Top and side adjust types**
- **15 standard terminal styles**
- **High voltage types HV2, HV3 available**

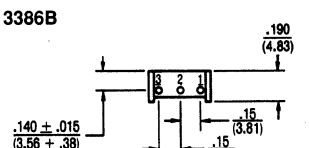
Electrical Characteristics
Standard Resistance Range
.....10 to 2 megohms
(see standard resistance table)
Resistance Tolerance .....±10% std.
(tighter tolerance available)
Absolute Minimum Resistance
.....2 ohms max.
Contact Resistance Variation
..... 2% or 3 ohms
(whichever is greater)
Adjustability
Voltage.....±0.05%
Resistance .....±0.15%
Resolution.....Infinite
Insulation Resistance .....500 vdc.
1,000 megohms min.
Dielectric Strength
Sea Level.....900 vac
70,000 Feet .....350 vac
Adjustment Angle.....280° nom.
Environmental Characteristics
Power Rating (300 volts max.)
85°C.....0.5 watt
125°C.....0 watt
Temperature Range
.....-55°C to +125°C
Temperature Coefficient
.....±100 ppm/°C
Seal Test .....85°C Fluorinert*
Humidity....MIL-STD-202 Method 103
96 hours
(2% ΔTR; 10 Megohms min.)
Vibration ...30G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life
.....1,000 hours 0.5 watt @ 70°C
(3% ΔTR; 1% or 1 ohm,
whichever is greater, CRV)
Rotational Life .....200 cycles
(4% ΔTR; 1% or 1 ohm,
whichever is greater, CRV)
Physical Characteristics
Mechanical Angle .....310° nom.
Torque .....5.0 oz.-in. max.
Stop Strength.....15.0 oz.-in. min.
Terminals.....Solderable pins
Weight .....0.03 oz.
Marking .....Manufacturer's trademark, resistance code, wiring diagram, date code, manufacturer's model number and style
Standard Packaging
.....50 pcs. per tube

*Fluorinert™ is a registered trademark of 3M Co.

COMMON DIMENSIONS
SIDE ADJUST



3386B



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105
2,000,000	205

Special resistances available from 10 to 2 megohms.

HOW TO ORDER

3386 P - 1 - 103 T

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
Resistance Code
Optional Suffix Letter
T = Knob

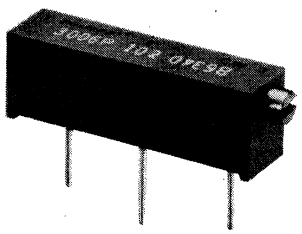
Also available in tape & reel or ammo pack packaging.

Consult factory for other available options.

Specifications are subject to change without notice.

BOURNS, INC., • 1200 COLUMBIA AVE. • RIVERSIDE, CA 92507
For technical assistance call (909) 781-5500.
www.bourns.com

TRIMMERS



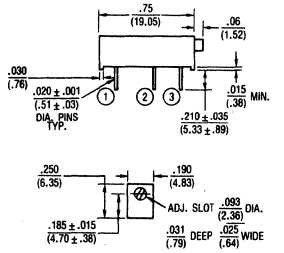
Model 3006
3/4" Rectangular 15-Turn Cermet Sealed

- **Low PC board profile – only 1/4" high**
- **Panel mount option available**
- **Transparent housing available**

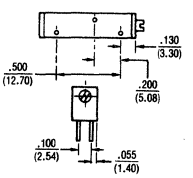
Electrical Characteristics
Standard Resistance Range .....10 to 5 megohms (see standard resistance table)
Resistance Tolerance .....±10% std. (tighter tolerance available)
Absolute Minimum Resistance .....1.0% or 2 ohms max. (whichever is greater)
Contact Resistance Variation .....1.0% or 1 ohm max. (whichever is greater)
Adjustability
Voltage.....±0.01%
Resistance .....±0.05%
Resolution.....Infinite
Insulation Resistance .....500 vdc. 1,000 megohms min.
Dielectric Strength
Sea Level.....1,000 vac
80,000 Feet .....250 vac
Adjustment Angle .....15 turns nom.
Environmental Characteristics
Power Rating (400 volts max.)
70°C.....0.75 watt
150°C.....0 watt
Temperature Range ...-55°C to +125°C
Temperature Coefficient ....±100 ppm/°C
Seal Test .....85°C Fluorinert*
Humidity....MIL-STD-202 Method 103 96 hours (3% ΔTR; 20 Megohms IR)
Vibration ...20G (2% ΔTR; 2% ΔVR)
Shock .....50G (2% ΔTR; 2% ΔVR)
Load Life .....
1,000 hours 0.75 watt 70°C (4% ΔTR)
Rotational Life .....200 cycles (3% ΔTR; 1% or 1 ohm, whichever is greater, CRV)
Physical Characteristics
Torque .....5.0 oz.-in. max.
Mechanical Stops .....Wiper idles
Terminals.....Solderable pins
Weight .....0.04 oz.
Marking....Manufacturer's trademark, resistance code, terminal numbers, date code, manufacturer's model number and style
Standard Packaging
P&Y Style .....25 pcs. per tube
W Style .....50 pcs. per tray

*Fluorinert™ is a registered trademark of 3M Co.

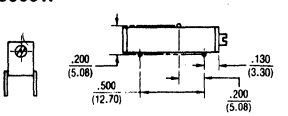
COMMON DIMENSIONS



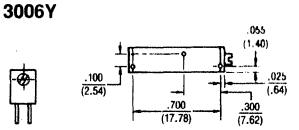
3006P



3006W



3006Y



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105
2,000,000	205

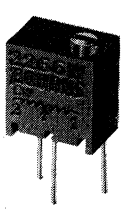
Special resistances available from 10 to 5 megohms.

HOW TO ORDER

3006 P - 1 - 103 Z

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
-7 = Transparent Housing
Resistance Code
Optional Suffix Letter
Z = Panel Mount (Factory Installed)

Consult factory for other available options.
Specifications are subject to change without notice.



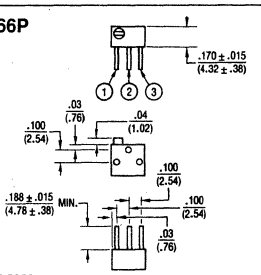
Model 3266
1/4" Square 12-Turn Cermet Sealed

- **Plasma etched body seal**
- **Standoffs allow thorough PC board washing**
- **Double chevron shaft seal**
- **Tape and reel packaging available**

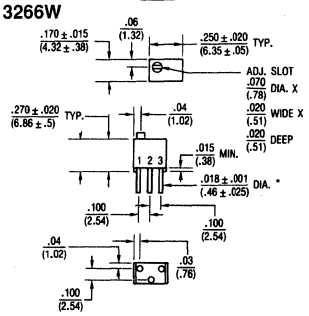
Electrical Characteristics
Standard Resistance Range .....10 to 1 megohm (see standard resistance table)
Resistance Tolerance .....±10% std.
Absolute Minimum Resistance .....1% or 2 ohms max. (whichever is greater)
Contact Resistance Variation .....3.0% or 3 ohms max. (whichever is greater)
Adjustability
Voltage.....±0.02%
Resistance .....±0.05%
Resolution.....Infinite
Insulation Resistance .....500 vdc. 1,000 megohms min.
Dielectric Strength
Sea Level.....600 vac
80,000 Feet .....250 vac
Effective Travel .....12 turns nom.
Environmental Characteristics
Power Rating (300 volts max.)
70°C.....0.25 watt
150°C.....0 watt
Temperature Range .....-55°C to +125°C
Temperature Coefficient .....±100 ppm/°C
Seal Test .....85°C Fluorinert*
Humidity....MIL-STD-202 Method 103 96 hours (2% ΔTR; 10 Megohms IR)
Vibration ...30G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life .....1,000 hours 0.25 watt 70°C (3% ΔTR; 3% CRV)
Rotational Life .....200 cycles (4% ΔTR; 3% or 3 ohms, whichever is greater, CRV)
Physical Characteristics
Torque .....3.0 oz.-in. max.
Mechanical Stops .....Wiper idles
Terminals.....Solderable pins
Weight .....0.015 oz.
Marking .....Manufacturer's trademark, resistance code, wiring diagram, date code, manufacturer's model number and style
Standard Packaging....50 pcs. per tube

*Fluorinert™ is a registered trademark of 3M Co.

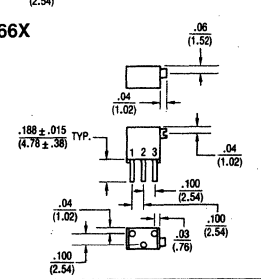
3266P



3266W



3266X



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105

Special resistances available from 10 ohms to 1 megohm.

HOW TO ORDER

3266 W - 1 - 103

Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
Resistance Code

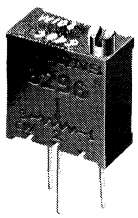
Consult factory for other available options.

Specifications are subject to change without notice.

Also available in tape & reel or ammo pack packaging.

BOURNS, INC., • 1200 COLUMBIA AVE. • RIVERSIDE, CA 92507
For technical assistance call (909) 781-5500.
www.bourns.com

TRIMMERS



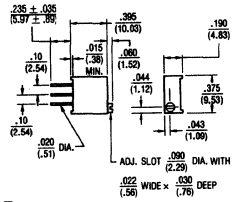
Model 3296
3/8" Square 25-Turn Cermet Sealed

- **5 terminal styles**
- **Thin body profile**
- **Tape and reel packaging available**

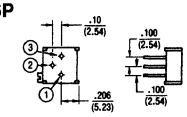
Electrical Characteristics
Standard Resistance Range .....10 to 5 megohms (see standard resistance table)
Resistance Tolerance .....±10% std. (tighter tolerance available)
Absolute Minimum Resistance .....1% or 2 ohms max. (whichever is greater)
Contact Resistance Variation .....1.0% or 3 ohms max. (whichever is greater)
Adjustability
Voltage.....±0.01%
Resistance.....±0.05%
Resolution.....Infinite
Insulation Resistance .....500 vdc. 1,000 megohms min.
Dielectric Strength
Sea Level.....900 vac
70,000 Feet .....350 vac
Effective Travel .....25 turns nom.
Environmental Characteristics
Power Rating (300 volts max.)
70°C.....0.5 watt
125°C.....0 watt
Temperature Range ...-55°C to +125°C
Temperature Coefficient ....±100 ppm/°C
Seal Test .....85°C Fluorinert*
Humidity....MIL-STD-202 Method 103 96 hours (2% ΔTR; 10 Megohms IR)
Vibration ...20G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life .....
1,000 hours 0.5 watt @ 70°C (3% ΔTR; 3% or 3 ohms, whichever is greater, CRV)
Rotational Life .....200 cycles (4% ΔTR; 3% or 3 ohms, whichever is greater, CRV)
Physical Characteristics
Torque .....3.0 oz.-in. max.
Mechanical Stops.....Wiper idles
Terminals.....Solderable pins
Weight .....0.03 oz.
Marking....Manufacturer's trademark, resistance code, wiring diagram, date code, manufacturer's model number and style
Standard Packaging ...50 pcs. per tube

*Fluorinert™ is a registered trademark of 3M Co.

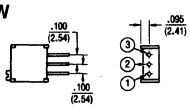
COMMON DIMENSIONS



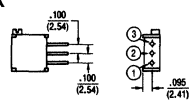
3296P



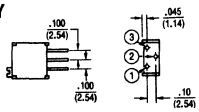
3296W



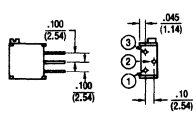
3296X



3296Y



3296Z



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105
2,000,000	205

Special resistances available from 10 ohms to 5 megohms.

HOW TO ORDER

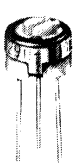
3296 W - 1 - 103

Model
Style
Standard or Modified Product Indicator
-1= Standard Product
Resistance Code

Also available in tape & reel or ammo pack packaging.

Consult factory for other available options.

Specifications are subject to change without notice.



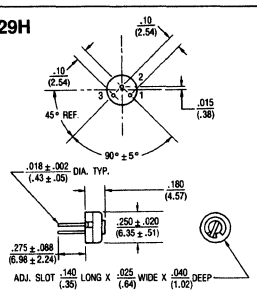
Model 3329
1/4" Round Single-turn Cermet Sealed

- **5 standard terminal styles**
- **Vertical and horizontal adjust types available**
- **Tape and reel packaging available**

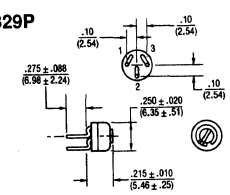
Electrical Characteristics
Standard Resistance Range .....10 to 1 megohm (see standard resistance table)
Resistance Tolerance .....±10% std. (closer tolerance available)
Absolute Minimum Resistance .....1% or 2 ohms (whichever is greater)
Contact Resistance Variation .....3.0% or 3 ohms max. (whichever is greater)
Adjustability
Voltage.....±0.05%
Resistance.....±0.15%
Resolution.....Infinite
Insulation Resistance .....500 vdc. 1,000 megohms min.
Dielectric Strength
Sea Level.....600 vac
80,000 Feet .....250 vac
Adjustment Angle.....240° nom.
Environmental Characteristics
Power Rating (300 volts max.)
85°C.....0.5 watt
150°C.....0 watt
Temperature Range .....-55°C to +150°C
Temperature Coefficient .....±100 ppm/°C
Seal Test .....85°C Fluorinert*
Humidity (Commercial Model) .....MIL-STD-202 Method 103 96 hours (3% ΔTR; 10 Megohms IR)
Vibration ...30G (1% ΔTR; 1% ΔVR)
Shock .....100G (1% ΔTR; 1% ΔVR)
Load Life .....1,000 hours 0.5 watt @ 85°C (3% ΔTR; 3% CRV)
Rotational Life .....200 cycles (4% ΔTR; 4% CRV)
Physical Characteristics
Mechanical Angle .....260° nom.
Torque .....5.0 oz.-in. max.
Stop Strength.....5.0 oz.-in. min.
Terminals.....Solderable pins
Weight .....0.02 oz.
Marking .....Manufacturer's trademark, resistance code, date code, manufacturer's model number and style
Standard Packaging....50 pcs. per tube

*Fluorinert™ is a registered trademark of 3M Co.

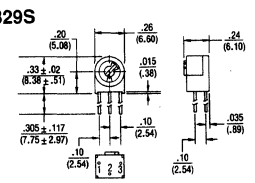
3329H



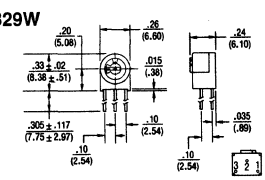
3329P



3329S



3329W



STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
10	100
20	200
50	500
100	101
200	201
500	501
1,000	102
2,000	202
5,000	502
10,000	103
20,000	203
25,000	253
50,000	503
100,000	104
200,000	204
250,000	254
500,000	504
1,000,000	105

Special resistances available from 10 ohms to 1 megohm.

HOW TO ORDER

3329 P - 1 - 103

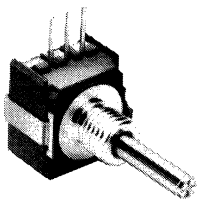
Model
Style
Standard or Modified Product Indicator
-1 = Standard Product
Resistance Code

Consult factory for other available options.

Specifications are subject to change without notice.

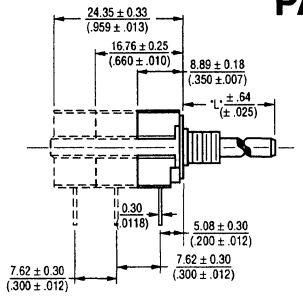
BOURNS, INC., • 1200 COLUMBIA AVE. • RIVERSIDE, CA 92507
For technical assistance call (909) 781-5500.
www.bourns.com

PANEL CONTROLS

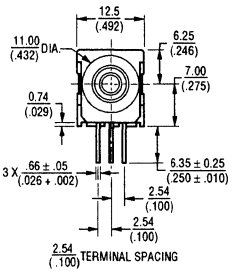


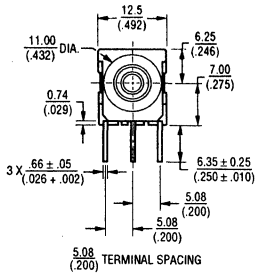
Model 50 Series
Sealed

PACKAGE DIMENSIONS



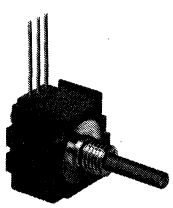
(SINGLE, DUAL AND TRIPLE MODULE SHOWN)
AVAILABLE IN 1 THROUGH 6 MODULE VERSIONS.





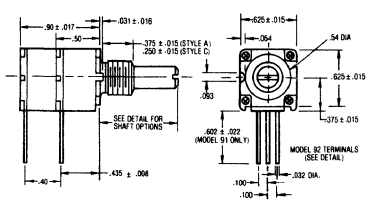
Electrical Characteristics[1]	**Conductive Plastic**	**Cermet**
Standard Resistance Range		
Linear	1K ohms to 1 megohm	150 ohms to 1 megohm
Audio	1K ohms to 1 megohm	1K ohms to 1 megohm
Total Resistance Tolerance		
Linear Tapers	±10% OR ±20%	±10% OR ±5%
Audio Tapers	±10% OR ±20%	±10%
Independent Linearity	±5%	±5%
Power Rating @ 70°C (Derate to 0 at 125°C. Voltage limited by power dissipation or 350 VAC, whichever is less)		
Linear Tapers	.5 watt	1.0 watt
Audio Tapers	.25 watt	.5 watt
Tracking (Multiple Sections)	3 db	3 db
Environmental Characteristics[1]		
Rotational Life—No Load (50,000 Cycles)[2]	±10% TRS maximum	±10% TRS maximum
Mechanical Characteristics		
Stop Strength	5 in-lb.	5 in-lb.
Mechanical Angle	290° ±5°	290° ±5°

[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.
[2]Conductive plastic, 25,000 cycles for cermet elements.

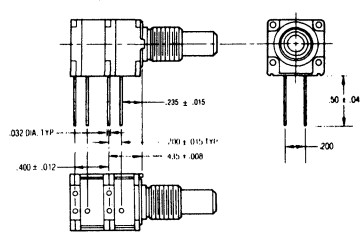


Models 91, 93, 95 (96—Sealed)

MODEL 91 PC PIN TERMINALS, IN-LINE



MODEL 93 PC PIN TERMINALS, "L" PATTERN



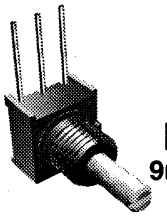
Initial Electrical Characteristics[1]	**Conductive Plastic Element**	**Cermet Element**
Standard Resistance Range		
Linear Tapers	150 ohms to 1 megohms	50 ohms to 1 megohms
Audio Tapers	1K ohms to 1 megohms	1K ohms to 1 megohms
Resistance Tolerance	±20% ~ ±10%	±10% ~ ±5%
Independent Linearity	±5%	±5%
Power Rating (Voltage limited by power dissipation or 350 VAC, whichever is less)		
+70°C Single Section Assembly	Linear 1 watt Log 0.5 watt	Linear 2 watts Log 1 watt
+70°C Multiple Section Assembly	Linear 0.5 watt/section Log 0.25 watt/section	1 watt/section 0.5 watt/section
+125°C	0 watt	0 watt
Environmental Characteristics[1]		
Rotational Life (No Load)	100,000 cycles	100,000 cycles
Mechanical Characteristics[1]		
Mechanical Angle	300° ±5°	

NOTE: All Model 90 performance specifications do not apply to units subjected to printed circuit board cleaning procedures, except for the sealed version (Model 96).
[1]At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.

Specifications are subject to change without notice.

BOURNS, INC., • 1200 COLUMBIA AVE. • RIVERSIDE, CA 92507
For technical assistance call (909) 781-5500.
www.bourns.com

PANEL CONTROLS



MODEL 3310
9mm Square Sealed Panel Control

- **Conductive Plastic**
- **PC Board and bushing mount**
- **Plastic bushing and plastic shaft**
- **Withstands typical industrial washing processes**
- **Compact package saves board and panel space**
- **Linear**

Electrical Characteristics

Standard Resistance Range - Linear
.....1K ohms to 1 megohm
Total Resistance Tolerance - Linear Tapers . .±20%
Independent Linearity .....±5%
Power Rating @ 70°C
(Derate to 0 at 125°C-
Voltage limited by power
dissipiation or 200 VAC,
whichever is less).....0.25 watts

Environmental Characteristics

Rotational Life - No Load (50,000 Cycles)
.....±5% TRS maximum

Mechanical Characteristics

Stop Strength .....5.65 Ncm
Mechanical Angle .....300°C nominal

Specifications are subject to change without notice.

Standard Resistance Table

Resistance (Ohms)	Resistance Code
1,000	**102**
2,000	**202**
5,000	**502**
10,000	**103**
20,000	**203**
50,000	503
100,000	**104**
200,000	204
500,000	504
1,000,000	105

Popular values listed in boldface. Consult factory for special resistances.

Part Numbering System

3310 Y - 0 0 1 - 103

Model Number Designator
3310 = 9mm Panel Control

Terminal Style Designator
Single Cup:
C = In-line Straight Terminals Side Exit 2.54 mm centers
R = In-line Terminals Rear Exit 2.54 mm centers
P = 5.08mm x 2.54mm Triangular Pattern Rear Exit
Y = 5.08mm x 5.08mmTriangular Pattern Rear Exit
Dual Cup (Pot/Pot or Pot/Switch):
H = Dual In-line Straight Terminals Rear Exit 2.54 mm centers

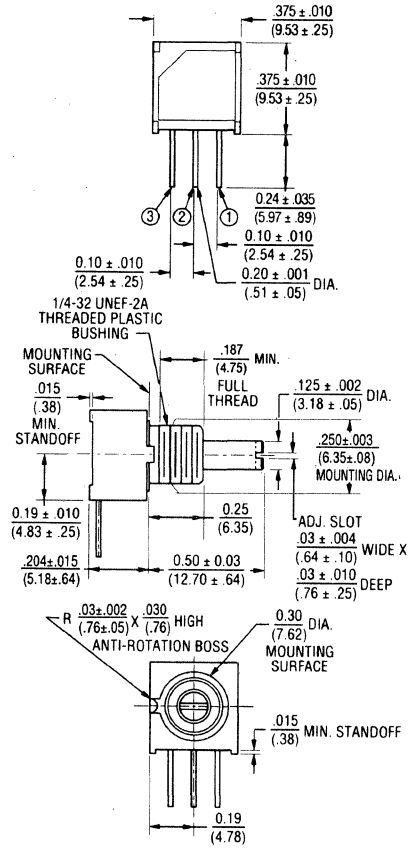
Shaft End Designator
0 = Shaft End Slotted
1 = Shaft End Flatted

Shaft Length Designator
0 = 12.7mm FMS Long Plastic Shaft
1 = 19.05mm FMS Long Plastic Shaft (Use with bushing version only)
2 = 5.59mm FMS Long Plastic Shaft (Bushingless version only)

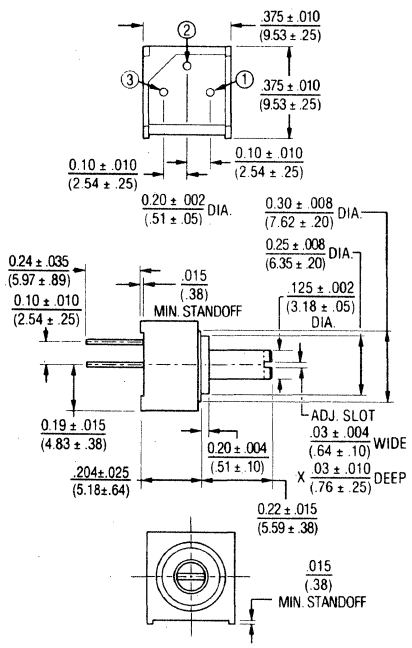
Bushing Designator
Pot (or Pot/Pot):
1 = 6.35mm x 6.35mm Plastic
2 = 6.35mm x 6.35mm Ni Plated Brass
5 = Bushingless (Board Level Control)
Pot/Switch Bushing Designator (Use with "H" terminal style only.)
3 = 6.35mm x 6.35mm Plastic
4 = 6.35mm x 6.35mm Ni Plated Brass
6 = Bushingless (Board Level) Pot/Switch

Resistance Code
(1st 2 digits are significant, 3rd digit is number of 0s to follow)

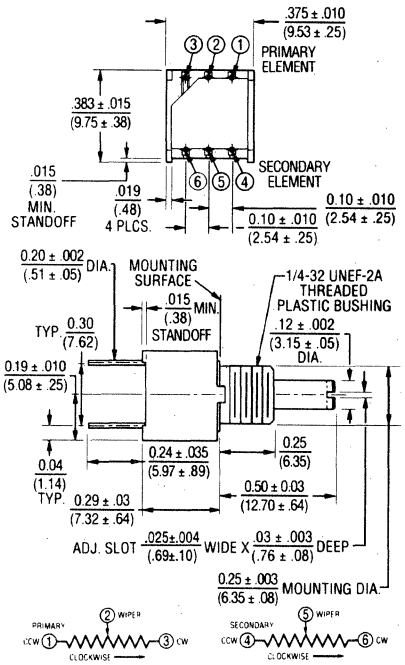
COMMON DIMENSIONS
3310-001
Plastic Bushing



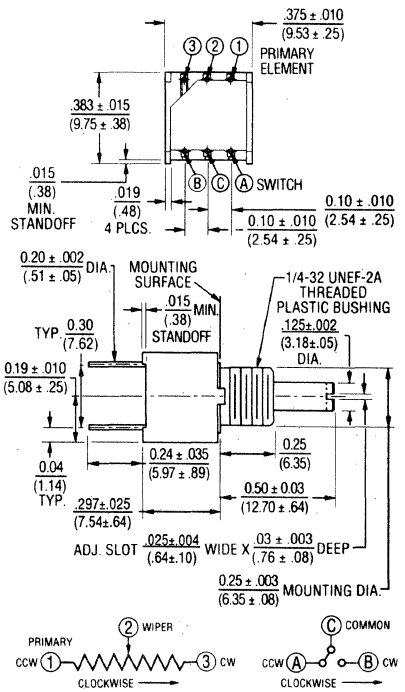
3310P-005
Bushingless



3310H-001
Pot/Pot Dual Cup
Plastic Bushing

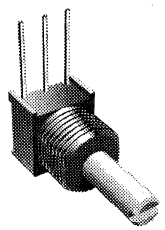


3310H-003
Pot/Switch Dual Cup
Plastic Bushing



BOURNS, INC., • 1200 COLUMBIA AVE. • RIVERSIDE, CA 92507
For technical assistance call (909) 781-5500.
www.bourns.com

PANEL CONTROLS



MODEL 3370
6mm Square Panel Control Conductive Plastic, Sealed

- **Conductive plastic**
- **PC board and bushing mount**
- **Plastic bushing and plastic shaft**
- **Withstands typical industrial washing processes**
- **Compact package saves board and panel space**
- **Linear**

Electrical Characteristics
Standard Resistance Range - Linear .....1K ohms to 1 megohm
Total Resistance Tolerance - Linear Tapers .....±20%
Independent Linearity .....±5%
Absolute Minimum Resistance .....2 ohms maximum
Effective Electrical Angle – 280° nominal
Contact Resistance Variation .....1 ohm or 1% (whichever is greater)
Dielectric Withstanding Voltage
Sea Level ....900 VAC minimum
70,000 Feet ...350 VAC minimum
Insulation Resistance .....1,000 megohms minimum
Power Rating @ 70°C (Derate to 0 at 1250°C - Voltage limited by power dissipation or 200 VAC, whichever is less).....125 watts
Environmental Characteristics
TCR (Over Storage Temperature Range) .....-55°C to +125°C ±1,000ppm/°C
Vibration 30G
Total Resistance Shift .....±1% maximum
Voltage Ratio Shift .....±1% maximum
Shock 100G
Total Resistance Shift .....±1% maximum
Voltage Ratio Shift .....±1% maximum
Load Life (1,000 Hours) .....±10% TRS maximum
Rotational Life - No Load (10,000 Cycles) .....±5% TRS maximum
CRV @ 5,000 Cycles .....±2%
Moisture Resistance ...±5% TRS
Seal Test .....85° Flourinert*
Mechanical Characteristics
Stop Strength .....5.65 Ncm
Mechanical Angle ....310° nominal
Torque
Running .....0.14 to 1.41 Ncm
Starting .....0.35 to 1.41 Ncm
Weight .....4.5 grams
Flammability .....Conforms to UL94V-0
Epoxy .....Conforms to UL94V-1
Terminals .....Solderable pins
Marking .....Manufacturer's symbol and model number, product code, terminal style, date code and resistance code

Specifications are subject to change without notice.
*"Flourinert" is a registered trademark of 3M Co.

STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
1,000	**102**
2,000	**202**
5,000	**502**
10,000	**103**
20,000	**203**
50,000	503
100,000	104
200,000	204
500,000	504
1,000,000	105

Popular values listed in boldface.
Consult factory for special resistances.

PART NUMBERING SYSTEM

3370 Y - 0 0 1 - 103

Model Number Designator
3370 = 6mm Panel Control

Terminal Style Designator
Single Cup:
C = In-line Straight Terminals Side Exit
P = 5.08mm x 2.54mm Triangular Pattern Rear Exit
Y = 5.08mm x 5.08mm Triangular Pattern Rear Exit

Shaft End Designator
0 = Shaft End Slotted

Shaft Length Designator
0 = 12.7mm FMS Long Plastic Shaft

Bushing Designator
1 = 6.35mm x 6.35mm Plastic

Resistance Code
(1st 2 digits are significant, 3rd digit is number of 0s to follow)

LINEAR MOTION POTENTIOMETERS

MODEL 3048
Linear Motion Potentiometer

- **Compact**
- **Lightweight**
- **Long life**
- **Infinite resolution**
- **Free shaft rotation**
- **AC or DC**
- **Shaft options available**
- **Flexible wire leads**

Specifications*
Standard Electrical Travel .....0.2, 0.3, 0.4, 0.5 in. (5.08, 7.62, 10.16, 12.70mm)
Standard resistances .....2.5K to 50K (±20%)
Independent Linearity .....±5%
Resolution .....Infinite
Power Rating .....4 to .5 Travel 0.25 watt @ 70°C (158°F)
Operating Temperature Range .....-55°C to +125°C
Insulation Resistance .....50 megohms@ 500 VDC
Backlash .....Negligible
Shaft Actuating Force ...4 oz. max. @ 70°F
Life .....500,000 cycles
Shock .....50G for 6msec
Vibration .....20G, 20-20,000 Hz
Marking ..Manufacturer's trademark resistance code, wiring diagram, date code manufacturer's model number and style

Specifications are typical.
Contact factory for special requirements.
*Specifications applicable from 5% to 95% of electrical travel.

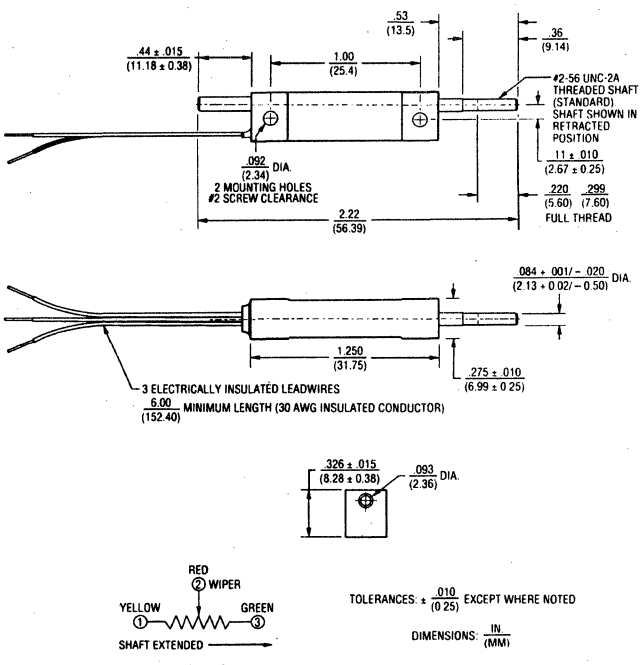
HOW TO ORDER

3048 L - 2 - 502

Model
Style
Range (Travel)
2 = 0.2" (5.08mm)
3 = 0.3" (7.62mm)
4 = 0.4" (10.16mm)
3 = 0.5" (12.70mm)
Resistance Value

STANDARD RESISTANCE TABLE

Resistance (Ohms)	Resistance Code
2,500	252
5,000	502
10,000	103
20,000	203
50,000	503

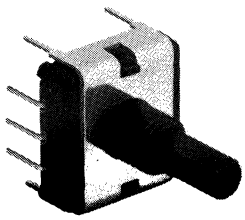


Popular values listed in boldface.
Special resistances available.

Specifications are subject to change without notice.

BOURNS, INC., • 1200 COLUMBIA AVE. • RIVERSIDE, CA 92507
For technical assistance call (909) 781-5500.
www.bourns.com

SLIMLINE POTENTIOMETERS



PC Series
Slimline Potentiometers

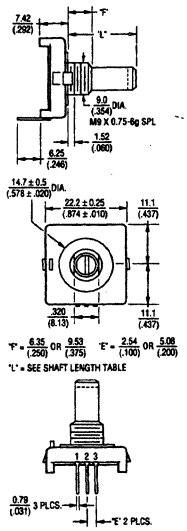
- **Space saving design**
- **PC pin or solder lug terminals**
- **Linear or audio taper versions**
- **Wide range of resistance values**
- **Metric shaft and bushing options**

Electrical Characteristics
Standard Resistance Range
Linear Tapers
.....500 ohms to 1.5 megohms
Audio Tapers
.....1K ohms to 500K ohms
Resistance Tolerance (All Tapers)
.....±20%
Independent Linearity
.....±5% (linear taper)
Effective Electrical Angle
.....270° ±5%
Power Rating @ 70° C
(Voltage Limited by Power dissipation or 350 VAC, whichever is less)
Linear ..... .75 watt
Audio ..... .25 watt

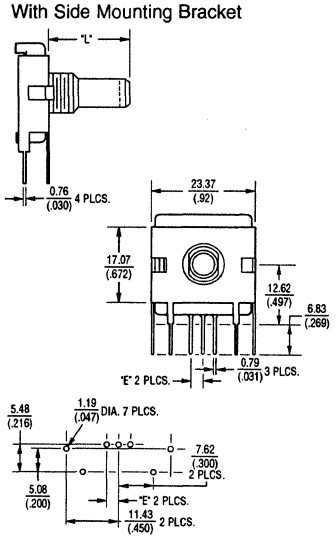
Environmental Characteristics
Rotational Life.....50,000 cycles
Total Resistance Shift
Linear.....±10 ohms or 12%, whichever is greater
Audio.....±20% maximum

Mechanical Characteristics
Mechanical Angle.....300° ±5°
Detents.....Center, 10, 20, 30, none

PC PINS
(Rear Facing)
With Rear Mounting Bracket



PC PINS (Side Exit)
With Side Mounting Bracket



Consult factory for other available options.
Specifications are subject to change without notice.

Bourns® Dials, Pushbutton and Knobpot® Potentiometers

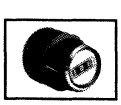
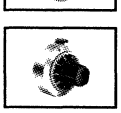
Push-button Potentiometers 3680 Series Cermet

Decades	Model	Resistance	Resolution
2	3682	500 ohms to 1 Megohm	1.0%
3	3682	1k ohms to 1 megohm	0.1%

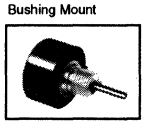
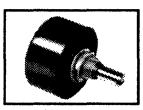
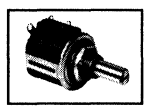
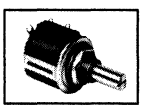
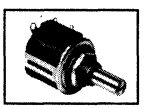
KNOBPOT® Potentiometers

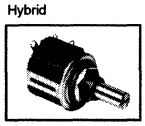
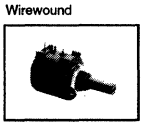
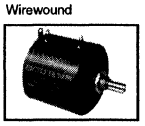
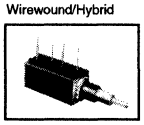
		Resistance	Power Rating	Dis.
3600 Wirewound		100 to 100k ohms	1.5 watts @ 25°C	3/4"
3610 Wirewound		100 to 100k ohms	1.5 watts @ 25°C	7/8"

Dials

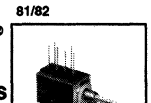
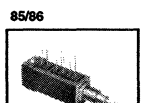
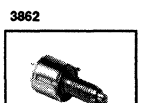
H-507-6 7/8" dia.
CT23 1 1/16" dia. 
H-490 1" dia. 
CT26 1¼" dia.
H-506 7/8" dia.
CT46 1 13/16"
CT50 1" dia.

Bourns® Single-Turn/Multi-Turn Precision Potentiometers

	6637/6638 Conductive Plastic Bushing Mount	6657 Conductive Plastic Servo Mount	3543 3-Turn Wirewound	3545 5-Turn Wirewound	3540 10-Turn Wirewound
					
Resistance	1k to 100k ohms	1k to 100k ohms	20 to 50k ohms	50 to 50k ohms	100 to 100k ohms
Power Rating @ 70°C	1.0 watt	1.0 watt	1.0 watt	1.5 watt	2.0 watt
Independant Linearity	±0.5%	±1.0%	±0.25%	±0.25%	±0.25%
Rotational Life	25 x 10⁶ revolutions	10 x 10⁶ revolutions	0.3 x 10⁶ revolutions	0.5 x 10⁶ revolutions	1 x 10⁶ revolutions
Size	7/8" diameter x 15/32"	1 5/16" diameter x 5/8"	7/8" diameter	7/8" diameter	7/8" diameter

	3541 10-Turn Hybrid	3590 10-Turn Wirewound	3400 10-Turn Wirewound	83/84 10-Turn Wirewound/Hybrid
				
Resistance	1k to 100k ohms	200 to 100k ohms	200 to 500k ohms	Wirewound 200 to 100k ohms Hybrid 1k to 100k ohms
Power Rating @ 70°C	2.0 watt	2.0 watt @ 40°C 0 watts @ 125°C	5.0 watt @ 40°C	1.0 watts
Independant Linearity	±0.25%	±0.25%	±0.15%	±0.25% Wirewound
Rotational Life	5 x 10⁶ revolutions	1 x 10⁶ revolutions	2 x 10⁶ revolutions	1 x 10⁶ revolutions Hybrid 4 x 106 revolutions
Size	7/8" diameter x 3/4"	7/8" diameter x 3/4"	1 13/16" diameter x 13/4"	1 13/16" diameter x 13/4"

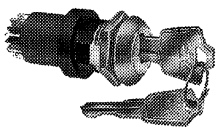
Bourns® Panel Controls

	81/82	85/86	3851/3852/3856	3862
				
	• 5/8" square modular construction. • Single or multiple sections. • Linear or audio tapers. • Concentric or single shafts, metal. • Cermet or Conductive plastic.	• 5/8" square modular construction. • Multiple sections. • DPST and DPDT rotary switches • Concentric or single shafts, metal. • Cermet or Conductive plastic.	• 3/4" square. • 1/4" depth. • Single section. • Linear or audio tapers. • Single shaft, metal • Cermet or Conductive plastic.	• 1/2" diameter. • Rear terminals. • Single section. • Linear tapers. • Single shaft, metal. • Cermet

C&K®
The Primary Source Worldwide...®

Switchlocks, Trimmers & Pushbuttons

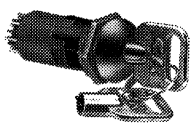
W SERIES 4 TUMBLER SWITCHLOCKS



Rating: 4 Amps at 125 V AC or 28 V DC; 2 Amps at 250 V AC (UL/CSA). 2 Amps at 125 V AC; 1 Amp at 250 V AC (VDE). **Locks**: 45° indexing, zinc alloy with stainless steel facing std. 4 tumbler single bitted lock. **Keys**: Two nickel plated brass keys with code no. **Switch Housing**: Gf nylon (UL 94V-0). **Contacts & Terminals**: Copper, silver plated. **Hardware**: Mounting nut.

C&K Part No.	No. Poles	Key Pull Possible These Positions	Terminals
W200132C205AQ	DP	Pos. 1	.100 Q.C.
W200132C2WCAQ	DP	Pos. 1	Wire leads

W SERIES 6 TUMBLER TUBULAR SWITCHLOCKS

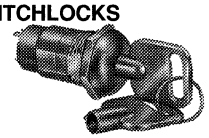


Rating: 4 Amps at 125 V AC or 28 V DC; 2 Amps at 250 V AC (UL/CSA). 2 Amps at 125 V AC; 1 Amp at 250 V AC (VDE). **Locks**: 45° indexing, zinc alloy with stainless steel facing std. 6 tumbler tubular lock. **Keys**: Two chrome plated zinc alloy keys with code no. **Switch Housing**: Gf nylon (UL 94V-0). **Contacts & Terminals**: Copper, silver plated. **Hardware**: Mounting nut.

C&K Part No.	No. Poles	Key Pull Possible These Positions	Terminals
W200132V205AQ	DP	Pos. 1	.100 Q.C.
W200132V2WCAQ	DP	Pos. 1	Wire leads

Y SERIES SWITCHLOCKS

A

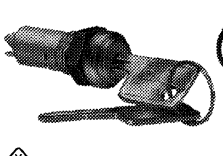


B

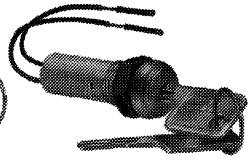
Rating: 4 Amps at 125 V AC or 28 V DC; 2 Amps at 250 V AC (UL/CSA). **Locks**: 90° indexing, zinc alloy with stainless steel facing. 4 tumbler single bitted or 6 tumbler tubular lock mechanism. **Keys**: Two nickel plated single bitted brass keys or two chrome plated die cast zinc keys with code no. **Switch Housing & Top Plate**: Gf polyester (UL 94V-0). **Contacts & Terminals**: Copper, silver plated. **Hardware**: Mounting nut.

C&K Part No.	No. Poles	Key Pull Possible These Positions	Fig.
Y101132C203NQ	SPDT	Pos. 1	A
Y1011U2C203NQ	SPDT	Pos. 1 & 2	A
Y201132C203NQ	DPDT	Pos. 1	A
Y2011U2C203NQ	DPDT	Pos. 1 & 2	A
Y101132V203NQ	SPDT	Pos. 1	B
Y1011U2V203NQ	SPDT	Pos. 1 & 2	B
Y201132V203NQ	DPDT	Pos. 1	B
Y2011U2V203NQ	DPDT	Pos. 1 & 2	B

YM SERIES MINIATURE SWITCHLOCKS



C

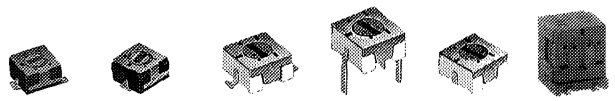


D

Rating: 4 Amps at 125 V AC or 28 V DC; 2 Amps at 250 V AC (UL/CSA). 4 Amps at 125 V AC; 2 Amps at 250 V AC, T65, 10,000 cycles, class 1 (VDE).**Locks**: 90° indexing, zinc alloy with stainless steel facing std. 4 tumbler single bitted lock. **Keys**: Two nickel plated brass keys with code no. **Contacts & Terminals**: Copper, silver plated. **Hardware**: Mounting nut.

C&K Part No.	No. Poles	Key Pull Possible These Positions	Fig.
YM06132C205NQ	SPST	Pos. 1	C
YM061U2C205NQ	SPST	Pos. 1 & 2	C
YM06132C2WCNQ	SPST	Pos. 1	D
YM061U2C2WCNQ	SPST	Pos. 1 & 2	D

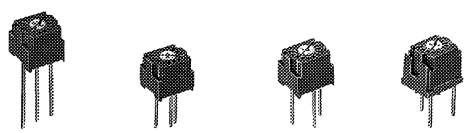
SEALED TRIMMING POTENTIOMETERS SURFACE MOUNT



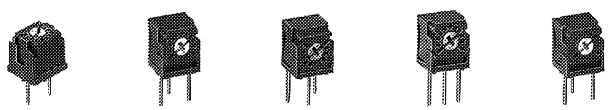
TR03G TR03J TR04G TR04H TR04J TR04SA

TR03 = 3mm square, TR04 = 4mm square. Gull-wing, J-bend and thru-hole terminals. **Electrical**: Resistance Range: 50 ohms to 2 megohms. Resistance Tolerance: ± 20%. Peak Noise (CRV): 2% or 3 ohms, whichever is greater, Temperature Coefficient: ± 100 ppm/°C, 200 ohms to 1 megohm (± 250 ppm/°C on all other resistance values), MIL-STD-202, method 304. Power Rating: 0.125 watt at 70°C, 0 watt at 125°C. Maximum Working Voltage: 200 V DC. Electrical Travel: 200° ± 10°. **Mechanical**: Mechanical Travel: 250° ± 10°. Cover Plate: Stainless steel. Rotary Base: PPS (UL 94V-0). Terminals: Copper alloy, 60/40 tin-lead plated. Terminal Seal: Epoxy. Resistive Element: Cermet, on ceramic substrate. **Environmental**: Temperature Range: −55°C to +125°C. Soldering Heat: 10 sec. @ 240°C, max., TRS ± 1% max. Rotational Life: 100 cycles.

SEALED TRIMMING POTENTIOMETERS SINGLE-TURN



TR06C TR06H TR06P TR07F



TR07P TR08A TR08H TR08W TR08X

Sealed, 1/4 in. square, Thru-hole terminal styles, Top and side adjust. **Electrical**: Resistance Range: 10 ohms to 2 megohms. Resistance Tolerance: ± 10% 100 ohms to 2 megohms; ± 20% 10 ohms to 50 ohms. Resistance Taper: Linear. Peak Noise: (CRV): 1% or 1 ohm, whichever is greater. Temperature Coefficient: ± 100 ppm/°C, 200 ohms to 1 megohm (± 250 ppm/°C on all other resistance values). Power Rating: 0.5 watt at 70°C, 0 watt at 125°C. Maximum Working Voltage: 250 V DC. Electrical Travel: 210° ± 10°. **Mechanical**: Mechanical Travel: 250° ± 10°. Rotary Housing: PBT (UL94-0). Wiper Contact: Multi-metal alloy wire. Terminals: Copper alloy, 60/40 tin-lead plated. Terminal Seal: Epoxy. Resistive Element: Cermet, on ceramic base. **Environmental**: Temperature Range: −55°C to +125°C. Soldering Heat: 3 sec. @ 350°C, TRS ± 1% max. Rotational Life: 100 cycles.

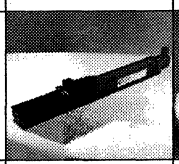
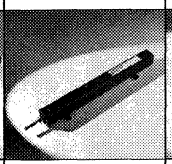
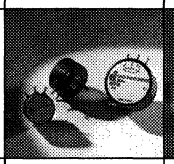
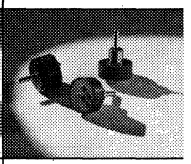
MP SERIES MECHANICAL PUSHBUTTON SWITCHES

G H I

Switch Function: SPDT Momentary, with separately wired LED(s). **Rating**: 0.4 VA max. at 20 V AC or DC max. **Housing**: .480" (12,19) x .680" (17,27).

C&K Part No.	Cap Width	Cap Color	LED Color(s)	Fig.
MP01R01CBE	.486	White	None	G
MP01R02CBE	.486	Black	None	G
MP01R113CBE	.486	White	Red	H
MP01R123CBE	.486	Black	Red	H
MP01R2133CBE	.486	White	Red, Red	I
MP01R2233CBE	.486	Black	Red, Red	I
MP01R2236CBE	.486	Black	Red, Green	I
MP01S01CBE	.679	White	None	G
MP01S02CBE	.679	Black	None	G
MP01S113CBE	.679	White	Red	H
MP01S123CBE	.679	Black	Red	H
MP01S2133CBE	.679	White	Red, Red	I
MP01S2233CBE	.679	Black	Red, Red	I
MP01S2236CBE	.679	Black	Red, Green	I

LINEAR/ROTARY POTENTIOMETERS

	DURASTAR	LONGFELLOW II	SHORT LONGFELLOW	MODELS LT/MLT	ROTARY POSITION	WPM SERIES	M22 SERIES
	SPACE MISER	VIBRATION RESISTANT	COMPACT, DURABLE	RUGGED, MINIATURE		HIGH PERFORMANCE	COMPACT, LOW COST
LINEAR POSITION					**ROTARY POSITION**		
Stroke Type	Side	Front	Front	Front	**Case Diameter**	7/8" (22mm) to 2" (51mm)	7/8" (22mm)
Body Size	1.50" X 1.375" (3.1mm x 34.9mm)	1.25" X 1.25" (31.8mm x 31.8mm)	0.9" x 0.9" (22.9mm x 22.9mm)	0.50"/0.375" (12.7mm/9.5mm)	**Mechanical Travel**	Continuous	S Series continuous, B Series with stops
Body Shape	Rectangular	Square	Square	Round	**Operating Speed**	10,000 deg./sec (max.)	
Stroke Length	4 to 50" (100 to 1250mm)	6 to 48" (150 to 1200mm)	1 to 6" (25 to 150mm)	1/2 to 10" (12 to 250mm)	**Starting Torque**	0.4 to 1 oz in. (varies with range)	M-22B = 1.0 oz in. M-22S = 0.3 oz in.
Starting Force	1.0 lb 0.45 Kg	1.0 lb 0.45 Kg	1.0 lb 0.45 Kg	1.0 oz 0.028 Kg	**Life**	One billion dither operations	50 million operations
Life	One billion dither operations	One billion dither operations	One billion dither operations	One billion dither operations	**Shock**	100g, 6 ms half sine	
Vibration	20 g rms/.75mm 5 Hz - 2kHz	20 g rms/.75mm 5 Hz - 2 kHz	20 g rms/.75mm 5 Hz - 2 kHz	MLT: 20 g rms/.75mm 5 Hz - 2 kHz	**Vibration**	10 Hz to 2 kHz @ 20 g	
Shock	50 g 11 ms	50 g 11 ms	50 g 11 ms	50 g 11 ms	**Electrical Stroke**	340° to 353°	M-22B = 320° M-22S = 340°
Independent Linearity	0.1 or 0.05%	0.1 or 0.05%	1.0 or 0.1%	1.0 or 0.1%	**Independent Linearity**	0.1 or 0.075%	M-22B: 1% M-22S: 1 or 0.25%
Resolution	Infinite	Infinite	Infinite	Infinite	**Resolution**	Infinite	Infinite
Temperature Range	-65° to 105°C -85° to 221°F	-65° to 105°C -85° to 221°F	-65° to 105°C -85° to 221°F	-40° to 80°C -40° to 176°F	**Temperature Range**	-55° to 125°C -67° to 257°F	-40° to 85°C -40° to 185°F
Resistance Tolerance	20%	20%	20%	20%	**Resistance Tolerance**	20%	20%
Total Resistance	2 KΩ to 10 KΩ (varies with range)	5 KΩ	1.5 KΩ/in. electrical travel	LT = 1 KΩ/in. MLT = 1.5 KΩ/in.	**Total Resistance**	5 KΩ	1 K, 2 K, 5 KΩ
Dielectric Strength	1000 Vrms	1000 Vrms	1000 Vrms	1000 Vrms	**Dielectric Strength**	750 to 1000 Vrms	750 Vrms
Insulation Resistance	1000 MΩ @ 500 Vdc	1000 MΩ @ 500 Vdc	1000 MΩ @ 500 Vdc	1000 MΩ @ 500 Vdc	**Insulation Resistance**	1000 MΩ @ 500 Vdc	1000 MΩ @ 500 Vdc
Maximum Power	0.75 Watt/in.	0.75 Watt/in.	0.75 Watt/in.	LT = 0.25 Watt/in. MLT = 0.2 Watt/in.	**Maximum Power**	1.5 to 3.0 Watts (Varies with model)	0.4 Watt
Recommended Wiper Current	<1 µA	<1 µA	<1 µA	<1 µA	**Recommended Wiper Current**	<1µA	<1µA
Electrical Connection	DIN43650	BINDER 681	BINDER 681	LT cable. MLT cable or connector	**Electrical Connection**	Gold plated terminals	Gold plated terminals

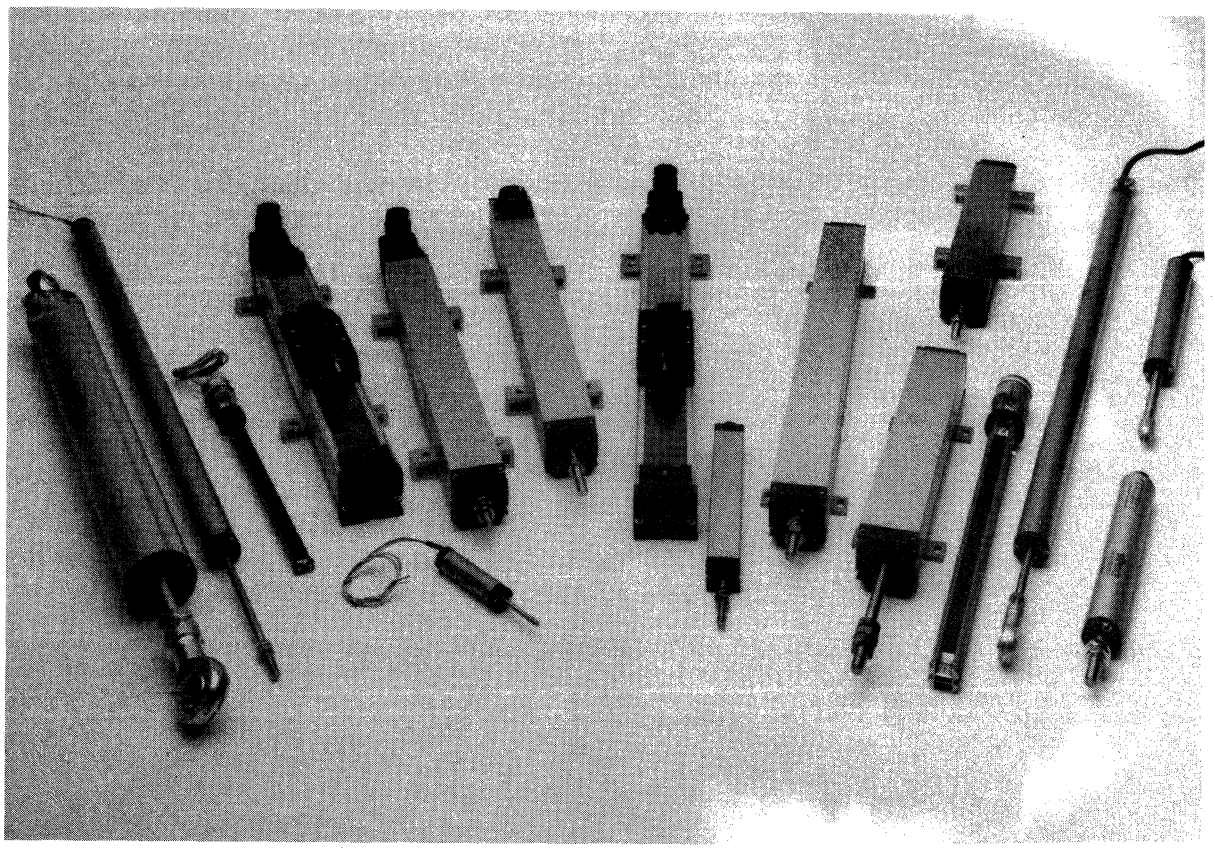
FEATURES: • **CE Compliance** • **Intrinsic Safety New! Factory Mutual Intrinsic Safety Approval for All Data Instruments Linear Potentiometers** • **Stroke Lengths** (5 in. to 4 ft. standard) • **Electrical Stroke Travel** (320° to 353°) Rotary • **Housing Size** (3/4 in. to 2 in. diameter) Rotary • Others Available • **Housing Size** (3/8 in. diameter to 1.50 in. sq.) • **MystR® Elements** Long life, durable, resistant to effects of industrial chemicals • **Precious Metal Wipers** Long term high quality signal in corrosive environments • **Absolute Measurement** Accurate position after power interruption • **Anodized Aluminum Housings** High strength and resistance to corrosion • **Stainless Steel Shafts** Smooth operation and resistance to corrosion • **High Level DC Output** Works with simple controls • **High Dither Life** Long life in automatic control systems • **Shaft Seals** Protect internal components from harsh environments • **High Performance Bearings** Long life with side load conditions

APPLICATIONS: • **Molding** • Blow molding • Injection Molding • **Printing** • Printing roll alignment • **Medical** • Artificial elbow • Dispensing equipment • Hospital beds • Knee rehabilitation • X-ray machines • **Robotics** • Animated characters • Bottle machines • Fork lift trucks • Gauging • Material Handling • Robotic Painters • Theatre rides • **Other** • Actuators • Chart recorders • Flow meters • Meat packing • Money counting • Antenna controls • Container bow • Infusion pumps • Missile controls • Valve control

DATA INSTRUMENTS
ISO 9001 APPROVED!
Data Instruments Inc., 100 Discovery Way, Acton, MA 01720
(800) 333-3282 • FAX (978) 263-0630 • INTERNET: http://www.datainstruments.com

DYNAMATION TRANSDUCERS
CORPORATION

LINEAR TRANSDUCERS



Advanced design criteria combined with precise process control manufacturing provide highly reliable transducers for control and measurement of linear position. Eight basic models allow selection of over 1000 standard and option features to best suit your length, accuracy, life, environment and price goals.

- ***Electrical Stroke 0.5" to 240"***
- ***Accuracy up to +/-0.025%***
- ***Infinite Resolution***
- ***Life 100 Million Cycles (typ.)***
- ***Sealed Construction***
- ***Choice of Mounting***

Special Designs Available on Request

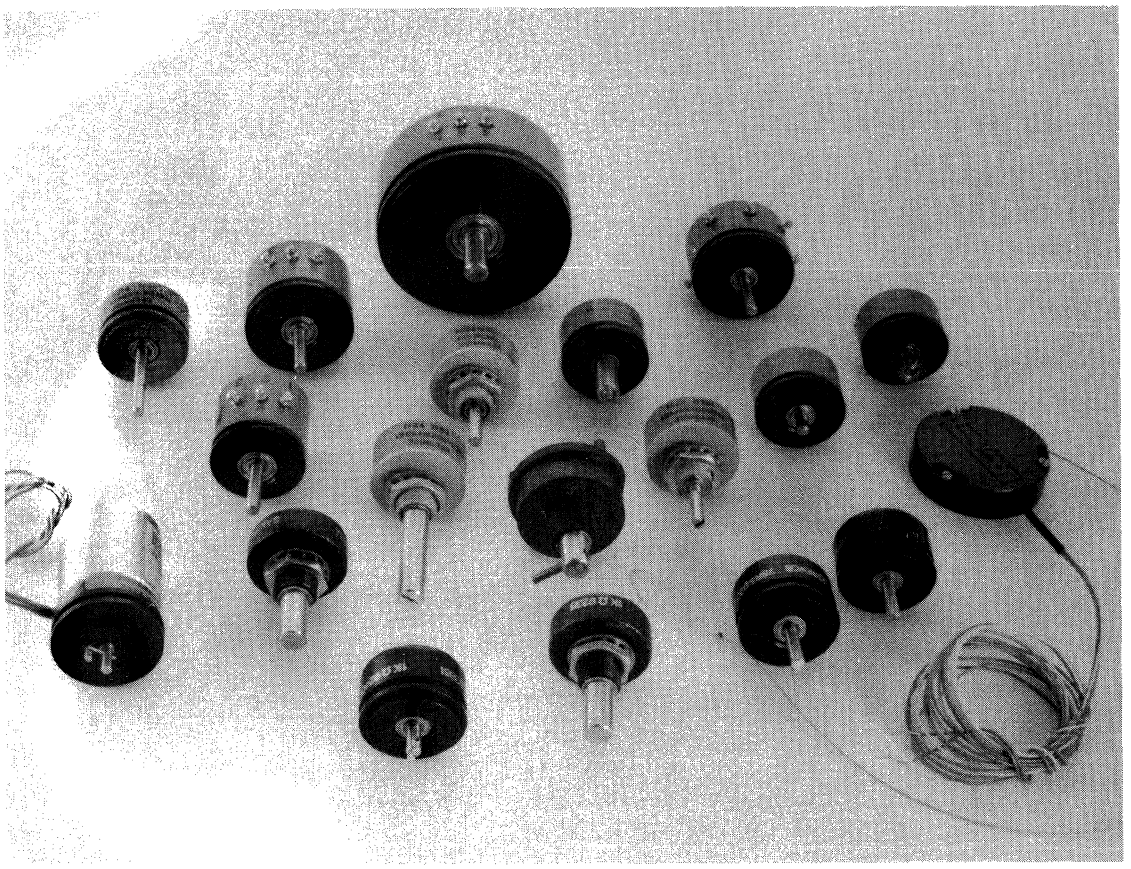
DYNAMATION TRANSDUCERS
CORPORATION
348 Marshall Street ❖ Holliston, MA 01746
Tel: 508-429-8440 Fax: 508-429-1317

VISHAY SFERNICE

DYNAMATION TRANSDUCERS
CORPORATION

VISHAY SFERNICE

ROTARY POSITION SENSORS



Thirty two precision designed standard models offer the accuracy, size, mounting features, reliability, life and cost effectiveness to fit your demanding applications.

Over two hundred standard design options allow optimized selection in this extensive product offering.

- ***Case Size 1/2" to 3"***
- ***Servo or Bushing Mount***
- ***Accuracy up to +/-0.01%***
- ***Linear Functions***
- ***Nonlinear Functions***

Special Designs Available on Request

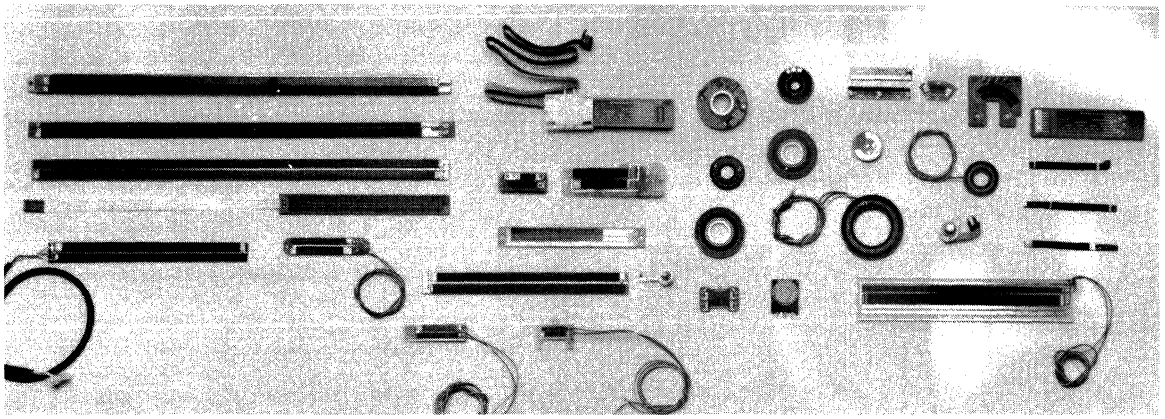
DYNAMATION TRANSDUCERS
CORPORATION
348 Marshall Street ❖ Holliston, MA 01746
Tel: 508-429-8440 Fax: 508-429-1317

VISHAY SFERNICE

DYNAMATION TRANSDUCERS
CORPORATION

VISHAY SFERNICE

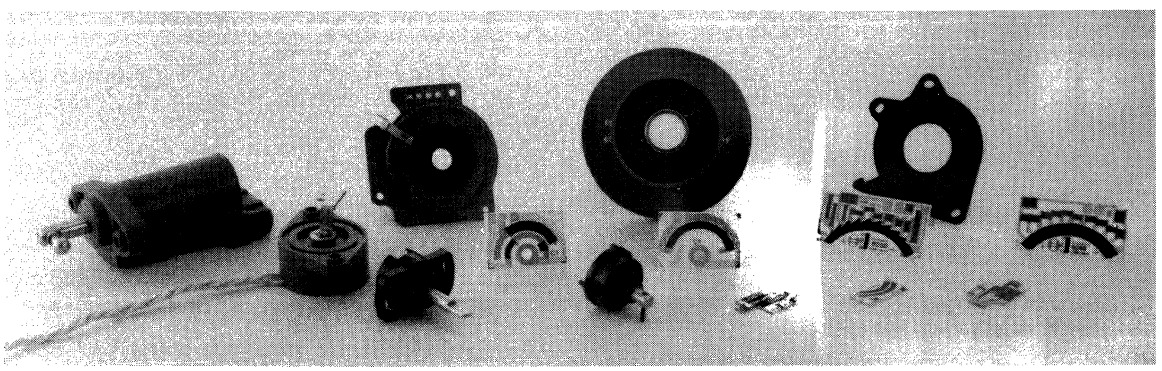
ELEMENTARY POSITION SENSING



When your application calls for the use of reliable, infinite resolution position sensing, select one from our standard line of linears or we'll custom design one specifically for you.

Virtually any size, shape or function can be economically produced in any volume with our application specific instrumentation.

AUTOMOTIVE SENSORS



Precise, unique designs utilizing our extensive experience in high-volume production. Linear and nonlinear functions. From basic element and wiper assemblies to sealed, enclosed designs.

- ***Throttle Position***
- ***Fuel Injection***
- ***Electronic Transmission***
- ***Light Intensity***
- ***Wiper Control***
- ***Wheel Alignment***
- ***Multiaxis Gearshift***
- ***Speed Sensor***

Special Designs Available on Request

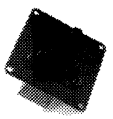
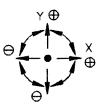
DYNAMATION TRANSDUCERS
CORPORATION
348 Marshall Street ❖ Holliston, MA 01746
Tel: 508-429-8440 Fax: 508-429-1317

ETI SYSTEMS, INC.

ETI SYSTEMS

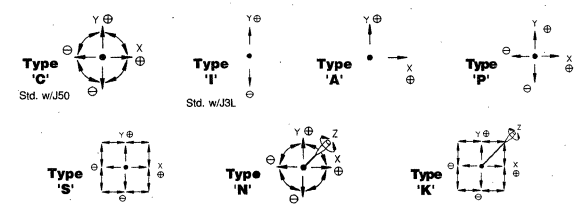
Industrial Joystick Controllers

Step 1: Choose a base model

	Series	Standard Features	Mechanical Specifications	Electrical Specifications
1-Dimensional 3.15²"w x 3.29"h as shown 	**J3L**	• Economical • 1-dimensional, Y-axis lever • Cylindrical knob • Spring return device to center position • Sub-panel for mounting	• Mech. range ±20° ~ ±25° from center position • 2,000,000 operations life • -4°F to +140°F Operating Temperature	• 40° electrical angle • Cond. plas.element • 0.1 watt power rating • ±5% ind. linearity • 10KΩ resistance value
1,2,3-Dimensional 3.15²"w x 6"h 	**J50**	• Heavy duty construction • 2-dimensional, X,Y-axis lever • Spherical knob • Dust proof rubber cover • Spring return device to center position • Sub-panel for mounting • Available in 3-dimensions with Z axis potentiometer in knob	• Mech. range ±30° ~ ±35° from center position • 5,000,000 operations life • -4°F to +140°F Operating Temperature	• 2 potentiometers mounted • 60° electrical angle • Cond. plas.element • 0.2 watt • ±3% ind. linearity • 10KΩ resistance

Step 2: Choose the options

Lever Direction



**NOTE: J30 Series only available with Type 'I' Types 'I' and 'C' are stocked options; other types available in 6-8 weeks.*

Potentiometers & Switches

Designate number of pots and switches on the chart below.

J3L Series is ready to ship with 1 pot, 0 switches. Available without a pot and up to 2 switches.

J50 Series is ready to ship with 2 pots, 0 switches. Available with up to 3 pots and up to 6 switches (Contact ETI for additional needs).

Knob Style

Type A*
Cylinder joystick knob
.47" w x 1.71"h

Type F*
Flatted joytick knob
1.18"w x 2.17"h

Type R
Spherical joystick knob
.98"w x 1.81"h (J3L)
1.02"w x 4.2"h (J50)

Rubber Boot
All of the above knobs are available with a dust proof rubber cover.
Specify with 'B' when ordering

Many other knob styles available.

**NOTE: Types 'A' and 'F' not available with J50 Series.*

Hundreds of other joystick models and styles available!
Call or fax for your FREE copy of the new Selection Guide!

Step 3: Nomenclature

J50	C	R	2	2	S	M	B

Series:
Lever Direction:
Handle Type:
# of Potentiometers mounted:
# of Switches mounted:
Spring return (leave blank if not desired):
Sub panel for mounting (leave blank if not desired):
Rubber boot (leave blank if not desired):

NEW PRODUCT!

J3R SERIES

ETI Systems ***NEW*** J3R Series **"Rocker Pot"** is a 1-dimensional see-saw joystick.

2-3/8"w x 1-7/16"h x 3/4"d
0.1 watt, 10KW Res.
±3% Ind. Linearity

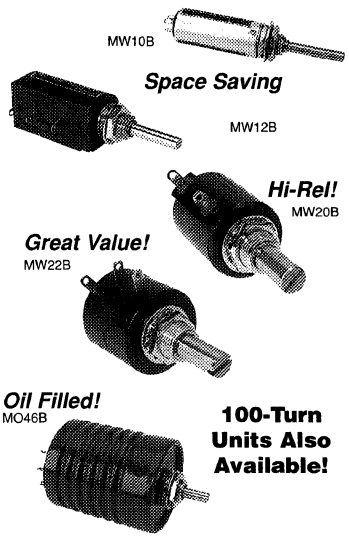
• Many other features and models available • Most items in stock, ready for immediate shipment!
• Engineering Assistance Available • Non-standards are no problem!

ETI SYSTEMS
ETI Systems, Inc. 2251 Las Palmas Drive, Carlsbad, CA 92009 Phone: ***(760) 929-0749*** *Fax:* ***(760) 929-0748***
A Division of Polaris Industrial Enterprises, Inc.
ETI SYSTEMS
Visit our website: ***www.etisystems.com*** *or email us at:* ***etisystems@aol.com***

ETI SYSTEMS, INC.

Precision Potentiometers

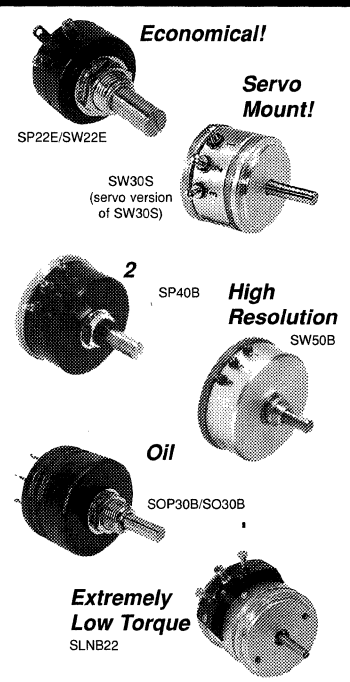
Multi-Turns



Model	No. of Turns Avail.	Resist. Range	Element	Ind. Lin.	Power Rating	Dia.	Features
MW10B	3,5,10	20-100K	Wirewnd.	±0.25%	1 W	7/16"	Compact size/All metal housing/1/8" dia. shaft
MW12B	3,5,10	20-150K	Wirewnd.	±0.25%	1.5 W	1/2"	Space saving configuration/ Rear or bottom lug terminals
MH12B	5,10	1K-100K	Hybrid	±0.4%	1 W	1/2"	10,000,000 turns life/Output smoothness below 0.05%
MW20B	3.5	10-200K	Wirewnd.	±0.25%	2 W	3/4"	Hi-Rel, 2 Mil. turns life
MH20B	3.5	500-100K	Hybrid	±0.25%	2 W	3/4"	10 Mil. turns life, output smoothness below 0.015%
MW22B	3.5	10-250K	Wirewnd.	±0.25%	2 W	7/8"	General purpose (many options avail.)
MH22B	3.5	1K-100K	Hybrid	±0.25%	2 W	7/8"	10,000,000 Mil. turns life, low inductance
MR46B	3-30	0.5-500K	Wirewnd.	±0.25%	5 W	1 13/16"	Rear terminals, 2,000,000 turns life
SMR46B	3-30	0.5-500K	Wirewnd.	±0.25%	5 W	1 13/16"	5 Amp Internal limit switches
MO20B	5,10	100-100K	Wirewnd. (Hybrid Avail.)	±0.25%	0.75 W	1 1/4"	Fully sealed & oil-filled, hi-resolution
MO46B	3-20	0.5-300K	Wirewnd. (Hybrid Avail.)	±0.3%	5 W	2 1/2"	Fully sealed & oil-filled, heavy-duty

Specifications listed for 10-turn versions.

Single Turns



SP22E	1	500-100K	Cond.Plas.	±1%	1 W	7/8"	10 Mil. turns life, essentially infinite resolution
SW22E	1	10-20K	Wirewnd.	±0.5%	0.5 W	7/8"	General purpose single turn
SP22B	1	500-100K	Cond.Plas.	±1%	1 W	7/8"	20,000,000 turn life/ Metal housing
SW22B	1	50-20K	Wirewnd.	±0.5%	0.5 W	7/8"	Anodized aluminum housing
SP22D	1	500-100K	Cond.Plas.	±1.5%	1 W	7/8"	Rear terminals/10,000,000 turns life
SW22D	1	10-20K	Wirewnd.	±0.5%	0.5 W	7/8"	Rear terminals/ All metal housing
SP30B	1	1K-100K	Cond.Plas.	±1%	1.5 W	1 1/16"	Hi-Rel, 20 Mil turns life
SW30B	1	10-50K	Wirewnd.	±0.5%	0.75 W	1 1/16"	Hi-Rel, metal housing
SP40B	1	1K-200K	Cond.Plas.	±0.5%	2 W	1 7/16"	50,000,000 turns life/ Low inductance
SW45B	1	10-50K	Wirewnd.	±0.5%	1 W	1 5/8"	Sleeve bearings/ precision tolerance
SP50B	1	1K-500K	Cond.Plas.	±0.5%	3 W	2"	Output smoothness below 0.1%
SW50B	1	10-50K	Wirewnd.	±0.5%	2.5 W	2"	High resolution/metal housing
SP80B	1	5K-500K	Cond.Plas.	±0.3%	3.5 W	3"	50,000,000 turns life
SW80B	1	10-50K	Wirewnd.	±0.5%	3 W	3"	Highest res. in single turn wirewound
SOP30B	1	1K-100K	Cond.Plas.	±1%	1 W	1 1/4"	Oil-filled for harsh environments, 10 Mil. turns life
SO30B	1	50-20K	Wirewnd.	±1%	.75 W	1 1/4"	Fully sealed and oil-filled
SLNB22	1	100-20K	Wirewnd.	±0.5%	0.3 W	7/8"	Extremely low torque/Cont. mechanical rotation

Both bushing and servo mounts are available on nearly all models.

• Many other features and models available • Most items in stock, ready for immediate shipment!
All rotary pots can be motorized • Engineering Assistance Available • Non-standards are no problem!

ETI SYSTEMS

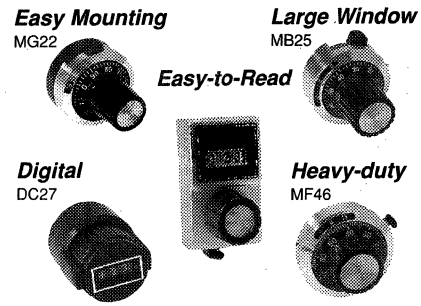
ETI Systems, Inc. 2251 Las Palmas Drive, Carlsbad, CA 92009 Phone: ***(760) 929-0749*** *Fax:* ***(760) 929-0748***

A Division of Polaris Industrial Enterprises, Inc.

Visit our website: ***www.etisystems.com*** *or email us at:* ***etisystems@aol.com***

ETI SYSTEMS, INC.

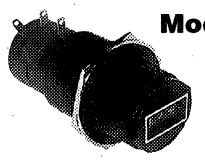
Turns Counting Dials



Model	Size	# of Turns	Fits Shaft	Options
MG22	7/8" Dia.	Up to 20	1/8", 1/4", 3mm, 6mm	Black or Grey
MB25	1" Dia.	Up to 10	1/8", 1/4", 3mm, 6mm	Black
DC27	1-1/16"Dia.	Up to 10	1/8", 1/4", 3mm, 4mm, 6mm	Pot/Dial Combo Avail.
DB10	1" Wide	Up to 10	1/8", 1/4", 3mm, 4mm, 6mm	100 turns (DB100)
MF46	1-13/16" Dia.	Up to 20	1/8", 1/4", 3mm, 4mm, 6mm	All Black

Contact ETI for more info.

Potentiometer/ Dial Combinations

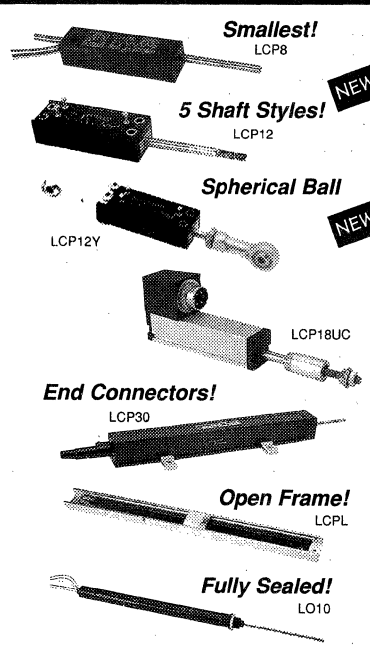


Model DC22 shown.
Many other features and models available. Contact ETI for more details.

Resistance Range ..	100 to 100K ohms
Resistance Tolerance	±5%
Power Rating	2 watts
No. of Turns	10
Size	1.45"dia. x 2 1/4" long
Panel Hole Size	1-1/8"
Maximum Panel Width	3/16"
Readout Accuracy ..	±0.35% of voltage ratio
Locking Device	Over the center

Precision Potentiometers

Linear Motions



Model	Stroke Length	Resist. Range	Element	Ind. Lin.	Power Rating	Body Size	Features/Options
LCP8	.433", 0.5"	1K-50K	Cond.Plas.	±2.0%	0.2 W	.25"wx.31"h	Leadwires for easy hookup
LCP12	0.5,1,2,4"	500-20K	Cond.Plas.	±0.5-1.5%	0.2-1.2 W	0.5"wx.44"h	20,000,000 strokes life
LCP12Y	0.5,1,2,4"	500-20K	Cond.Plas.	±0.5-1.5%	0.2-1.2 W	0.5"wx.44"h	Spherical ball endings
LW12	0.5,1,2,4"	100-50K	Wirewnd.	±0.5-1.5%	0.25-2 W	.5"wx.44"h	Spring return & threaded shafts avail.
LCP15	.394"-1.181"	500-10K	Cond.Plas.	±1.0-2.0%	0.2-0.5 W	1 5/16"w x9/16"h	20 Mil stokes life/Solderless connect terminals
LCP18UC	1,2,3,4,6"	500-20K	Cond.Plas.	±0.2-0.5%	0.3-1.5 W	.67"wx1.6"h	Heavy duty, Phasible for tracking with cleats
LCP20	0.5,1,2,4"	500-20K	Cond.Plas.	±0.5-1.0%	0.3-1.25 W	.6"wx.8"h	20 Mil. strokes life, industrial grade
LW20	0.5,1,2,4"	10-20K	Wirewnd.	±0.7-2.0%	0.5-3 W	.6"wx.8"h	Precision tolerances, heavy duty unit
LCP30	4.13"-39.37"	1K-500K	Cond.Plas.	±0.5%	1.25-10 W	1.25" w x1.38"h	Adjustable mounting feet for stability
LCPL	7.87-39.37"	2K-500K	Cond.Plas.	±0.5%	2-6 W	.75"wx.5"h	Open frame, 10 Mil strokes life
LWR10	1,2,4"	100K-20K	Wirewnd.	±.5-1.0%	0.5-1 W	.5" dia.	Round shape conserves space/all metal housing
LWR20	2,4,8"	100-50K	Wirewnd.	±0.5-0.7%	0.75-2 W	.75" dia.	Round shape and rear terminals conserve space
LO10	1,2,4"	100-20K	Wirewnd.	±0.5-1.0%	0.5-1 W	0.5" dia.	Oil-filled & sealed/ Submersible up to 15 psi
LO20C	2,4,8"	25-20K	Wirewnd.	±0.5-0.7%	0.75-2 W	2.81" dia.	Oil-filled & sealed/ Moisture proof

Contact ETI for more info.

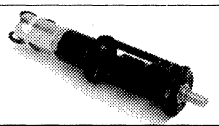
• Many other features and models available • Most items in stock, ready for immediate shipment!
All rotary pots can be motorized • Engineering Assistance Available • Non-standards are no problem!

ETI Systems, Inc. 2251 Las Palmas Drive, Carlsbad, CA 92009 Phone: ***(760) 929-0749*** *Fax:* ***(760) 929-0748***
A Division of Polaris Industrial Enterprises, Inc.
Visit our website: ***www.etisystems.com*** *or email us at:* ***etisystems@aol.com***

ETI SYSTEMS, INC.

Motorized Potentiometers

ETI SYSTEMS

	Series	Features
DC Motorpots		
	MC	•Best Performance at low currents •Can be positioned by op-amp outputs or pulsed with bumper circuits. •Typical running currents 5-20mA
	ME	•Stronger motor for running small mechanisms off potentiometer shaft •Lower cost than MC series
AC Motorpots		
	MAC	•AC voltage motor with same potentiometers as the MC and ME series •Includes starting capacitor and dynamic braking diode
Rheostats		
	MACR	•Motorized rheostat 25 to 300 watts AC voltage motor •Automates older current driver circuits and high wattage lighting applications. •Variable transformers also available
	MER	•Same as MACR except with 12 & 24VDC motors •Excellent low cost speed control for many types of small, industrial motors •Available with a feedback potentiometer
Stepper Motors		
	MS	•Stepper motors that drive analog potentiometers can solve many digital to analog control problems •Pot maintains position when stepper motor pulse driver is off-line

	20	2W	2P	2E	4R	25	50	100	VARIABLE TRNSFRMR.	VOLTAGE	
	HIGH QUALITY 10 TURN WIREWOUND	2 WATT INDUSTRIAL GRADE 10-TURN WIREWOUND	2 WATT CONDUCTIVE PLASTIC SINGLE TURN	1 WATT WIREWOUND SINGLE TURN	0.5 WATT HIGH RESOLUTION 10-TURN WIREWOUND	5 WATT RHEOSTAT 25 WATTS		RHEOSTAT 50 WATTS	RHEOSTAT 100 WATTS	2-1/4 AMP MOTOR INPUT	SPEED OF POT	
MC	●	●	●	●	●	*Not Applicable*			*N/A*	12,6	3,5,10 18,35,61
ME	○	○	○	○	○	*See MER Below*			*MEV*	24,12	*
MAC	●	●	●	●	●	*See MACR Below*			*MACV*	230,115, 24	1,2,3, 5,8,10
MACR	*Not Applicable*					○	○	○	*N/A*	230,115, 24	1,2,3, 5,8,10
MER	*Not Applicable*					●	●	●	*N/A*	24,12	*
MS	○	○	○	○	○	○	○	○	*N/A*	*Customer Specified*	

* *If motor input voltage is 12, then RPM's are: 3,5,10,20,25,35,50,65*
If motor input voltage is 24, then RPM's are: 7,10,15,20,30,45,60

Nomenclature:

ME — 2W — 10K/5K — 12VDC — 25RPM

Series
Type of pot
Resistance value *(dual gang configuration shown)*
Input voltage
RPM

Features:

Precision Potentiometer, Rheostat, or Variable Transformer
ETI Systems can motorize any other manufacturer's rotary potentiometers, or rheostats.

Friction Clutch
Allows for **manual adjustment** of potentiometer when motor is off. Protects potentiometer stops against over-ranging.

Motor and Geartrain
Allows you to choose high-response swiss grade motors, industrial DC motors, or AC motors to meet the precise needs of your application.

Limit Switches*
Prevents over-ranging of potentiometer when motorized and can be integrated into your circuitry for various applications.

Turns Counting Dial*
Allows visual monitoring of motorized potentiometer position. Stainless steel shaft with many modifications available.

Bird Cage Design*
Economical hardware which allows for easier modification to non-standard units.

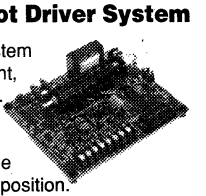
Cable and Lugs*
Allows for ease in installation with all cables soldered by qualified technicians

* Optional Feature

What to consider:

- Will any mechanism be coupled to the output shaft? How much torque will be required?
- Motor and voltage type
- Type of potentiometer
- Resistance of potentiometer
- Limit switches at end of potentiometer travel
- Second gang for feedback purposes
- Cables and connectors
- Driver board (See below) for proportional control

6500 Series Motorpot Driver System



High performance driver system available with voltage, current, or 16-bit digital input modes. The dual gang pot affords an isolated variable output and a feedback pot to null the servo system at the desired position.

• Many other features and models available • Most items in stock, ready for immediate shipment!
• Engineering Assistance Available • Non-standards are no problem!

ETI SYSTEMS *ETI Systems, Inc. 2251 Las Palmas Drive, Carlsbad, CA 92009 Phone:* ***(760) 929-0749*** *Fax:* ***(760) 929-0748*** ETI SYSTEMS
A Division of Polaris Industrial Enterprises, Inc.
Visit our website: ***www.etisystems.com*** *or email us at:* ***etisystems@aol.com***

It's FREE... and it's fast!

http://icmaster.com

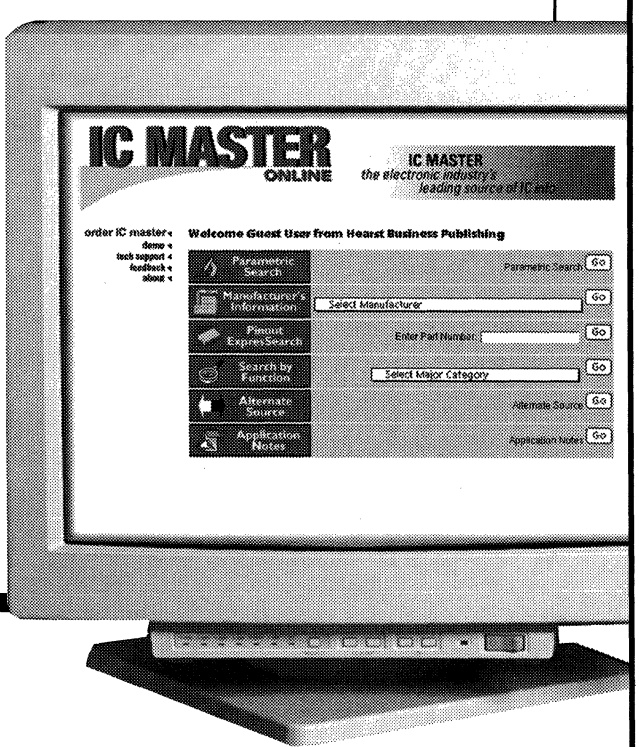
IC MASTER Online is the industry's leading database, updated monthly, of both current and discontinued commercially available integrated circuits from over 345 manufacturers. It gives you basic specifications, pinout diagrams and package outlines, second source data, application notes, and complete vendor contact information for over 135,000 base part numbers.

Go online now for:

- ***FREE*** and unlimited access to the entire IC MASTER database.
- ***Direct links*** to actual datasheets on the manufacturer's own website, for devices selected by the manufacturer.
- Full part number and specification search capability.
- Plus, much more!

Try **http://icmaster.com** today, it's ***FREE!***

IC MASTER Online will dramatically cut the number of online hours you spend searching, comparing, and finally selecting integrated circuits.



Hearst Business Communications, Inc./UTP Division
645 Stewart Avenue, Garden City, NY 11530 ▪ Tel: 516.227.1300 ▪ FAX: 516.227.1901

ISL PRODUCTS INTERNATIONAL LTD.

800-626-6116

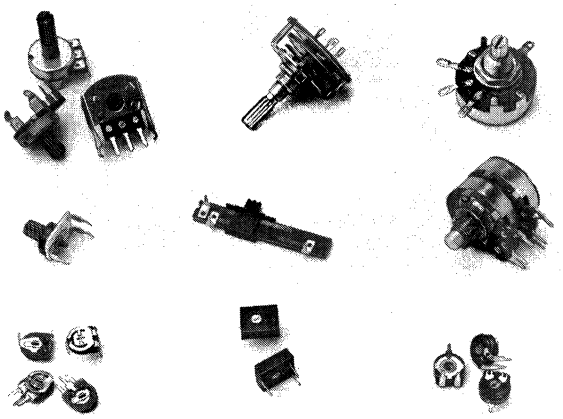
Dept. EM, 235 Robbins Lane, Suite 270,
Syosset, NY 11791
(516) 937-3475 • FAX (516) 937-3840
e.mail:info@islproducts.com

1975-1999
24
YEARS OF EXCELLENCE

CAPACITORS / SILICON DIODES / CUSTOM CABLE ASSEMBLIES / LEDS /
CUSTOM HYBRID CIRCUITS / TRANSFORMERS / ADAPTORS AND POWER SUPPLIES

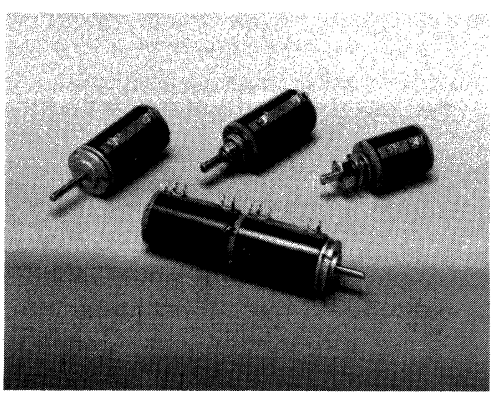
COMMON POTENTIOMETERS

- **Slide Variable Resistors**
  Non Case Slide Pots
  Low Profile Slide Pots
- **Trimmer Potentiometers**
  Carbon Types
  Cermet Types
  SMD Cermet
- **Rotary Variable Potentiometers**
  9mm-17mm
  Insulated Shaft
  Metal Shaft
  Gang Configuration Available
- **Weatherproof Carbon Composition Potentiometers**
  .5w-2w

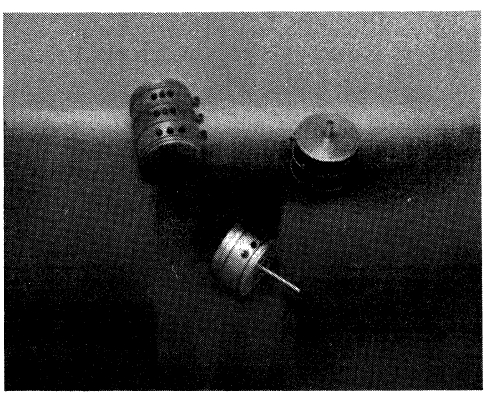


- **Wire Wound Potentiometer** 1W-5W
- **Thumbwheel Pots**
- **Potentiometer Blacks**

PRECISION POTENTIOMETERS



Multiturn Wirewound Pot



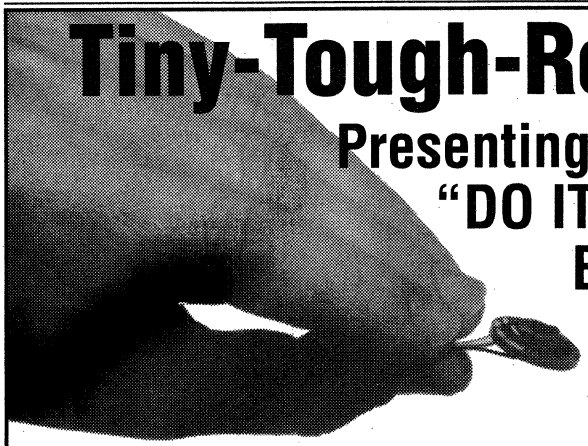
Precision Single Twin WW Pot

- **Precision Single Turn Wirewound Pots** .5W-5W
- **Multi-turn Wirewound Pots** 1W-5W
- **Sine-Cosine Wirewound Potentiometer**
- **Linear Motion Wirewound Potentiometer**

SEE OUR PAGES IN SECTIONS 1300, 5600 & 6000
SEE OUR CATALOG ON THE INTERNET @ http://www.islproducts.com

Tiny-Tough-Reliable-Low Cost

Presenting: The JDK Easy To Assemble "DO IT YOURSELF" Potentiometer Element Rotor/Wiper Kits



← Actual Size .187" Thick

JDK Controls new "DO IT YOURSELF" Potentiometer Element and Rotor Wiper Assemblies provide 100,000,000 revolutions minimum of the smoothest, infinite resolution precision position sensing money can buy. These assemblies are designed to slip over existing shafts reducing the need for additional shaft and bearings and all associated coupling headaches. Space problems are a thing of the past. By reducing this redundant packaging, you save on size & cost. Just slip it over the shaft of your motor, lever, actuator etc. JDK ELEMENT AND ROTOR/WIPER ASSEMBLIES are the best way for you to increase system reliability while reducing system space, weight and packaging costs, all at the same time.

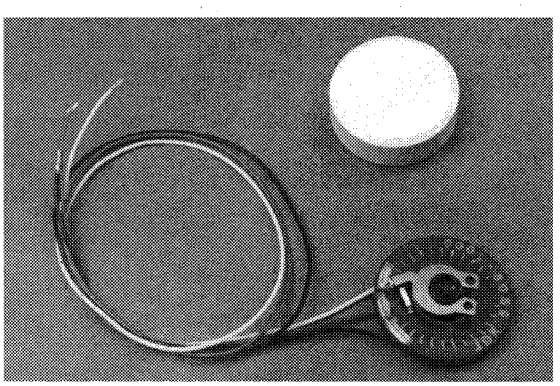
HOW'S THIS FOR RELIABILITY?
Typical-Run one of our assemblies continuously at 4 RPM, 24 hours per day, 365 days per year and it will last for **50 years minimum.**

STANDARD OR *CUSTOM*-WHAT DO YOU NEED?
JDK offers its "DO IT YOURSELF" assemblies in kit form. Some standard sizes are shown on pages A•2034 and A•2035 of this EEM volume. In addition, we can customize kits with virtually any diameter, resistance, linearity, thickness or electrical angle you need.

WHAT ABOUT LESS OPERATING SPACE?
JDK "DO IT YOURSELF" element and rotor/wiper assemblies take up only .187" of working height, about as much as an antacid tablet (throw your antacids away).

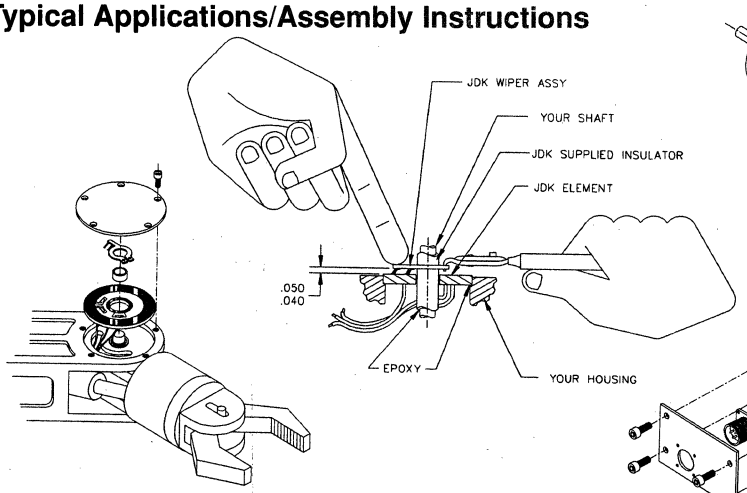
EASY TO ASSEMBLE
JDK "DO IT YOURSELF" kits are individually packaged including element, shaft insulator, rotor assembly and assembly instructions. They take only a few minutes to assemble. A spreader tool for attaching the rotor assembly can be found in most hardware stores. However, JDK offers one as an option. Please specify with your order.

HOW ABOUT LOWER COSTS?
With no housings, bearings or other packaging hardware required, you save at least half over the cost of standard units.

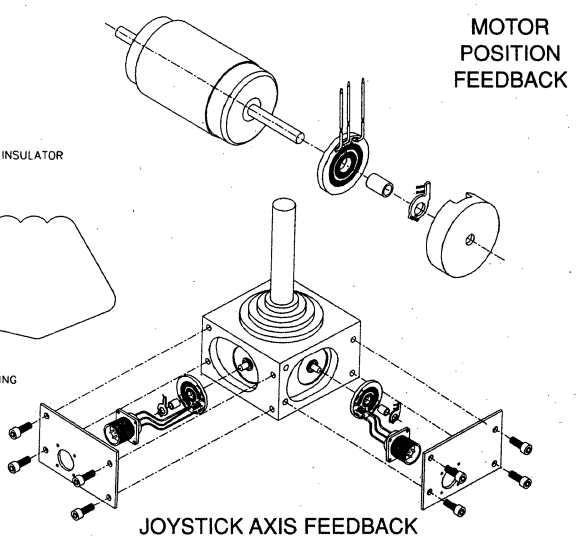


CALL, FAX OR WRITE FOR COMPLETE DETAILS & SAMPLES

Typical Applications/Assembly Instructions



ROBOTIC "JOINT" POSITION FEEDBACK



JOYSTICK AXIS FEEDBACK

C:/REF/DIAG_98

JDK CONTROLS, INC.
WHEN POTENTIOMETER PERFORMANCE IS CRITICAL *Website: www.jdkcontrols.com*
424 Crown Point Circle, Grass Valley, California 95945 • Tel. (530) 273-4608 • Fax (530) 273-0769 • (800) 880-7730

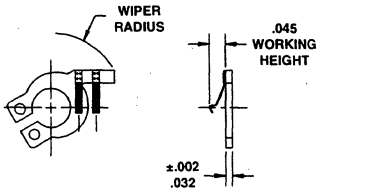
JDKontrols, Inc.

With customer/supplier relationships growing closer and as concurrent engineering becomes a way of life, it is becoming more and more feasible to reduce system packaging costs by designing in JDK Co-molded Conductive Plastic Potentiometer Element and Mating Wiper assemblies and Shaft Insulators. If you are designing for a new application, please consider the reduced size, space, weight and costs associated with JDK Elements/Wipers/Shaft insulators. Listed below are our four standard sizes. However, we offer many custom options ranging from different mechanical shapes to electrical options such as special angles, resistance values, linearities, etc. Please don't hesitate to call or Fax with questions.

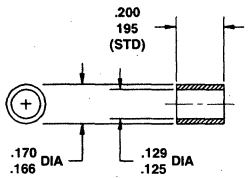
JDK "DO-IT-YOURSELF" POTENTIOMETER ELEMENT/WIPER KITS

1/8" SHAFT MODELS

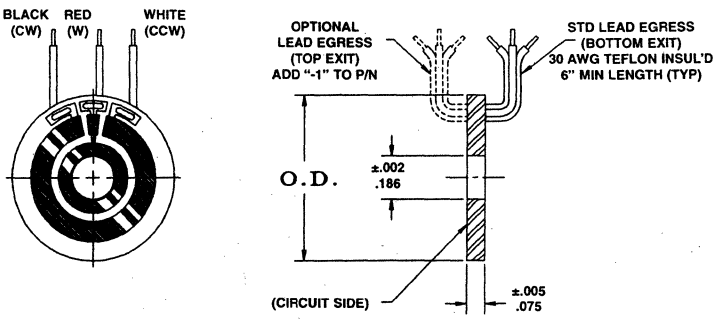
	MODEL 6909-	MODEL 6911-
O.D. (±.005)	.700	.885
STD ELEC. ANGLE	320°	340°
STD IND. LINEARITY	±0.5%	±0.5%
POWER RATING	1.00 W	1.25W
OUTPUT SMOOTHNESS	±0.1% MAX	±0.1% MAX
WIPER RADIUS	.330 MAX	.395 MAX
1K Ω RESIST. (±10%)	6909-1000	6911-1000
2K Ω RESIST. (±10%)	6909-1001	6911-1001
5K Ω RESIST. (±10%)	6909-1002	6911-1002
10K Ω RESIST. (±10%)	6909-1003	6911-1003
20K Ω RESIST. (±10%)	6909-1004	6911-1004



WIPER ASSEMBLY
(ADD "-60" TO PART NO.)



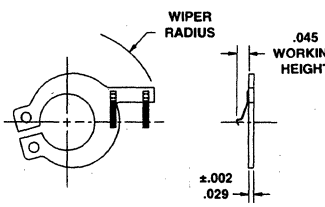
INSULATOR
(PART NO: 7040-0001-15)



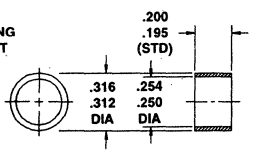
ELEMENT ASSEMBLY
(ADD "-70" TO PART NO.)

1/4" SHAFT MODELS

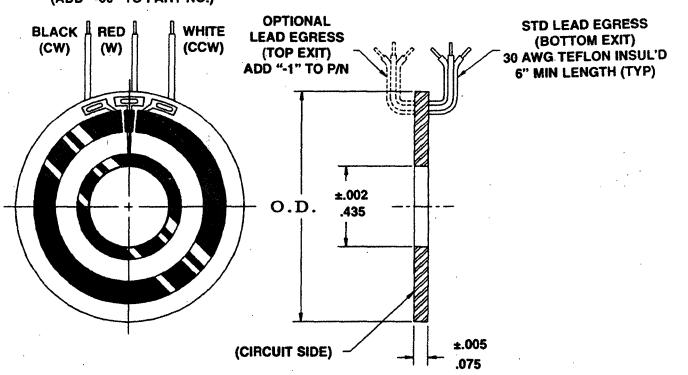
	MODEL 6915-	MODEL 6920-
O.D. (±.005)	1.250	1.805
STD ELEC. ANGLE	340°	350°
STD IND. LINEARITY	±0.5%	±0.5%
POWER RATING	1.50 W	2.00 W
OUTPUT SMOOTHNESS	±0.1% MAX	±0.1% MAX
WIPER RADIUS	.520 MAX	.710 MAX
1K Ω RESIST. (±10%)	6915-1000	6920-1000
2K Ω RESIST. (±10%)	6915-1001	6920-1001
5K Ω RESIST. (±10%)	6915-1002	6920-1002
10K Ω RESIST. (±10%)	6915-1003	6920-1003
20K Ω RESIST. (±10%)	6915-1004	6920-1004



WIPER ASSEMBLY
(ADD "-60" TO PART NO.)



INSULATOR
(PART NO: 7040-0002-20)



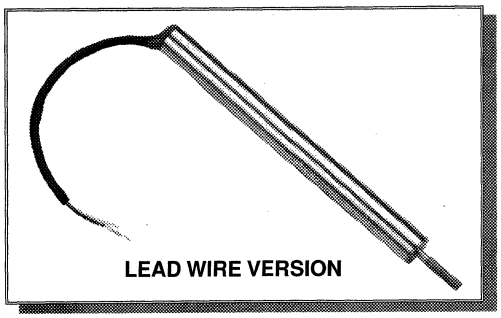
ELEMENT ASSEMBLY
(ADD "-70" TO PART NO.)

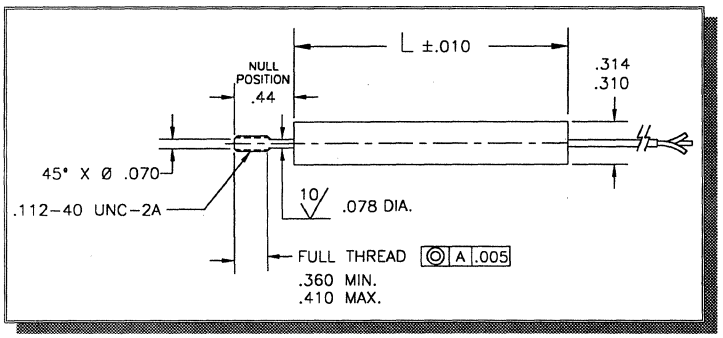
Custom Features Available...

- Variable overall diameters up to 1.805 in max. dia. variable thickness.
- Electrical angles up to 357°
- Custom output accuracy to 20 minutes of arc.
- Multiple circuits on a single element
- Choice of wire type, gauge, color and length {Options for wire sleeves, shields, connectors}
- Non-linear functions (audio, tapers, etc.) end or current limiting resistors
- Special shaft diameter

JDK CONTROLS, INC.
WHEN POTENTIOMETER PERFORMANCE IS CRITICAL *Website: www.jdkcontrols.com*
424 Crown Point Circle, Grass Valley, California 95945 • Tel. (530) 273-4608 • Fax (530) 273-0769 • (800) 880-7730

NEW CO-MOLDED LINEAR MOTION POTENTIOMETERS





SPECIFICATIONS:

ELECTRICAL

Resistance:	1k, 2k, 5k, 10k, 20k OHMS ±10%
Linearity:	±1% Independent
Resolution:	Essentially Infinite
Output Smoothness:	0.1% Max
Resistance Temp. Coefficient:	±400 PPM/°C Max
Power Rating:	1.0 Watt per stroke inch.
Dielectric Strength:	750 VRMS
Insulatioin Resistance:	100 MEG Ω Min

MECHANICAL

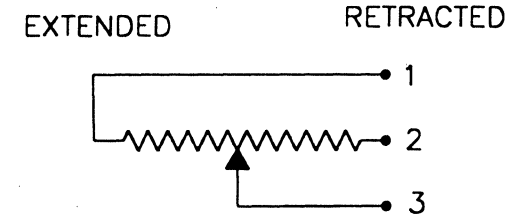
Stroke Length:	See Tab

ENVIRONMENTAL

Cycle Life:	50 Million Cycles Minimum
Operating Temperature:	-65°C TO +125°C
Shock and Vibration per MIL-R-39023	

MATERIALS

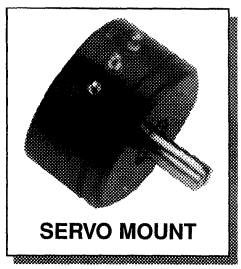
Contact Bracket:	Beryllium Copper
Contacts:	Mutifinger Precious Metal
Element:	Co-Molded Conductive Plastic
Lead Wires:	30 AWG Type ET



P/N	STROKE INCHES EXTENDED	LENGTH "L"
-1	0.50	1.467
-2	0.75	1.717
-3	1.00	1.967
-4	1.50	2.467
-5	2.0	2.967

STANDARD ROTARY POTENTIOMETERS

SERVO MOUNT MODELS



MODEL	OUTSIDE DIAMETER INCHES	SHAFT DIAMETER INCHES	SHAFT LENGTH	BODY LENGTH MAXIMUM	RESISTANCE RANGE	ELECTRICAL ANGLE	INDEPENDENT LINEARITY	OUTPUT SMOOTHNESS
6005	.500	.1249	.500	.550	1K-50K	325	1.0%	<0.05%
6008	.750	.1249	.500	.625	1K-50K	340	.5%	<0.05%
6009	.875	.1249	.500	.625	1K-50K	340	.5%	<0.05%
6011	1.062	.1249	.500	.625	1K-50K	340	.5%	<0.05%
6015	1.437	.2498	.625	.750	1K-50K	340	.5%	<0.05%
6018	1.750	.2498	.625	.750	1K-50K	350	.5%	<0.05%
6020	2.000	.2498	.625	.750	1K-50K	350	.5%	<0.05%

Specials available

BUSHING MOUNT MODELS

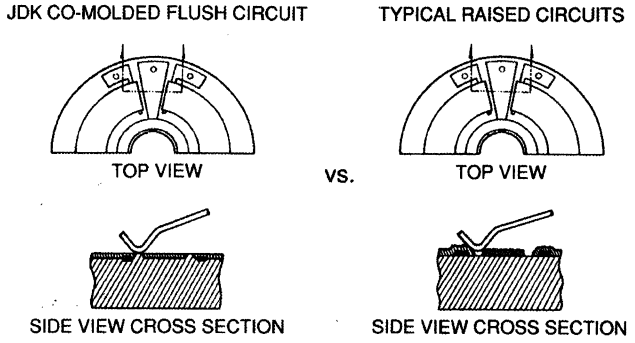
MODEL	OUTSIDE DIAMETER INCHES	SHAFT DIAMETER INCHES	SHAFT LENGTH	BODY LENGTH MAXIMUM	RESISTANCE RANGE	ELECTRICAL ANGLE	INDEPENDENT LINEARITY	OUTPUT SMOOTHNESS
6205	.500	.1249	.687	.550	1K-50K	325	1.0%	<0.05%
6208	.750	.1249	.687	.625	1K-50K	340	.5%	<0.05%
6209	.875	.1249	.687	.625	1K-50K	340	.5%	<0.05%
6211	1.062	.1249	.687	.625	1K-50K	340	.5%	<0.05%
6215	1.437	.2498	.875	.750	1K-50K	340	.5%	<0.05%
6218	1.750	.2498	.875	.750	1K-50K	350	.5%	<0.05%
6220	2.000	.2498	.875	.750	1K-50K	350	.5%	<0.05%

Specials available

JDK CONTROLS, INC.
WHEN POTENTIOMETER PERFORMANCE IS CRITICAL *Website: www.jdkcontrols.com*
424 Crown Point Circle, Grass Valley, California 95945 • Tel. (530) 273-4608 • Fax (530) 273-0769 • (800) 880-7730

THE JDK CO-MOLDED CONDUCTIVE PLASTIC PROCESS

JDK manufactures one type of potentiometer element—co-molded conductive plastic—because, to the designer and builder of systems in critical applications, there is no justification to use less than the best. In the JDK process, the termination and resistance materials are simultaneously molded with the plastic substrate. The result is a flush circuit with a very hard, smooth surface which, when combined with JDK's multifinger precious metal contacts, promotes ultra long life, as well as excellent electrical performance in all environments. The superiority of the JDK flush circuit over the raised circuit elements (i.e., conductive plastic film, screened conductive plastic, cermet, hybrid, and wirebound) is most evident in its long-term consistent performance and reliability.



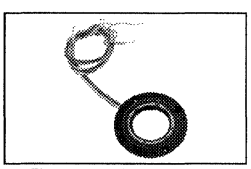
THE JDK DIFFERENCE

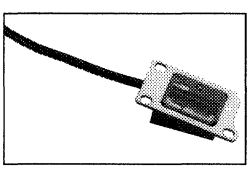
Since the JDK process and systems are foremost in the industry, we are able to offer the following features:

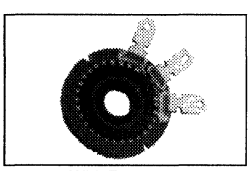
- ULTRA-LONG ROTATIONAL LIFE — 50 million cycles minimum for most applications of 6000 & 6200 models
- STATE-OF-THE-ART OUTPUT SMOOTHNESS — always under 0.05% (standard angles)
- NO INTERNAL SOLDER CONNECTIONS — conductive epoxy and welded connections used for greater reliability
- LOW TORQUE — less than 0.1 in oz. available in most single cup 6000 & 6200 models
- 18 MONTH WARRANTY — standard for most applications of 6000 & 6200 models
- OUTSTANDING VALUE — best "price/performance" ratio in the industry
- ALL UNITS DESIGNED, MANUFACTURED, AND TESTED IN ACCORDANCE WITH MIL-R-39023

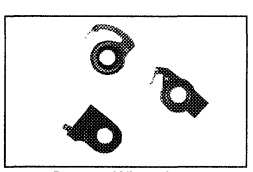
CUSTOM POTENTIOMETERS

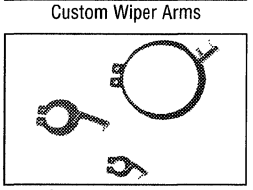
ELEMENTS


4 Element on Same Substrate

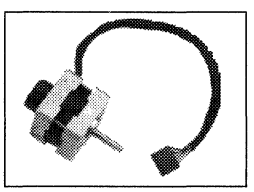

Custom Linear Motion - Housed

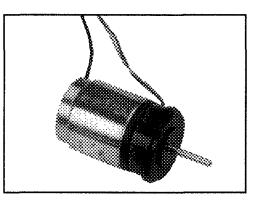

With Terminals

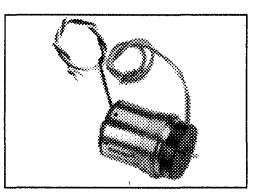

Custom Wiper Arms


Standard Wiper Arms

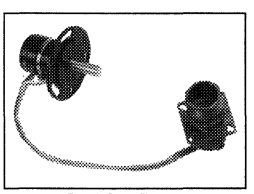
MOTOR POTS

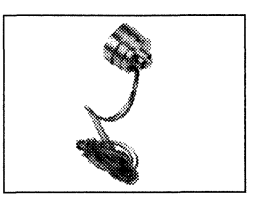

With Sleeved Wires/Connectors

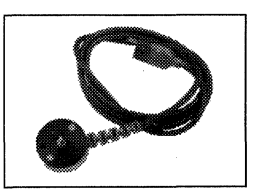

Servo Mount

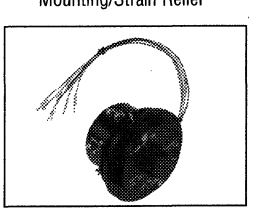

Molded Plastic Housing/ Flange Mount

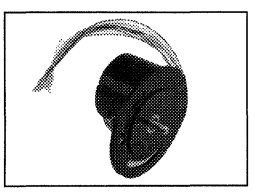
ROTARY POTS

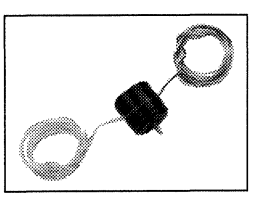

Dual Cup/Flange Mount/Connector

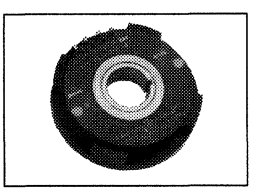

Stainless Steel Packaging/ Front wire Exit

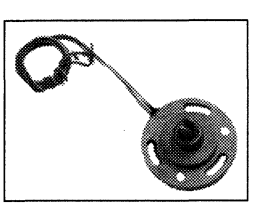

Special Through Hole Mounting/Strain Relief


Dual Gang/Geared/Soldering Per J-STD-001B


Dual Gang/Geared/ Flanged Mount


Dual Element On Same Substrate


Hollow Shaft/Dual Element

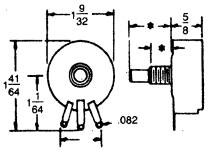

Molded Plastic Plated Housing/ Flange Mount/Slotted Shaft

JDK CONTROLS, INC.
WHEN POTENTIOMETER PERFORMANCE IS CRITICAL *Website: www.jdkcontrols.com*
424 Crown Point Circle, Grass Valley, California 95945 • Tel. (530) 273-4608 • Fax (530) 273-0769 • (800) 880-7730

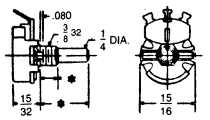
MALLORY *custom wirewound controls*

WIREWOUND POTENTIOMETERS

STYLE R AND QR

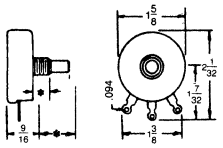


STYLE LW

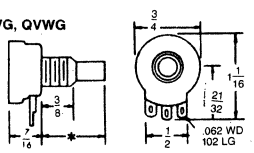


*AS REQUIRED

STYLE M, QM, MG, QMG



STYLE VW, QVW, VWG, QVWG



STYLE SC, QSC, SCG, QSCG
As Above But Smaller Shaft & Bushing Diameter

OTHER WIREWOUND POTENTIOMETER FEATURES AVAILABLE ON SELECTED PRODUCT TYPES:
- — nonlinear resistance tapers,
- — ±5% resistance tolerance,
- — multisection units,
- — twist-tab mounting.

MALLORY MANUFACTURES A COMPLETE LINE OF "T", "L", AND "LL" PAD ATTENUATORS.

In addition to the many types of wire-wound controls carried as stock items, Mallory can supply custom made units tailored to your exact requirements. Specifying Mallory for your custom made control will assure exacting quality for either your prototype or production use.

POTENTIOMETER LINE SWITCHES AVAILABLE

Grade Name	Action	Type	Size	Rating	Available On Control	Approval
OAC-1	Rotary	SPST	15/16"	6 A 125VAC 3 A 125VDC	M, R	UL & CSA
OAC-2	Rotary	DPST	15/16"	6 A 125VAC 6 A 125VDC (3 amps/circuit)	M, R	UL & CSA
OAC-3	Rotary	2XSPST	15/16"	3 amps 125VAC	M, R	UL & CSA
OAC-SPC	Rotary	SPST	15/16"	15A 10VDC	M, R	N.R.
OAC-4	Rotary	SPST	15/16"	5 amps 125VAC	M, R	UL & CSA
OAC-8 Auto-SPL	Rotary	SPST	15/16"	20 amps 15VDC	M, R	Automotive
OAC-5	Rotary	SPST	15/16"	5 amps 125VAC	M, R	UL & CSA
OAC-8	Rotary	SPST	15/16"	5 amps 125VAC	M, R	CSA
OAC-8 AUTO	Rotary	SPST	15/16"	15 amps 10V	M, R	UL & CSA
OAC-6	Rotary	SPST	15/16"	5 amps 125VAC		UL & CSA
OAC-8 AUTO	Rotary	SPST	15/16"	15 amps 20VDC 7.5 amps 10VDC	M, R	
OAC-9	Rotary	SPDT	15/16"	5 amps 125VAC	M, R	CSA
OPP-3	Push-Pull	SPST	15/16"	5 amps 125VAC 1 amp 125VDC	LW	UL & CSA
OPP-5	Push-Return	Momentary SPST	15/16"	1 amp 125VAC	LW	UL
PPSI	Push-Pull Side Mount	DPST (OAC-2) SPDT (OAC-3)				
PPS2	Push-Push Side Mount	DPST (OAC-2) SPDT (OAC-3)				
Dual Switches any pr. of OAC		Side Mounted Rotary switches may be used.				
MOAC-1 MOAC-3	Rotary Rotary	SPST SPDT	1/2" 1/2"	3 amps 125VAC 2 amps 125VAC	NO NO	UL UL

Most of the above switches are available separately for mounting on the customer's control, either by welding or tab mounting.

SPECIFICATION TABLE

						Degrees Of Rotation			Resistance ±10%		Locating Lug Radius (3 and/or 9 o'clock)
Watts	Style	Diameter	Depth	Standard Bushing	Standard Shaft Diameter	Mechanical	Electrical W/Switch	Electrical W/O Switch	Min. OHMS	Max. OHMS	Radius
3	R	1 9/32	5/8	3/8-32	1/4	297	260	290	1	50K	17/32
4	M	1 5/8	9/16	3/8-32	1/4	294	245	275	1/2	100K	17/32
5	SC	3/4	7/16	1/4-32	1/8	305	—	275	1	25K	15/64
5	VW	3/4	7/16	3/8-32	1/4	305	—	275	1	25K	17/32
5	LW	15/16	15/32	3/8-32	1/4	300	—	280	3	25K	7/16
10	SCT	3/4	7/16	1/4-32	1/8	305	—	275	1	25K	15/64
10	VWG	3/4	7/16	3/8-32	1/4	305	—	275	1	24K	17/32
12 1/2	MG	1 5/8	9/16	3/8-32	1/4	294	245	275	1/2	100K	17/32

Style M, MG, R, SC, SCG, VW and VWG also available with "Q" prefix in Military Construction.

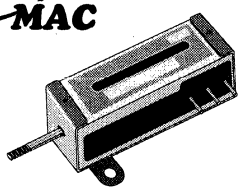
Standard Breakdown Voltage test 900 V RMS

The above data is only a guide. This listing of controls does not cover all possible configurations tooled. Please consult Mallory-Duracap Engineering for further details and availability of deviations.

DURACAP INTERNATIONAL INCORPORATED
P.O. Box 210, 59 Montclair Drive, Woodstock, Ontario N4V-1C5, Canada
Phone: (519) 539-4891, Fax: (519) 539-6684

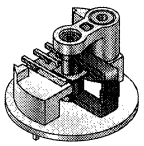
MIDORI MAC

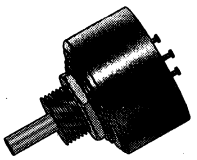
PRECISION POTENTIOMETERS



Blue Pot contactless

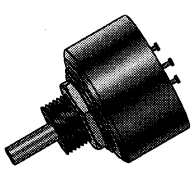
CONTACTLESS POTS





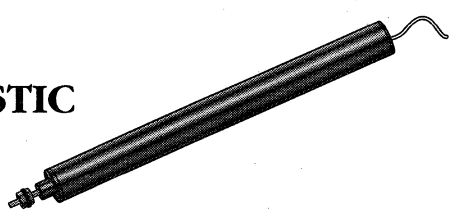
- Virtually Unlimited Life
- No Noise
- Very Low Torque
- Excellent Repeatability & Sensitivity

	MODEL	ANGLE (Stroke)	OUTPUT SENSITIVITY	LINEARITY	INPUT VOLTAGE	INPUT IMPEDANCE (Current)
ROTARY	UV-1	+/–45°	2.5% Vin / 10° Min.	+/–1.5% FS	10 VDC Max	15KΩ+/–30%
	UV-J	+/–45°	2.5% Vin / 10° Min.	+/–1.5% FS	10 VDC Max	15KΩ+/–30%
	CP-2UTX	+/–45°	2.5% Vin / 10° Min.	+/–1.5% FS	10 VDC Max	15KΩ+/–30%
	CP-2UT	+/–45°	2.5% Vin / 10° Min.	+/–1.5% FS	10 VDC Max	15KΩ+/–30%
	CP-2H	+/–45°	45mV/1° Nom.	+/–2% FS	5.5 VDC Max	(10mA Max.)
	QP-3H	+/–45°	45mV/1° Nom.	+/–2% FS	5.5 VDC Max	(10mA Max.)
	CP-3UY	+/–125°	0.5% Vin / 10° Min.	+/–1% FS	14 VDC Max	30KΩ+/–30%
	CP-5UY	+/–150°	0.5% Vin / 10° Min.	+/–1% FS	14 VDC Max	30KΩ+/–30%
LINEAR	LP-1U	(.6mm)	2.5% Vin / 0.1mm Min.	+/–1% FS	8 VDC Max	7KΩ+/–30%
	LP-3U	(3mm)	8% Vin / 1mm Min.	+/–1.5% FS	14 VDC Max	25KΩ+/–30%
	LP-15UL	(12mm)	1.4% Vin / 1mm Min.	+/–1% FS	7 VDC Max	8KΩ+/–30%
	LP-10UF-R	(10mm)	8% Vin / 1mm Nom.	+/–2% FS	5 – 10 VDC	(5mA Max.)
	LP-20UF-R	(20mm)	4% Vin / 1mm Nom.	+/–2% FS	5 – 10 VDC	(5mA Max.)
	LP-30UF-R	(28mm)	2.9% Vin / 1mm Nom.	+/–2% FS	5 – 10 VDC	(5mA Max.)
INCLINOMETER	PMP-S10T	+/–10°	0.75+/–.15% Vin / 1°	+/–1% FS	8 VDC Max	7KΩ+/–30%
	PMP-S20T	+/–20°	0.37+/–.07% Vin / 1°	+/–1% FS	8 VDC Max	7KΩ+/–30%
	PMP-S30T	+/–30°	0.25+/–.05% Vin / 1°	+/–1% FS	8 VDC Max	7KΩ+/–30%
	UV-3HF	+/–40°	45mV/1° Nom.	+/–2% FS	5.5 VDC	(10mA Max.)
	PMP-10TA	+/–10°	0.1 V / 1° Nom.	+/–2% FS	10 – 16 VDC	(25mA Max.)



Green Pot

CONDUCTIVE PLASTIC



- In Stock – No Factory Min.
- Long Life: 10 to 100 Millions Cycles
- High Accuracy
- Excellent Repeatability

	MODEL	ANGLE (Stroke)	RESISTANCE TOTAL (K ohm.)	LINEARITY STD. (Available)	MOUNT. TYPE/ BODY SIZE (mm)
ROTARY	CP-2FB	340°	0.5, 1, 2, 5, 10	+/–1% (.5%)	Bush. / 22mm Dia.
	CP-2FK	340°	0.5, 1, 2, 5, 10	+/–1% (.5%)	Servo / 22mm Dia.
	CP-35B	340°	0.5, 1, 2, 5, 10	+/–1% (.15%)	Bush. / 37mm Dia.
	CPP-45B	350°	0.5, 1, 2, 5, 10, 20	+/–.5% (.1%)	Servo / 45mm Dia.
	QP-3F	90°	1	+/–2%	Bracket / 29mm Dia.
LINEAR	LP-20FP	(20mm)	0.5, 1, 2, 5	+/–1%	12mm Dia. x 48mm L.
	LP-100FP	(100mm)	2, 5, 10, 20	+/–1%	12mm Dia. x 128mm L.
	LP-10F	(10mm)	0.1, 0.2, 0.5, 1	+/–1%	20 x 24 x 37mm
	LP-400F	(400mm)	2, 5, 10, 20, 30	+/–0.1%	22mm Dia. x 438mm L.
	LP-1000FX	(1000mm)	20	+/–0.1%	32 x 34 x 1070mm

2555 E. Chapman Ave., Suite 400, Fullerton, CA 92831
Tel: (714) 449-0997 • FAX: (714) 449-0139

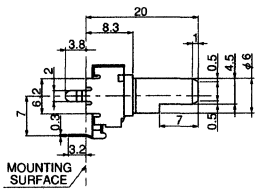
NOBLE
5450 Meadowbrook Industrial Court,
Rolling Meadows, IL 60008-3800 USA
Phone: 847/364-6038 • Fax: 847/364-6045
www.nobleusa.com

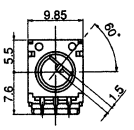
POTENTIOMETERS — 9mm Board-Mount Rotary Potentiometers -XV092 Series

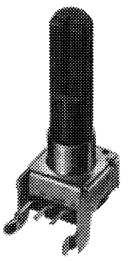
The XV092 Series pots offer easy snap-in mounting in both vertical and horizontal configurations. They feature a unique film element which reduces noise while providing smooth operation and superior wobble characteristics. Products are available with a full range of options, including choice of flatted, 40-tooth knurled or screwdriver adjust shaft, each in a variety of lengths. A center detent type is also available.

SPECIFICATIONS:

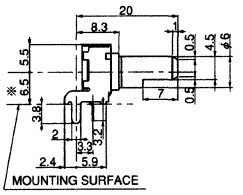
Total Rotational Angle: 300±5° (280±5° option: Model XV09202)
Rotational Torque: 1-8mNom
Nominal Total Range: 5kΩ - 500kΩ
Resistance Tolerance: Within ±20% of the nominal total resistance
Resistance Taper: Audio, Linear, Reverse Audio
Rated Power: 0.05W
Maximum Rated Voltage: AC 50V, DC 20V

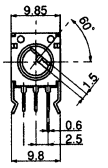


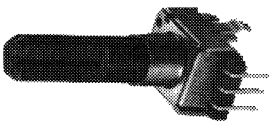




XV092PV







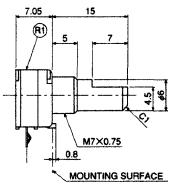
XV092PH

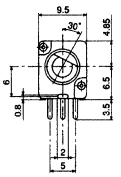
POTENTIOMETERS — 9mm Panel-Mount Rotary Potentiometers -XVB93 Series

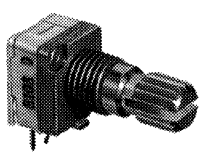
Noble's XVB93 Series potentiometers are available in a variety of configurations, including single, dual, or multiple section resistive elements, offered with a single or concentric shafts. Combinations include a rotary potentiometer matched with rotary or push-momentary switches, or with push-lock retractable shaft functions. Shafts are offered, knurled and round shapes in a variety of lengths.

SPECIFICATIONS:

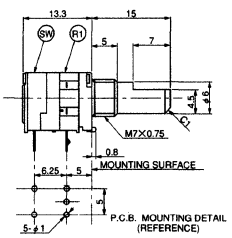
Total Rotational Angle: 300±5°
Rotational Torque: 2-5mN-m
Nominal Total Range: 5kΩ - 500kΩ
Resistance Tolerance: Within ±20% of the nominal total resistance
Resistance Taper: Audio, Linear, Reverse Audio
Rated Power: 0.05W
Maximum Rated Voltage: AC 50V, DC 10V

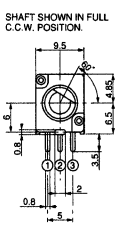


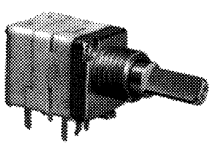




XVB93PHPN





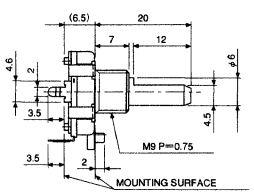


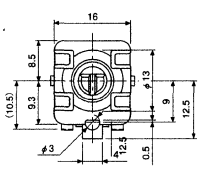
XVB93 (97 ST)
(with Rotary Switch)

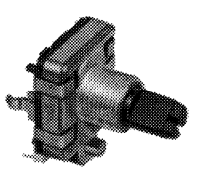
ENCODERS — Rotary Encoders RE Series

The RE Series offers numerous rotational torque specifications, allowing designers to match a particular feel to their specific application requirements. They are available with a variety of output signals including 2-bit (24 position), 4-bit (16 position, and 5 -bit (24 and 31 positions), with or without detented positions. The RE Series includes an encoder with a momentary push switch for dual functions within one shaft.

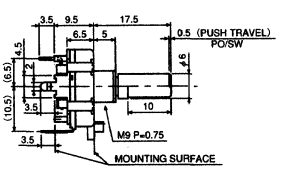
SPECIFICATIONS:	REB161	REB16
Type of Output Signal:	INA, INB (2 Bits)	Gray (4-Bit)
Operating Temperature Range	-10 to 70°C	-10 to 70°C
Rated Voltage/Rated Current	DC 5V 0.5mA	DC 5V 0.5mA
Resolution	24 Pulses/360°	15 Position/300°
Total Rotational Angle	360° Endless	300°
Detent Position and Angle	24 Detents 15±3°	15 Detents 15±3°
Detent Torque	3 to 20 mN-m	5 to 25 mN-m
Rotational Life	100,000 (INA)	50,000

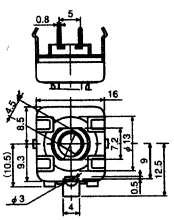


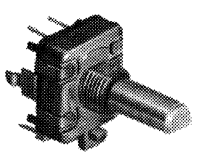




REB161 PVB



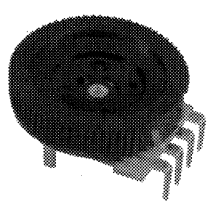




REB162 PVBS
(with Push Switch)

OTHER PRODUCTS — Other Products Offered by NOBLE!

- Surface Mount Trimmers
- Thumbwheel/Potentiometers
- Metal Oxide Power Resistors
- Push Switches
- Slide Potentiometers
- Long Life Potentiometers
- Fixed Resistors
- Attenuators



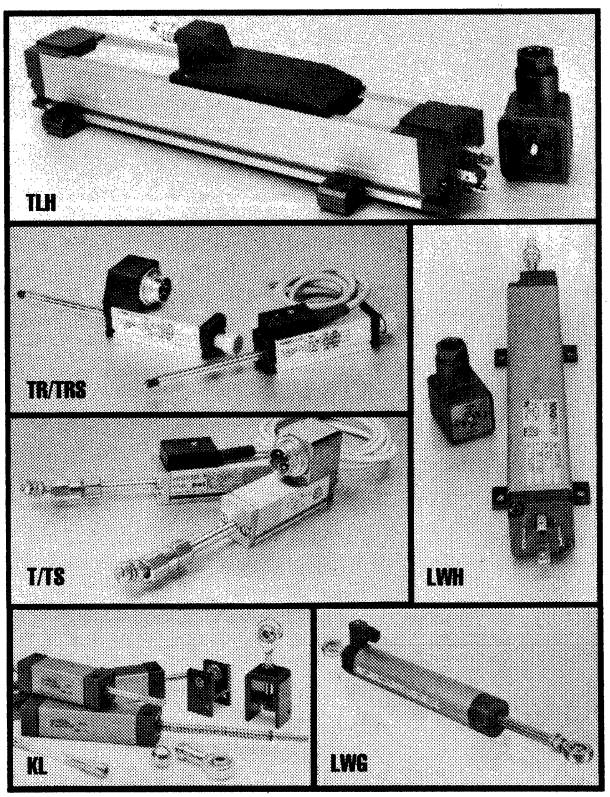
Displacement Transducers • Rotary and Rectilinear

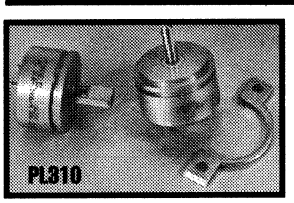
Novotechnik U.S.'s family of rotary and rectilinear displacement transducers features outstanding linearities, high tolerance to environmental extremes, and long operating lifetimes (typically 100 x 10^6 operations).

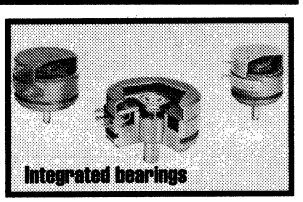
The position transducers and rotary potentiometers have conductive plastic resistance and collector tracks, and use multi-fingered elastometer-damped precious metal wipers.

The linear transducers offer a range of electrical strokes from 25mm to 4000mm, with resolution better than .01mm and linearities as low as 0.01%. Operational speeds are typically as high as 10 m/s.

The rotary potentiometers give 360° of mechanical rotation, operational speeds to 10,000 rpm, accelerations to 50,000 rad/s², linearities to 0.02% and resolution better than 0.01°.







Linear Position/Displacement Transducers

TLH Series Features side actuation and ball coupling to eliminate offset errors, and twenty-one stroke lengths from 100-4000mm. Independent linearity is between ±.07% and ±.01%; resolution is .01mm.

LWG Series Ruggedized for use in rigorous mechanical testing applications, the LWG can be mounted over swivelling pivot heads with up to ±25° of movement, eliminating side load errors. Eleven stroke lengths are available from 75-750mm, with linearity to ±.05%.

LWH Series Features pivoting front bearing and range of connectors: DIN, Binder, or Amphenol. Fifteen stroke lengths are available from 75 to 900mm, with independent linearity between ±.07% and ±.01% and resolution of .01mm.

TR/TRS Series Return spring and double bearings enclosed inside housing of displacement transducer, with stroke lengths of 25, 50, 75 or 100mm. Linearities range from ±.2% to ±.15%; two alternate electrical connections are available via 3-core cable or plug-and-socket connections.

T/TS Series Features double precision bearings and anti-rotation mechanism for load-free operation, five stroke lengths from 25 to 150mm, and linearities from ±.2% to ±.075%. Two alternate electrical connections are available: via 3-core cable (type T) or plug-and-socket (type TS).

KL Series short stroke position transducers feature single or through shaft with 10 through 100mm stroke lengths, and linearity to within 1.0% with 0.25% available. Angular offset compensation, rod end bearings and mounting brackets are available attachments.

Rotary Potentiometers

Integrated Bearing Series Industry's first rotary potentiometer with a single integrated main bearing. The innovative design improves reliability and performance, giving linearities to ±.02% (servo size 20). Also available are sizes 9,11, 11 (low torque), and 13.

PL300 series single turn conductive plastic potentiometers are available in 1k, 5k and 10k ohm resistance ranges with 1/4" shaft diameter and 3/8" bushing.

PL310 family of single-turn conductive plastic potentiometers feature military servo size 9 (1/8" diameter) shaft, anodized aluminum housing, optional ballbearings and a convenient mounting clamp (also an option). Resistance ranges are 1k, 5k and 10k ohms and linearity to within 1% is standard with 0.25% available. Protection rated to IP 50 standard.

Resistance Elements Rotary potentiometer elements are available with wipers for incorporation into customers' devices as integral potentiometers.

Special-Purpose Potentiometers Novotechnik U.S. offers rotary potentiometers for a wide spectrum of applications:

Low Torque Potentiometers for angular measurement without loading
Industrialized Potentiometers for use in harsh environments
Sensor Potentiometers specially developed for the automobile industry
Geared Potentiometers for use in harsh environments with backlash-free gearing for 3, 5, or 10 turns.

Custom-designed Transducers

Novotechnik U.S. welcomes inquiries from design engineers with special needs for sensing and transmitting motion, position and displacement. We welcome custom designs and the opportunity to quote on any unique requirement you may have. For more information please call or fax.

For more information call toll free: 1-888-485-3472

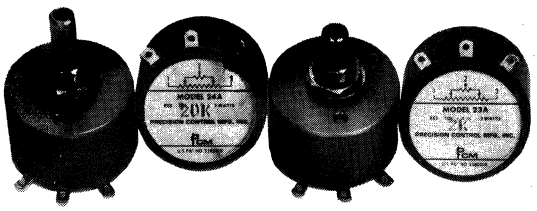
novotechnik
Siedle Group

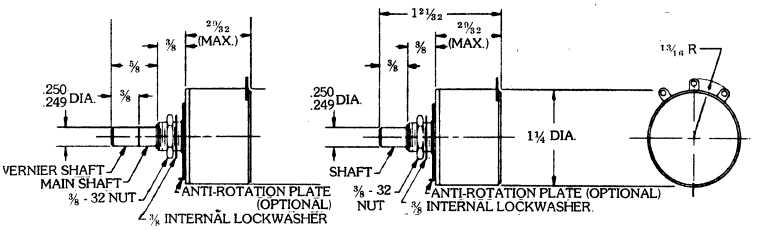
Novotechnik U.S., Inc.
237 Cedar Hill Street
Marlborough, MA 01752
Tel: 508-485-2244
FAX: 508-485-2430

Visit our Web site at http://www.novotechnik.com

We Specialize in Precision Controls
PRECISION CONTROL MFG. INC.
17517 15TH AVE., N.E., SHORELINE, WASHINGTON 98155
(206) 368-9828 FAX: (206) 368-9828

HIGH RESOLUTION VERNIER POTENTIOMETERS





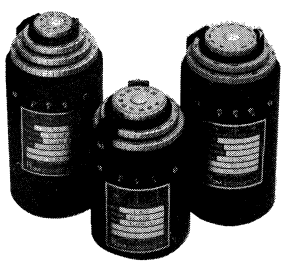
Models 23A, 24A and 24B Vernier Potentiometers feature high and very high resolution due to the unique design. Coupled both mechanically and electrically, they allow a fixed portion of the main element to be interpolated for the full 270° of the vernier element. 5% for the 23A and 24A models which provides a resolution of a 15 turn Potentiometer in only 1.5 turns of total rotation. The 24B model exhibits a 2.5% vernier, which expands the same 1.5 turns to 30 turns of resolution.

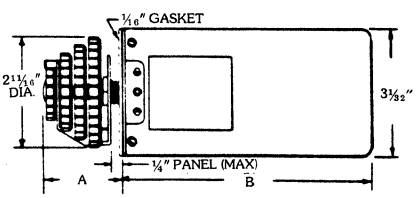
Customized products are available with modified shafts. R_t (total resistance), tolerance, P_v (vernier percentage), and torque. Please consult the factory with your unique requirements.

All PCM potentiometers are wire wound; standard values are from 100 ohms to 100K ohms ±3%.

We sell quality and service and we stand behind what we sell.

HIGH ACCURACY DECADE POTENTIOMETERS AND RHEOSTATS





Precision Control Mfg., Inc. (PCM) produces high quality, coaxial dial decade potentiometers and rheostats for high accuracy applications. The basic design features a positive in-line readout and easy, rapid adjustment made possible by a combination of distinct dials and a parallax free indicator. The unique electrical and mechanical design of PCM decades makes a small and accurate package which is very rugged.

Decade potentiometers provide linearities ranging from ±0.005% in the model 50A to ±0.0025% in the model 60A. All PCM rheostats have an accuracy base of ±0.025%.

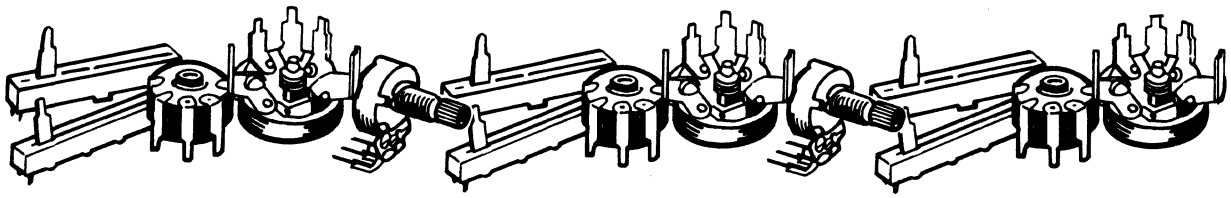
All PCM decades are available in militarized versions which meet or exceed the environmental portions of MIL-E-5272C, Sections 4.2.2, 4.3.1, 4.4, 4.6 through 4.11.2, 4.12, 4.15 and MIL-T-945A, Sections 4.4.1 through 4.6. Resistors used in PCM decades are wound with only premium resistance alloys for low temperature coefficients and are single layer wound, with low inductance making possible precision attenuation over a wide range of frequencies. Switch decks utilize low leakage materials and feature gold plated silver contacts. The case is heavy gauge aluminum to provide shielding and dust protection, shafts are of stainless steel.

- **Analog Instrumentation**
- **Precision Voltage Dividers**
- **Decade Resistors**
- **Decade Potentiometers**
- **Precision Resistors**
- **Decade Voltage Dividers**

and Other Instrumentation

Potentiometers: Rotary, Slide, Thumbwheel & Trimmer

STANDARD OR TO YOUR SPECIFICATIONS



- **All types and styles - PC or panel mount; with or without switch, in the resistance and taper you need.**
- **For audio, instrument, motor speed, lighting and sensor control applications.**
- **Engineered & tested for longer lasting and superior performance in every project**
- **Over 70,000 OEM components- Direct from our overseas factories**
- **On Time Deliveries- We deliver to meet your deadlines. We won't make you a promise that we can't keep.**

Shokai's problem solving engineers are ready to help. Work samples, as well as assistance with designs to your specs are available.

When you need OEM quality components specify SHOKAI. We are an American company, with over 30 years experience manufacturing and importing components from the Far East. We understand your needs.

We control every aspect in the manufacturing of our products. We consistently ensure the highest standards of production and design. All of which results in an assortment of quality components designed to meet our customers' every requirement.

That's why more and more components engineers & purchasing managers have turned to SHOKAI.

We encourage you to challenge us with your exact requirements. You can count on SHOKAI for consistently superior quality, competitive pricing, and unbeatable values for exactly the part you want without compromising your design to accept second best.

Call, fax or write us for all your component needs.

We Make Your Ideas Profitable™

SHOKAI™
FAR EAST LTD.®

9 Elena Court • Peekskill, NY 10566

914-736-3500 • Fax: 914-736-3656

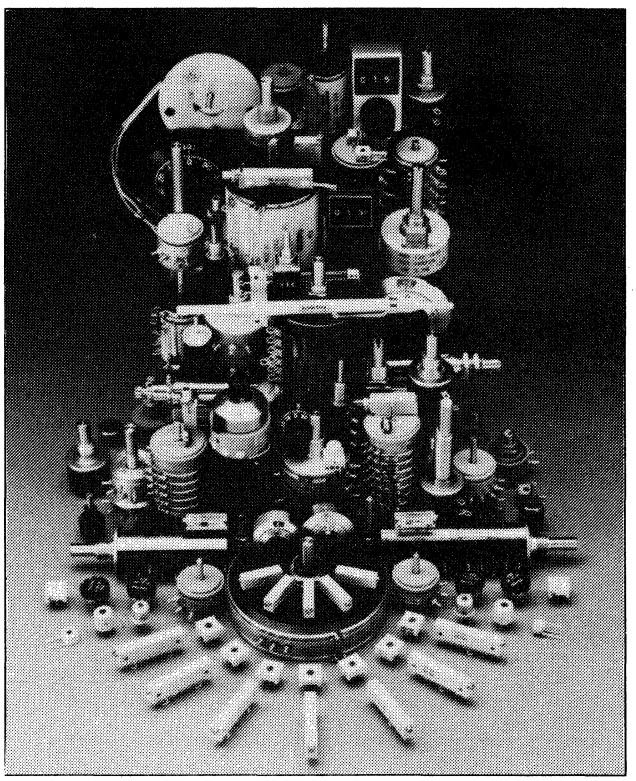
Turn to Spectrol for Precision Potentiometers, Dials, Trimmers and Planar Power Resistors.

Spectrol has been an industry leading producer of resistive components for industry for more than 45 years. We offer a wide range of highly reliable models from stock, or we can custom manufacture to your specifications.

Our advanced engineering and automated manufacturing facilities utilizing the latest total quality management (TQM) techniques are located in the United States, England and Mexico.

You can depend on Spectrol for knowledgeable technical support, responsive service and the most reliable products available. Fax or phone us for our data sheets or comprehensive catalog. For immediate answers call 1-800-624-8902.

Spectrol manufactures a wide range of standard and custom precision potentiometers, trimmers and turns-counting dials



RESISTORS, PLANAR POWER

NEW

Power~Ω™, 5 & 10W
Power~ΩLO™, 5 & 10W, height 0.5"
Power~ΩSN™, 5 & 10W, 500Ω~22pF to 1kΩ~470pF
Power~ΩSK™, 10, 15 & 25W, integral heat sink

TRIMMERS; Through Hole and SMD

	Single-Turn	Multi-Turn
Types:	Round, square, TO-9 transistor case	Rectangular, square
Sizes:	¼", ⅜", ½" 4mm SMD	¼", ⅜", ¾", 1¼" 4mm SMD
Elements:	Wirewound, Cermet	Cermet
Resistance range:	10Ω to 20kΩ	10Ω to 2MΩ
Temperature ranges:	-65°C to +175°C	-55°C to +150°C

DIALS

Types:	11-21 turn, round and rectangular
Scale:	Vernier and digital scales
Sizes:	7/8" dia. to 1 13/16" dia.
Finishes:	Satin chrome and satin metal; satin chrome; brushed metal

PRECISION POTENTIOMETERS

	Single-Turn	Multi-Turn (3-, 5-, 10-turns)
Type:	Square, round	Round
Size:	½", ⅞", 1⅛", 2"	⅞", 1 13/16"
Shafts:	⅛", ¼"	⅛", ¼"
Elements:	Conductive plastic, Cermet and wirewound	Wirewound, hybrid
Mountings:	Servo or bushing	Servo or bushing
Linearities:	to ±.25%	to ±.10%
Resistance ranges:	5Ω to 2MΩ	5Ω to 500kΩ
Temperature ranges:	-55° to +150°C	-55° to +125°C
Rotational life:	to 20,000,000 revs	to 2,000,000 revs

QS9000 Certified

Spectrol sensors and encoders. See EEM Vol.B, Section 5500.

Spectrol Electronics Corporation
4051 Greystone Drive
Ontario, CA 91761
Tel: (909)923-3313 Fax:(909) 923-6765

Precision Potentiometers • Power Resistors
Dials • Trimmers • Sensors • Encoders
Call Toll Free (800)624-8902
www.spectrol.com

Spectrol®

STATE ELECTRONICS

Modular Potentiometers

Conductive Plastic • Cermet • Carbon

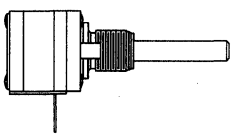
Multi -Section with Billions of Combinations Readily Available

Single & Concentric Shafts, Rotary & Push-Pull Switches, P.C. Pins or Solder Lugs / Hooks, Center Detents, 4 & 16 Turn Vernier Drives, Linear / Audio / Reverse Audio Tapers, Shaft Lengths up to 2 - 1/2 Inches, Custom Shaft End Modification.

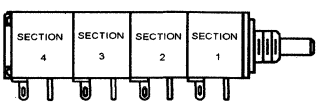
48 Hour

V.I.P. Service Available on Most Designs

Complete Specifications Available VIA FAX ON DEMAND 1-800-636-5545

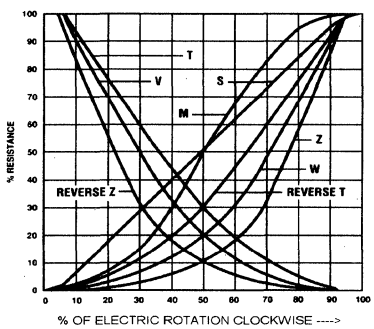


POTENTIOMETER PRODUCT SELECTOR



Quad Unit

Series	Conductive Plastic	Cermet	Carbon	Power (Watts)	Shafts	Bushings	Rotary Switch	Push-Pull Switch	P.C. Pins or Solder Lugs / Hooks	Vernier Drives 4 & 16 Turn	Maximum Sections
388 1/2 Inch Square	√			0.5	Metal	Metal	√	√	√		8
389 1/2 Inch Square		√		1.0	Metal	Metal	√	√	√		8
70 5/8 Inch Square	√			0.5	Metal or Plastic	Metal	√	√	√	√	4
70 5/8 Inch Square		√		2.0	Metal or Plastic	Metal	√	√	√	√	4
70 5/8 Inch Square			√	1.0	Metal or Plastic	Metal	√	√	√	√	4
72 5/8 Inch Square	√			0.25	Metal or Plastic	Plastic	√	√	√	√	4
72 5/8 Inch Square		√		1.0	Metal or Plastic	Plastic	√	√	√	√	4
72 5/8 Inch Square			√	0.5	Metal or Plastic	Plastic	√	√	√	√	4



Standard Tapers

Linear	S
Clockwise Modified Log	Z
Counter Clockwise Modified Log	RZ

Other Available Tapers

Modified Linear	M
Counter Clockwise Modified Log	V
Modified Log	W
Counter Clockwise Modified Log	RT
Modified Log	T

Complete technical support is available to assist you in specifying your potentiometer requirements. Contact our Potentiometer Product Manger at 1-888-788-POTS Ext 109 (1-888-788-7687) Ext 109, or to request complete specifications Via FAX call 800-636-5545. Call for a free copy of our Customer Potentiometer Designer Guide

General Specifications

			70 / 72 Series		
	388 Series	389 Series	Conductive Plastic	Cermet	Hot Molded Carbon
Electrical Travel	265° ± 5°	250° ± 5°	260° ± 5°	260° ± 5°	260° ± 5°
Resistance Range	Linear: 100 Ω to 5 Meg Ω Taper: 500 Ω to 5 Meg Ω	Linear 5 Ω to 5 Meg Ω Taper: 100 Ω to 2 Meg Ω	Linear: 100 Ω to 1 Meg Ω Taper: 250 Ω to 1 Meg Ω	Linear: 100 Ω to 5 Meg Ω Taper: N / A	Linear: 50 Ω to 10 Meg Ω Taper: 250 Ω to 1 Meg Ω
Temperature Coefficient	± 500 PPM Typical / C°	150 PPM if R > 100 Ω	± 500 PPM Typical / C°	< ± 100 PPM / C°	± 500 PPM Typical / C°
Working Voltage	350 Vdc	350 Vdc	350 Vdc	350 Vdc	350 Vdc
End Resistance	2 Ω	2 Ω	2 Ω	2 Ω	2 Ω
Turning Torque					
Single Units	.2 to 3.0 oz. in.	.2 to 3.0 oz. in.	3 oz. in.	3 oz. in.	3 oz. in.
Dual Units	.3 to 3.5 oz. in.	.3 to 3.5 oz. in.	6 oz. in	6 oz. in	6 oz. in
Triple	.5 to 4.5 oz. in.	.5 to 4.5 oz. in.	8 oz. in.	8 oz. in.	8 oz. in.
Quad	.5 to 5.5 oz	.5 to 5.5 oz	10 oz. in.	10 oz. in.	10 oz. in.
Rotational Life	50,000 Cycles	25,000 Cycles	100,000 Cycles	100,000 Cycles	100,000 Cycles

Finished product is assembled from component parts manufactured by Clarostat. State Electronics is an authorized Mod Center for Clarostat.

STATE ELECTRONICS 36 Route 10, East Hanover, NJ 07936 Phone 888-788-7687 Ext 109 FAX 973-887-1940
http://www.potentiometers.com trussin@state-elec.com

VERNITRON

SENSOR SYSTEMS DIVISION OF AXSYS TECHNOLOGIES, INC.

800-688-2181

• INDUSTRIAL
• COMMERCIAL
• MILITARY

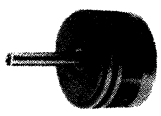
2800 Anvil Street • St. Petersburg, Florida 33710 • (813) 347-2181 • Fax: (813) 347-3881 • E-MAIL: sales@vsensors.com

VERNITRON PRECISION POTENTIOMETERS GENERAL SPECIFICATIONS:

Vernitron manufactures standard and custom precision potentiometers utilizing conductive plastic, cermet and wirewound elements. Call Vernitron to take the mystery out of problem solving.

Rotary Single-Turn Potentiometers Linear-Functional/Sine-Cosine (Housed or Modular)

Multi-Element Assemblies Available (Ganged)

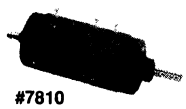


Available From 1/2" to 3" Diameters

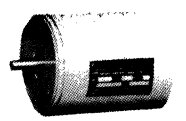
SPECIFICATIONS

	Linear	Sine-Cosine
Mechanical Rotation	360° Continuous	
Electrical Function Angle	350° Nominal	360°
Resistance Range	0.5KΩ-2 MegΩ	500Ω-50KΩ/Quad
Best Linearity or Conformity	.1% ÷ Inch of Dia.	.3% P-P ÷ Inch of Dia.
Resolution (Typ.)	CP = Virtually Inf. WW=1/λ	
Wattage	Diameter x 2 Watt(s)	
Temperature Range	–55°C to +125°C	
Taps, Maximum No.	Diameter x 6	
Starting Torque (In.-Oz.)	Diameter x .15	Diameter x .2
Guaranteed Life (at 100 RPM)	To 30 Million Cycles Depending on Circuitry	

Rotary Multi-Turn Potentiometers Linear-Functional



#7810



#20010

Available From 1/2" to 2" Diameters

SPECIFICATIONS

Model	7810†**	7820	7813/7814	20010
Mechanical Rotation	3700° Min.	7200° +100°–0°	3600° +100°–0°	3600° +100°–0°
Electrical Function Angle	3600°±10°	7200°±10°	3600°±5°	3600°±5°
Resistance Range	250Ω-125KΩ		5KΩ-1.5 MegΩ	5KΩ-3MegΩ
Best Linearity or Conformity	.075%	.05%	0.05%	0.01%
Resolution (Typ.)	CP = Virtually Inf.*		WW = 1/λ	
Wattage at 25°C	1		2	4
Temperature Range	–55°C to +125°C			
Taps Maximum No.*	1	2	1	
Starting Torque (In.-Oz.)	1.5		0.5	1.0
Guaranteed Life (at 100 RPM)	100 x 10^6 Revolutions Depending on Circuitry			
Stop Strength	10 In.-Oz.Max.		50 In.-Oz.	160 In.-Oz.

DIMENSIONS

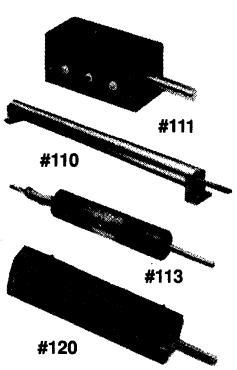
Model	7810/ 7820	7813/ 7814	20010
A	.875	.875	2.000
B*	.750	.750	1.875
C	.1875	.125	.250
D*	.750	.800	.750
E	.062	.062	.035
F/G	.062	.062	.035
H	.600	.531	†
J	2.00	1.875	2.625
K	.375	.375	.375

*+ .0000 – .0005

† Axial Rear Teminations

* For voltage reference, specify 0° width taps. For current carrying, specify zero resistance taps.
† Available in Dual Units, same case dimensions.
**Available to 36,000°

Linear Motion Potentiometers (Housed or Modular)



SPECIFICATIONS

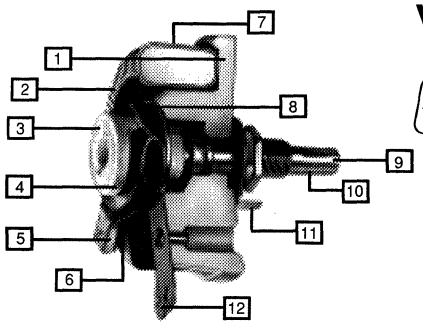
Model	110*	111*	112	113*	190†	119*	120	121	111V*
Electrical Stroke	To 60"	To 48"	To 12"	To 8"	To 6"	To 10"	To 1"	To 12"	To 28"
Cross Section ¶ Configuration	RD ○	SQ □	REC □	RD ○	SQ □	RD ○	REC □	RD ○	SQ □
Resistance Range	250Ω/In. to 200K Ω/In.	150Ω/In. to 200K Ω/In.	150Ω/In. to 200K Ω/In.	500Ω/In. to 250K Ω/In.	1K, 5K 10K	350Ω/In. to 250K Ω/In.	500Ω/In. to 125K Ω/In.	500Ω/In. to 250K Ω/In.	150Ω/In. to 200K Ω/In.
Best Linearity	0.2% ÷ Length of Electrical Stroke								
Resolution (Typ.)	CP = Virtually Inf. WW = 1/λ								
Wattage	1 Watt per Inch of Stroke								
Temperature Range	– 55°C to + 125°C								
Taps Maximum No.‡	4	To Suit	To Suit	1	1	1	1	1	To Suit
Starting Force Oz. at 25°C	16	8	4	8	4	8	4	8	8
Life	30 Million Strokes, Depending on Circuitry								
Shaft Misalignment Feature	Available	Available	Available	Not Available	Not Available	Available	Available	Not Available	Available

* Available in Dual Units, same case dimensions.
† Low Cost. Also available Model 140 and 150 Cylinder Potentiometers.
¶ RD–Round SQ–Square REC–Rectangular
‡ For Voltage reference, specify zero width taps. For current carrying, specify zero resistance taps.
§ Threaded, ball spring-return and other shaft endings available.

See Our Other Page In Volume B, Section 5500

Power Rheostats 940

Standard and Special Features



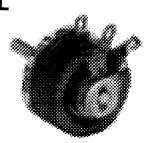
1. **Base and Ring:** Molded of high density ceramic, the base and ring provide the rheostat foundation.
2. **Winding:** Utilizing the most modern toroidal winding machines assures a uniform wind. Resolution and power dissipation are maintained at a maximum through proper selection of wire size.
3. **Insulator:** Molded of high density, porcelain/ceramic. Electrically "isolates" the contact assembly from the control shaft. Rated to 300V
4. **Contact Arm:** Balanced and plated for protection, the contact arm assures positive contact between the winding and the contact shoe and between the contact ring and collector ring, through the employment of a "live" spring of simple, yet reliable design.
5. **Contact Shoe:** Fabricated of long-life, metallic material. Minimizes wire wear and assures excellent current conduction from the winding to the center terminal.
6. **Shunt Pigtail:** Carries the current from the contact shoe to the contact ring.
7. **Ceramic Coating:** Provides the "bonding medium" necessary to securely attach the ring and base together and to lock the windings from shifting.
8. **Contact Ring:** Provides high current carrying capabilities through its large surface area to the center terminal. The ring is nickel plated to withstand corrosion.
9. **Control Shaft:** Manufactured to exacting tolerances and protected from adverse environments by plating, the shaft provides for rotation of the contact assembly.
10. **Bushing:** Precision machined, the polished brass bushing affords smooth, uniform rotation of the control shaft.
11. **Locating Tab:** Provides rheostat indexing and "non-turn" feature. The tab may be ordered at 3, 6, 9 or 12 o'clock positions. 6 o'clock is standard on all models - rheostat terminals located downward.
12. **Three Terminals:** Permit use as a potentiometer or rheostat. The center terminal or "collector ring," collects the current from the winding via the shoe-shunt assembly.

Receive More Information NOW!

To get complete product information faxed to you, phone **1-800-7-VISHAY** (784-7429) and enter the index number of the products that interest you.

POWER RHEOSTATS

12.5 Watt
MODEL MP06



FEATURES
- Diameter 7/8" [22.22mm]
- Depth behind panel 11/16" [17.46mm]
- Shaft 1/8" [3.18mm] diameter
- Rotation 300° ± 5°
- Weight .037 pounds (17 grams)

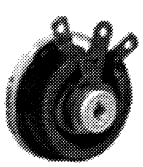
Index Number 961

25 Watt
MODEL MP10

FEATURES
- Diameter 1 9/16" [39.69mm]
- Depth behind panel 1 3/8" [34.92mm]
- Shaft 1/4" [6.35mm] diameter
- Rotation 300° ± 5°
- Weight .180 pounds (82 grams)
- U. L. Recognized, File No. E51076

Index Number 962

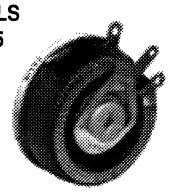
50 Watt
MODEL MP15



FEATURES
- Diameter 2 9/32" [57.94mm]
- Depth behind panel 1 3/8" [34.92mm]
- Shaft 1/4" [6.35mm] diameter
- Rotation 300° ± 5°
- Weight .321 pounds (145 grams)
- U. L. Recognized, File No. E51076

Index Number 963

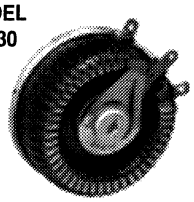
100 Watt
MODELS MP25



FEATURES
- Diameter 3 5/32" [80.17mm]
- Depth behind panel 1 1/2" [38.10mm]
- Shaft 1/4" [6.35mm] diameter
- Rotation 300° ± 5°
- Weight .594 pounds (268 grams)
- U. L. Listed, File No. E51076

Index Number 964

150 Watt
MODEL MP30



FEATURES
- Diameter 4" [101.60mm]
- Depth behind panel 1 3/4 [44.45mm]
- Shaft 1/4" [6.35mm] diameter
- Rotation 300° ± 5° and weight 1.014 pounds (460 grams)
- Total ohms available in higher ranges up to 10,000 ohms
- U. L. Listed, File No. E51076

Index Number 965

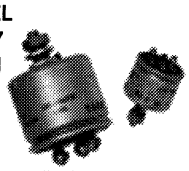
300 Watt
MODEL MP40

FEATURES
- Diameter 6" [152.40mm]
- Depth behind panel 2 3/16" [55.56mm]
- Shaft 3/8" [9.52mm] diameter
- Rotation 315° ± 5°
- Type "A" shaft
- Weight 2.625 pounds (1.191 kilograms)
- U. L. Listed, File No. E51076

Index Number 966

MP07 - 12.5 Watt derated to 6.25 Watt
MP11 - 25 Watt derated to 12.6 Watt

MODEL MP07 MP11

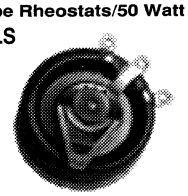


ENCLOSED RHEOSTATS

The MP07 and MP11 Rheostats can be furnished in a light-weight, dust-proof metal can, equipped with two or three screw terminals or solder lugs. They are not hermetically sealed but are closed by a rolled double seam.

Index Number 967

Ring Type Rheostats/50 Watt
MODELS N152



FEATURES
- Operation - Manual
- Enclosure - Open
- Duty - Continuous
- Form - EW, Exposed Wire or Ribbon
- Resistance Range - 8Ω to 5000Ω
- Ambient - 50°C
- Service - Navy A
- Insulation - Class C

Index Number 968

VISHAY ANGSTROHM • 18400 Precision Place • P.O. Box 1827 • Hagerstown, MD 21740 USA • Phone (301) 739-8722 • Fax (310) 797-6852 • www.vishay.com

POTENTIOMETERS, TRIMMERS and ATTENUATORS

EEM DESCRIPTIONS

POTENTIOMETERS:

- Cermet Metal
- Conductive Plastic
- Linear
- Metal Film
- Motorized
- Multi-turn
- Non-Linear
- Trimmer
- Resistors: Adjustable

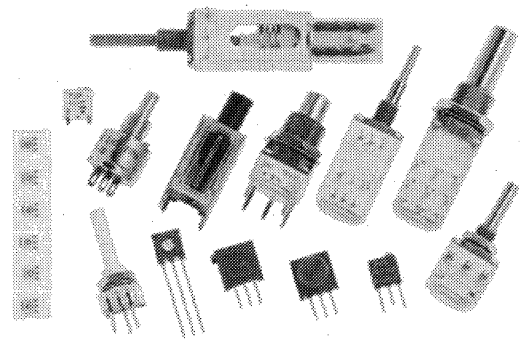
FLASHFAX℠

Fax 1-800-835-4272 for literature.

Or call Vishay's FlashFax℠ at 1-800-487-9437. Request document 9999. This is a listing of data sheets you can order by fax in a flash!

22 Potentiometer and Trimmer data sheets are available.

INTERNET



TRIMMERS, SURFACE MOUNT

SINGLE TURN

Model	Size	Power	Sealing
ST-22/-23	4mm Square	.2 Watt	Open Frame
ST-30	3mm Square	.1 Watt	Open Frame
TS-3	3mm Square	.125 Watt	Fully Sealed
TS-4	4mm Square	.25 Watt	Fully Sealed
TS-53	5mm Square	.2 Watt	Fully Sealed

MULTI TURN, FULLY SEALED

Model	Size	Power	No. of Turns
TSM-41	4mm Square	0.25 Watt	5
TSM-43	4mm Square	0.25 Watt	11
TS-63	1/4" Square	0.25 Watt	13

TRIMMERS, THRU-HOLE

SINGLE TURN

Model	Size	Power	Sealing
T7	7mm Round	.5 Watt	Dust Sealed
T7R	1/4" Round	.5 Watt	Fully Sealed
T11	1/2" Square	.5 Watt	Dust Sealed
T20	3/8" Square	.5 Watt	Fully Sealed
T53	5mm Square	.2 Watt	Fully Sealed
T70	1/4" Square	.5 Watt	Fully Sealed

MULTI TURN, FULLY SEALED

Model	Size	Power	No. of Turns
T18	3/4" Rectangular	.75 Watt	15
T63	1/4" Square	.25 Watt	13
T93	3/8" Square	.5 Watt	19

POTENTIOMETERS

SINGLE TURN

Model	Size	Power	Sealing
PRV6/PARV6	1/2" Round	1.5W/.75W	Fully Sealed
PA10	9mm Square	.25 Watt	Fully Sealed
P11/PA11 (Modular)	1/2" Square	1.0W/.5W	Dust Sealed
P16/PA16	16mm Knob Pot	1.0W/.5W	Fully Sealed
PE30	19.7mm Round	3 Watt	Fully Sealed

CONTINUOUS TRAVEL ENCODER

PA15 (2 bit gray code)	9mm	0.1 Watt	Fully Sealed

LINEAR MOTION @ 0.2", 0.3", 0.4" or 0.5" TRAVEL

PA48	1.25" Rectangular	.25 Watt	Dust Sealed

ATTENUATORS

Model	Impedance	Decibels
M2001H	50 or 75 Ohm	10 or 20 dB

Vishay Components Supply Division 1155 W. 23rd Street, Tempe, AZ 85282-1883 • **Phone** (602) 967-7874 • **Fax** 602-829-9314 • **Internet** www.vishay.com

Major Vishay Brands Dale • Draloric • Foil Resistors • Measurements Group • Roederstein • Sfernice • Sprague • Thin Film • Vitramon

VISHAY FOIL RESISTORS

Precision Trimming Potentiometers

Precision Bulk Metal® Foil Technology 898

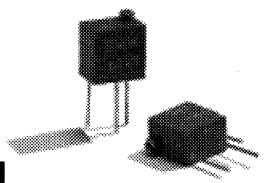
1. Temperature Coefficient of Resistance
2. Settability
3. Setting Stability
4. Low Noise
5. Noninductive Design

Receive More Information NOW!

To get complete product information faxed to you, phone **1-800-7-VISHAY** (784-7429) and enter the index number of the products that interest you.

Military

1242 Series

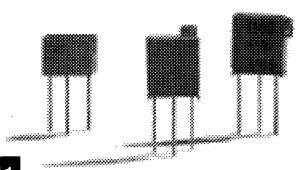


- **Temperature Coefficient of Resistance** ±10 ppm/°C; Max (–55°C to +150°C, Ref. @ +25°C)
- **Load-Life Stability** 0.1% Typical ΔR, 1.0% Maximum ΔR under Full Rated Power of 0.25 watts @ 85°C for 1,000 hrs.
- **Settability** 0.05% Typical; 0.1% Maximum
- **Setting Stability** 0.1% Typical; 0.5% Maximum, ΔSS
- **Power Rating** 0.25 watts @ +85°C
- **Resistance Range** 50 Ω to 5K Ω
- **Resistance Tolerance** ±10%

Index Number 800

Aerospace/Instrumentation

1240 Series

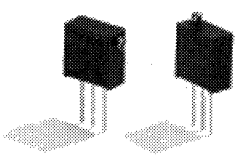


- **Temperature Coefficient of Resistance** ±10 ppm/°C Max (–55°C to +150°C, Ref. @ +25°C)
- **Load-Life Stability** 0.1% Typical ΔR, 1.0% Maximum ΔR under Full Rated Power @ +85°C for 10,000 hours
- **Settability** 0.05% Typical; 0.1% Maximum
- **Setting Stability** 0.1% Typical; 0.5% Maximum, ΔSS
- **Power Rating** 0.25 watts @ +85°C
- **Resistance Range** 5 Ω to 10K Ω
- **Resistance Tolerance** ±5%, ±10%

Index Number 811

Aerospace/Instrumentation

1260 Series

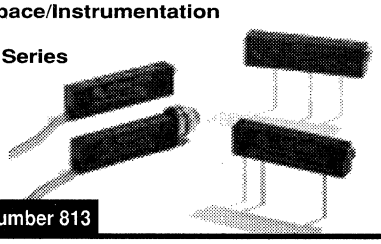


- **Temperature Coefficient of Resistance** ±10 ppm/°C Max (–55°C to +150°C, Ref. @ +25°C)
- **Load-Life Stability** 0.1% Typical ΔR, 1.0% Maximum ΔR under Full Rated Power @ +85°C for 10,000 hours
- **Settability** 0.05% Typical; 0.1% Maximum
- **Setting Stability** 0.1% Typical; 0.5% Maximum, ΔSS
- **Power Rating** 0.25 watts @ +85°C
- **Resistance Range** 5 Ω to 10K Ω
- **Resistance Tolerance** ±5%, ±10%

Index Number 812

Aerospace/Instrumentation

1202 Series

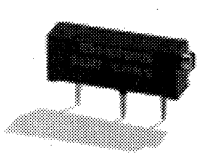


- **Temperature Coefficient of Resistance** ±10 ppm/°C Max (–55°C to +150°C, Ref. @ +25°C)
- **Load-Life Stability** 0.1% Typical ΔR, 0.5% Maximum ΔR under Full Rated Power @ +85°C for 2,000 hours
- **Settability** 0.05% Typical; 0.1% Maximum
- **Setting Stability** 0.1% Typical; 0.5% Maximum, ΔSS
- **Power Rating** 0.5 watts @ +85°C
- **Resistance Range** 2 Ω to 20K Ω
- **Resistance Tolerance** ±5%, ±10%, ±20%

Index Number 813

Aerospace/Instrumentation

Models 1280 and 1285G



- **Temperature Coefficient of Resistance** <15 ppm/°C (Model 1280G); <5 ppm/°C (Model 1285G) (–55°C to +125°C Ref. @ +25°C); through the wiper ±50 ppm/°C
- **Load-Life Stability** 0.5% Maximum ΔR under Full Rated Power @ +25°C for 2,000 hours
- **Settability** 0.05% Typical; 0.1% Maximum
- **Setting Stability** 0.1% Typical; 0.5% Maximum, ΔSS
- **Power Rating** 0.75 watts @ +25°C
- **Resistance Range** 10 Ω to 20K Ω
- **Resistance Tolerance** ±10%, ±5 %

Index Number 814

Surface Mount Trimming Potentiometers Soon To Be Available. Call For Availability.

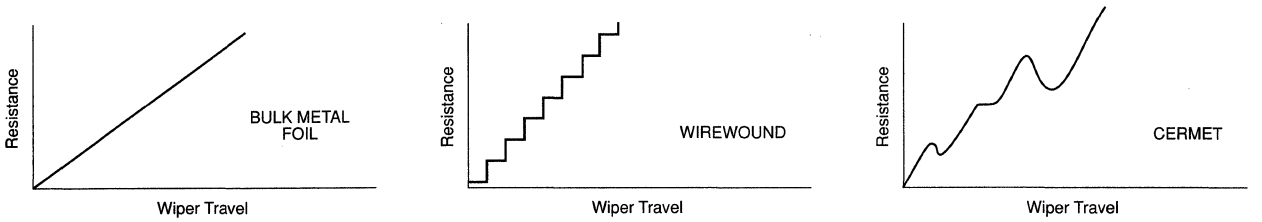
PRECISION TRIMMING POTENTIOMETERS

VISHAY RESISTORS • 63 Lincoln Highway • P.O. Box 4004 • Malvern, PA 19355-0988 • (610) 644-1300 • FAX (610) 296-0657 • Sales FAX (610) 640-9081
www.vishay.com

VISHAY FOIL RESISTORS

Precision Trimming Potentiometers

Typical Trimmer Resolution by Element Type



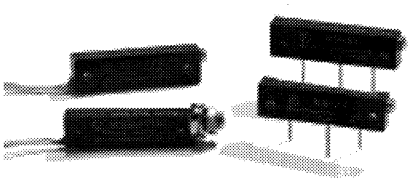
PRECISION TRIMMING POTENTIOMETERS

Receive More Information NOW!

To get complete product information faxed to you, phone **1-800-7-VISHAY** (784-7429) and enter the index number of the products that interest you.

Industrial

1208 Series

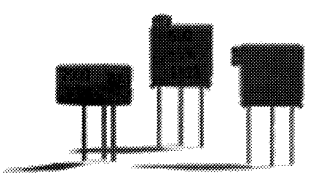


- **Temperature Coefficient of Resistance** ± 20 ppm/°C Max.(–55°C to +150°C Ref. @ +25°C); Through the wiper: ±50 ppm/°C typical
- **Load-Life Stability** 0.5% Maximum ΔR under Full Rated Power for 2,000 hours @ +85°C
- **Settability** 0.1%
- **Setting Stability** 0.1% Typical; 0.5% Maximum, ΔSS
- **Power Rating** 0.5 watts @ +85°C
- **Resistance Range** 20 Ω to 10K Ω
- **Tolerance** ±20%, ±10%

Index Number 821

Industrial

1248 Series

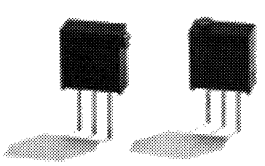


- **Temperature Coefficient of Resistance** ±20 ppm/°C Max (–55°C to +150°C Ref. @ +25°C); Through the wiper; ±50 ppm/°C
- **Load-Life Stability** 1.0% Maximum ΔR under Full Rated Power for 2,000 hours @ +85°C
- **Settability** 0.1%
- **Setting Stability** 0.1% Typical; 0.5% Maximum, ΔSS
- **Power Rating** 0.25 watts @ +85°C
- **Resistance Range** 20 Ω to 5K Ω
- **Resistance Tolerance** ±10%

Index Number 822

Industrial

1268 Series



- **Temperature Coefficient of Resistance** ±20 ppm/°C Max (–55°C to +150°C Ref. @ 25°C); Through the wiper; ±50 ppm/°C
- **Load-Life Stability** 0.1% Typical ΔR, 1.0% Maximum ΔR under Full Rated Power @ +85°C for 1,000 hours
- **Settability** 0.1%
- **Setting Stability** 0.1% Typical; 0.5% Maximum, ΔSS
- **Power Rating** 0.25 watts @ +85°C
- **Resistance Range** 20 Ω to 5K Ω
- **Resistance Tolerance** ±10%

Index Number 823

TRANSISTORS

Manufacturer	Starting EEM Page No.	RF (Incl. Microwave)	Power		Switching	UJT	Darlington	Chip	Germanium	Small Signal	IGBT
			Bipolar	FET							
American Microsemiconductor, Inc.	A•2051	√	√	√	√	√	√	√	√	√	√
Central Semiconductor Corp.	A•2052	√§	√§	√§	√§		√§	√		√§	
Collmer Semiconductor	A•2060		√	√	√		√				√
Electronic Devices, Inc.	A•2064	√§	√§	√§	√§		√§			√§	
Powerex Inc.	A•2068		√	√	√		√				√
RFE International	A•2066		√	√							√
Semitronics Corporation	A•2070	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*
Shindengen America, Inc.	A•2069		√	√							
World Products Inc.	A•2073		√		√					√	

§ Surface Mount.

THYRISTORS, RECTIFIERS, & DIODES

Manufacturer	Starting EEM Page No.	Thyristors			Rectifiers			Diodes								
		SCRs	TRIACs	DIACs	Silicon	Germanium	Bridges & Assemblies	Zener	Varactor	Silicon	Suppressor	Avalanche	Tunnel	High Voltage	Schottky	Germanium
American Microsemiconductor, Inc.	A•2051	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Central Semiconductor Corp.	A•2052	√§	√§		√§		√§	√§		√§	√§				√§	
Collmer Semiconductor	A•2060				√		√	√		√				√	√	
Crydom	A•2061	√	√		√		√			√	√			√		
EDAL Industries	A•2063	√	√		√§		√	√		√§	√	√		√	√	
Electronic Devices, Inc.	A•2064	√§	√§		√§		√§	√§		√§	√§	√§		√	√§	
Peter Parts Electronics	A•2065				√§		√§								√§	
Powerex, Inc.	A•2068	√	√		√		√			√				√		
RFE International	A•2066		√	√	√§		√§	√		√§	√§	√§		√	√§	
Semitronics Corporation	A•2070	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*
Shindengen America Inc.	A•2069						√								√	
Victoreen, Inc.	A•2072													√		
World Products Inc.	A•2073	√						√			√	√		√		

§ Surface Mount.

VOLTAGE SUPPRESSORS

Manufacturer	Starting EEM Page No.	Metal Oxide Varistors	Transient Voltage Suppressors	Thermistors
American Bright Optoelectronics	A•2050	√		
American Microsemiconductor, Inc.	A•2051	√	√	
Central Semiconductor Corp.	A•2052		√§	
Collmer Semiconductor	A•2060	√		
Crydom	A•2061		√	
EDAL Industries	A•2063	√	√	
Electronic Devices, Inc.	A•2064		√§	
RFE International	A•2066	√§	√§	√§
Semitronics Corporation	A•2070	√§*	√§*	
Victoreen Inc.	A•2072		√	
World Products Inc.	A•2073	√	√	√

§ Surface Mount.

LED BRT SINCE 1981

AMERICAN BRIGHT OPTOELECTRONICS CORP.

"Your L.E.D. Solution and Perfect Supplier" Toll Free: (888)LED-0800/Fax: (714)257-1310

460 W. Lambert Rd., Suite H, Brea, CA 92821 Web site: WWW.AMERICANBRIGHTLED.COM

LED BRT SINCE 1981

Metal Oxide Varistor (MOV)

UL & CSA approved

Part No.	Varistor Voltage	Max. Allowable Voltage		Max. Clamping Voltage	Withstanding Surge Current 8/20μs V_{1mA} ± 10%		Energy 10/1000μs	Rated Wattage	Typical Capacitance (Reference)
	V_{1mA}	Vac	Vdc	V_{5A}	1pulse	2pulses	Joule	Watt	1KHz(PF)
5MM DISC									
SEN180KD05	18(16-20)	11	14	*40	100	50	0.3	0.01	2400
SEN181KD05	180(162-198)	115	150	320	400	200	3.6	0.1	200
SEN471KD05	470(423-517)	300	385	810	400	200	10.0	0.1	45
7MM DISC									
SEN180KD07	18(16-20)	11	14	*36	250	125	0.8	0.02	3500
SEN181KD07	180(162-198)	115	150	300	1200	600	8.5	0.25	310
SEN681KD07	680(612-748)	420	560	1075	1200	600	50.0	0.25	70
10MM DISC									
SEN180KD10	18(16-20)	11	14	*36	500	250	1.5	0.05	7500
SEN181KD10	180(162-198)	115	150	300	2500	1250	18.5	0.4	430
SEN821KD10	820(738-902)	510	670	1355	2500	1250	55.0	0.4	120
14MM DISC									
SEN180KD14	18(16-20)	11	14	*36	1000	500	3.5	0.1	18000
SEN181KD14	180(162-198)	115	150	300	4500	2500	33.0	0.6	970
SEN821KD14	820(738-902)	510	670	1355	4500	2500	110.0	0.6	200
20MM DISC									
SEN820KD20	82(74-90)	50	65	135	6500	4000	27.0	1	5800
SEN331KD20	330(297-363)	210	275	550	6500	4000	110.0	1	1250
SEN821KD20	820(738-902)	510	670	1355	6500	4000	190.0	1	600

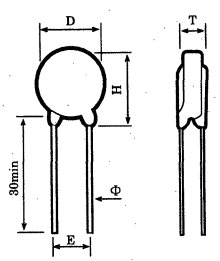
*The clamping voltage from 180K to 680K is tested with current 1A.

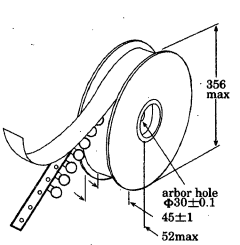
FEATURES	Wide Voltage and Energy Range	No Follow-On Current
	Excellent Clamp Ratio	Fast Response Time
	Low Standby Power	Tape & Reel Package available

APPLICATIONS	IC, Transistor, Diode, Thyristor, Triac, and other semiconductor protection
	Surge protection in communication, measuring and controller electronics
	Suppression of internally-generated spikes in electronics circuit
	Relay and electromagnetic valve surge absorption
	Protection in Consumer, and Industrial electronics
	Surge protection in electronic home appliances

Dimension Table Measure: mm

Series	5MM	7MM	10MM	14MM	20MM
D max	7.5	9	14	17	25
H max	10.5	12	17	20	28
Φ (±0.02)	0.6	0.6	0.8	0.8	1
E (±0.8)	5	5	7.5	7.5	10





*****Please call us for catalog, sample, and technical support.*****

THE #1 SOURCE FOR SEMICONDUCTORS

- TRANSISTORS, DIODES, SILICON CONTROLLED RECTIFIERS, TRIACS
- INTEGRATED CIRCUITS
- DAILY SHIPMENTS FROM STOCK DEVICES
- LARGE INVENTORY
- OBSOLETE & HARD TO FIND
- VISIT THE TUTORIALS PAGE AT OUR WEBSITE

DIACs/DIODES

DIACs
Diode Arrays (Incl. Photo)
Diodes, Avalanche
Diodes, Backward
Diodes, Chip, Unpackaged
Diodes, Germanium
Diodes, High Voltage (1,000 Volts & Over)
Diodes, Matched Pairs
Diodes, Power, Surface Mount
Diodes, Schottky
Diodes, Silicon
Diodes, Switching
Diodes, Switching, Surface Mount
Diodes, Temperature Compensating
Diodes, Tunnel
Diodes, Varactor
Diodes, Varactor, Surface Mount
Diodes, Zener & Stabistors (Forward Reference Diodes)
Diodes, Zener, Surface Mount

INTEGRATED CIRCUITS

Integrated Circuits, Digital
Integrated Circuits, Interface
Integrated Circuits, Linear
Integrated Circuits, Memory
Integrated Circuits, Microprocessor

RECTIFIERS

Rectifier Assemblies
Rectifiers, Bridges & Assemblies
Rectifiers, General Purpose, Surface Mount
Rectifiers, Germanium
Rectifiers, Schottky, Surface Mount
Rectifiers, Selenium
Rectifiers, Silicon
Rectifiers, Surface Mount

THYRISTOR/TRANSISTORS/TRIACS

Thyristors and SCRs, Surface Mount
Thyristors (Incl. Silicon Controlled Rectifiers)
Transistors, Bipolar
Transistors, Bipolar, Surface Mount
Transistors, Chip, Unpackaged
Transistors, Darlington
Transistors, Dual
Transistors, Field Effect
Transistors, Germanium
Transistors, Power
Transistors, Power, Bipolar
Transistors, Power, FET
Transistors, RF
Transistors, Silicon
Transistors, Switching
Transistors, Unijunction
TRIACs

AMERICAN EXPRESS MasterCard VISA

AMS

973-377-9566
Fax 973-377-3078

E-Mail:sales@americanmicrosemi.com • http://www.americanmicrosemi.com

AMERICAN MICROSEMICONDUCTOR, INC.
133 KINGS RD., MADISON, NEW JERSEY 07940

Central Semiconductor Corp.™
145 Adams Avenue
Hauppauge, NY 11788 USA
Phone (516) 435-1110
FAX (516) 435-1824
email: inquiry@centralsemi.com
www.centralsemi.com

ISO 9001

SMD Surface Mount Devices
Leaded devices also available.
Contact factory for details.

Small Signal Transistors SOT-323 Case, 250mW

SUPER™ mini

2/3 The Size of The SOT-23 Case!

TYPE NO.	DESCRIPTION	BV_{CBO} (V) MIN	BV_{CEO} (V) MIN	BV_{EBO} (V) MIN	I_{CBO} @ V_{CB} *I_{CEV} (nA) MAX	(V_{CB}) (V)	h_{FE} MIN	h_{FE} MAX	@ V_{CE} (V)	@ I_C (mA)	V_{CE}(SAT) @ I_C (V) MAX	(I_C) (mA)	C_{ob} (pF) MAX	f_T (MHz) MIN	NF (dB) MAX
CMST2222A	NPN AMPL/SWITCH	75	40	6.0	10	60	100	300	10	150	1.0	500	8.0	300	4.0
CMST2907A	PNP AMPL/SWITCH	60	60	5.0	10	50	100	300	10	150	1.6	500	8.0	200	-
CMST3904	NPN AMPL/SWITCH	60	40	6.0	50*	30	100	300	1.0	10	0.3	50	4.0	300	5.0
CMST3906	PNP AMPL/SWITCH	40	40	5.0	50*	30	100	300	1.0	10	0.4	50	4.5	250	4.0

Small Signal Transistors SOT-23 Case U.S. Specification, 350mW

TYPE NO.	DESCRIPTION	BV_{CBO} (V) MIN	BV_{CEO} *BV_{CES} (V) MIN	BV_{EBO} (V) MIN	I_{CBO} @ V_{CB} *I_{CES} (nA) MAX	(V_{CB}) (V)	h_{FE} MIN	h_{FE} MAX	@ V_{CE} (V)	@ I_C (mA)	V_{CE}(SAT) @ I_C (V) MAX	(I_C) (mA)	C_{ob} (pF) MAX	f_T (MHz) MIN	NF (dB) MAX	t_{off} (ns) MAX	MARKING CODE
CMPT918	NPN RF OSCILLATOR	30	15	3.0	10	15	20	-	1.0	3.0	0.4	10	1.7	600	6.0	-	C3B
CMPT930	NPN LOW NOISE	45	45	5.0	10	45	100	300	5.0	0.01	1.0	10	8.0	30	3.0	-	C1X
CMPT2222A	NPN AMPL/SWITCH	75	40	6.0	10	60	100	300	10	150	1.0	500	8.0	300	4.0	285	C1P
CMPT2369	NPN SAT SWITCH	40	15	4.5	400	20	40	120	1.0	10	0.25	10	4.0	500	-	18	C1J
CMPT2484	NPN LOW NOISE	60	60	6.0	10	45	250	-	5.0	1.0	0.35	1.0	6.0	-	3.0	-	C1U
CMPT2907A	PNP AMPL/SWITCH	60	60	5.0	10	50	100	300	10	150	1.6	500	8.0	200	-	100	C2F
CMPT3019	NPN HIGH CURRENT	120	80	7.0	10	90	100	300	10	150	0.5	500	12	100	4.0	-	C3A
CMPT3640	PNP SAT SWITCH	12	12	4.0	10*	6.0	30	120	0.3	10	0.5	50	3.5	300	-	60	C2J
CMPT3646	NPN SAT SWITCH	40	15	5.0	500*	20	15	-	1.0	300	0.5	300	5.0	350	-	28	C2R
CMPT3904	NPN AMPL/SWITCH	60	40	6.0	50*	30	100	300	1.0	10	0.3	50	4.0	300	5.0	250	C1A
CMPT3906	PNP AMPL/SWITCH	40	40	5.0	50*	30	100	300	1.0	10	0.4	50	4.5	250	4.0	300	C2A
CMPT4033	PNP HIGH CURRENT	80	80	5.0	50	60	100	300	5.0	100	0.5	500	20	100	-	-	C4A
CMPT4401	NPN AMPL/SWITCH	60	40	6.0	100*	35	100	300	1.0	150	0.75	500	6.5	200	-	255	C2X
CMPT4403	PNP AMPL/SWITCH	40	40	5.0	100*	35	100	300	2.0	150	0.75	500	8.5	200	-	255	C2T
CMPT5086	PNP LOW NOISE	50	50	3.0	50	35	150	500	5.0	0.1	0.3	10	4.0	40	3.0	-	C2P
CMPT5087	PNP LOW NOISE	50	50	3.0	50	35	250	800	5.0	0.1	0.3	10	4.0	40	2.0	-	C2Q
CMPT5088	NPN LOW NOISE	35	30	4.5	50	20	300	900	5.0	0.1	0.5	10	4.0	50	3.0	-	C1Q
CMPT5089	NPN LOW NOISE	30	25	4.5	50	15	400	1,200	5.0	0.1	0.5	10	4.0	50	2.0	-	C1R
CMPT5179	NPN RF OSCILLATOR	20	12	2.5	20	15	25	250	1.0	3.0	0.4	10	1.0	900	4.5	-	C7H
CMPT5401	PNP HIGH VOLTAGE	160	150	5.0	50	120	60	240	5.0	10	0.5	50	6.0	100	8.0	-	C2L
CMPT5551	NPN HIGH VOLTAGE	180	160	6.0	50	120	80	250	5.0	10	0.2	50	6.0	100	8.0	-	1FF
CMPT6427	NPN DARLINGTON	40	40	12	50	30	20,000	200,000	5.0	100	1.5	500	7.0	130	10	-	C1V
CMPT6428	NPN LOW NOISE	60	50	6.0	10	30	250	650	5.0	0.1	0.6	100	3.0	100	-	-	C1K
CMPT6429	NPN LOW NOISE	55	45	6.0	10	30	500	1,250	5.0	0.1	0.6	100	3.0	100	-	-	C1L
CMPT6517	NPN HIGH VOLTAGE	350	350	5.0	50	250	30	200	10	30	1.0	50	6.0	40	-	-	C1Z
CMPT6520	PNP HIGH VOLTAGE	350	350	5.0	50	250	30	200	10	30	1.0	50	6.0	40	-	-	C2Z
CMPT8099	NPN AMPL/SWITCH	80	80	6.0	100	80	100	300	5.0	1.0	0.4	100	6.0	150	-	-	CKB
CMPT8599	PNP AMPL/SWITCH	80	80	5.0	100	80	100	300	5.0	1.0	0.4	100	4.5	150	-	-	C2W
CMPTA06	NPN HIGH CURRENT	80	80	4.0	100	80	50	-	1.0	100	0.25	100	-	100	-	-	C1G
CMPTA13	NPN DARLINGTON	30	30*	10	100	30	10,000	-	5.0	100	1.5	100	-	125	-	-	C1M
CMPTA14	NPN DARLINGTON	30	30*	10	100	30	20,000	-	5.0	100	1.5	100	-	125	-	-	C1N
CMPTA27	NPN DARLINGTON	60	60*	10	100	50	10,000	-	5.0	100	1.5	100	-	125	-	-	FG
CMPTA29	NPN HIGH VOLTAGE DARL	100	100*	12	100	80	10,000	-	5.0	100	1.5	100	8.0	125	-	-	C29
CMPTA42	NPN HIGH VOLTAGE	300	300	6.0	100	200	40	-	10	30	0.5	20	3.0	50	-	-	C1D
CMPTA44	NPN HIGH VOLTAGE	450	400	6.0	100	400	50	200	10	10	0.75	50	7.0	20	-	-	C3Z
CMPTA56	PNP HIGH CURRENT	80	80	4.0	100	80	50	-	1.0	100	0.25	100	-	50	-	-	C2G
CMPTA63	PNP DARLINGTON	30	30*	10	100	30	10,000	-	5.0	100	1.5	100	-	125	-	-	C2U
CMPTA64	PNP DARLINGTON	30	30*	10	100	30	20,000	-	5.0	100	1.5	100	-	125	-	-	C2V
CMPTA92	PNP HIGH VOLTAGE	300	300	5.0	250	200	25	-	10	30	0.5	20	6.0	50	-	-	C2D
CMPTH10	NPN VHF/UHF OSC	30	25	3.0	100	25	60	-	10	4.0	0.5	4.0	0.7	650	-	-	C3E

European "BC" types are available on special order.

Shaded areas indicate Darlington.

Central Semiconductor Corp.™
145 Adams Avenue
Hauppauge, NY 11788 USA
Phone (516) 435-1110
FAX (516) 435-1824
email: inquiry@centralsemi.com www.centralsemi.com

ISO 9001

SMD Surface Mount Devices
Leaded devices also available.
Contact factory for details.

Small Signal Transistors SOT-89 Case, 1.2W

TYPE NO.	DESCRIPTION	BV_{CBO} (V) MIN	BV_{CEO} *BV_{CES} (V) MIN	BV_{EBO} (V) MIN	I_{CBO} @ V_{CB} *I_{CES} (nA) MAX	(V_{CB}) (V)	h_{FE} @ V_{CE} @ I_C MIN	MAX	(V_{CE}) (V)	(I_C) (mA)	$V_{CE(SAT)}$ @ I_C (V) MAX	(I_C) (mA)	C_{ob} (pF) MAX	f_T (MHz) MIN	NF (dB) MAX	t_{off} (ns) MAX
CBCX68	NPN HIGH CURRENT	25	20	5.0	100	25	85	375	1.0	500	0.5	1,000	-	65	-	-
CBCX69	PNP HIGH CURRENT	25	20	5.0	100	25	85	375	1.0	500	0.5	1,000	-	65	-	-
CXT2222A	NPN AMPL/SWITCH	75	40	6.0	10	60	100	300	10	150	1.0	500	8.0	300	4.0	285
CXT2907A	PNP AMPL/SWITCH	60	60	5.0	10	50	100	300	10	150	1.6	500	8.0	200	-	100
CXT3019	NPN HIGH CURRENT	140	80	7.0	10	90	100	300	10	150	0.5	500	12	100	4.0	-
CXT3904	NPN AMPL/SWITCH	60	40	6.0	50*	30	100	300	1.0	10	0.3	50	4.0	300	5.0	250
CXT3906	PNP AMPL/SWITCH	60	40	6.0	50*	30	100	300	1.0	10	0.3	50	4.0	300	5.0	250
CXT4033	PNP HIGH CURRENT	80	80	5.0	50	60	100	300	5.0	100	0.5	500	20	100	-	-
CXT5401	PNP HIGH VOLTAGE	160	150	5.0	50	120	60	240	5.0	10	0.5	50	6.0	100	8.0	-
CXT5551	NPN HIGH VOLTAGE	180	160	6.0	50	120	80	250	5.0	10	0.2	50	6.0	100	8.0	-
CXTA14	NPN DARLINGTON	30	30*	10	100	30	20,000	-	5.0	100	1.5	100	-	125	-	-
CXTA27	NPN DARLINGTON	60	60*	10	100	30	10,000	-	5.0	100	1.5	100	-	125	-	-
CXTA42	NPN HIGH VOLTAGE	300	300	6.0	100	200	40	-	10	30	0.5	20	4.0	50	-	-
CXTA64	PNP DARLINGTON	30	30*	10	100	30	20,000	-	5.0	100	1.5	100	-	100	-	-
CXTA92	PNP HIGH VOLTAGE	300	300	5.0	250	200	25	-	10	30	0.5	20	6.0	50	-	-

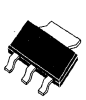
Shaded areas indicate Darlington.

Small Signal Transistors SOT-223 Case, 2.0W

TYPE NO.	DESCRIPTION	BV_{CBO} (V) MIN	BV_{CEO} *BV_{CES} (V) MIN	BV_{EBO} (V) MIN	I_{CBO} @ V_{CB} *I_{CES} (nA) MAX	(V_{CB}) (V)	h_{FE} @ V_{CE} @ I_C MIN	MAX	(V_{CE}) (V)	(I_C) (mA)	$V_{CE(SAT)}$ @ I_C (V) MAX	(I_C) (mA)	C_{ob} (pF) MAX	f_T (MHz) MIN	NF (dB) MAX	t_{off} (ns) MAX
CBCP68	NPN HIGH CURRENT	25	20	5.0	100	25	85	375	1.0	500	0.5	1,000	-	65	-	-
CBCP69	PNP HIGH CURRENT	25	20	5.0	100	25	85	375	1.0	500	0.5	1,000	-	65	-	-
CZT2000	NPN HIGH VOLT DARLINGTON	200	200*	10	500	180	3,000	-	5.0	160	1.1	80	-	-	-	-
CZT2222A	NPN AMPL/SWITCH	75	40	6.0	10	60	100	300	10	150	1.0	500	8.0	300	4.0	285
CZT2907A	PNP AMPL/SWITCH	60	60	5.0	10	50	100	300	10	150	1.6	500	8.0	200	-	100
CZT3019	NPN HIGH CURRENT	120	80	7.0	10	90	100	300	10	150	0.5	500	12	100	4.0	-
CZT3904	NPN AMPL/SWITCH	60	40	6.0	50*	30	100	300	1.0	10	0.3	50	4.0	300	5.0	250
CZT3906	NPN AMPL/SWITCH	60	40	6.0	50*	30	100	300	1.0	10	0.3	50	4.0	300	5.0	250
CZT4033	PNP HIGH CURRENT	80	80	5.0	50	60	100	300	5.0	100	0.5	500	20	100	-	-
CZT5401	PNP HIGH VOLTAGE	160	150	5.0	50	120	60	240	5.0	10	0.5	50	6.0	100	8.0	-
CZT5551	NPN HIGH VOLTAGE	180	160	6.0	50	120	80	250	5.0	10	0.2	50	6.0	100	8.0	-
CZTA14	NPN DARLINGTON	30	30*	10	100	30	20,000	-	5.0	100	1.5	100	-	125	-	-
CZTA42	NPN HIGH VOLTAGE	300	300	6.0	100	200	40	-	10	30	0.5	20	4.0	50	-	-
CZTA44	NPN EXTREMELY HIGH VOLT	450	400	6.0	100	400	50	200	10	10	0.75	50	7.0	20	-	-
CZTA64	PNP DARLINGTON	30	30*	10	100	30	20,000	-	5.0	100	1.5	100	-	125	-	-
CZTA92	PNP HIGH VOLTAGE	300	300	5.0	250	200	25	-	10	30	0.5	200	6.0	50	-	-

Shaded areas indicate Darlington.

SUPER™ mini



Power Transistors SOT-223 Case, 2.0W

POWER 223™

TYPE NO. NPN	TYPE NO. PNP	DESCRIPTION	I_C (A) MAX	P_D (W)	BV_{CBO} (V) MIN	BV_{CEO} (V) MIN	h_{FE} @ I_C MIN	MAX	(I_C) (A)	$V_{CE(SAT)}$ @ I_C (V) MAX	(I_C) (A)	f_T (MHz) MIN
CZT31C	CZT32C	AMPL/SWITCH	3.0	2.0	100	100	10	100	3.0	1.2	3.0	3.0
CZT122	CZT127	DARLINGTON	5.0	2.0	100	100	1,000	—	3.0	4.0	5.0	4.0
CZT3055	CZT2955	AMPL/SWITCH	6.0	2.0	100	70	20	70	4.0	1.1	4.0	2.5
CZT5338		HIGH CURRENT SWITCH	5.0	2.0	100	100	30	120	2.0	1.2	5.0	30

Shaded areas indicate Darlington.

Central Semiconductor Corp.™
145 Adams Avenue
Hauppauge, NY 11788 USA
Phone (516) 435-1110
FAX (516) 435-1824
email: inquiry@centralsemi.com www.centralsemi.com

ISO 9001

SMD Surface Mount Devices
Leaded devices also available.
Contact factory for details.

DPAK POWER!

Power Transistors DPAK Case

TYPE NO. NPN	TYPE NO. PNP	DESCRIPTION	I_C (A) MAX	P_D (W)	BV_{CBO} *BV_{CEV} (V) MIN	BV_{CEO} (V) MIN	h_{FE} @ I_C MIN	h_{FE} @ I_C MAX	I_C (A)	V_{CE}(SAT) @ I_C (V) MAX	I_C (A)	f_T *TYP (MHz) MIN
CJD31C	CJD32C	AMPL/SWITCH	3.0	15	100	100	10	50	3.0	1.2	3.0	3.0
CJD41C	CJD42C	AMPL/SWITCH	6.0	20	100	100	15	75	3.0	1.5	6.0	3.0
CJD44H11	CJD45H11	PLANAR AMPL/SWITCH	8.0	20	80	80	40	-	4.0	1.0	8.0	50*
CJD47		HIGH VOLTAGE AMPL	1.0	15	350	250	30	150	0.3	1.0	1.0	10
CJD50		HIGH VOLTAGE AMPL	1.0	15	500	400	30	150	0.3	1.0	1.0	10
CJD112	CJD117	DARLINGTON	2.0	20	100	100	1,000	12,000	2.0	2.0	2.0	25
CJD122	CJD127	DARLINGTON	5.0	20	100	100	1,000	12,000	4.0	4.0	8.0	4.0
CJD200	CJD210	AMPL/SWITCH	5.0	12.5	40	25	45	180	2.0	1.8	50	65
CJD340	CJD350	HIGH VOLTAGE AMPL	0.5	15	300	300	30	240	0.05	---	---	---
CJD3055	CJD2955	AMPL/SWITCH	10	20	70	60	20	100	4.0	1.1	4.0	2.0
CJD13003		HIGH VOLTAGE AMPL	1.5	15	700*	400	5.0	25	1.0	3.0	1.5	4.0

Shaded areas indicate Darlington.

Small Signal MOSFET SOT-23 Case

TYPE NO.	$r_{DS(ON)}$ @ I_D (Ω) MAX	(A)	(V) MIN	(V) MAX	$V_{GS(th)}$ (V) MIN	(pF) MAX	BV_{DSS} (pF) MAX	C_{iss} (ns) MAX	C_{rss} (ns) MAX	MARKING CODE	t_{off}
2N7002	7.5	0.5	1.0	2.5	60	50	5.0	20	20	702	

Junction FETs SOT-23 Case

TYPE NO.	DESCRIPTION	BV_{GSS} (V) MIN	I_{DSS} (mA) MIN	I_{DSS} (mA) MAX	$V_{GS(OFF)}$ (V) MIN	$V_{GS(OFF)}$ (V) MAX	$r_{DS(ON)}$ (Ω) MAX	NF (dB) MAX	t_{off} (ns) MAX	MARKING CODE
CMPF4391	N CH, SWITCHING	40	50	150	4.0	10	30	-	20	6J
CMPF4392	N CH, SWITCHING	40	25	75	2.0	5.0	60	-	35	6K
CMPF4393	N CH, SWITCHING	40	5.0	30	0.5	3.0	100	-	50	6G
CMPF4416A	N CH, RF AMPL/MIXER	35	5.0	15	2.5	6.0	-	2.0	-	6A2
CMPF5485	N CH, RF AMPL/MIXER	25	4.0	10	0.5	4.0	-	2.0	-	6B1

Schottky Diodes

TYPE NO.	CONFIGURATION	V_{RRM} (V) MAX	I_F (mA) MAX	V_F (V) MAX	@ I_F (mA)	t_{rr} *TYP (ns) MAX	C_T *TYP (pF) MAX	MARKING CODE
SOD-323 Case - High Current								
CMDSH-3	SINGLE	30	100	0.55	100	--	7.0*	S1
CMDSH2-3	SINGLE	30	200	0.55	200	--	15*	S2
SOT-23 Case - Low Current								
CMPD6263	SINGLE	70	15	0.41	1.0	1.0*	2.0	D76
CMPD6263A	DUAL, COMMON ANODE	70	15	0.41	1.0	1.0*	2.0	D98
CMPD6263C	DUAL, COMMON CATHODE	70	15	0.41	1.0	1.0*	2.0	D97
CMPD6263S	DUAL, IN SERIES	70	15	0.41	1.0	1.0*	2.0	D96
SOT-23 Case - High Current								
CMPSH-3	SINGLE	30	100	0.45	15	5.0	7.0*	D95
CMPSH-3A	DUAL, COMMON ANODE	30	100	0.45	15	5.0	7.0*	DB1
CMPSH-3C	DUAL, COMMON CATHODE	30	100	0.45	15	5.0	7.0*	DB2
CMPSH-3S	DUAL, IN SERIES	30	100	0.45	15	5.0	7.0*	DA5
SOT-143 Case - High Current								
CMFSH-3I	DUAL, ISOLATED	30	100	1.0	100	5.0	7.0	C3I

SUPER mini

NEW

Central Semiconductor Corp.™
145 Adams Avenue
Hauppauge, NY 11788 USA
Phone (516) 435-1110
FAX (516) 435-1824
email: inquiry@centralsemi.com www.centralsemi.com

ISO 9001

SMD Surface Mount Devices
Leaded devices also available.
Contact factory for details.

Switching Diodes

TYPE NO.	DESCRIPTION	V_{RRM} (V) MAX	I_O (mA) MAX	V_F @ (V) MAX	I_F (mA)	t_{rr} (ns) MAX	MARKING CODE
SOD-80 Case				Devices are listed in order of ascending breakdown voltage.			
CLL4150	HIGH CURRENT SWITCHING DIODE	50	300	1.0	200	4.0	BAND
CLL 914	SWITCHING DIODE	100	200	1.0	10	4.0	BAND
CLL4448	SWITCHING DIODE	100	200	1.0	100	4.0	BAND
CLL2003	HIGH VOLTAGE SWITCHING DIODE	250	250	1.0	100	50	BAND
SOT-23 Case				Devices are listed in order of ascending breakdown voltage.			
CMPD4150	SINGLE HIGH CURRENT SWITCHING DIODE	50	300	1.0	200	4.0	ABA
CMPD2836	DUAL SWITCHING DIODE, COMMON ANODE	75	200	1.0	50	6.0	CA2
CMPD2838	DUAL SWITCHING DIODE, COMMON CATHODE	75	200	1.0	50	6.0	CA6
CMPD1001	SINGLE HIGH CURRENT DIODE	90	250	1.0	200	50	L20
CMPD1001A	DUAL HIGH CURRENT DIODE, COMMON ANODE	90	250	1.0	200	50	L22
CMPD1001S	DUAL HIGH CURRENT, IN SERIES	90	250	1.0	200	50	L21
CMPD914	SINGLE SWITCHING DIODE	100	200	1.0	10	4.0	C5D
CMPD4448	SINGLE SWITCHING DIODE	100	200	1.0	100	4.0	AAD
CMPD7000	DUAL SWITCHING DIODE, IN SERIES	100	200	1.1	100	4.0	C5C
CMPD5001	SINGLE INDUCTIVE LOAD DIODE	175	400	1.0	200	50	DA2
CMPD5001S	DUAL INDUCTIVE LOAD DIODE, IN SERIES	175	400	1.0	200	50	DA9
CMPD2003	SINGLE HIGH VOLTAGE SWITCHING DIODE	250	200	1.0	100	50	A82
CMPD2004	SINGLE HIGH VOLTAGE SWITCHING DIODE	300	200	1.0	100	50	D53
CMPD2004S	DUAL HIGH VOLTAGE SWITCHING DIODE, IN SERIES	300	200	1.0	100	50	DB6
SOT-143 Case				Devices are listed in order of ascending breakdown voltage.			
BAS56	DUAL HIGH CURRENT DIODE ISOLATED	60	200	1.0	200	6.0	L51
BAS28	DUAL SWITCHING DIODE ISOLATED	85	250	1.0	50	6.0	A61
NEW BAW101	DUAL SWITCHING DIODE, HIGH CURRENT	300	200	1.3	100	50	CJP
SOT-323 Case				Devices are listed in order of ascending breakdown voltage.			
CMSD2836	DUAL SWITCHING DIODE, COMMON ANODE	75	200	1.0	50	6.0	A2C
CMSD2838	DUAL SWITCHING DIODE, COMMON CATHODE	75	200	1.0	50	6.0	A6C
CMSD7000	DUAL SWITCHING DIODE, IN SERIES	100	200	1.1	100	4.0	5CC
CMSD4448	SINGLE SWITCHING DIODE	100	200	1.0	100	4.0	ADA

NEW

SUPER mini

Low Leakage Diodes SOD-80 Case

TYPE NO.	V_{RRM} (V) MAX	I_O (mA) MAX	I_R @ (nA) MAX	V_{RWN} (V)	V_F @ (V) MAX	I_F (mA)	C_T (pF) MAX	MARKING CODE
CLL457A	70	200	25	60	1.0	100	6.0	BAND
CLL459A	200	200	25	175	1.0	100	6.0	BAND
CLL3595	150	150	1.0	125	1.0	200	8.0	BAND

Central Semiconductor Corp.™
145 Adams Avenue
Hauppauge, NY 11788 USA
Phone (516) 435-1110
FAX (516) 435-1824
email: inquiry@centralsemi.com www.centralsemi.com

ISO 9001

SMD Surface Mount Devices
Leaded devices also available.
Contact factory for details.

Current Limiting Diodes SOD-80 Case

MAXIMUM RATINGS (T_L=75°C)	SYMBOL		UNIT
Peak Operating Voltage	POV	100	V
Power Dissipation	P_D	800	mW
Operating and Storage Junction Temperature	T_J, T_{STG}	-65 to +200	°C

ELECTRICAL CHARACTERISTICS (T_A =25°C)

TYPE NO.	REGULATOR CURRENT (1) I_P @ V_T = 25V (mA) MIN	NOM	MAX	DYNAMIC IMPEDANCE Z_T @ V_T = 25V (MΩ) MIN	KNEE IMPEDANCE Z_K@ V_K = 6.0V (MΩ) MIN	LIMITING VOLTAGE V_L @ I_L=0.8 I_P MIN (V) MAX	TEMPERATURE COEFFICIENT TC* %/°C
CCLM0035	0.010	0.035	0.060	8.0	4.00	0.4	+2.10 TO +0.10
CCLM0130	0.050	0.130	0.210	6.0	2.00	0.6	+2.10 TO +0.10
CCLM0300	0.200	0.310	0.420	4.0	1.00	0.8	+0.40 TO -0.20
CCLM0500	0.400	0.515	0.630	2.0	0.50	1.1	+0.15 TO -0.25
CCLM0750	0.600	0.760	0.920	1.0	0.20	1.4	0.0 TO -0.32
CCLM1000	0.880	1.100	1.320	0.65	0.10	1.7	-0.10 TO -0.37
CCLM1500	1.280	1.500	1.720	0.45	0.07	2.0	-0.13 TO -0.40
CCLM2000	1.680	2.000	2.320	0.35	0.05	2.3	-0.15 TO -0.42
CCLM2700	2.280	2.690	3.100	0.30	0.03	2.7	-0.18 TO -0.45
CCLM3500	3.000	3.550	4.100	0.25	0.02	3.2	-0.20 TO -0.47
CCLM4500	3.900	4.500	5.100	0.20	0.01	3.7	-0.22 TO -0.50
CCLM5750	5.000	5.750	6.500	0.05	0.005	4.5	-0.25 TO -0.53
High Current							
CCLHM080	6.56	8.2	9.84	0.32	15	3.1	-0.25 TO -0.45
CCLHM100	8.0	10	12	0.17	6.0	3.5	-0.25 TO -0.45
CCLHM120	9.6	12	14.4	0.08	3.0	3.8	-0.25 TO -0.45
CCLHM150	12	15	18	0.03	2.0	4.3	-0.25 TO -0.45

*The Temperature Coefficient is measured between the following points:+25°C, +50°C.

(1) TESTED USING THE PULSED METHOD. $\left(\text{PULSE WIDTH (ms)} = \frac{27.5}{I_P\text{NOM (mA)}}\right)$

General Purpose Rectifiers

I_O (AMPS)	1.0		2.0	3.0
@T_A (°C)	25	25	25	25
I_{FSM} (AMPS)	30	30	60	200
CASE	SMA	SMB		SMC
V_{RRM} (VOLTS)				
200	CMR1-02M	CMR1-02	CMR2-02	CMR3-02
400	CMR1-04M	CMR1-04	CMR2-04	CMR3-04
600	CMR1-06M	CMR1-06	CMR2-06	CMR3-06
1000	CMR1-10M	CMR1-10	CMR2-10	CMR3-10

V_F (MAX) @ $I_F = I_O$	1.1V	1.1V	1.1V	1.2V
I_R (MAX) @ V_{RRM}	5.0μA	10μA	5.0μA	5.0μA

Central ™ **Semiconductor Corp.**
145 Adams Avenue
Hauppauge, NY 11788 USA
Phone (516) 435-1110
FAX (516) 435-1824
email: inquiry@centralsemi.com www.centralsemi.com

ISO 9001

SMD Surface Mount Devices
Leaded devices also available. Contact factory for details.

Ultra Fast Recovery Rectifiers

I_O (AMPS)	1.0		2.0	3.0		6.0
@T_A (°C)	25	25	25	25	25	25
I_{FSM} (AMPS)	30	30	50	150	75	75
CASE	SMA	SMB		SMC	DPAK	
V_{RRM} (VOLTS)						
100	CMR1U-01M	CMR1U-01	CMR2U-01	CMR3U-01		
200	CMR1U-02M	CMR1U-02	CMR2U-02	CMR3U-02	CUD3-02	CUD6-02C
400	CMR1U-04M	CMR1U-04	CMR2U-04	CMR3U-04		
600	CMR1U-06M	CMR1U-06	CMR2U-06	CMR3U-06		

V_F (MAX) @ $I_F = I_O$						
100V	1.0V	1.0V	1.0V	1.0V		
200V	1.0V	1.0V	1.0V	1.0V	1.25V@12A	1.25V@10A
400V	1.25V	1.25V	1.25V	1.25V		
600V	1.4V	1.4V	1.4V	1.4V		

I_R (MAX)@ V_{RRM}	5.0 µA	5.0 µA	10 µA	5.0 µA	20 µA	20 µA
t_{rr}(100V thru 200V)	35ns	50ns	50ns	50ns	35ns	35ns
t_{rr} (400V)	50ns	50ns	50ns	50ns		
t_{rr} (600V)	75ns	100ns	50ns	100ns		

Schottky Rectifiers

I_O (AMPS)	1.0			2.0		3.0		6.0
@T_A (°C)	25	25	25	25	25	25	25	25
I_{FSM} (AMPS)	30	30	10	30	10	150	75	75
CASE	SMA	SMB	SOT-89	SMB	SOT-223	SMC	DPAK	
V_{RRM} (VOLTS)								
20	CMSH1-20M	CMSH1-20		CMSH2-20		CMSH3-20		
40	CMSH1-40M	CMSH1-40	CXSH-4	CMSH2-40	CZSH-4	CMSH3-40	CSHD3-40	CSHD6-40C
60	CMSH1-60M	CMSH1-60		CMSH2-60		CMSH3-60	CSHD3-60	CSHD6-60C
100		CMSH1-100		CMSH2-100		CMSH3-100		

NEW

V_F (MAX) @ $I_F = I_O$								
20V	0.5V	0.55V		0.5V		0.5V		
40V	0.5V	0.55V	0.55V	0.5V	0.55V	0.5V	0.84V	0.84V
60V	0.7V	0.7V		0.7V		0.7V	0.65V	0.65V
100V		0.85V		0.85V		0.8V		

$I_{R\,(MAX)}$ @ V_{RRM}	500 µA	500 µA	1000 µA	500 µA	1000 µA	500 µA	100 µA*	100 µA*

*40 Volt device

Central Semiconductor Corp.™ 145 Adams Avenue
Hauppauge, NY 11788 USA
Phone (516) 435-1110
FAX (516) 435-1824
email: inquiry@centralsemi.com www.centralsemi.com

ISO 9001

SMD Surface Mount Devices
Leaded devices also available. Contact factory for details.

Bridge Rectifiers

I_O (AMPS)	0.5	1.0		
@ T_A (°C)	25	50	50	25
I_{FSM} (AMPS)	30	50	50	50
CASE	HD DIP	SMDIP		
	GENERAL PURPOSE	GENERAL PURPOSE	FAST RECOVERY	ULTRA FAST RECOVERY
V_{RRM} (VOLTS)				
100				CBR1U-D010S
200	CBRHD-02	CBR1-D020S	CBR1F-D020S	CBR1U-D020S
400	CBRHD-04	CBR1-D040S	CBR1F-D040S	
600	CBRHD-06	CBR1-D060S	CBR1F-D060S	
1000	CBRHD-10*	CBR1-D100S	CBR1F-D100S	

V_F MAX @ I_F	1.0V @ 0.4A	1.1V @ 1.0A	1.3V @ 1.0A	1.05V @ 1.0A
I_R MAX @ V_{RRM}	5.0μA	10μA	10μA	10μA
t_{rr} (100V thru 400V)			200ns	50ns
t_{rr} (600V)			300ns	
t_{rr} (1000V)			500ns	

* Available on special order only, consult factory.

SCRs

SOT-23 Case

TYPE NO.	V_{DRM} / V_{RRM} (V) MAX	$I_{T(RMS)}$ (A) MAX	I_{GT} (μA) MAX	V_{GT} (V) MAX	I_H (mA) MAX	MARKING CODE
CMPS5064	400	0.8	200	0.8	5.0	P2D

SOT-223 Case

CZS5064	400	0.8	200	0.8	5.0	

Triacs SOT-89 Case

TYPE NO.	V_{DRM}/V_{RRM} (V) MAX	$I_{T(RMS)}$ (A) MAX	$I_{GT(QI)}$ (mA) MAX	$I_{GT(QII)}$ (mA) MAX	$I_{GT(QIII)}$ (mA) MAX	$I_{GT(QIV)}$ (mA) MAX	$V_{GT(QI-QIV)}$ (V) MAX	I_H (mA) MAX
CQ89D	400	2.0	25	25	25	25	2.0	25
CQ89DS	400	2.0	5.0	5.0	5.0	5.0	2.0	5.0
CQ89M	600	2.0	25	25	25	25	2.0	25
CQ89MS	600	2.0	5.0	5.0	5.0	5.0	2.0	5.0
CQ89N	800	2.0	25	25	25	25	2.0	25
CQ89NS	800	2.0	5.0	5.0	5.0	5.0	2.0	5.0

Central Semiconductor Corp.™
145 Adams Avenue
Hauppauge, NY 11788 USA
Phone (516) 435-1110
FAX (516) 435-1824
email: inquiry@centralsemi.com www.centralsemi.com

ISO 9001

SMD Surface Mount Devices
Leaded devices also available. Contact factory for details.

Zener Diodes

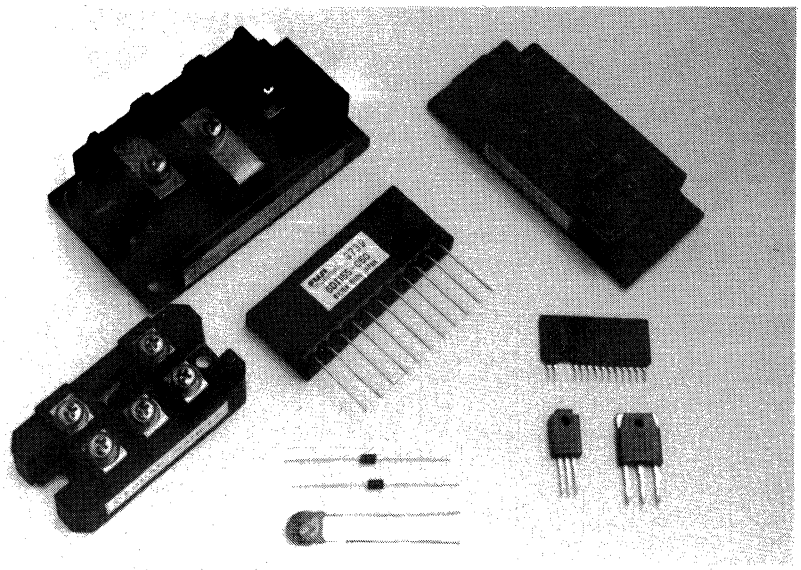
POWER	250mW		350mW					500mW		1.0W	1.5W
	Under Development! SUPER mini										NEW
CASE	PREFERRED	SOD-323	PREFERRED			SOT-23		PREFERRED	SOD-80	MELF	SMA
ZENER VOLTAGE	INDUSTRY STANDARD	LOW LEVEL SHARP KNEE	INDUSTRY STANDARD	LOW NOISE LOW LEVEL	LOW LEVEL	PROELECTRON SPECIFICATION	DUAL, COMMON ANODE	INDUSTRY STANDARD	LOW LEVEL	GENERAL PURPOSE	INDUSTRY STANDARD
1.8				CMPZ4614*	CMPZ4678*				CLL4678		
2.0				CMPZ4615*	CMPZ4679*				CLL4679		
2.2				CMPZ4616*	CMPZ4680*				CLL4680		
2.4	CMDZ5221B		CMPZ5221B	CMPZ4617*	CMPZ4681*				CLL4681		
2.5	CMDZ5222B		CMPZ5222B								
2.7	CMDZ5223B		CMPZ5223B	CMPZ4618*	CMPZ4682*				CLL4682		
2.8	CMDZ5224B		CMPZ5224B								
3.0	CMDZ5225B		CMPZ5225B	CMPZ4619*	CMPZ4683*				CLL4683		
3.3	CMDZ5226B		CMPZ5226B	CMPZ4620*	CMPZ4684*	BZX84C3V3		CLL5226B	CLL4684		
3.6	CMDZ5227B		CMPZ5227B	CMPZ4621*	CMPZ4685*	BZX84C3V6	CMPZDA3V6	CLL5227B	CLL4685	CLL4729A	
3.9	CMDZ5228B		CMPZ5228B	CMPZ4622*	CMPZ4686*	BZX84C3V9	CMPZDA3V9	CLL5228B	CLL4686	CLL4730A	
4.3	CMDZ5229B		CMPZ5229B	CMPZ4623*	CMPZ4687*	BZX84C4V3	CMPZDA4V3	CLL5229B	CLL4687	CLL4731A	
4.7	CMDZ5230B		CMPZ5230B	CMPZ4624*	CMPZ4688*	BZX84C4V7	CMPZDA4V7	CLL5230B	CLL4688	CLL4732A	
5.1	CMDZ5231B	CMDZ5L1	CMPZ5231B	CMPZ4625*	CMPZ4689*	BZX84C5V1	CMPZDA5V1	CLL5231B	CLL4689	CLL4733A	
5.6	CMDZ5232B	CMDZ5L6	CMPZ5232B	CMPZ4626*	CMPZ4690*	BZX84C5V6	CMPZDA5V6		CLL4690	CLL4734A	
6.0	CMDZ5233B		CMPZ5233B					CLL5233B			
6.2	CMDZ5234B	CMDZ6L2	CMPZ5234B	CMPZ4627*	CMPZ4691*	BZX84C6V2	CMPZDA6V2	CLL5234B	CLL4691	CLL4735A	
6.8	CMDZ5235B	CMDZ6L8	CMPZ5235B		CMPZ4692*	BZX84C6V8	CMPZDA6V8	CLL5235B	CLL4692	CLL4736A	CMZ5921B
7.5	CMDZ5236B	CMDZ7L5	CMPZ5236B		CMPZ4693*	BZX84C7V5	CMPZDA7V5	CLL5236B	CLL4693	CLL4737A	CMZ5922B
8.2	CMDZ5237B	CMDZ8L2	CMPZ5237B		CMPZ4694*	BZX84C8V2	CMPZDA8V2	CLL5237B	CLL4694	CLL4738A	CMZ5923B
8.7	CMDZ5238B		CMPZ5238B		CMPZ4695*			CLL5238B	CLL4695		
9.1	CMDZ5239B	CMDZ9L1	CMPZ5239B		CMPZ4696*	BZX84C9V1	CMPZDA9V1	CLL5239B	CLL4696	CLL4739A	CMZ5924B
10	CMDZ5240B	CMDZ10L	CMPZ5240B		CMPZ4697*	BZX84C10	CMPZDA10V	CLL5240B	CLL4697	CLL4740A	CMZ5925B
11	CMDZ5241B	CMDZ11L	CMPZ5241B		CMPZ4698*	BZX84C11	CMPZDA11V	CLL5241B	CLL4698	CLL4741A	CMZ5926B
12	CMDZ5242B	CMDZ12L	CMPZ5242B		CMPZ4699*	BZX84C12	CMPZDA12V	CLL5242B	CLL4699	CLL4742A	CMZ5927B
13	CMDZ5243B	CMDZ13L	CMPZ5243B		CMPZ4700*	BZX84C13	CMPZDA13V	CLL5243B	CLL4700	CLL4743A	CMZ5928B
14	CMDZ5244B		CMPZ5244B		CMPZ4701*			CLL5244B	CLL4701		
15	CMDZ5245B	CMDZ15L	CMPZ5245B		CMPZ4702*	BZX84C15	CMPZDA15V	CLL5245B	CLL4702	CLL4744A	CMZ5929B
16	CMDZ5246B	CMDZ16L	CMPZ5246B		CMPZ4703*	BZX84C16	CMPZDA16V	CLL5246B	CLL4703	CLL4745A	CMZ5930B
17	CMDZ5247B		CMPZ5247B		CMPZ4704*	BZX84C18	CMPZDA18V	CLL5247B	CLL4704		
18	CMDZ5248B	CMDZ18L	CMPZ5248B		CMPZ4705*			CLL5248B	CLL4705	CLL4746A	CMZ5931B
19	CMDZ5249B		CMPZ5249B		CMPZ4706*			CLL5249B	CLL4706		
20	CMDZ5250B	CMDZ20L	CMPZ5250B		CMPZ4707*	BZX84C20	CMPZDA20V	CLL5250B	CLL4707	CLL4747A	CMZ5932B
22	CMDZ5251B	CMDZ22L	CMPZ5251B		CMPZ4708*	BZX84C22	CMPZDA22V	CLL5251B	CLL4708	CLL4748A	CMZ5933B
24	CMDZ5252B	CMDZ24L	CMPZ5252B		CMPZ4709*	BZX84C24	CMPZDA24V	CLL5252B	CLL4709	CLL4749A	CMZ5934B
25	CMDZ5253B		CMPZ5253B		CMPZ4710*			CLL5253B	CLL4710		
27	CMDZ5254B	CMDZ27L	CMPZ5254B		CMPZ4711*	BZX84C27	CMPZDA27V	CLL5254B	CLL4711	CLL4750A	CMZ5935B
28	CMDZ5255B		CMPZ5255B		CMPZ4712*			CLL5255B	CLL4712		
30	CMDZ5256B	CMDZ30L	CMPZ5256B		CMPZ4713*	BZX84C30	CMPZDA30V	CLL5256B	CLL4713	CLL4751A	CMZ5936B
33	CMDZ5257B	CMDZ33L	CMPZ5257B		CMPZ4714*	BZX84C33	CMPZDA33V	CLL5257B	CLL4714	CLL4752A	CMZ5937B
36	CMDZ5258B	CMDZ36L	CMPZ5258B		CMPZ4715†				CLL4715	CLL4753A*	CMZ5938B
39	CMDZ5259B		CMPZ5259B		CMPZ4716*				CLL4716	CLL4754A*	CMZ5939B
43	CMDZ5260B		CMPZ5260B		CMPZ4717*				CLL4717	CLL4755A*	CMZ5940B
47	CMDZ5261B		CMPZ5261B							CLL4756A*	CMZ5941B
51										CLL4757A*	CMZ5942B
56										CLL4758A*	CMZ5943B
62										CLL4759A*	CMZ5944B
68										CLL4760A*	CMZ5945B
75										CLL4761A*	CMZ5946B
82										CLL4762A*	CMZ5947B
91										CLL4763A*	CMZ5948B
100										CLL4764A*	CMZ5949B†

* Available on special order only, consult factory.

† CMZ5950B thru CMZ5956B, 110V thru 200V also available

The industry's most complete line of advanced technology

Power Semiconductors



IGBT Modules
Discrete IGBTS
Intelligent Power Modules
Gate-Driver Hybrids
Darlington Modules
MOSFET Modules
Diode Modules
Discrete Power MOSFETs
Schottky Rectifiers
Fast Recovery Rectifiers
MOV Surge Arrestors
High Voltage Diodes
Bridges, All Types
Surface Mount
Rectifiers
Silicon Surge Absorbers

Brief Highlights

IGBT
High frequency capability
1.7 VCE (Sat) available
Rugged RBSOA
Single, dual, 6-pack PIM & 7-pack modules as well as discretes
600V, 1200V & 1400V
2.5A to 600A

Intelligent Power Modules
Gate drive & protection included 6 & 7 packs
600V, 1200V, 15A-100A

Diode Modules
3-Phase and dual packages
Fast recovery available
Glass passivated junctions
100V to 1600V 30A to 250A

Discrete MOSFETs
TO-3P, TO-220
Surface Mount K-Pack (D), T-Pack (D^2) and SO-8 Packages
30V-1000V, 2A-80A

- F-I SERIES, Low $R_{DS(ON)}$
- FAP-I SERIES, Low $R_{DS(ON)}$, High Avalanche Ruggedness
- F-II SERIES, V_{GS} ±30V, Reduced Turn-Off Time
- FAP-II SERIES, V_{GS} ± 30V, Reduced Turn-Off Time, High Avalanche Ruggedness
- FAP-IIA SERIES, V_{GS}±30V, Reduced Turn-Off Time, $V_{GS(TH)}$±.5V High Avalanche Ruggedness
- FAP-IIS SERIES, V_{GS}±30V, Reduced Turn-Off Time, Improved High Temp Avalanche Ruggedness
- F-III SERIES, Logic Level Operation, Low $R_{DS(ON)}$
- FAP-III SERIES, Logic Level Operation, Low $R_{DS(ON)}$, High Avalanche Ruggedness
- FAP-IIIA SERIES, *Automotive Types,* Logic Level Operation, Low $R_{DS(ON)}$, High Avalanche Ruggedness Intergrated G-S Surge Protection
- FAP-IIIB SERIES, Logic Level Operation, Ultra Low $R_{DS(ON)}$, High Avalanche Ruggedness
- F-V SERIES, FREDFET, Diode Recovery Time (150-200nS), Improved Turn-On Time

Switching Transistors
TO-220AB, TO-220F,TO-3P,
50V to 1000V; 3A to 30A

High Voltage Diodes
1kV to 30kV

Surface Mount Diodes
Schottky, Ultra-Fast, Fast Recovery, GP40V to 600V;
500mA to 20A

Schottky Rectifiers
Axial, TO-220, TO-3P and Surface Mount
Singles and Duals
45V, 60V, 90V
0.6A - 60A

Also from Collmer: *HV Power Supplies, Multipliers, Diode-Rectifier Assemblies (See Sec. 4000)*
Hall Current Sensors (See Vol. B, Sec. 5500)

FUJI Semiconductors • Imported and Distributed by

Collmer Semiconductor, Inc.

14368 PROTON RD • DALLAS, TEXAS 75244 • 972/233-1589
Fax 972/233-0481 • http://www.collmer.com • e-mail: info@collmer.com

ISO 9002 CERTIFIED

Your reliable source for Thyristor/Diode Modules and more...

For Complete Product Specifications:

Fax-On-Demand, call **888-267-9191** for instant specs on your fax
www.crydom.com - view and download specifications

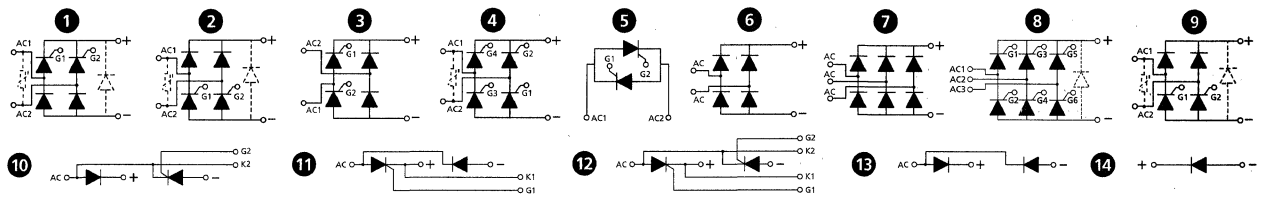
9525 Chesapeake Drive, San Diego, CA 92123
Tel: (619) 715-7200 • Fax: (619) 715-7280
Toll-Free **800-8 CRYDOM (827-9366)**

CRYDOM
Control over power

Power Modules

Crydom is your single source for all your SCR/diode power module needs. Choose from a wide selection of ready-to-use circuit configurations, in virtually any package size and power rating. And when you want something special, Crydom can produce custom circuitry to your exacting specifications.

Top quality and dependability are assured in Crydom's ISO 9002 certified manufacturing facilities.



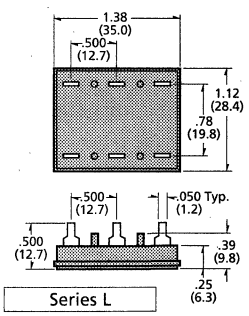
SERIES L
15-42.5 Amp • SCR/Diode Module

Fast Fax No. **226**

- ▶ **Low Profile**
- ▶ **Designed for PCB Connections**

PCB MOUNT Type	Current (Amps)	Circuit Fig. No.	AC Line Input Voltage (Vac)	Repetitive Peak Rev. Voltage (V_{RRM})	Max. Non-Repetitive Surge Current (I_{TSM})
L312F	**15**	**1**	**240**	**600**	**225**
L512F	**25**	**1**	**240**	**600**	**300**
L514F	**25**	**1**	**480**	**800**	**300**
L522F	**25**	**2**	**240**	**600**	**300**
L542	**25**	**4**	**240**	**600**	**300**
L612F	**42.5**	**1**	**240**	**600**	**600**
L622F	**42.5**	**2**	**240**	**600**	**600**
L652	**42.5**	**5**	**240**	**600**	**600**

Operating Temp Range: **-30°C to 80°C** Isolation Voltage (Vac): **2500**



Series L

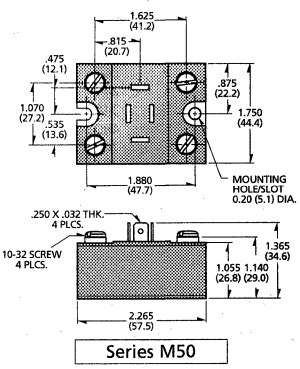
SERIES M50
50-100 Amp • SCR/Diode Module

Fast Fax No. **228, 232**

- ▶ **Over 40KW Output Capability**

PANEL MOUNT Type	Current (Amps)	Circuit Fig. No.	AC Line Input Voltage (Vac)	Repetitive Peak Rev. Voltage (V_{RRM})	Max. Non-Repetitive Surge Current (I_{TSM})
M5010045V*	**100**	**5**	**480**	**1200**	**1500**
M50100SB1200	**100**	**6**	**480**	**1200**	**1500**
M50100SB600	**100**	**6**	**240**	**600**	**1500**
M50100TB1200	**100**	**7**	**480**	**1200**	**1500**
M50100TB600	**100**	**7**	**240**	**600**	**1500**
M505012F	**50**	**1**	**240**	**600**	**600**
M505012FV*	**50**	**1**	**240**	**600**	**600**
M505015F	**50**	**1**	**480**	**1200**	**600**
M505015FV*	**50**	**1**	**480**	**1200**	**600**
M505032	**50**	**4**	**240**	**600**	**600**
M505035	**50**	**4**	**480**	**1200**	**600**
M505042	**50**	**5**	**240**	**600**	**600**
M505045	**50**	**5**	**480**	**1200**	**600**
M5060SB1200	**60**	**6**	**480**	**1200**	**800**
M5060SB600	**60**	**6**	**240**	**600**	**800**
M5060TB1200	**60**	**7**	**480**	**1200**	**800**
M5060TB600	**60**	**7**	**240**	**600**	**800**
M508012F	**80**	**1**	**240**	**600**	**1500**

* V =external suppressor Operating Temp Range: **-30°C to 80°C** Isolation Voltage (Vac): **2500**



Series M50

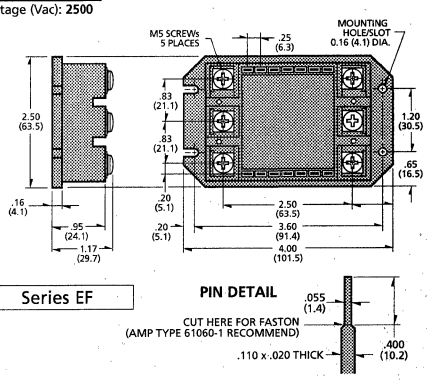
SERIES EF
50-170 Amp • SCR/Diode Module

Fast Fax No. **230**

- ▶ **High Thermal Efficiency**
- ▶ **Complete Power Control Circuits in a Single Package**

PANEL MOUNT Type	Current (Amps)	Circuit Fig. No.	AC Line Input Voltage (Vac)	Repetitive Peak Rev. Voltage (V_{RRM})	Max. Non-Repetitive Surge Current (I_{TSM})
EFD01FF	**50**	**1**	**480**	**1200**	**400**
EFE01FF	**75**	**1**	**480**	**1200**	**600**
EFE13C	**75**	**6**	**240**	**600**	**600**
EFE15C	**100**	**7**	**240**	**600**	**600**
EFE15F	**100**	**7**	**480**	**1200**	**600**
EFE16F	**100**	**8**	**480**	**1200**	**600**
EFF01FF	**100**	**1**	**480**	**1200**	**1500**
EFG13C	**125**	**6**	**240**	**600**	**1950**
EFG15C	**170**	**7**	**240**	**600**	**1950**
EFG15F	**170**	**7**	**480**	**1200**	**1950**

Operating Temp Range: **-30°C to 80°C** Isolation Voltage (Vac): **2500**



Series EF

ISO 9002 CERTIFIED

Your reliable source for Thyristor/Diode Modules and more...

For Complete Product Specifications:

Fax-On-Demand, call **888-267-9191** for instant specs on your fax
www.crydom.com - view and download specifications

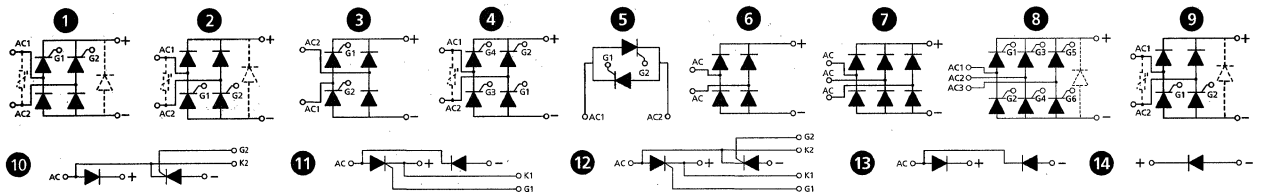
9525 Chesapeake Drive, San Diego, CA 92123
Tel: (619) 715-7200 • Fax: (619) 715-7280
Toll-Free **800-8 CRYDOM (827-9366)**

CRYDOM
Control over power

Power Modules

Crydom is your single source for all your SCR/diode power module needs. Choose from a wide selection of ready-to-use circuit configurations, in virtually any package size and power rating. And when you want something special, Crydom can produce custom circuitry to your exacting specifications.

Top quality and dependability are assured in Crydom's ISO 9002 certified manufacturing facilities.



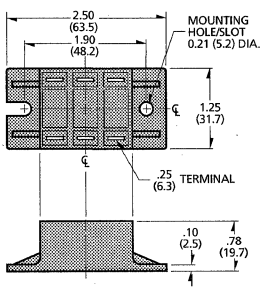
SERIES B48-2T, B48-2, B-2T, B-2
25-42.5 Amp • SCR/Diode Module

Fast Fax No. **227, 231**

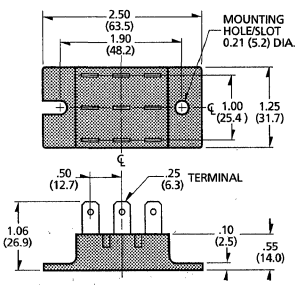
- **Single and Three Phase Circuits**
- **Up to 1600 Volt Blocking Standard**

PANEL MOUNT Type	Current (Amps)	Circuit Fig. No.	AC Line Input Voltage (Vac)	Repetitive Peak Rev. Voltage (V_{RRM})	Max. Non-Repetitive Surge Current (I_{TSM})
B483C-2	35	6	240	600	600
B483F-2	35	6	480	1200	600
B485C-2	35	7	240	600	600
B485F-2	35	7	480	1200	600
B512F-2	25	1	240	600	300
B512F-2T	25	1	240	600	300
B512FSE-2T	25	1	240	600	300
B514F-2T	25	1	480	1200	300
B514FSE-2T	25	1	480	1200	300
B522F-2T	25	2	240	600	300
B522FSE-2	25	2	240	600	300
B522FSE-2T	25	2	240	600	300
B532-2T	25	3	240	600	300
B542-2T	25	4	240	600	300
B552-2T	25	5	240	600	300
B554-2T	25	5	480	1200	300
B612F-2T	42.5	1	240	600	600
B622F-2T	42.5	2	240	600	600
B652-2T	42.5	5	240	600	600

S = internal suppressor Operating Temp Range: **-30˚C to 80˚C** Isolation Voltage (Vac): **2500**



Series B48-2, B-2



Series B48-2T, B-2T

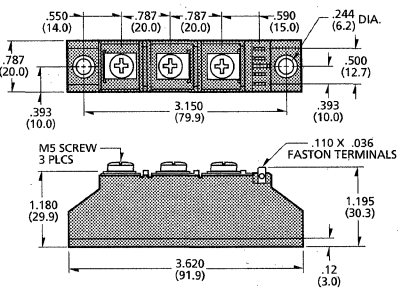
SERIES F18
25-90 Amp • SCR/Diode Module

Fast Fax No. **229**

- **Industry Standard Package and Circuits**
- **Power Control Building Blocks**

PANEL MOUNT Type	Current (Amps)	Circuit Fig. No.	AC Line Input Voltage (Vac)	Repetitive Peak Rev. Voltage (V_{RRM})	Max. Non-Repetitive Surge Current (I_{TSM})
F1842SD600	40	12	240	600	1000
F1842SD1200	40	12	480	1200	1000
F1857D1200	55	14	480	1200	1500
F1857DH1200	55	10	480	1200	1500
F1857DH600	55	10	240	600	1500
F1857HD1200	55	11	480	1200	1500
F1857HD600	55	11	240	600	1500
F1857RD1200	55	13	480	1200	1500
F1857RD600	55	13	240	600	1500
F1857SD1200	55	12	480	1200	1500
F1857SD600	55	12	240	600	1500
F1892D1200	90	14	480	1200	1950
F1892D600	90	14	240	600	1950
F1892DH1200	90	10	480	1200	1950
F1892DH600	90	10	240	600	1950
F1892HD1200	90	11	480	1200	1950
F1892HD600	90	11	240	600	1950
F1892RD1200	90	13	480	1200	1950
F1892RD600	90	13	240	600	1950
F1892SD1200	90	12	480	1200	1950
F1892SD600	90	12	240	600	1950

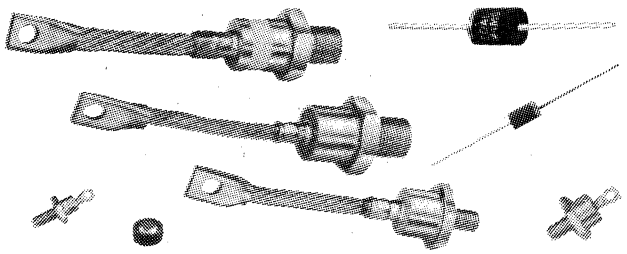
Operating Temp Range: **-30˚C to 80˚C** Isolation Voltage (Vac): **2500**



Series F18

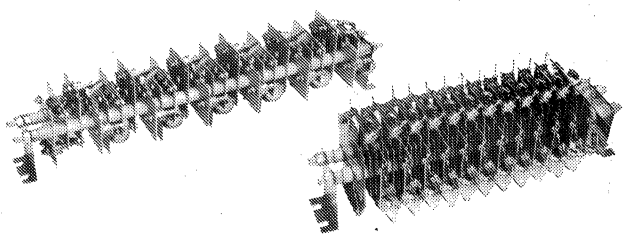
EDAL INDUSTRIES INCORPORATED RECTIFIERS

POWER RECTIFIERS



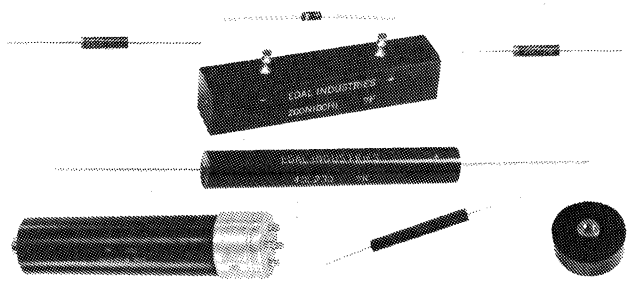
Ranging in current from 1 amp to 300 amps. From miniature axial leaded DO-41 thru rugged hermetically sealed DO-9 package. Standard, bulk avalanche and fast recovery types in voltage rating from 50 to 1500 volts. Edal rectifiers offer reliable operation under extreme humidity and other severe environmental conditions. Double diffused passivated junctions techniques is utilized to assure stable, uniform electrical characteristics. Diodes available in surface mount.

HIGH VOLTAGE POWER ASSEMBLIES



All Edal Assemblies are pretested to meet the most rigorous military/industrial applications. All individual diodes are pretested/preselected bulk avalanche diodes. Additional resistive/capacitive compensating network are used to withstand transient conditions. Available in several models, current ranges are from 8 amps to 50 amps, with voltages to 50KV PIV (extendable with series connecting stacks). Current ranges can be extended to 100 amps with forced air or auxillary cooling or full wave or 3-phase connections.

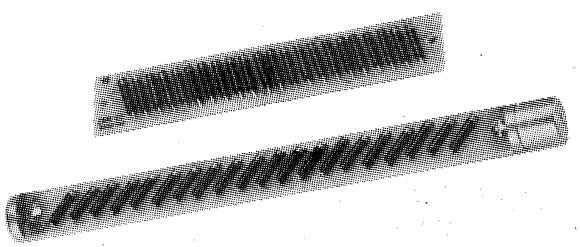
HIGH VOLTAGE RECTIFIERS



From subminiature epoxy package to rugged cartridge and standard modular design packages. Wide range of currents available from 25 milliamps to 6 amps, voltages to 50,000 volts.

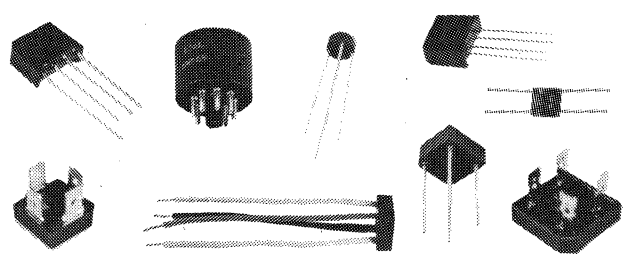
Available in standard and fast recovery types. Higher current rectifiers utilize pretested, preselected double diffused bulk avalanche junctions. Edal rectifiers combine minimum size with maximum power.

HIGH VOLTAGE BOARD ASSEMBLIES



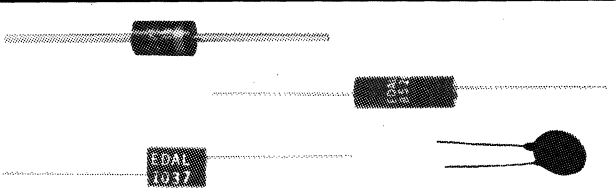
Edal high voltage board assemblies offer maximum power with minimum size. All series available in standard and fast recovery speeds. Special ratings available upon request. Edal high voltage boards available up to 200,000 volts. Can be used in a variety of applications such as x-ray, electrostatic precipitators, heat sealing, AM, FM, and radar transmitters.

BRIDGE RECTIFIERS



Edal offers a wide selection of designs, ratings and terminal styles. Compact designs are available in printed circuit board, medium and high current bridges. Most types available in standard, fast recovery and avalanche characteristics. Many of the high current bridges are also available in center tap or doubler configuration. Standard bridges available in current ranging from 1 amp to 100 amps, voltage up to 1500 V PIV. Special ratings available upon request.

CIRCUIT PROTECTION DEVICES

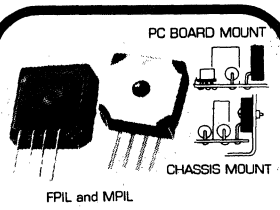


Circuit Protection Devices–Encompass surge suppressors, transient voltage suppressor diodes (TVS), metal oxide varistors (MOV), and noise arrestors are designed for protection of voltage transients and reduction of noise on signal lines. Can also be used to replace copper oxide varistors in telephone equipment. In addition can be used in applications for fractional voltage regulators, negative temperature coefficient resistors, signal limiters and meter protection. Used as protective devices where induced lightning on transmission lines present a hazard to electronic circuitry. Due to good response time, Edal suppressors offer effective clamping action and can be used to protect integrated circuits, MOS devices, hybrids and other voltage sensitive equipment.

EDAL INDUSTRIES INC.
51 Commerce Street, East Haven, CT 06512
Phone: (203) 467-2591 • Fax: (203) 469-5928 • On Line Address: edalind@aol.com

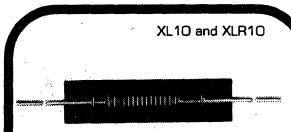
edi® electronic devices, incorporated

since 1951 1-800-678-0828



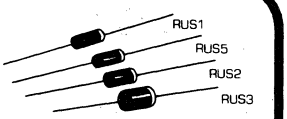
40 A IN-LINE BRIDGES

Space-saving design
Low thermal impedance
Standard, fast, and ultrafast
UL Recognized



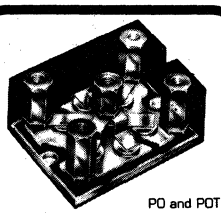
HV X-RAY DIODES

XL10	9KV	220mA	standard
XLR5	5KV	200mA	175ns
XLR10	9KV	200mA	175ns
XLU12	11KV	100mA	50ns
XMU5	5KV	300mA	175ns
XMU10	9KV	300mA	150ns
XMR5	5KV	500mA	150ns



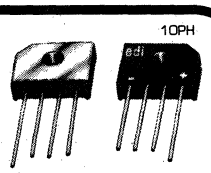
ULTRA-FAST, 1 TO 5A MINIATURE DIODES

PRV to 600V
Current to 5A.
Low forward characteristic
High surge current
Recoveries to 50 ns



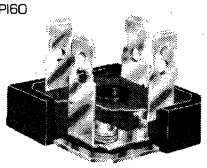
100A, 1ø & 3ø BRIDGES

Rugged compact module
Patented "Porcelainized" heat sink
Low thermal impedance
UL Recognized



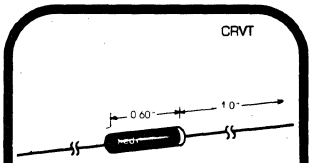
10 A IN-LINE BRIDGES

PC or chassis mount
Integral heat sink for low thermal impedance
300 A surge
UL Recognized
Standard, fast, and ultrafast



60 A BRIDGES

Integral heat sink
Quick connect or wire leads
1,000A surge
Also available in fast recovery
UL Recognized



FAST RECOVERY, 30KV MINIATURE DIODES

15, 20 & 30 KV models
25 mA forward current
Low leakage
Recovery less than 100 ns

SURFACE MOUNT DEVICES

SOT23, SMA, SMB, SMC, SC59

DIODES

Switching, Zeners, Schottky, Ultra-Fast

SURGE SUPPRESSORS

BRIDGE RECTIFIERS

TRANSISTORS

INNOVATIVE RECTIFIER DESIGNS...

and an extensive line of standard types

bridges

- ☐ 1 and 3 phase
- ☐ 36 different models
- ☐ Broad range of package types
- ☐ 0.8 to 100 amps
- ☐ PRV to 1,200V

Standard, fast, and ultrafast, recovery

hv diodes

- ☐ Up to 250KV
- ☐ Current up to 6A
- ☐ Ultra-miniature packaging
- ☐ General purpose diodes

Standard, fast, and ultrafast, recovery

hv assemblies

- ☐ Standard products; blocks, packs, cylinders, night vision, CRT
- ☐ Custom designs
- ☐ PIV to 300KV
- ☐ To 25 amps

Standard, fast, and ultrafast, recovery

EDI has specialized in rectifier devices since 1951. Our fully integrated manufacturing facilities perform all operations from silicon diffusion to packaging. Stringent testing for quality control is performed at every step to provide customers the most reliable high performance rectifiers available today. We will be pleased to provide all the help and technical information you want. Catalogs are available, please give us a call.

CALL US FOR ENGINEERED SOLUTIONS TO YOUR PRODUCT REQUIREMENTS

1-800-678-0828

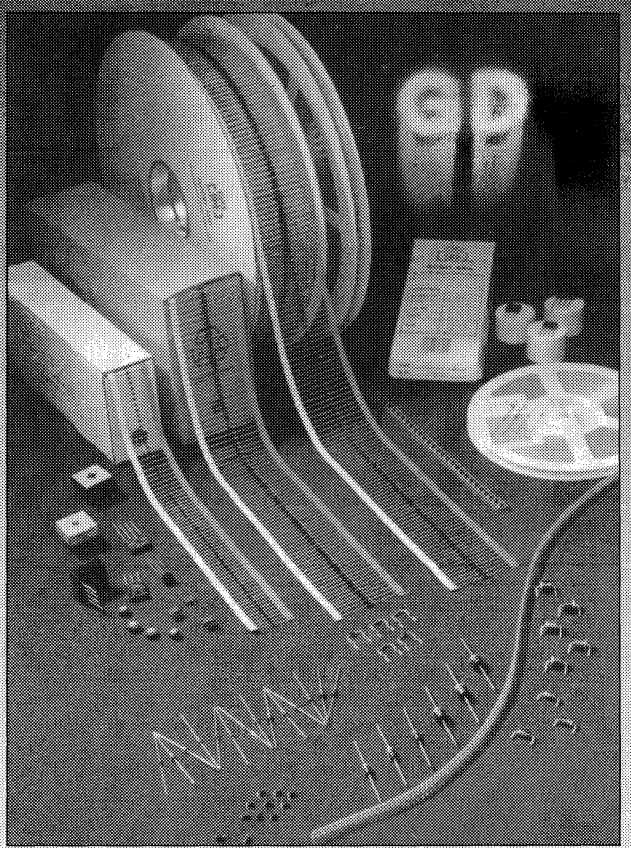
edi® ELECTRONIC DEVICES, INC. edi®
21 GRAY OAKS AVENUE • YONKERS, NEW YORK 10710
914-965-4400 • 1-800-678-0828 • FAX 914-965-5531
E-MAIL: EDI-SALES@INTERNETMCI.COM • WEBSITE: WWW.EDIDIODES.COM

U.S.A. SALES OFFICE

PETER PARTS ELECTRONICS

DIODES & RECTIFIERS

Huge Inventory in U.S.A. and China



- SMT
- Glass Passivated Devices
- General Purpose Silicon Diodes
- Fast Recovery Diodes
- Button Diodes
- Schottky Diodes
- Bridge Rectifiers
- Tape & Reel
- Cut & Form

GOOD-ARK ELECTRONICS CO., LTD.

* First semiconductor factory in China to earn ISO9002

PETER PARTS ELECTRONICS

CALL NOW 716-265-2000

www.peterparts.com
Email: sales@peterparts.com
Call or Email to request our NEW Catalog

RFE INTERNATIONAL

CIRCUIT PROTECTION

METAL OXIDE VARISTORS - TRANSIENT VOLTAGE SUPPRESSOR

Series	Disc Size (mm)	Max Allowable Voltage		Varistor Voltage (V)	MAX Clamping Voltage (V)	Withstanding Surge Current 1 Time (A)	Rated Wattage (W)	Energy (J)
		Vac	Vdc					
JVR05N***K	5	11 ~ 300	14 ~ 385	18 ~ 470	40 ~ 810	100 ~ 400	0.01 ~ 0.1	0.6 ~ 17.5
JVR05S***K	5	50 ~ 300	65 ~ 385	82 ~ 470	145 ~ 810	800	0.1	3.5 ~ 21.0
JVR07N***K	7	11 ~ 300	14 ~ 385	18 ~ 470	36 ~ 775	250 ~ 1,200	0.02 ~ 0.25	1.2 ~ 35.0
JVR07S***K	7	50 ~ 300	65 ~ 385	82 ~ 470	135 ~ 775	1,750	0.25	7.0 ~ 42.0
JVR10N***K	10	11 ~ 680	14 ~ 895	18 ~ 470	38 ~ 1,815	500 ~ 2,500	0.05 ~ 0.4	2.4 ~ 124
JVR10S***K	10	50 ~ 680	65 ~ 895	82 ~ 1100	135 ~ 1,815	3,500	0.4	14 ~ 155
JVR14N***K	14	11 ~ 680	14 ~ 895	18 ~ 1100	36 ~ 1,815	1,000 ~ 4,500	0.1 ~ 0.6	4.7 ~ 248
JVR14S***K	14	50 ~ 680	65 ~ 895	82 ~ 1100	135 ~ 1,815	6,000	0.6	28.0 ~ 310
JVR20N***K	20	50 ~ 680	14 ~ 895	18 ~ 110	36 ~ 1,815	2000 ~ 6500	0.2 ~ 1.0	7.0 ~ 496
JVR20S***K	20	50 ~ 550	65 ~ 745	82 ~ 910	135 ~ 1500	10,000	1	56 ~ 510

*** The varistor voltage

* at 2ms ** at 10 cycles/1000μs

NTC THERMISTORS - IN RUSH CURRENT LIMITER

Series	Diameter (mm)	Resistance Range Ω@25°C	Imax (A)	Resistance Ω@Imax
JNR08S	8	5 ~ 15	2 ~ 3	0.200 ~ 0.643
JNR10S	10	3 ~ 120	1 ~ 5	0.130 ~ 2.200
JNR13S	13	2.5 ~ 25	2 ~ 6	0.098 ~ 0.411
JNR15S	15	1.3 ~ 220	1 ~ 8	0.049 ~ 2.501
JNR20S	20	0.7 ~ 12.0	2 ~ 8	0.320 ~ 1.205

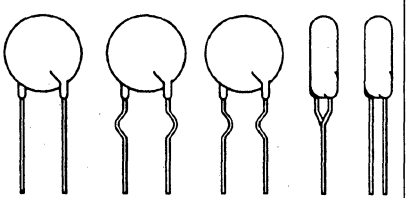
PTC THERMISTORS - OVER CURRENT PROTECTOR

Series	Diameter (mm)	Max Operating Voltage (V)	Resistance Range (Ω@25°C)	Rated Current (mA@25°C)	Max Switching Current (A)
PTC Thermistor for Electronic Ballast					
PTD	6.0 - 12.5	265V	15 ~ 150	40 ~ 175	0.2 ~ 1.2
PTC Thermistor for Circuit Protection					
PTD	7.8 - 9.8	24	3.3 ~ 15	90 ~ 220	190 ~ 460
PTD	7.8	32	22 ~ 33	65 ~ 80	135 ~ 160
PTD	16 - 18.5	140	3.8 ~ 180	35 ~ 330	75 ~ 690
PTD	6.0 - 18.5	265	6 ~ 150	40 ~ 330	80 ~ 660
PTD	7.8	420	600	18	38
PTD	7.8	550	1200 ~ 1500	10 ~ 21	24 ~ 21
PTD	7.8	660	2200	9 ~ 10	18 ~ 21
PTC Thermistor for Telephone Circuit					
PTD	7.6	60	10	100 ~ 180	210 ~ 380

Series	Diameter (mm)	Max Operating Voltage (V)	Resistance Range (Ω@25°C)	Non-Operating Current (A@25°C)
PTC Thermistor for Telephone Exchange				
P06 - P10	6 ~ 9.6	220	15 ~ 35±20%	110

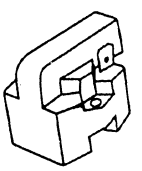
Series	Size (mm)	Max Operating Voltage (V)	Resistance Range (Ω@25°C)	Max Operating Current (A)	Reference Temperature (°C)
PTC Thermistor for Motor Start					
MSC	25x27.5x25	16- ~ 410	3.3 ~ 100	2.5 ~ 12	100 ~ 120

ILLUSTRATIONS

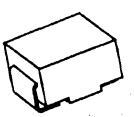


JVR, JNR & PTD

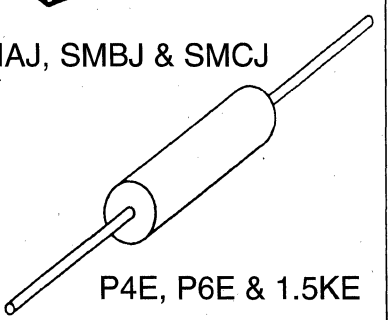
P06 to P10



MSC



SMAJ, SMBJ & SMCJ



P4E, P6E & 1.5KE

TRANSIENT VOLTAGE SUPPRESSORS - DIODES

Surface Mount

Series	PK. Power	Voltage	Package Size (Inch)		
			Width	Length	Thickness
SMAJ	300 W	5 ~ 170	0.105	0.201	0.084
SMBJ	600 W	5 ~ 170	0.14	0.213	0.09
SMCJ	1500 W	5 ~ 170	0.24	0.313	0.091

Axial Leaded

Series	Watts (W)	Package	Notes
P4E6.8 - 400A	400	DO -41	Tol: ±5%
P6E6.8 - 400A	600	DO -15	Also available
1.5KE6.8 - 400A	1500	DO -201	as Bi-Polar

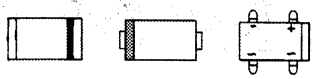
RFE INTERNATIONAL

RFE International Inc. • 20432 Barents Sea Circle, Lake Forest, CA 92630

Tel:(949)583-0808 • Fax:(949)583-9898 • E-Mail: rfeint@Compuserve.com

RFE INTERNATIONAL

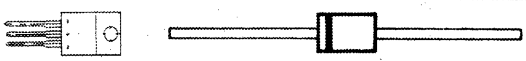
RECTIFIER PRODUCTS



Surface Mount

Series	Product Type	Io (A)	PRV (v)	Package Size (inch)		
				Width	Length	Thickness
S1A ~ J	Rectifier	1.0	50 ~ 600	0.105	0.167	0.084
LL4001 ~ 7G	Rectifier	1.0	50 ~ 1000		MELF DL-41	
RS1A ~ J	Rectifier, Fast Recovery	1.0	50 ~ 600	0.105	0.167	0.084
ES1A ~ D	Rectifier, Super Fast	1.0	50 ~ 200	0.105	0.167	0.084
SS12 ~ 1B	Schottky	1.0	20 ~ 100	0.105	0.167	0.084
LL5817 ~ 9	Schottky	1.0	20 ~ 40		MELF DL-41	
S2A ~ M	Rectifier	1.5	50 ~ 1000	0.140	0.183	0.090
RS2A ~ K	Rectifier, Fast Recovery	1.5	50 ~ 800	0.140	0.183	0.090
ES2A ~ K	Rectifier, Super Fast	2.0	50 ~ 200	0.140	0.183	0.090
SS22 ~ 2B	Schottky	2.0	20 ~ 100	0.140	0.183	0.090
S3A ~ M	Rectifier	3.0	50 ~ 1000	0.23	0.27	0.091
RS3A ~ K	Rectifier, Fast Recovery	3.0	50 ~ 800	0.23	0.27	0.091
ES3A ~ D	Rectifier, Super Fast	3.0	50 ~ 200	0.23	0.27	0.091
SS32 ~ 3B	Schottky	3.0	20 ~ 100	0.23	0.27	0.091
DB101G ~ 7G	Bridge	1.0	50 ~1000	0.250	0.330	0.125
DB151G ~ 7GM	Bridge	1.5	50 ~1000	0.250	0.420	0.125
		PK. Power	Voltage			
SMAJ	TVS Suppressor	300 W	5 ~ 170	0.105	0.167	0.084
SMBJ	TVS Suppressor	600 W	5 ~ 170	0.140	0.185	0.090
SMCJ	TVS Suppressor	1500 W	5 ~ 170	0.240	0.280	0.103

*Surface Mount Zener and Switching Diodes are also available.

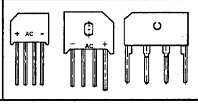
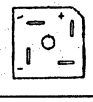


Leaded Rectifiers

Series	Current (A)	PRV (v)	trr (ns)	Package	Notes
Fast Recovery					
SF	1 ~ 16	50 ~ 400	35	Axial/Radial	Glass Passivation
HER	1 ~ 16	50 ~ 800	50 & 80	Axial/Radial	Available
FR	1 ~ 16	50 ~ 1000	150/250/500	Axial/Radial	
Schottky					
IN58——	1 ~ 3	20 ~ 40		DO-41	
SR	1 ~ 16	20 ~ 40		DO-41 ~ TO-220	
Transient Voltage Suppressors					
	Watts				
P4KE6.8 ~ 400A	400			DO-41	Tol: ±5%
P6KE6.8 ~ 400A	600			DO-15	Also available
1.5KE6.8 ~ 400A	1500			DO-201	as Bi-Polar
General Purpose					
IN4001 ~ 7	1.0	50 ~ 1000		DO-41	
IN5391 ~ 9	1.5	50 ~ 1000		DO-15	
2A01 ~ 7	2.0	50 ~ 1000		DO-15	
IN5400 ~ 8	3.0	50 ~ 1000		DO-201AD	Glass Passivation
6A05 ~ 100	6.0	50 ~ 1000		R6	Available
GPA801 ~ 7	8.0	50 ~ 1000		TO-220A	
GPA1601 ~ 7	16.0	50 ~ 1000		TO-220A	
GP1601 ~ 7	16.0	50 ~ 1000		TO-220A	

*Leaded Zener and Switching Diodes are also available.

Bridge Products

Io(A)	DIP	Round	SIP	Square Box	Leads	Square Box	Leads
1	DB10	1WO					
1.5	DB15	WO					
2		2WO	KBP2				
3				SB3	Wire		
4			KBL/KBU/TS4B				
6			KBU6	SB6	Wire/Terminal		
8			KBU8	SB8	Wire		
10.0			KBU10	SB10	Wire		
15.0			GBPC-V TS15P	SB15	Terminal/Wire	GBPC15	Terminal/Wire
25.0			GBPC-V TS25P	SB25	Terminal/Wire	GBPC25	Terminal/Wire
35.0			GBPC-V	SB35	Terminal/Wire	GBPC35	Terminal/Wire
40.0			GBPC-V			GBPC40	Terminal
50.0			GBPC-V			GBPC50	Terminal
Outline							

RFE INTERNATIONAL
RFE International Inc. • 20432 Barents Sea Circle, Lake Forest, CA 92630
Tel:(949)583-0808 • Fax:(949)583-9898 • E-Mail: rfeint@Compuserve.com

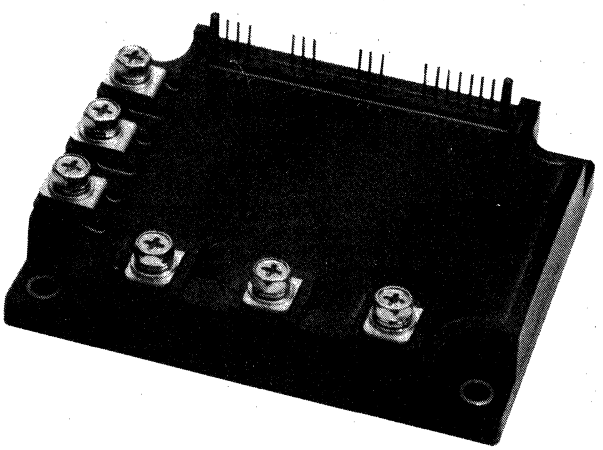
Powerex Technology Has Produced the Best Selection of Rugged and Design-Adaptable Power Modules Available Today.

Like our isolated INTELLIMOD™, which features combined components to allow easy integration, and to reduce circuit design costs, allowing you to get your product to market in half the time. INTELLIMOD™ offers fail-safe protection against excess currents, temperatures, undervoltage lock, and short circuits. Rated 10-600A at 600 and 1200V.

Then there is our family of IGBT isolated modules. Powerex IGBT's outperform the competition when total power loss, system efficiency and reliability are key concerns. Features like square switching safe operating area (SOA), low on state voltage Vce (SAT) and excellent short circuit withstand time make Powerex IGBT's the natural choice for applications requiring maximum durability. The Powerex H-Series family of IGBT's have been designed for optimum switching frequencies of 20-25kHz with the lowest total power loss. The devices are available in ratings from 15-600A at 600V and 15-1000A at 1200V. In order to address 575V line applications, Powerex has developed a 1400V series from 50-1000A and also has a 400A/1700V device available for specific purpose applications.

To choose from lead, stud, disc or modular packages in product lines listed below, or for additional product information and technical support, contact Powerex Technical Marketing Department or Applications Department.

INTELLIMOD™
Design Friendly



IGBT
Performance Tough

- **Standard Rectifiers**
  1.5-4800A, 50-4400V
- **Fast Recovery Rectifiers**
  1.5-1500A, 50-3500V,
  3.25 μsec
- **Phase Control Thyristors**
  .5-2750A, 25-4500V
- **Inverter Grade SCRs**
  63-2360A, 100-3000V,
  10-100 μsec
- **Triacs**
  8-30A, 200-600V
- **INTELLIMOD™ Intelligent Power Modules**
  10-800A/600V
  10-800A/1200V
- **IGBT Power Modules**
  10-600A/600V
  10-1000A/1200V
  50-1000A/1400V
  400-1200A/3300V
  400-1200A/2500V
  400-2000A/1700V
- **GTO Thyristors**
  2000-6000V
  2500-6000V
- **Power Transistors**
  1.5-800A, 40-1200V
- **Darlington Transistor Modules**
  5-1000A, 200-1400V
- **SCR/Diode Isolated Power Modules**
  20-400A, 50-2400V
- **High Power Isolated Modules**
  300-800A, 600-3000V
- **Assemblies**
  .6-8700A, 1-72 kV
- **Isolated Fast and Super Fast Recovery Diode Modules**
  20-400A, 200-500 ηsec

POWEREX

POWEREX, INC. UL® REGISTERED FIRM ISO 9001 A6025

Powerex, Inc., 200 Hillis Street, Youngwood, Pennsylvania 15697-1800, (724) 925-7272
Rapifax: 724/925-4393,
Literature request, call Toll Free: 1-800-451-1415.
http://www.pwrx.com

Shindengen America, Inc.

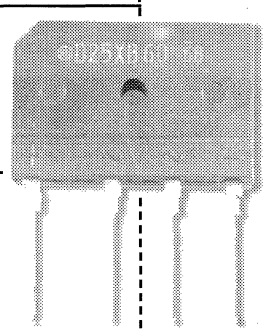
POWER SEMICONDUCTORS

Shindengen power semiconductors mean the highest quality, unexcelled performance and field-proven reliability at competitive prices, ensuring a total cost of procurement among the lowest in the industry. Products include wide variety of: Diodes • MOSFETS • Silicon Transient Surge Suppressors • SIDAC • Bipolar Transistors • Stepping Motor Drivers • Power Modules for Switching Power Supply • Rush Current Suppression Hybrid • Automatic AC Line Voltage Selectors. Packaging includes SMD, DIP and SIP.

For more information, visit our website at www.shindengen.com.

SIP Diode Bridges
for space saving solutions in Power Supply & Motor Designs

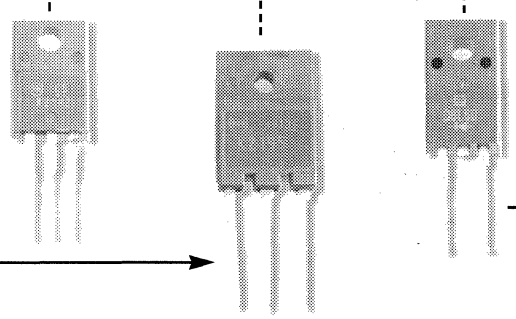
Forward Rectified Currents
Range1A to 25A
Reverse Voltage
800V @ 25A



UL Recognition
Low Noise Versions

Schottky (4A & 10A versions) and MOSFET (450V, 12A & .62ohms) Bridges included in product line

Global Technology **Local Presence**

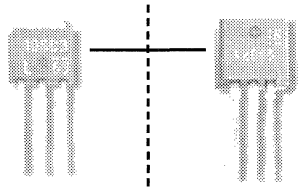


MOSFET families
60V
600V & 900V

Power Diodes and Transistors
in Isolated TO-220 and TO-247 Packaging

Single/Dual Diode Versions
Schottky - V_F = 0.45V
Fast Recovery - t_{rr} = 35ns

Extensive product selection of Diodes with wide range of rectified forward currents MOSFETs with wide range of drain currents. Eliminates the need to isolate device in manufacturing.



Non-isolated versions also available in low profile D & D² type packaging

800-543-6525 • www.shindengen.com

semitronics
64 Commercial Street
Freeport, NY 11520

For complete specifications, samples
& technical assistance: Tel: (516) 623-9400
Fax: (516) 623-6954 • Toll Free: 800-926-SEMI
e-mail: semitron@aol.com
www.semitronics.thomasregister.com

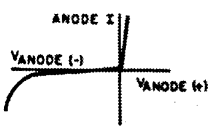
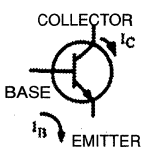
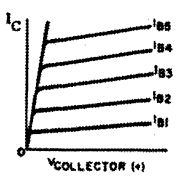
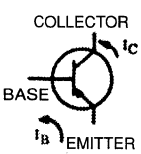
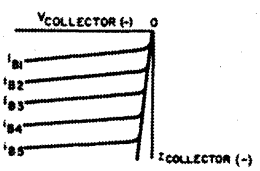
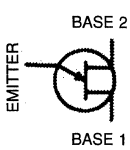
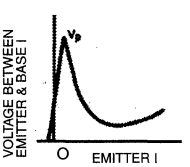
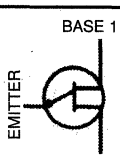
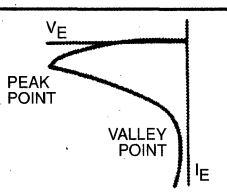
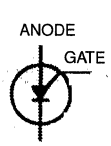
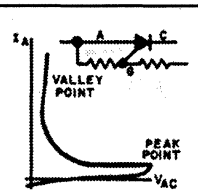
RECTIFIERS
- Silicon Rectifiers
- Fast Recovery Rectifiers
- Bridge Rectifiers
- Schottky Rectifiers
- Ultra Efficient Rectifiers
- High Voltage Assemblies
- Power Rectifiers

THYRISTORS (SCR)
- Inverters
- Phase
- Asymmetrical

TRANSISTORS
- Silicon Power Transistors
- Metal Can Transistors
- Silicon Switch Transistors
- Small Signal Transistors
- Unijunctions - Programmable & Bipolar
- Radio Frequency (RF)

BI-DIRECTIONAL TRIGGER DEVICES
- Diacs
- Sidacs
- Triacs

High Reliability Screening Available. Consult factory for details.

NAME OF DEVICE	CIRCUIT SYMBOL	ELECTRICAL CHARACTERISTICS		MAJOR APPLICATIONS	NOTES
Diode or Rectifier			Conducts easily in one direction, blocks in the other	Rectification Blocking Detecting Steering	Switching Phase High Speed Ultra Fast Schottky
n-p-n Transistor			Constant collector current for given base drive	Amplification Switching Oscillation	Small Signal Power Bi-Polar Hermetic
p-n-p Transistor			Complement to n-p-n translator	Amplification Switching Oscillation	Small Signal Power Bi-Polar Hermetic
Unijunction Transistor (UJT)			Unijunction emitter blocks until its voltage reaches V_p; then conducts	Interval timing Oscillation Level Detector SCR Trigger	2N2646 2N2647 2N489-494 2N4948-9 2N4851-3
Complementary Unijunction Transistor (CUJT)			Functional complement to UJT	High Stability timers Oscillators and level detectors	2N6114 2N6115 D5K1 D5K2
Programmable Unijunction Transistor (PUT)			Programmed by two resistors for V_p, I_p, I_v. Function equivalent to normal UJT	Low cost timers and oscillators Long period timers SCR trigger level detector	2N6116 2N6117 2N6118 2N6119 2N6137

semitronics HI-REL AND BEYOND

NEW ENGLAND/INTERNATIONAL
400 West Cummings Park
Woburn, MA 01801
(781) 935-2150 • Fax: (781) 935-6637

EAST
64 Commercial Street
Freeport, NY 11520
(516) 623-9400 • Fax: (516) 623-6954

MID WEST
496 Windsor Park Drive
Dayton, OH 45459
(937) 435-6600 • Fax: (937) 435-1074

WEST
2659 Townsgate Road - Suite 101
Westlake Village, CA 91361
(805) 373-6850 • Fax: (805) 379-3801

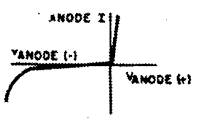
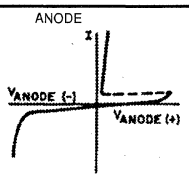
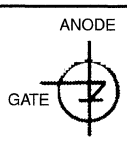
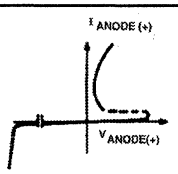
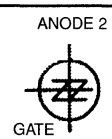
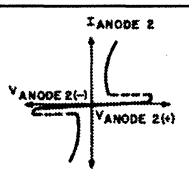
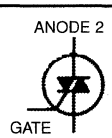
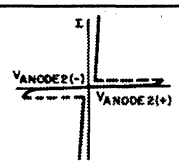
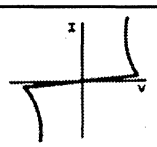
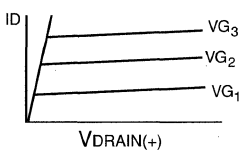
DIODES
- Transient Voltage Suppressors (TVS)
- Zener Diodes
- Silicon Signal Diodes
- Tuning Diodes
- High Voltage Diodes
- Diode Assemblies

OPTO ELECTRONICS
- Mosfet Drivers
- Opto-Couplers
- Zero Crossing Triacs

SOLID STATE RELAYS
- Optically Isolated
- Bi-Directional
- Current & Thermal Shut-Off
- DESC Approved

HYBRIDS
- Multichip Modules
- Chip & Wire
- Custom Military, Medical & Commercial Applications

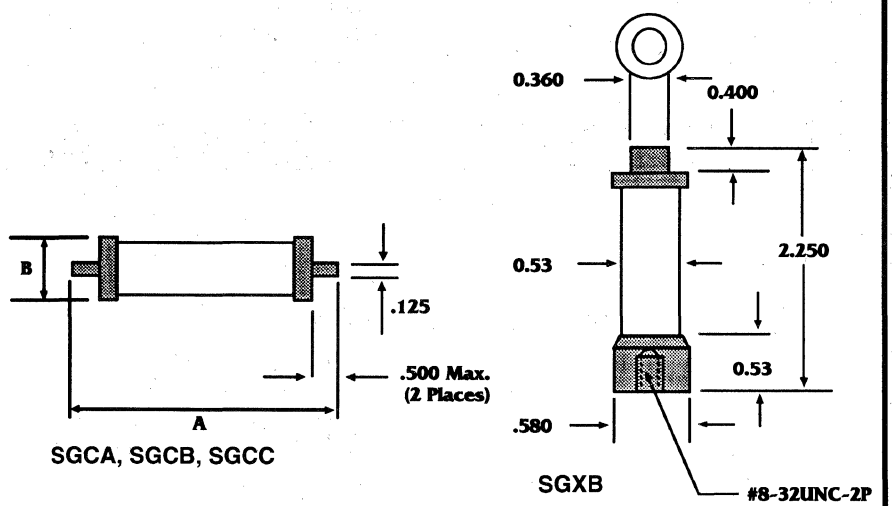
JAN/JANTX Qualified to MIL-PRF-19500 DMS

NAME OF DEVICE	CIRCUIT SYMBOL	ELECTRICAL CHARACTERISTICS		MAJOR APPLICATIONS	NOTES
Zener Diode			Conducts easily in one direction, blocks in the other until threshold voltage is reached	Power Supply Voltage Protection Triggering	Lead Mount Power Hermetic Metal
Silicon Controlled Rectifier (SCR)			With anode voltage (+), SCR can be triggered by I_g, remaining in conduction until anode I is reduced to zero	Power Switching Phase Control Inverters Choppers	Plastic Stud Hockey Puck Press-Pak
Silicon Unilateral Switch (SUS)			Similar to SCS but zener added to anode gate to trigger device into conduction at ~ 8 volts. Can also be triggered by negative pulse at gate lead.	Switching Circuits Counters SCR Trigger Oscillator	Plastic TO92 Metal TO18 Hermetic
Silicon Bilateral Switch (SBS)			Symmetrical bilateral version of the SUS. Breaks down in both directions as SUS does in forward.	Switching Circuits Counters TRIAC Phase control	Plastic TO92 Metal TO18 Hermetic
Triac			Operates similar to SCR except can be triggered into conduction in either direction by (+) or (-) gate signal	A/C switching Phase control Relay replacement	Plastic Metal Iso and Non-Iso Stud
Diac Trigger			When voltage reaches trigger level (about 35 volts), abruptly switches down about 10volts.	Triac and SCR Trigger Oscillator	Lead Mount Plastic
MOS Transistor			Conducts to low on resistance with applied gate voltage	High Power Switching Amplification Controls	High Speed Switching Low Input Current Low on Resistance TO-3, 5, 61, 66, 254, 257, 258 LCC Packages

Victoreen Components
Phone: 440-248-9300 Fax: 440-248-9301
www.victoreen.com

CERAMIC SPARK GAPS

Outline drawing for "Ceramic Spark Gap" series



FEATURES

- Energy discharge capability up to 70% better than similar spark gaps
- Extended life cycle without permanent degradation of breakdown voltage

CHARACTERISTICS

- Breakdown Voltage: 1,000V - 35,000V
- Maximum Energy Pulse: 100 Joules
- Tolerance: typically ±10%

APPLICATIONS

- Ideal for ignition or overvoltage protection applications
- Spark gaps capable of meeting various AC. requirements

TYPICAL DATA FOR COMMON TYPES OF SPARK GAPS

Victoreen Type	D.C. Firing Voltage Range	Tolerance	Maximum Energy** Pulse	Dimensions (inches)	
				A	B
SGCA	1,000 V - 12,000 V	±10%	100 Joules	1.93 Ref.	.562 Ref.
SGCB	12,000 V - 20,000 V	±10%	100 Joules	2.18 Ref.	.562 Ref.
SGCC	20,000 V - 35,000 V	±10%	100 Joules	2.60 Ref.	.562 Ref.
SGXB	17,500 V	±10%	100 Joules	See outline drawing	

Notes:

*D.C. Voltage is defined with a ramp rate of less than 5 volts/microsecond. A typical firing time of 1 microsecond or less could result in some erratic behavior, depending on the ramp rate of the pulse.

**The Maximum energy pulse stated is for a single pulse application only. Contact Victoreen's Application Engineering Department for pulse life information for lower energy/pulse applications.

W O R L D P R O D U C T S

SEMITRON TRANSIENT VOLTAGE SUPPRESSION DIODES (TVS) – SURFACE MOUNT

PART NUMBER*	Uni Part Marking	Bi Part Marking	Rated Standoff Voltage V_{WM} (Volts)	Breakdown Voltage V_{BR} (Volts) Min	Breakdown Voltage @ I_T (mA)	Maximum Stand By Current @ V_{WM}+ I_D (Volts)	Maximum Clamping Voltage @ I_{PPM} 10/1000µs V_C Max (Volts)	Rated Peak Impulse Current I_{PPM} 10/1000µs (Amperes)
SMBJ5.0	KD	AD	5.0	6.40	10	800.0	9.6	62.5
SMBJ5.0A	KE	AE	5.0	6.40	10	800.0	9.2	65.2
SMBJ6.0	KF	AF	6.0	6.67	10	800.0	11.4	52.6
SMBJ6.0A	KG	AG	6.0	6.67	10	800.0	10.3	58.3
SMBJ6.5	KH	AH	6.5	7.22	10	500.0	12.3	48.7
SMBJ6.5A	KK	AK	6.5	7.22	10	500.0	11.2	53.6
SMBJ7.0	KL	AL	7.0	7.78	10	200.0	13.3	45.1
SMBJ7.0A	KM	AM	7.0	7.78	10	200.0	12.0	50.0
SMBJ7.5	KN	AN	7.5	8.33	1	100.0	14.3	42.0
SMBJ7.5A	KP	AP	7.5	8.33	1	100.0	12.9	46.5
SMBJ8.0	KQ	AQ	8.0	8.89	1	50.0	15.0	40.0
SMBJ8.0A	KR	AR	8.0	8.89	1	50.0	13.6	44.1
SMBJ8.5	KS	AS	8.5	9.44	1	20.0	15.9	37.7
SMBJ8.5A	KT	AT	8.5	9.44	1	20.0	14.4	41.7
SMBJ9.0	KU	AU	9.0	10.00	1	10.0	16.9	35.5
SMBJ9.0A	KV	AV	9.0	10.00	1	10.0	15.4	39.0
SMBJ10	KW	AW	10.0	11.10	1	5.0	18.8	31.9
SMBJ10A	KX	AX	10.0	11.10	1	5.0	17.0	35.3
SMBJ11	KY	AY	11.0	12.20	1	5.0	20.1	29.9
SMBJ11A	KZ	AZ	11.0	12.20	1	5.0	18.2	33.0
SMBJ12	LD	BD	12.0	13.30	1	5.0	22.0	27.3
SMBJ12A	LE	BE	12.0	13.30	1	5.0	19.9	30.2
SMBJ13	LF	BF	13.0	14.40	1	5.0	23.8	25.2
SMBJ13A	LG	BG	13.0	14.40	1	5.0	21.5	27.9
SMBJ14	LH	BH	14.0	15.60	1	5.0	25.8	23.3
SMBJ14A	LK	BK	14.0	15.60	1	5.0	23.2	25.8
SMBJ15	LL	BL	15.0	16.70	1	5.0	26.9	22.3
SMBJ15A	LM	BM	15.0	16.70	1	5.0	24.4	24.0
SMBJ16	LN	BN	16.0	17.80	1	5.0	28.8	20.8
SMBJ16A	LP	BP	16.0	17.80	1	5.0	26.0	23.1
SMBJ17	LQ	BQ	17.0	18.90	1	5.0	30.5	19.7
SMBJ17A	LR	BR	17.0	18.90	1	5.0	27.6	21.7
SMBJ18	LS	BS	18.0	20.00	1	5.0	32.2	18.6
SMBJ18A	LT	BT	18.0	20.00	1	5.0	29.2	20.5
SMBJ20	LU	BU	20.0	22.20	1	5.0	35.8	16.7
SMBJ20A	LV	BV	20.0	22.20	1	5.0	32.4	18.5
SMBJ22	LW	BW	22.0	24.40	1	5.0	39.4	15.2
SMBJ22A	LX	BX	22.0	24.40	1	5.0	35.5	16.9
SMBJ24	LY	BY	24.0	26.70	1	5.0	43.0	14.0
SMBJ24A	LZ	BZ	24.0	26.70	1	5.0	38.9	15.4
SMBJ26	MD	CD	26.0	28.90	1	5.0	46.6	12.4
SMBJ26A	ME	CE	26.0	28.90	1	5.0	42.1	14.2
SMBJ28	MF	CF	28.0	31.10	1	5.0	50.4	12.0
SMBJ28A	MG	CG	28.0	31.10	1	5.0	45.4	13.2
SMBJ30	MH	CH	30.0	33.30	1	5.0	53.5	11.2
SMBJ30A	MK	CK	30.0	33.30	1	5.0	46.6	12.4
SMBJ33	ML	CL	33.0	36.70	1	5.0	59.0	10.2
SMBJ33A	MM	CM	33.0	36.70	1	5.0	53.3	11.3
SMBJ36	MN	CN	36.0	40.00	1	5.0	64.3	9.3
SMBJ36A	MP	CP	36.0	40.00	1	5.0	58.1	10.3
SMBJ40	MQ	CQ	40.0	44.40	1	5.0	71.4	8.4
SMBJ40A	MR	CR	40.0	44.40	1	5.0	64.5	9.3
SMBJ43	MS	CS	43.0	47.80	1	5.0	76.7	7.8
SMBJ43A	MT	CT	43.0	47.80	1	5.0	69.4	8.6
SMBJ45	MU	CU	45.0	50.00	1	5.0	80.3	7.5
SMBJ45A	MV	CV	45.0	50.00	1	5.0	72.7	8.3
SMBJ48	MW	CW	48.0	53.30	1	5.0	85.5	7.0
SMBJ48A	MX	CX	48.0	53.30	1	5.0	77.4	7.7
SMBJ51	MY	CY	51.0	56.70	1	5.0	91.1	6.6
SMBJ51A	MZ	CZ	51.0	56.70	1	5.0	82.4	7.3
SMBJ54	ND	DD	54.0	60.00	1	5.0	96.3	6.2
SMBJ54A	NE	DE	54.0	60.00	1	5.0	87.1	6.9
SMBJ58	NF	DF	58.0	64.40	1	5.0	103.0	5.8
SMBJ58A	NG	DG	58.0	64.40	1	5.0	93.6	6.4
SMBJ60	NH	DH	60.0	66.70	1	5.0	107.0	5.6
SMBJ60A	NK	DK	60.0	66.70	1	5.0	96.8	6.2
SMBJ64	NL	DL	64.0	71.10	1	5.0	114.0	5.3
SMBJ64A	NM	DM	64.0	71.10	1	5.0	103.0	5.8
SMBJ70	NN	DN	70.0	77.80	1	5.0	125.0	4.8
SMBJ70A	NP	DP	70.0	77.80	1	5.0	113.0	5.3
SMBJ75	NQ	DQ	75.0	83.30	1	5.0	134.0	4.5
SMBJ75A	NR	DR	75.0	83.30	1	5.0	121.0	4.9
SMBJ78	NS	DS	78.0	86.70	1	5.0	139.0	4.3
SMBJ78A	NT	DT	78.0	86.70	1	5.0	126.0	4.7
SMBJ85	NU	DU	85.0	94.40	1	5.0	151.0	3.9
SMBJ85A	NV	DV	85.0	94.40	1	5.0	137.0	4.4
SMBJ90	NW	DW	90.0	100.00	1	5.0	160.0	3.8
SMBJ90A	NX	DX	90.0	100.00	1	5.0	146.0	4.1
SMBJ100	NY	DY	100.0	111.00	1	5.0	179.0	3.4
SMBJ100A	NZ	DZ	100.0	111.00	1	5.0	162.0	3.7
SMBJ110	PD	ED	110.0	122.00	1	5.0	196.0	3.0
SMBJ110A	PE	EE	110.0	122.00	1	5.0	177.0	3.4
SMBJ120	PF	EF	120.0	133.00	1	5.0	214.0	2.8
SMBJ120A	PG	EG	120.0	133.00	1	5.0	193.0	3.1
SMBJ130	PH	EH	130.0	144.00	1	5.0	231.0	2.6
SMBJ130A	PK	EK	130.0	144.00	1	5.0	209.0	2.9
SMBJ150	PL	EL	150.0	167.00	1	5.0	268.0	2.2
SMBJ150A	PM	EM	150.0	167.00	1	5.0	243.0	2.5
SMBJ160	PN	EN	160.0	178.00	1	5.0	287.0	2.1
SMBJ160A	PP	EP	160.0	178.00	1	5.0	259.0	2.3
SMBJ170	PQ	EQ	170.0	189.00	1	5.0	304.0	2.0
SMBJ170A	PR	ER	170.0	189.00	1	5.0	275.0	2.2

* Add suffix "C" or "CA" for bidirectional device types.
\+ For bidirectional types having $V_{WM} \leq 10V$, their I_D limit is doubled.

SMA and SMC also available!

WORLD PRODUCTS INC.
19654 8TH ST. EAST, SONOMA, CA 95476 PHONE (707) 996-5201 FAX (707) 996-3380
Internet: www.worldproducts.com • E-Mail: ppgsales@worldproducts.com

SEE OUR OTHER DATA PAGES IN SECTIONS 1500, 1850, 2460, 4300 AND 4700

W O R L D P R O D U C T S

SEMITRON TRANSIENT VOLTAGE SUPPRESSION DIODES (TVS) – 600 WATT

PART NUMBER*	Rated Standoff Voltage V_{WM} (Volts)	Breakdown Voltage V_{BR} (Volts) Min	Breakdown Voltage V_{BR} (Volts) Max	@ I_T (mA)	Maximum Stand By Current @ V_{WM}+ I_D (Volts)	Maximum Clamping Voltage @ I_{PPM} 10/1000µs V_C Max (µA)	Rated Peak Impulse Current I_{PPM} 10/1000µs (Amperes)	Temperature Coefficient of V_{BR} (%/°C)
1.5KE6.8	5.50	6.12	7.48	10	1000	10.8	139.0	5.0
1.5KE6.8A	5.80	6.45	7.14	10	1000	10.5	143.0	5.0
1.5KE7.5	6.05	6.75	8.25	10	500	11.7	128.0	5.0
1.5KE7.5A	6.40	7.13	7.88	10	500	11.3	132.0	5.0
1.5KE8.2	6.63	7.38	9.02	10	200	12.5	120.0	6.0
1.5KE8.2A	7.02	7.79	8.61	10	200	12.1	124.0	6.0
1.5KE9.1	7.37	8.19	10.0	1	50	13.8	109.0	7.0
1.5KE9.1A	7.78	8.65	9.55	1	50	13.4	112.0	7.0
1.5KE10	8.10	9.00	11.0	1	10	15.0	100.0	8.0
1.5KE10A	8.55	9.5	10.5	1	10	14.5	103.0	8.0
1.5KE11	8.92	9.9	12.1	1	5	16.2	93.0	9.0
1.5KE11A	9.40	10.5	11.6	1	5	15.6	96.0	9.0
1.5KE12	9.72	10.8	13.2	1	5	17.3	87.0	10.0
1.5KE12A	10.2	11.4	12.6	1	5	16.7	90.0	10.0
1.5KE13	10.5	11.7	14.3	1	5	19.0	79.0	11.0
1.5KE13A	11.1	12.4	13.7	1	5	18.2	82.0	11.0
1.5KE15	12.1	13.5	16.5	1	5	22.0	68.0	13.0
1.5KE15A	12.8	14.3	15.8	1	5	21.2	71.0	12.0
1.5KE16	12.9	14.4	17.6	1	5	23.5	64.0	16.0
1.5KE16A	13.6	15.2	16.8	1	5	22.5	67.0	14.0
1.5KE18	14.5	16.2	19.8	1	5	26.5	56.5	17.0
1.5KE18A	15.3	17.1	18.9	1	5	25.2	59.5	19.0
1.5KE20	16.2	18.0	22.0	1	5	29.1	51.5	20.0
1.5KE20A	17.1	19.0	21.0	1	5	27.7	54.0	19.0
1.5KE22	17.8	19.8	24.2	1	5	31.9	47.0	21.0
1.5KE22A	18.8	20.9	23.1	1	5	30.6	49.0	20.0
1.5KE24	19.4	21.6	26.4	1	5	34.7	43.0	25.0
1.5KE24A	20.5	22.8	25.2	1	5	33.2	45.0	23.0
1.5KE27	21.8	24.3	29.7	1	5	39.1	38.5	28.0
1.5KE27A	23.1	25.7	28.4	1	5	37.5	40.0	25.0
1.5KE30	24.3	27.0	33.0	1	5	43.5	34.5	31.0
1.5KE30A	25.6	28.5	31.5	1	5	41.4	36.0	28.0
1.5KE33	26.8	29.7	36.3	1	5	47.7	31.5	31.0
1.5KE33A	28.2	31.4	34.7	1	5	45.7	33.0	20.0
1.5KE36	29.1	32.4	39.6	1	5	52.0	29.0	35.0
1.5KE36A	30.8	34.2	37.8	1	5	49.9	30.0	31.0
1.5KE39	31.6	35.1	42.9	1	5	56.4	26.5	39.0
1.5KE39A	33.3	37.1	41.0	1	5	53.9	28.0	36.0
1.5KE43	34.8	38.7	47.3	1	5	61.9	24.0	46.0
1.5KE43A	36.8	40.9	45.2	1	5	59.3	25.3	44.0
1.5KE47	38.1	42.3	51.7	1	5	67.8	22.2	50.0
1.5KE47A	40.2	44.7	49.4	1	5	64.8	23.2	48.0
1.5KE51	41.3	45.9	56.1	1	5	73.5	20.4	55.0
1.5KE51A	43.6	48.5	53.6	1	5	70.1	21.4	51.0
1.5KE56	45.4	50.4	61.6	1	5	80.5	18.6	58.0
1.5KE56A	47.8	53.2	58.8	1	5	77.0	19.5	56.0
1.5KE62	50.2	55.8	68.2	1	5	89.0	16.9	65.0
1.5KE62A	53.0	58.9	65.1	1	5	85.0	17.7	62.0
1.5KE68	55.1	61.2	74.8	1	5	98.0	15.3	71.0
1.5KE68A	58.1	64.6	71.4	1	5	92.0	16.3	69.0
1.5KE75	60.7	67.5	82.5	1	5	108.0	13.9	80.0
1.5KE75A	64.1	71.3	78.8	1	5	103.0	14.6	76.0
1.5KE82	66.4	73.8	90.2	1	5	118.0	12.7	90.0
1.5KE82A	70.1	77.9	86.1	1	5	113.0	13.3	86.0
1.5KE91	73.7	81.9	100.0	1	5	131.0	11.4	99.0
1.5KE91A	77.8	86.5	95.5	1	5	125.0	12.0	94.0
1.5KE100	81.0	90.0	110.0	1	5	144.0	10.4	109.0
1.5KE100A	85.5	95.0	105.0	1	5	137.0	11.0	104.0
1.5KE110	89.2	99.0	121.0	1	5	158.0	9.5	120.0
1.5KE110A	94.0	105.0	116.0	1	5	152.0	9.9	115.0
1.5KE120	97.2	108.0	132.0	1	5	173.0	8.7	131.0
1.5KE120A	102.0	114.0	126.0	1	5	165.0	9.1	125.0
1.5KE130	105.0	117.0	143.0	1	5	187.0	8.0	142.0
1.5KE130A	111.0	124.0	137.0	1	5	179.0	8.4	136.0
1.5KE150	121.0	135.0	165.0	1	5	215.0	7.0	164.0
1.5KE150A	128.0	143.0	158.0	1	5	207.0	7.2	157.0
1.5KE160	130.0	144.0	176.0	1	5	230.0	6.5	175.0
1.5KE160A	136.0	152.0	168.0	1	5	219.0	6.8	167.0
1.5KE170	138.0	153.0	187.0	1	5	244.0	6.2	186.0
1.5KE170A	145.0	162.0	179.0	1	5	234.0	6.4	188.0
1.5KE180	146.0	162.0	198.0	1	5	258.0	5.8	197.0
1.5KE180A	154.0	171.0	189.0	1	5	246.0	6.1	188.0
1.5KE200	162.0	180.0	220.0	1	5	287.0	5.2	219.0
1.5KE200A	171.0	190.0	210.0	1	5	274.0	5.5	209.0
1.5KE220	175.0	198.0	242.0	1	5	344.0	4.3	240.0
1.5KE220A	185.0	209.0	231.0	1	5	328.0	4.6	230.0
1.5KE250	202.0	225.0	275.0	1	5	360.0	5.0	270.0
1.5KE250A	214.0	237.0	263.0	1	5	344.0	5.0	260.0
1.5KE300	243.0	270.0	330.0	1	5	430.0	5.0	330.0
1.5KE300A	256.0	285.0	315.0	1	5	414.0	5.0	315.0
1.5KE350	284.0	315.0	385.0	1	5	504.0	4.0	385.0
1.5KE350A	300.0	332.0	368.0	1	5	482.0	4.0	368.0
1.5KE400	324.0	360.0	440.0	1	5	574.0	4.0	440.0
1.5KE400A	342.0	380.0	420.0	1	5	548.0	4.0	420.0

* Add suffix "C" or "CA" for bidirectional device types.
\+ For bidirectional types having $V_{WM} \leq 10V$, their I_D limit is doubled.

WORLD PRODUCTS INC.
19654 8TH ST. EAST, SONOMA, CA 95476 PHONE (707) 996-5201 FAX (707) 996-3380
Internet: www.worldproducts.com • E-Mail: ppgsales@worldproducts.com

SEE OUR OTHER DATA PAGES IN SECTIONS 1500, 1850, 2460, 4300 AND 4700

W O R L D P R O D U C T S

SEMITRON TRANSIENT VOLTAGE SUPPRESSION DIODES (TVS) – 1500 WATT

PART NUMBER*	Rated Standoff Voltage V_{WM} (Volts)	Breakdown Voltage V_{BR} (Volts) Min	Breakdown Voltage V_{BR} (Volts) Max	@ I_T (mA)	Maximum Stand By Current @ V_{WM}+ I_D (Volts)	Maximum Clamping Voltage @ I_{PPM} 10/1000µs V_C Max (µA)	Rated Peak Impulse Current I_{PPM} 10/1000µs (Amperes)	Temperature Coefficient of V_{BR} (mV/°C)
P6KE6.8	5.50	6.12	7.48	10	1000	10.8	56	5.0
P6KE6.8A	5.80	6.45	7.14	10	1000	10.5	57	5.0
P6KE7.5	6.05	6.75	8.25	10	500	11.7	51	5.0
P6KE7.5A	6.40	7.13	7.88	10	500	11.3	53	5.0
P6KE8.2	6.63	7.38	9.02	10	200	12.5	48	6.0
P6KE8.2A	7.02	7.79	8.61	10	200	12.1	50	6.0
P6KE9.1	7.37	8.19	10.0	1	50	13.8	44	7.0
P6KE9.1A	7.78	8.65	9.55	1	50	13.4	45	7.0
P6KE10	8.10	9.00	11.0	1	10	15.0	40	8.0
P6KE10A	8.55	9.5	10.5	1	10	14.5	41	8.0
P6KE11	8.92	9.9	12.1	1	5	16.2	37	9.0
P6KE11A	9.40	10.5	11.6	1	5	15.6	38	9.0
P6KE12	9.72	10.8	13.2	1	5	17.3	35	10.0
P6KE12A	10.2	11.4	12.6	1	5	16.7	36	10.0
P6KE13	10.5	11.7	14.3	1	5	19.0	32	11.0
P6KE13A	11.1	12.4	13.7	1	5	18.2	33	11.0
P6KE15	12.1	13.5	16.5	1	5	22.0	27	13.0
P6KE15A	12.8	14.3	15.8	1	5	21.2	28	12.0
P6KE16	12.9	14.4	17.6	1	5	23.5	26	16.0
P6KE16A	13.6	15.2	16.8	1	5	22.5	27	14.0
P6KE18	14.5	16.2	19.8	1	5	26.5	23	17.0
P6KE18A	15.3	17.1	18.9	1	5	25.2	24	19.0
P6KE20	16.2	18.0	22.0	1	5	29.1	21	20.0
P6KE20A	17.1	19.0	21.0	1	5	27.7	22	19.0
P6KE22	17.8	19.8	24.2	1	5	31.9	19	21.0
P6KE22A	18.8	20.9	23.1	1	5	30.6	20	20.0
P6KE24	19.4	21.6	26.4	1	5	34.7	17	25.0
P6KE24A	20.5	22.8	25.2	1	5	33.2	18	23.0
P6KE27	21.8	24.3	29.7	1	5	39.1	15	28.0
P6KE27A	23.1	25.7	28.4	1	5	37.5	16	25.0
P6KE30	24.3	27.0	33.0	1	5	43.5	14	31.0
P6KE30A	25.6	28.5	31.5	1	5	41.4	14.4	28.0
P6KE33	26.8	29.7	36.3	1	5	47.7	12.6	31.0
P6KE33A	28.2	31.4	34.7	1	5	45.7	13.2	20.0
P6KE36	29.1	32.4	39.6	1	5	52.0	11.6	35.0
P6KE36A	30.8	34.2	37.8	1	5	49.9	12.0	31.0
P6KE39	31.6	35.1	42.9	1	5	56.4	10.5	39.0
P6KE39A	33.3	37.1	41.0	1	5	53.9	11.2	36.0
P6KE43	34.8	38.7	47.3	1	5	61.9	9.6	46.0
P6KE43A	36.8	40.9	45.2	1	5	59.3	10.1	44.0
P6KE47	38.1	42.3	51.7	1	5	67.8	8.9	50.0
P6KE47A	40.2	44.7	49.4	1	5	64.8	9.3	48.0
P6KE51	41.3	45.9	56.1	1	5	73.5	8.2	55.0
P6KE51A	43.6	48.5	53.6	1	5	70.1	8.6	51.0
P6KE56	45.4	50.4	61.6	1	5	80.5	7.4	58.0
P6KE56A	47.8	53.2	58.8	1	5	77.0	7.8	56.0
P6KE62	50.2	55.8	68.2	1	5	89.0	6.8	65.0
P6KE62A	53.0	58.9	65.1	1	5	85.0	7.1	62.0
P6KE68	55.1	61.2	74.8	1	5	98.0	6.1	71.0
P6KE68A	58.1	64.6	71.4	1	5	92.0	6.5	69.0
P6KE75	60.7	67.5	82.5	1	5	108.0	5.5	80.0
P6KE75A	64.1	71.3	78.8	1	5	103.0	5.8	76.0
P6KE82	66.4	73.8	90.2	1	5	118.0	5.1	90.0
P6KE82A	70.1	77.9	86.1	1	5	113.0	5.3	86.0
P6KE91	73.7	81.9	100.0	1	5	131.0	4.5	99.0
P6KE91A	77.8	86.5	95.5	1	5	125.0	4.8	94.0
P6KE100	81.0	90.0	110.0	1	5	144.0	4.2	109.0
P6KE100A	85.5	95.0	105.0	1	5	137.0	4.4	104.0
P6KE110	89.2	99.0	121.0	1	5	158.0	3.8	120.0
P6KE110A	94.0	105.0	116.0	1	5	152.0	4.0	115.0
P6KE120	97.2	108.0	132.0	1	5	173.0	3.5	131.0
P6KE120A	102.0	114.0	126.0	1	5	165.0	3.6	125.0
P6KE130	105.0	117.0	143.0	1	5	187.0	3.2	142.0
P6KE130A	111.0	124.0	137.0	1	5	179.0	3.3	136.0
P6KE150	121.0	135.0	165.0	1	5	215.0	2.8	164.0
P6KE150A	128.0	143.0	158.0	1	5	207.0	2.9	157.0
P6KE160	130.0	144.0	176.0	1	5	230.0	2.6	175.0
P6KE160A	136.0	152.0	168.0	1	5	219.0	2.7	167.0
P6KE170	138.0	153.0	187.0	1	5	244.0	2.5	186.0
P6KE170A	145.0	162.0	179.0	1	5	234.0	2.6	188.0
P6KE180	146.0	162.0	198.0	1	5	258.0	2.3	197.0
P6KE180A	154.0	171.0	189.0	1	5	246.0	2.4	188.0
P6KE200	162.0	180.0	220.0	1	5	287.0	2.1	219.0
P6KE200A	171.0	190.0	210.0	1	5	274.0	2.2	209.0
P6KE220	175.0	198.0	242.0	1	5	344.0	1.75	240.0
P6KE220A	185.0	209.0	231.0	1	5	328.0	1.83	230.0
P6KE250	202.0	225.0	275.0	1	5	360.0	1.67	270.0
P6KE250A	214.0	237.0	263.0	1	5	344.0	1.75	260.0
P6KE300	243.0	270.0	330.0	1	5	430.0	1.4	330.0
P6KE300A	256.0	285.0	315.0	1	5	414.0	1.45	315.0
P6KE350	284.0	315.0	385.0	1	5	504.0	1.2	385.0
P6KE350A	300.0	332.0	368.0	1	5	482.0	1.25	368.0
P6KE400	324.0	360.0	440.0	1	5	574.0	1.05	440.0
P6KE400A	342.0	380.0	420.0	1	5	548.0	1.1	420.0

* Add suffix "C" or "CA" for bidirectional device types.
\+ For bidirectional types having $V_{WM} \leq 10V$, their I_D limit is doubled.

Other series available: SA, ICTE, LCE, 5KP, 15KP, SMA, SMC.

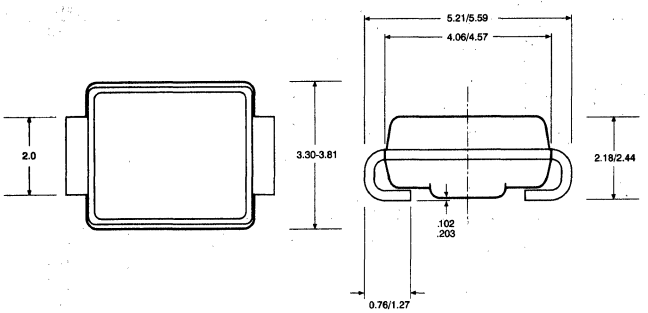
WORLD PRODUCTS INC.
19654 8TH ST. EAST, SONOMA, CA 95476 PHONE (707) 996-5201 FAX (707) 996-3380
Internet: www.worldproducts.com • E-Mail: ppgsales@worldproducts.com

SEE OUR OTHER DATA PAGES IN SECTIONS 1500, 1850, 2460, 4300 AND 4700

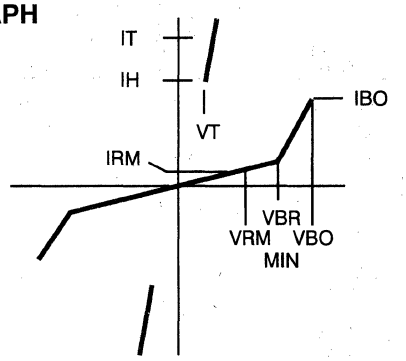
W O R L D P R O D U C T S

SEMITRON SMTBJ SERIES (TVS THYRISTOR)

DO-214AA



V-I GRAPH



Electrical Characteristics (Tj=25°C)

SYMBOL	PARAMETER		
V_{DRM}	Stand-off Voltage	I_{DRM}	Stand-off Current
$V_{BO\ Min.}$	Breakover Voltage Min.	I_{BO}	Breakover Current
$V_{BO\ Max.}$	Breakover Voltage Max.	I_H	Holding Current
V_T	On-State Voltage		

Absolute Ratings

SYMBOL	PARAMETER		VALUE A	VALUE B	UNIT
I_{PP}	Peak Pulse Current	10/1000µsec	50	100	A
		8/20 µs expo	150	250	A
I_{TSM}	Non Repetitive Surge Peak on-state Current	tp20 ms	30		A
di/dt	Critical Rate of Rise of on-state Current	Non repetitive	100		A/µs
T stg	Storage and Operating Junction Temperature Range		-40 to +150		°C
Tj			150		°C
TL	Maximum Temperature For Soldering (For period of 10 seconds max)		230		°C

DEVICE TYPE	V_{DRM}	I_{DRM} @V_{DRM} (µA)	V_{BO} MIN	V_{BO} MAX	V_T TYP @ 1A	I_{BO} TYP (mA)	I_H MIN (mA)
SMTBJ050 A or B	50	1	60	80	<2V	50	150
SMTBJ070 A or B	70	1	80	120	<2V	50	150
SMTBJ100 A or B	100	1	110	135	<2V	50	150
SMTBJ120 A or B	120	1	140	165	<2V	50	150
SMTBJ170 A or B	170	1	180	215	<2V	50	150
SMTBJ200 A or B	200	1	220	265	<2V	50	150

The SMTBJ Range Can Be Used To Protect Against Surges As Defined In The Following International Standards.

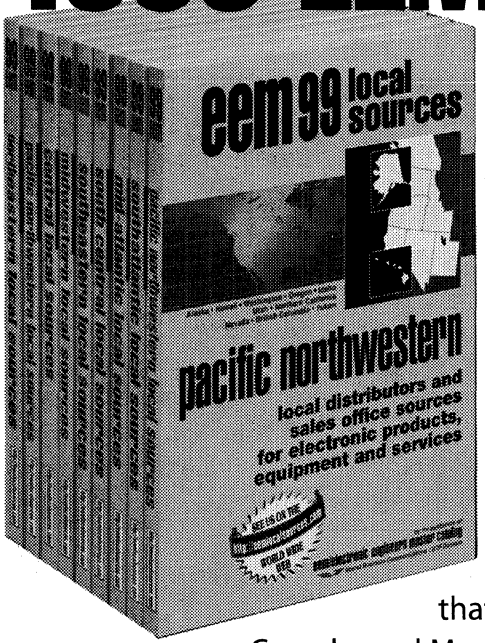
			A	B
FCC Rules Part 68/D	Metallic	10/56µs	50A	100A
	Longitudinal	10/160µs	100A	200A
Bellcore Specification	TR-NWT-0011089	10/1000µs	50A	100A
		100v/µs	>1KV	>1KV
ITU-T K 17 - K20 (Formerly CCITT)		10/700µs	1.5K	1.5KV
		5/310µs	38A	38A
VDE 0433		10/700µs	2KV	2KV
		5/200µs	50A	50A
C-NET		0.5/700µs	1.5KV	1.5KV
		0.2/310µs	38A	38A
IEC 1000 - 4-5 (Discharge through 2Ω impedance)		8/20µs	150A	250A
		1-2/50µs	300V	500V

*Please contact us for information on other types available

WORLD PRODUCTS INC.
19654 8TH ST. EAST, SONOMA, CA 95476 PHONE (707) 996-5201 FAX (707) 996-3380
Internet: www.worldproducts.com • E-Mail: ppgsales@worldproducts.com

SEE OUR OTHER DATA PAGES IN SECTIONS 1500, 1850, 2460, 4300 AND 4700

1999 EEM Local Sources



You found the part, now you can find the localsource... in print and on-line!

You use EEM/Electronic Engineers Master all the time to find the components you need. But what about a local source for the part?

Now you can turn to **EEM Local Sources** for all your local distributors. This valuable time saver is printed in nine regional editions that cover the United States, Canada, and Mexico, and is on the World Wide Web at **http://eemlocalsources.com.**

EEM Local Sources is a comprehensive directory to local distributors and sales offices for the manufacturers listed in EEM and in EEM's sister publication, the IC MASTER. For easy reference, the **EEM Local Sources** product index lists the products in both EEM and the IC MASTER.

You found the part, now you can find the local source in EEM Local Sources!

EEM Local Sources is your direct link to the distributors and sales offices in your local area. In print, there are nine regional editions:

- ▶ Northeastern
- ▶ Midwestern
- ▶ Mid Atlantic
- ▶ Central
- ▶ South Atlantic
- ▶ Pacific Northwestern
- ▶ Southeastern
- ▶ Pacific Southwestern
- ▶ South Central

To order

a printed copy of the **1999 EEM Local Sources** for your region, contact Marie Botta at:

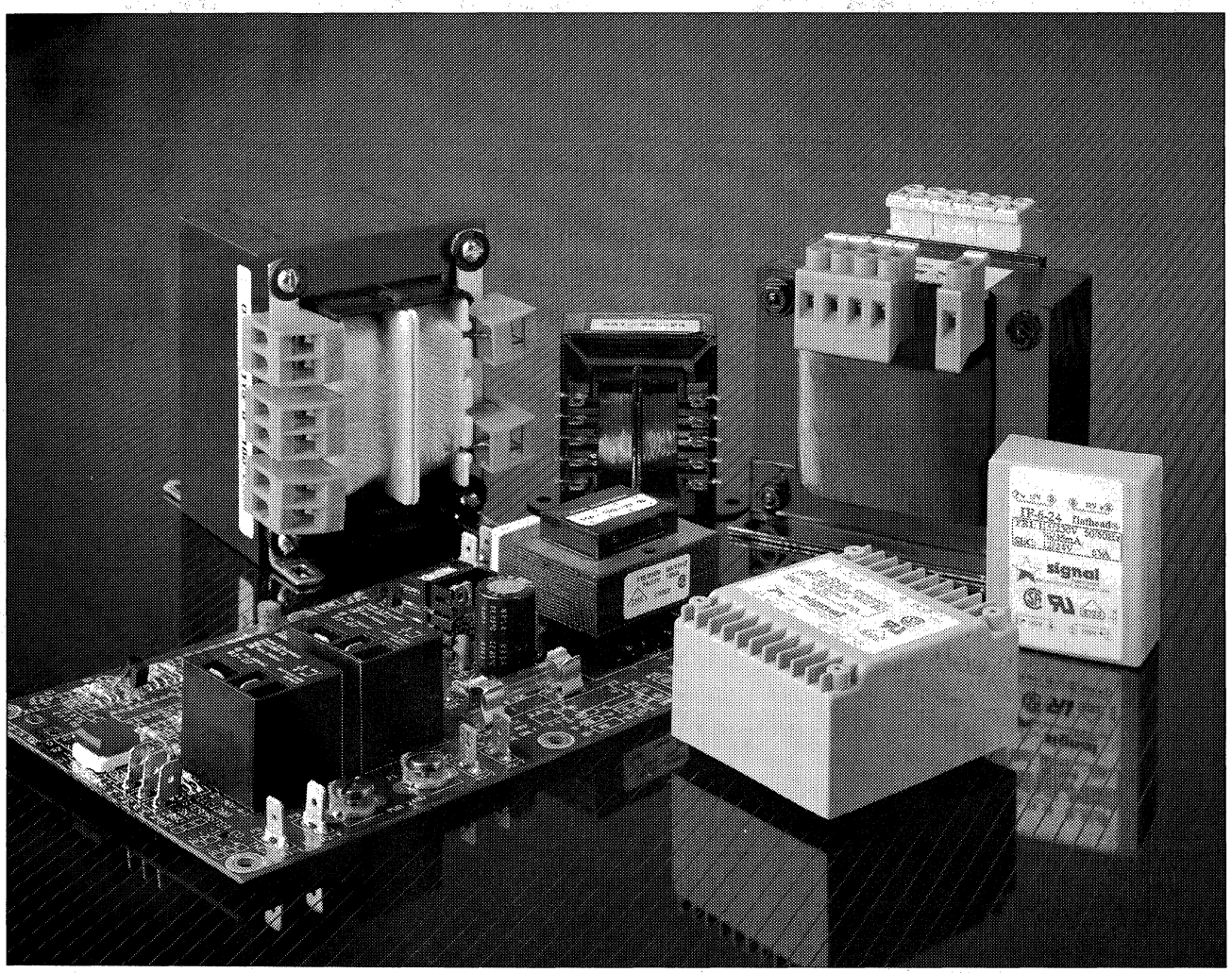
Hearst Business Communications, Inc.
645 Stewart Avenue
Garden City, NY 11530
(516) 227-1314 • FAX (516) 227-1453
Credit Card Hotline: 1-800-833-7138

See us on the World Wide Web at http://eemlocalsources.com

EEM Local Sources is published annually in October.

Signal Transformer

For All Your Transformer Needs...
See Pages A2344 to A2375



Telephone or fax for your personal copy of this new full line, full color catalog.

TELEPHONE: 516-239-5777
FAX 24-hours: 516-239-7208
Website: http://www.signaltransformer.com

AUDIO, SPECIAL, RF

Manufacturer	Starting EEM Page No.	Low Frequency	High Frequency	Micro-phone	CRT	Telephone Coupling	RF-IF	Pulse Including Trigger	Local Area Networks	Balun	Digital Audio (Incl. AES/EBU.)
3S Industries, Inc.	A•2408	√	√			√		√	√		√
AALTAM/Microtran	A•2086	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*
Amecon, Inc.	A•2110	√*				√*	√*	√*	√*	√*	√*
APX Technologies, Inc.	A•2116	√		√		√§	√§	√§	√§		
Beta Transformer Technology Corp.	A•2132							√§*			
Bey Electric, Inc.	A•2133						√			√	
BH Electronics, Inc.	A•2136						√	√	√	√	√
Bicron Electronics	A•2134							√			
C&C Jetronic	A•2137					√	√	√	√	√	
CET Technology	A•2138	√		√	√	√§	√	√§	√§	√	√
Commmunication Coil Inc.	A•2142	√	√		√		√	√		√	√
Cramer Coil and Transformer Co. Inc.	A•2143					√					
Custom Magnetics	A•2148	√	√		√	√	√				
Datatronics, Inc.	A•2149			√§*		√§*	√§*	√§*	√§*	√§*	
Dynage/Power & Magnetics	A•2154					√§*		√§*	√§*	√*	√§*
EAG Electronics	A•2156	√	√	√	√	√	√	√	√	√	√
Electronic Transformer Corp.	A•2160			√		√					
Elytone Electronics Co., Ltd.	A•2161					√§	√§	√§	√§		
EMS Development Corp.	A•2163									√*	
Ensign Corp.	A•2164	√				√					
EWC, Inc.	A•2167					√					
Fernwood Magnetics	A•2179	√					√	√*			
FETCO	A•2180							√			
Forest Electric Company	A•2185	√*						√*			
Inphase, Inc.	A•2188	√§*	√§*			√§*	√§*	√§*	√§*	√*	√§*
ISL Products Int'l, Limited	A•2189					√	√				
Kappa Technologies, Inc.	A•2194		√§*				√§	√§	√§	√§	
Lenco Electronics Inc.	A•2196				√			√			√
Magnecomp Inc.	A•2199	√*				√*		√*		√*	
Magnelab	A•2200							√			√
MagneTek Triad	A•2202	√	√	√	√	√		√		√	
Magnetic Circuit Elements	A•2203					√§					√§
Magnetic Windings	A•2204					√*		√*		√*	
Maxconn, Inc.	A•2206					√			√		
Microtran	A•2086	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*
Midcom, Inc.	A•2219	√§				√§	√§	√§	√§		√§
Mini-Circuits	A•2227	√§*	√§*				√§	√§*		√§	
Mitchell Electronics Corp.	A•2225	√	√	√	√	√	√	√	√	√	√

* MIL Spec. § Surface Mount.

TAMURA Transformers

Custom Designed to OEM Specs Meet World Safety Standards

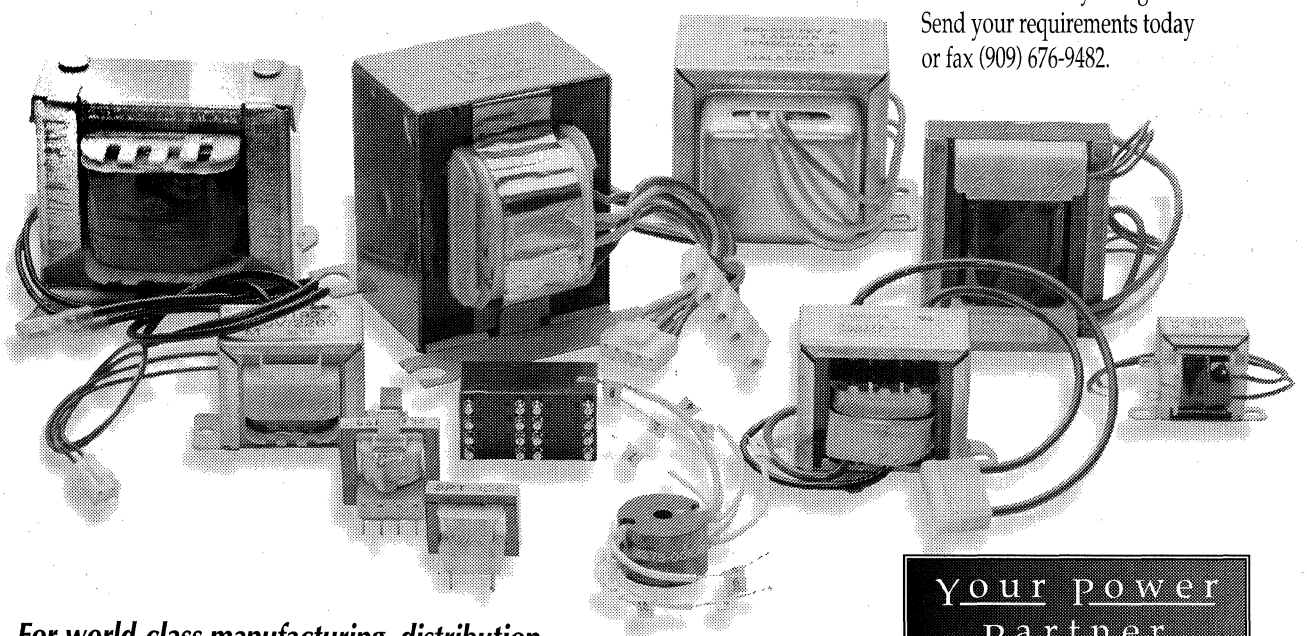
TAMURA custom designs and manufactures transformers to OEM specifications for consumer, commercial, and industrial applications. Our UL family of custom transformers come in 24 case sizes and 350 configurations... up to 300VA... and all are recognized to severe UL 1411 requirements (file E98949). Certification requirements to CSA, IEC, VDE and MITI are easily met.

Features include a double protection system, 4000V dielectric strength, and physical barriers between primary and secondary.

ISO REGISTERED 9001/9002

TAMURA HAS IT ALL.

For world-class manufacturing, reliability and responsibility, go to the source. Partner with TAMURA and you'll get it all. Send your requirements today or fax (909) 676-9482.



Your power partner.

For world-class manufacturing, distribution, reliability, and responsibility, go to the sources...

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

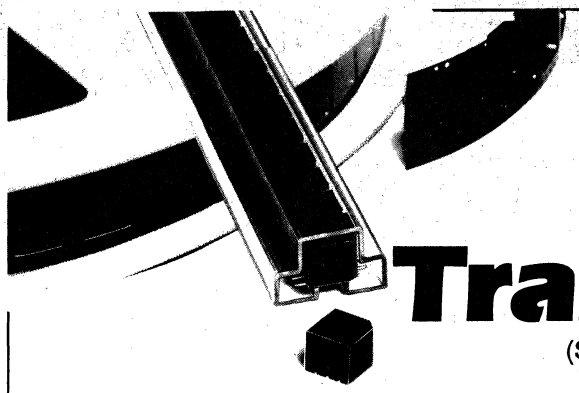
Microtran Division, Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

AUDIO, SPECIAL, RF (cont'd.)

Manufacturer	Starting EEM Page No.	Low Frequency	High Frequency	Micro-phone	CRT	Telephone Coupling	RF-IF	Pulse Including Trigger	Local Area Networks	Balun	Digital Audio (incl. AES/EBU.)
Neshaminy Transformer Corp.	A•2228	√	√		√			√			
North Hills Signal Processing	A•2231	√*	√*			√	√*	√*	√*	√*	
OPT Industries, Inc.	A•2237	√§*		√§*		√§*					√§*
Para-Line Transformer Company, Inc.	A•2241			√		√					
PC Transformer Corp.	A•2242	√				√					
Pearson Electronics, Inc.	A•2249							√*			
Peter Parts Electronics	A•2250	√				√	√	√		√	
Pico Electronics, Inc.	A•2251			√§*		√§*		√§*	√§*	√§*	
Powertronix Corp.	A•2304	√	√		√						
Precision Electronics	A•2308			√		√	√	√	√		
Precision Inc.	A•2310						√§	√§		√§	
Prem Magnetics, Inc.	A•2311					√§					
Pulse Engineering	A•2326	√							√§		√§
Quality Transformer Corp.	A•2330	√									
Renco Electronics, Inc.	A•2331	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*
RFI Corp.	A•2334		√*					√*			
Rhombus Industries	A•2335	√§		√§	√§	√§	√§		√§	√§	√§
Schott Corp	A•2336					√					√
Scientific Conversion Inc.	A•2339	√	√§		√		√§	√§			√§
South American Development Corp.	A•2377	√				√					
Talema Electronic, Inc.	A•2381	√									
Tamura Corp./AALTAM	A•2389	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*
Toroid Corporation of Maryland	A•2415	√					√				√
Toroid Technologies Inc.	A•2420	√									
Tortran Inc.	A•2414	√									
V & F Transformer	A•2426	√	√	√		√	√	√		√	√
Vishay Dale Electronics	A•2428	√§				√§		√			
Vitec Electronics Corporation	A•2432						√§	√	√§	√	
Wilco Corporation	A•2438	√			√		√§	√		√	
ZMAN Magnetics, Inc.	A•2440					√§	√§	√§		√	

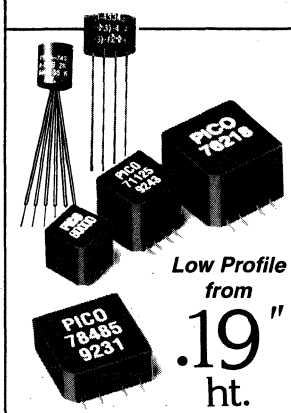
* MIL Spec. § Surface Mount.



PICO Miniature Transformers

(See EEM pages A•2251-A•2301)

SURFACE MOUNT • PLUG-IN • AXIAL LEADS • TOROIDAL • INSULATED LEADS



Low Profile from .19" ht.

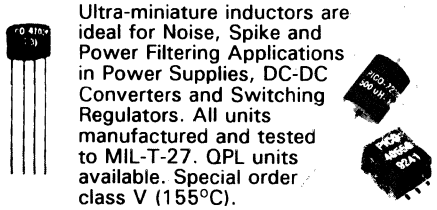
Surface Mount

All PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, IR, and other reflow procedures without degradation of electrical or mechanical characteristics.

AUDIO TRANSFORMERS

Impedance Levels 10 ohms to 250k ohms, Power Level to 3 Watts, Frequency Response ±3db 20Hz to 250kHz. All units manufactured and tested to MIL-T-27. QPL units available. Special order class V (155°C).

POWER & EMI INDUCTORS



Ultra-miniature inductors are ideal for Noise, Spike and Power Filtering Applications in Power Supplies, DC-DC Converters and Switching Regulators. All units manufactured and tested to MIL-T-27. QPL units available. Special order class V (155°C).

PULSE TRANSFORMERS

10 Nanoseconds to 100 Microseconds. ET Rating to 150 Volt-Microsecond. All units manufactured and tested to MIL-T-21038. QPL units available. Special order class V (155°C).

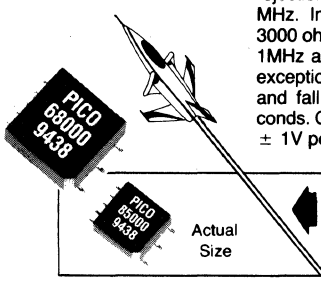
400HZ TRANSFORMERS

115 volt or 26 volt primary, Split secondary voltages, 5 volt to 310 volts, 2.4 Watts, Manufactured and tested to MIL-T-27. Special order class V (155°C).

PICO's MULTIPLEX DATA BUS PULSE TRANSFORMERS *MEET MIL-T-21038/27*

These pulse transformers manufactured to MIL-STD-1553 COMMAND/RESPONSE MULTI-PLEX DATA BUS requirements. They also are manufactured to MIL-T-21038/27 specifications and are designed to meet MAC AIR SPECIFICATIONS A3818, A5690, A5232 and A4905.

All of these transformers exhibit superior electrical performance. Common mode rejection ratio is greater than 45dB at 1 MHz. Input impedance is greater than 3000 ohms over the band from 75 kHz to 1MHz at 1V rms. This series possesses exceptional waveform integrity: Rise time and fall time is less than 100 nanoseconds. Overshoot and ringing is less than ± 1V peak. Droop is less than 20%.

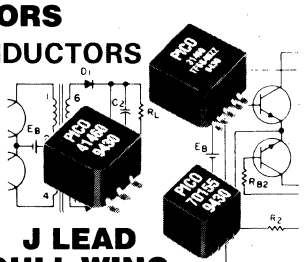


Surface Mount **electrical equivalents of QPL MIL-T-21038/27**

DC-DC CONVERTER TRANSFORMERS POWER INDUCTORS

COMMON MODE EMI INDUCTORS

These units have gull wing construction which is compatible with tube fed automatic placement equipment or pick and place manufacturing techniques. Transformers can be used for self-saturating or linear switching applications. The Inductors are ideal for noise, spike and power filtering applications in Power Supplies, DC-DC Converters and Switching Regulators.



J LEAD GULL WING

See PICO's full Catalog immediately on the internet
http://www.picoelectronics.com

Call Toll Free 1-800-228-9747 or send direct for FREE 152 pg. PICO Catalog featuring Transformers, Inductors, DC-DC Converters, AC-DC Power Supplies

Delivery— stock to one week

PICO Electronics, Inc.

143 Sparks Avenue, Pelham, NY 10803-1837

Call Toll Free 800-228-9747

FAX 914-738-8225

E-Mail - HLSC73A@prodigy.com

VISA MasterCard

TRANSFORMERS, POWER

Manufacturer	Starting EEM Page No.	Power												
		115-230V Input												
		50-60 Hz	400 Hz	Low Voltage	Split Bobbin	Isolation	Voltage Regulating	DC-to-DC Converter	Variable Incl. Auto Transformer	High Voltage	Switch Mode	Toroidal	Current Instrument	Planar Construction
3S Industries, Inc.	A•2408	√	√	√	√	√	√	√	√	√	√	√	√	
AALTAM	A•2086	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*
Abbott Technologies, Inc.	A•2100	√*	√*	√*	√	√*		√*			√*	√*	√	√
Advanced Components Industries, Inc.	A•2104	√	√	√	√	√	√			√	√			
Amecon, Inc.	A•2110	√*	√*	√*	√*	√*	√*	√*	√*	√*	√*	√*	√*	
APX Technologies, Inc.	A•2116	√		√	√	√	√	√	√	√	√	√	√	
Avel Transformers Inc.	A•2120	√	√	√	√	√	√	√	√		√	√		
Bel Fuse	A•2124				√	√		√			√			√
Beta Transformer Technology Corp.	A•2132	√*	√*	√*	√*	√*				√*		√§*		
Bey Electric, Inc.	A•2133	√	√		√	√	√	√	√	√		√	√	
BH Electronics, Inc.	A•2136			√	√	√	√	√			√	√	√	
Bicron Electronics	A•2134	√	√		√			√	√		√	√	√	
C&C Jetronic	A•2137	√	√		√	√	√	√	√	√	√	√	√	
CET Technology	A•2138	√	√	√	√	√	√	√	√	√	√	√	√	√
Communication Coil Inc.	A•2142			√	√	√		√		√	√	√	√	√
Cramer Coil and Transformer Co. Inc.	A•2143	√	√		√	√		√		√	√	√	√	
CR Magnetics, Inc.	A•2146											√	√	
Custom Coils Inc.	A•2147	√		√	√					√	√	√		
Custom Magnetics	A•2148	√		√	√	√		√			√	√	√	
Datatronics, Inc.	A•2149	√*	√*		√*	√*	√*	√*		√*	√*		√*	√*
Del Electronics Corp.	A•2150	√	√			√		√		√	√			
Dynage/Power & Magnetics	A•2154	√*	√*		√*	√*		√*		√*	√*	√*	√*	
EAG Electronics	A•2156	√	√	√	√	√	√	√	√	√	√	√	√	√
Eichhoff Electronics	A•2157	√		√	√	√						√		
Electromech Inc.	A•2158	√	√	√	√	√			√		√		√	
Electronic Transformer Corp.	A•2160	√	√		√	√	√	√	√	√	√			
Elytone Electronics	A•2161	√		√	√	√		√		√	√	√	√	
EMS Development Corp.	A•2163	√*	√*		√*	√*		√*		√*	√*	√*		
Ensign Corp.	A•2164	√	√	√	√	√					√	√	√	
EPCO Products Inc.	A•2166	√	√		√	√	√	√	√	√	√			
EWC Inc.	A•2167	√	√	√	√	√			√		√			
Fernwood Magnetics	A•2179			√	√	√*	√	√	√	√*	√	√*		
FETCO	A•2180	√			√	√			√			√		
Flat Transformer Technology Corp.	A•2182			√				√			√	√		√
Flex-Core Division	A•2183												√	
Forest Electric Company	A•2185	√*	√*	√*		√*						√*	√*	
Hammond Manufacturing Company	A•2186	√		√	√	√								
Inphase, Inc.	A•2188	√*	√*	√§*	√*	√*	√§*	√§*	√*	√§*	√§*	√§*	√§*	√§*
ISL Products Int'l, Limited	A•2189	√		√	√	√								
JM Transformer Company, Inc.	A•2190	√	√	√	√	√			√	√		√	√	
Kappa Technologies, Inc.	A•2194					√		√				√		
Lenco Electronics Inc.	A•2196	√	√	√	√	√	√		√	√			√	
Magnecomp, Inc.	A•2199	√*	√*	√*	√*	√*		√*			√*	√*	√*	
Magnelab	A•2200					√		√				√	√	
MagneTek Triad	A•2202	√	√	√	√	√	√		√	√	√	√	√	
Magnetic Windings	A•2204	√*	√*		√*	√*	√*	√*	√*	√*	√*	√*	√*	√*
Magnetico Inc.	A•2205		√*	√*		√*		√§*		√*	√§*	√*		√*
MCI Transformer Corp.	A•2207	√*	√*		√*	√*					√*			
Microtran	A•2086	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*
Midcom, Inc.	A•2219			√§	√§	√§	√§	√§			√§	√§		
Mitchell Electronics Corp.	A•2225	√	√	√	√	√	√	√	√	√	√	√	√	√

* MIL Spec. § Surface Mount.

TRANSFORMERS, POWER (cont"d.)

Manufacturer	Starting EEM Page No.	Power												
		115-230V Input												
		50-60 Hz	400 Hz	Low Voltage	Split Bobbin	Isolation	Voltage Regulating	DC-to-DC Converter	Variable Incl. Auto Transformer	High Voltage	Switch Mode	Toroidal	Current Instrument	Planar Construction
Neshaminy Transformer Corp.	A•2228	√	√	√	√	√	√	√	√	√	√	√		
North Hills Signal Processing	A•2231							√			√			
OPT Industries, Inc.	A•2237	√*	√*	√*	√*	√*	√*			√*	√§*	√§*		
Panel Components Corp.	A•2240	√				√								
Para-Line Transformer Company, Inc.	A•2241	√	√	√	√	√							√	
PC Transformer Corp.	A•2242	√	√	√	√	√								
Pearson Electronics, Inc.	A•2249											√*	√*	
Peter Parts Electronics	A•2250			√							√	√		
Pico Electronics, Inc.	A•2251	√§*	√§*		√§*	√§*	√§*	√§*		√§*	√§*	√§*	√§*	√§*
Plitron Manufacturing, Inc.	A•2302	√				√						√	√	
Powertronix Corp.	A•2304	√	√	√		√	√		√	√	√	√	√	
Precision Electronics	A•2308	√	√		√	√	√	√		√	√	√	√	√
Precision, Inc.	A•2310	√*	√*		√*	√*	√*	√§*	√		√§*	√§*	√*	√§*
Prem Magnetics, Inc.	A•2311	√		√	√	√								
Pulse Engineering	A•2326					√		√§			√	√§		√
Quality Transformer Corp.	A•2330	√*	√*		√*	√*	√*			√*		√*	√*	
Renco Electronics Inc.	A•2331	√§*		√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	
RFI Corp.	A•2334					√*	√*			√*				
Rhombus Industries	A•2335	√	√		√*	√*	√*			√	√*	√§	√*	
Schott Corp.	A•2336				√	√		√			√			
Scientific Conversion, Inc.	A•2339	√		√	√	√		√		√	√§	√		
Shogyo International Corp.	A•2340	√*			√*	√*	√*	√*	√*	√*	√*		√*	
Signal Transformer Co., Inc.	A•2344	√	√		√	√	√	√			√		√	√
South American Development Corp.	A•2377			√	√	√		√			√	√	√	
Stancor	A•2378	√	√		√	√	√		√					
Talema Electronic Inc.	A•2381	√		√		√	√					√	√	
Tamura Corp.	A•2389	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*
Todd Systems, Inc.	A•2410	√*	√*	√		√	√		√					
Torelco Inc.	A•2407	√§*	√§*			√§	√§		√§					
Toroid Corporation of Maryland	A•2415	√	√	√		√			√			√	√	
Toroid Technologies Inc.	A•2420	√	√	√		√			√			√	√	
Torotel Products Inc.	A•2422		√*	√*	√*	√*		√*			√*	√*		
Tortran Inc.	A•2414	√		√								√		
Trans American Transformer	A•2424	√§*	√§*		√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*	√§*
Transformer Engineering Corp.	A•2425	√	√	√	√	√	√	√	√	√			√	
Ulveco, Inc.	A•2429	√	√			√			√			√	√	
V & F Transformer	A•2426	√	√	√	√	√	√				√	√	√	
Vishay Dale Electronics	A•2428	√		√	√	√		√§			√§	√§	√§	√
Vitec Electronics Corporation	A•2432					√§		√			√	√	√	
West Coast Magnetics	A•2434			√§	√§	√§	√§	√§			√§			
Wilco Corporation	A•2438										√§	√§		
Zettler Magnetics	A•2439	√		√	√							√		
ZMAN Magnetics	A•2440				√	√				√§	√§	√§	√§	√§

* MIL Spec. § Surface Mount.

It's FREE... and it's fast!

http://icmaster.com

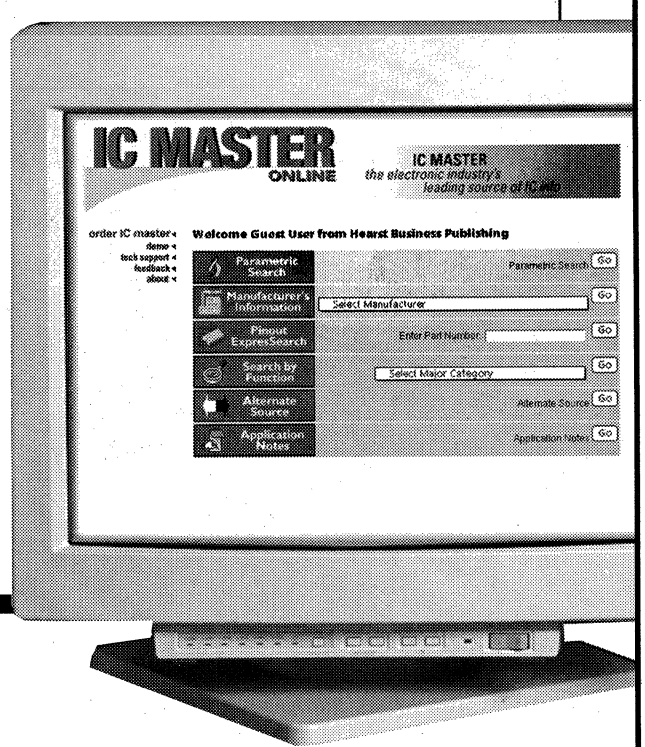
IC MASTER Online is the industry's leading database, updated monthly, of both current and discontinued commercially available integrated circuits from over 345 manufacturers. It gives you basic specifications, pinout diagrams and package outlines, second source data, application notes, and complete vendor contact information for over 135,000 base part numbers.

Go online now for:

- ***FREE*** and unlimited access to the entire IC MASTER database.
- ***Direct links*** to actual datasheets on the manufacturer's own website, for devices selected by the manufacturer.
- Full part number and specification search capability.
- Plus, much more!

Try **http://icmaster.com** today, it's ***FREE!***

IC MASTER Online will dramatically cut the number of online hours you spend searching, comparing, and finally selecting integrated circuits.



Hearst Business Communications, Inc./UTP Division
645 Stewart Avenue, Garden City, NY 11530 ▪ Tel: 516.227.1300 ▪ FAX: 516.227.1901

TAMURA Transformers

Custom Designed to OEM Specs Meet World Safety Standards

TAMURA custom designs and manufactures transformers to OEM specifications for consumer, commercial, and industrial applications. Our UL family of custom transformers come in 24 case sizes and 350 configurations... up to 300VA... and all are recognized to severe UL 1411 requirements (file E98949). Certification requirements to CSA, IEC, VDE and MITI are easily met.

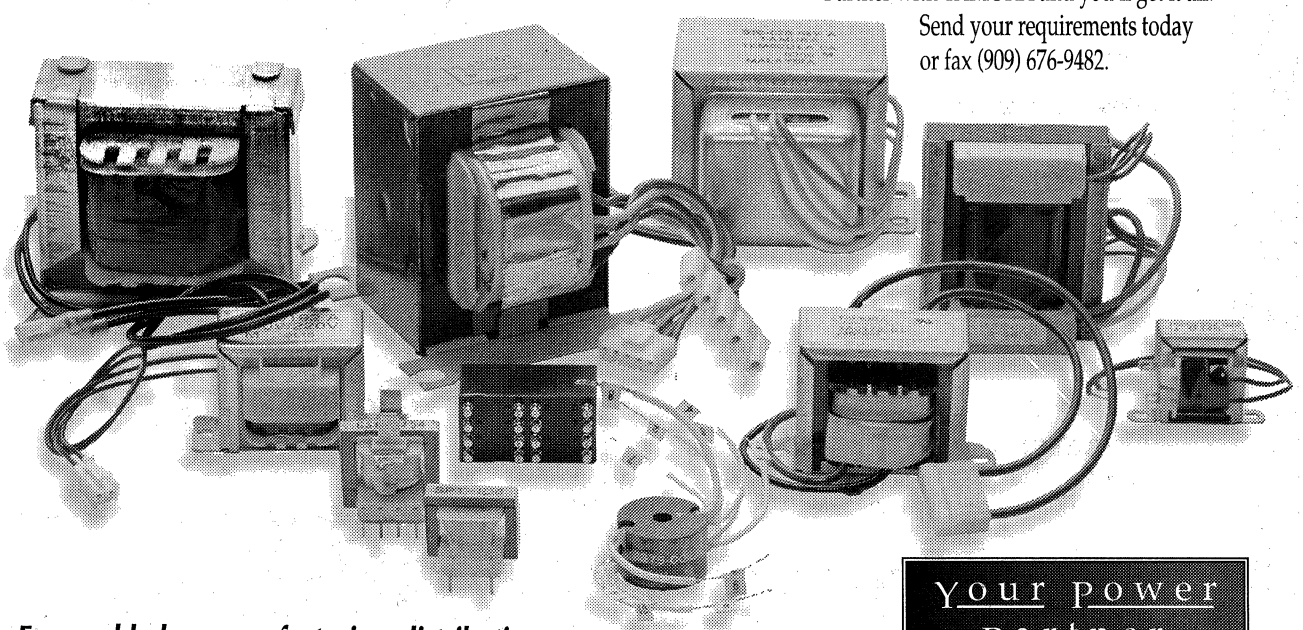
Features include a double protection system, 4000V dielectric strength, and physical barriers between primary and secondary.

ISO REGISTERED 9001/9002

TAMURA HAS IT ALL.

For world-class manufacturing, reliability and responsibility, go to the source. Partner with TAMURA and you'll get it all.

Send your requirements today or fax (909) 676-9482.



Your Power Partner.

For world-class manufacturing, distribution, reliability, and responsibility, go to the sources...

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

Microtran Division, Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

WORLDTRANS® POWER TRANSFORMERS

For PC Board, Solid-State Power, Control, and Instrumentation Applications.

File #LR69222 File 810/89
File #LR69223 811/89
VDE 0551, 0806

TUV File 810/89
811/89
IEC 380 EN60950

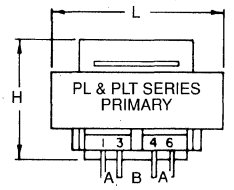
File #E79781
UL506
File #138028
UL1411

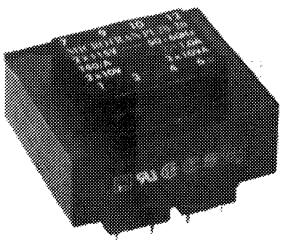
tamura MICROTRAN.

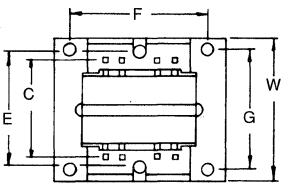
- **115V/230V 50/60 Hz primary**
- Meets US and International Safety Standards-UL, VDE, IEC, CSA
- 4,000 Volt RMS hi-pot Test-Dual Non-concentric Bobbins and Insulating Shroud Provide High Isolation and Reduced Capacitance
- 130°C Insulation System- Insulating Materials Meet UL 94V-0 Flammability Requirements
- Cost Effective Design

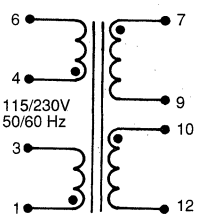
PL SERIES-FOR CONTROL AND POWER SUPPLY APPLICATIONS

PART NO.	VA (SIZE)	SECONDARY			
		PARALLEL CONNECTED		SERIES CONNECTED	
		AC VOLTS	RMS AMPS	AC VOLTS	RMS AMPS
PL2.5-10	2.5	5.0	0.5	10.0 CT	0.25
PL5.0-10	5.0	5.0	1.0	10.0 CT	0.5
PL10-10	10.0	5.0	2.0	10.0 CT	1.0
PL20-10	20.0	5.0	4.0	10.0 CT	2.0
PL30-10	30.0	5.0	6.0	10.0 CT	3.0
PL56-10	56.0	5.0	11.2	10.0 CT	5.6
PL2.5-12	2.5	6.3	0.4	12.6 CT	0.2
PL5.0-12	5.0	6.3	0.8	12.6 CT	0.4
PL10-12	10.0	6.3	1.6	12.6 CT	0.8
PL20-12	20.0	6.3	3.2	12.6 CT	1.6
PL30-12	30.0	6.3	4.8	12.6 CT	2.4
PL56-12	56.0	6.3	8.8	12.6 CT	4.4
PL2.5-16	2.5	8.0	0.3	16.0 CT	0.15
PL5.0-16	5.0	8.0	0.62	16.0 CT	0.31
PL10-16	10.0	8.0	1.25	16.0 CT	0.62
PL20-16	20.0	8.0	2.5	16.0 CT	1.25
PL30-16	30.0	8.0	3.8	16.0 CT	1.9
PL56-16	56.0	8.0	7.0	16.0 CT	3.5
PL2.5-20	2.5	10.0	0.24	20.0 CT	0.12
PL5.0-20	5.0	10.0	0.5	20.0 CT	0.25
PL10-20	10.0	10.0	1.0	20.0 CT	0.5
PL20-20	20.0	10.0	2.0	20.0 CT	1.0
PL30-20	30.0	10.0	3.0	20.0 CT	1.5
PL56-20	56.0	10.0	5.6	20.0 CT	2.8
PL2.5-24	2.5	12.0	0.2	24.0 CT	0.1
PL5.0-24	5.0	12.0	0.42	24.0 CT	0.21
PL10-24	10.0	12.0	0.84	24.0 CT	0.42
PL20-24	20.0	12.0	1.66	24.0 CT	0.83
PL30-24	30.0	12.0	2.5	24.0 CT	1.25
PL56-24	56.0	12.0	4.66	24.0 CT	2.33
PL2.5-28	2.5	14.0	0.18	28.0 CT	0.09
PL5.0-28	5.0	14.0	0.36	28.0 CT	0.18
PL10-28	10.0	14.0	0.72	28.0 CT	0.36
PL20-28	20.0	14.0	1.44	28.0 CT	0.72
PL30-28	30.0	14.0	2.12	28.0 CT	1.06
PL56-28	56.0	14.0	4.0	28.0 CT	2.0
PL2.5-36	2.5	18.0	0.14	36.0 CT	0.07
PL5.0-36	5.0	18.0	0.28	36.0 CT	0.14
PL10-36	10.0	18.0	0.56	36.0 CT	0.28
PL20-36	20.0	18.0	1.12	36.0 CT	0.56
PL30-36	30.0	18.0	1.64	36.0 CT	0.82
PL56-36	56.0	18.0	3.12	36.0 CT	1.56

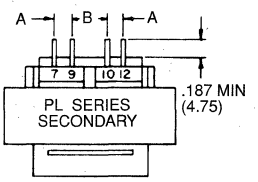


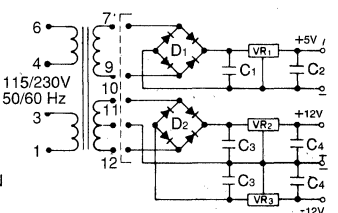




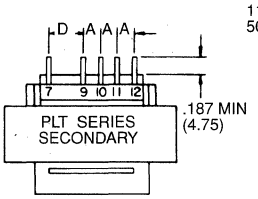


PL SERIES





PLT SERIES-
TYPICAL SCHEMATIC



DIMENSIONS INCHES (MM)

VA (SIZE)	L	W	H	A†	B	C	D	MOUNTING E	MOUNTING F	MOUNTING G	MTG. SCREWS	PIN SQUARE	LBS (KG.)
2.5	1.625 (41.3)	1.313 (33.3)	1.125 (28.6)	.200 (5.1)	.250 (6.4)	1.000 (25.4)	—	1.063 (27.0)	—	—	2X#4 (2X M3)	.025 (.635)	.25 (.11)
5.0	1.625 (41.3)	1.313 (33.3)	1.375 (34.9)	.200 (5.1)	.400 (10.2)	1.000 (25.4)	—	1.063 (27.0)	—	—	2X#4 (2X M3)	.025 (.635)	.37 (.17)
10.0	1.875 (47.6)	1.563 (39.7)	1.375 (34.9)	.200 (5.1)	.400 (10.2)	1.140 (29.0)	—	1.250 (31.8)	—	—	2X#4 (2X M3)	.036 (.914)	.53 (.24)
20.0	2.250 (57.1)	1.875 (47.6)	1.625 (41.3)	.400 (10.2)	.400 (10.2)	1.460 (37.1)	.40 (10.2)	1.500 (38.1)	—	—	2X#4 (2X M3)	.036 (.914)	.90 (.41)
30.0	2.625 (66.7)	2.188 (55.6)	1.563 (39.7)	.550 (14.0)	.275 (7.0)	1.680 (42.7)	.55 (14.0)	—	2.19 (55.6)	1.75 (44.5)	4X#6 (4X M3)	.045 (1.14)	1.15 (.52)
56.0	3.000 (76.2)	2.500 (63.5)	1.845 (46.9)	.600 (15.2)	.300 (7.6)	1.900 (48.3)	.60 (15.2)	—	2.50 (63.5)	2.00 (50.8)	4X#6 (4X M5)	.045 (1.14)	1.70 (.77)

† For PLT series secondary only, dimension A is 1/2 of value shown.

TRIPLE OUTPUT TRANSFORMERS FOR REGULATED AND UNREGULATED POWER SUPPLIES

PART NO.	VA AC (SIZE)	SECONDARY AC RMS		DC OUTPUT #1		DC OUTPUT #2		C_1	C_2	VR_1	VR_2	VR_3	D_1	D_2
		OUTPUT 1	OUTPUT 2	DC VOLTS	AMPS DC	DC VOLTS	mA DC							
PLT20-32	20.0	11.11V	33.0 CT	5.0	1.25	±12 20V DC	150 50V DC	7,500 µF	1,500 µF	LM-323K-5	LM-340K-12	LM-320K-12	3N253	3N247
PLT30-32	30.0	11.77V	34.0 CT	5.0	1.75	±12 20V DC	210 50V DC	10,000 µF	1,500 µF	LM-323K-5	LM-340K-12	LM-320K-12	3N253	3N247
PLT56-32	56.0	11.60V	33.5 CT	5.0	2.8	±12 20V DC	350 50V DC	15,000 µF	2,000 µF	LM-323K-5	LM-340K-12	LM-320K-12	MDA-400	3N247

C_2 and C_4 10,000 µF @ 20V. All VR's are National Semiconductor P/N's. All diodes are Motorola P/N's.

Refer to Tamura in this section for additional specifications and model numbers.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

MICROTRAN.

SPLITFORM™ POWER TRANSFORMER

UL 1585 Class 2 & 3- 130B

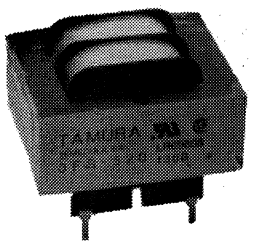
File #'s LR73078 LR69808

File#'s E96720,95844

File No.E92957

UL 506-File# E79781, E91239

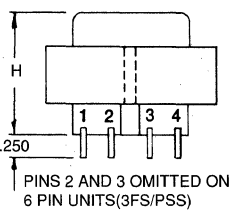
For PC Board Solid-State Power, Control, and Instrumentation Applications.

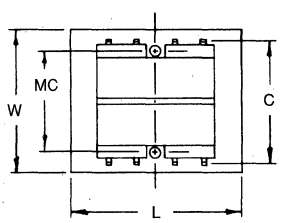


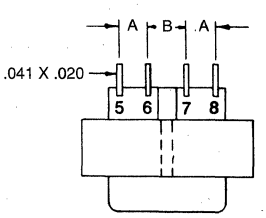
FEATURES

- 115V Single or 115/230V 50/60 Hz Dual Primary
- 130°C insulation system
- 2,500Vrms hi-pot
- Dual Secondaries may be either Parallel or Series Connected
- Attractive pricing-Superior quality
- Split Bobbin Construction-Center Flange Insulation Barrier; High Isolation for Low Leakage Applications; Low Capacitive Coupling Minimizes Line Noise and False Triggering
- Precision Spaced Terminals. Terminal Numbers are Molded on Bobbin

115V 50/60 Hz SINGLE PRIMARY		115/230V 50/60 Hz DUAL PRIMARY		SECONDARY RMS RATING PARALLEL CONNECTED		SERIES CONNECTED	
MICROTRAN PART No.	TAMURA PART No.	MICROTRAN PART No.	TAMURA PART No.	AC VOLTS	RMS AMPS	AC VOLTS	RMS AMPS
PSS2-10	3FS-210	PSD2-10	3FD-210	5.0	0.220	10.0 CT	0.110
PSS3-10	3FS-310	PSD3-10	3FD-310	5.0	0.500	10.0 CT	0.250
PSS4-10	3FS-410	PSD4-10	3FD-410	5.0	1.200	10.0 CT	0.600
PSS5-10	3FS-510	PSD5-10	3FD-510	5.0	2.400	10.0 CT	1.200
PSS2-12	3FS-212	PSD2-12	3FD-212	6.3	0.180	12.6 CT	0.090
PSS3-12	3FS-312	PSD3-12	3FD-312	6.3	0.400	12.6 CT	0.200
PSS4-12	3FS-412	PSD4-12	3FD-412	6.3	1.000	12.6 CT	0.500
PSS5-12	3FS-512	PSD5-12	3FD-512	6.3	2.000	12.6 CT	1.000
PSS2-16	3FS-216	PSD2-16	3FD-216	8.0	0.140	16.0 CT	0.070
PSS3-16	3FS-316	PSD3-16	3FD-316	8.0	0.300	16.0 CT	0.150
PSS4-16	3FS-416	PSD4-16	3FD-416	8.0	0.800	16.0 CT	0.400
PSS5-16	3FS-516	PSD5-16	3FD-516	8.0	1.600	16.0 CT	0.800
PSS2-20	3FS-220	PSD2-20	3FD-220	10.0	0.110	20.0 CT	0.055
PSS3-20	3FS-320	PSD3-20	3FD-320	10.0	0.240	20.0 CT	0.120
PSS4-20	3FS-420	PSD4-20	3FD-420	10.0	0.600	20.0 CT	0.300
PSS5-20	3FS-520	PSD5-20	3FD-520	10.0	1.200	20.0 CT	0.600
PSS2-24	3FS-224	PSD2-24	3FD-224	12.0	0.090	24.0 CT	0.045
PSS3-24	3FS-324	PSD3-24	3FD-324	12.0	0.200	24.0 CT	0.100
PSS4-24	3FS-424	PSD4-24	3FD-424	12.0	0.500	24.0 CT	0.250
PSS5-24	3FS-524	PSD5-24	3FD-524	12.0	1.000	24.0 CT	0.500
PSS2-28	3FS-228	PSD2-28	3FD-228	14.0	0.080	28.0 CT	0.040
PSS3-28	3FS-328	PSD3-28	3FD-328	14.0	0.170	28.0 CT	0.085
PSS4-28	3FS-428	PSD4-28	3FD-428	14.0	0.400	28.0 CT	0.200
PSS5-28	3FS-528	PSD5-28	3FD-528	14.0	0.840	28.0 CT	0.420
PSS2-36	3FS-236	PSD2-36	3FD-236	18.0	0.060	36.0 CT	0.030
PSS3-36	3FS-336	PSD3-36	3FD-336	18.0	0.130	36.0 CT	0.065
PSS4-36	3FS-436	PSD4-36	3FD-436	18.0	0.340	36.0 CT	0.170
PSS5-36	3FS-536	PSD5-36	3FD-536	18.0	0.700	36.0 CT	0.350
PSS2-48	3FS-248	PSD2-48	3FD-248	24.0	0.046	48.0 CT	0.023
PSS3-48	3FS-348	PSD3-48	3FD-348	24.0	0.100	48.0 CT	0.050
PSS4-48	3FS-448	PSD4-48	3FD-448	24.0	0.250	48.0 CT	0.125
PSS5-48	3FS-548	PSD5-48	3FD-548	24.0	0.500	48.0 CT	0.250
PSS2-56	3FS-256	PSD2-56	3FD-256	28.0	0.040	56.0 CT	0.020
PSS3-56	3FS-356	PSD3-56	3FD-356	28.0	0.090	56.0 CT	0.045
PSS4-56	3FS-456	PSD4-56	3FD-456	28.0	0.220	56.0 CT	0.110
PSS5-56	3FS-556	PSD5-56	3FD-556	28.0	0.440	56.0 CT	0.220
PSS2-120	3FS-2120	PSD2-120	3FD-2120	60.0	0.020	120.0 CT	0.010
PSS3-120	3FS-3120	PSD3-120	3FD-3120	60.0	0.040	120.0 CT	0.020
PSS4-120	3FS-4120	PSD4-120	3FD-4120	60.0	0.100	120.0 CT	0.050
PSS5-120	3FS-5120	PSD5-120	3FD-5120	60.0	0.200	120.0 CT	0.100





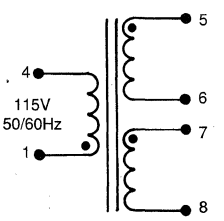


DIMENSIONS INCHES (MM)

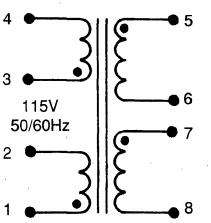
PSS /PSD SERIES	VA	L	W	H	MC	A	B	C	LB. (GM.)
2	1.1	1.44 (36.60)	1.230 (31.200)	1.00 (25.40)	–	.250 (6.350)	.250 (6.350)	1.200 (30.500)	0.17 (77.40)
3	2.4	1.44 (36.60)	1.230 (31.200)	1.26 (32.00)	–	.250 (6.350)	.250 (6.350)	1.200 (30.500)	0.25 (114.00)
4	6.0	1.69 (43.00)	1.390 (35.300)	1.36 (34.50)	1.0625* (27.0000)*	.250 (6.350)	.350 (8.900)	1.280 (32.500)	0.44 (200.00)
5	12.0	1.97 (50.00)	1.630 (41.400)	1.50 (38.10)	1.2500* (31.8000)*	.300 (7.620)	.400 (10.160)	1.410 (35.800)	0.70 (319.00)

* Clearance hole for 4-40 x 1 3/8" nylon mtg. screws. Order screw as P/N PS-S and nut as P/N PS-N; Sold only in pkgs. of 100 each.

SCHEMATICS



6 PIN
3FS/PSS SERIES



8 PIN
3FS/PSD SERIES

Refer to Tamura in this section for additional specifications and model numbers.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

FLATSTACK® LOW PROFILE POWER TRANSFORMERS

130B

CSA22,2 No 66
File # LR81383-7

File No.E92957

UL506,
File # E145619, E79781

tamura
MICROTRAN

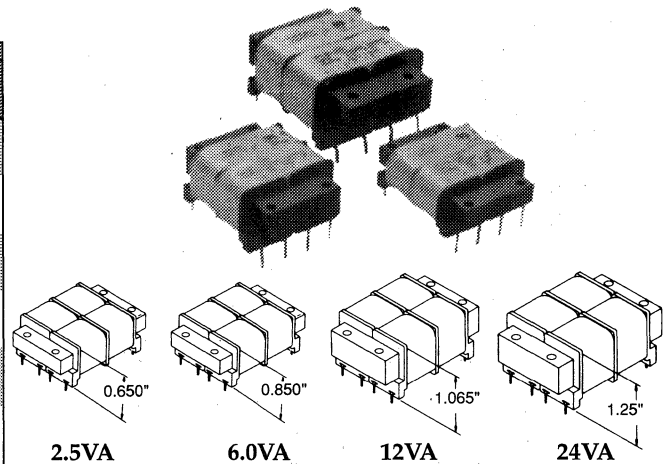
For Low Height PC Board Solid-State Power, Control, and Instrumentation Applications.

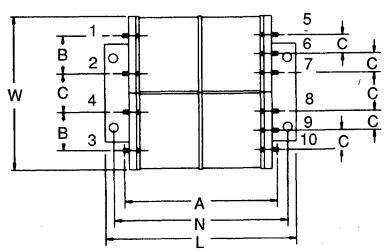
FEATURES

- Three Flange Bobbin.
- 1500Vrms hi-pot.
- 115/230VAC, 50/60Hz., Dual Primary
- Low Profile: 0.65", 0.85", 1.065", 1.25" Heights.
- 4 Sizes: 2.5, 6.0, 12 and 24VA Ratings.
- NL-FL Regulation: 30%; 12VA, 20%
- Tube Packaged.
- 80 Models Stocked.
- Competitive Prices.
- Drop-in compatibility.
- DC Power Supply Models.
- 130B on 3FL series.

LOW PROFILE SERIES MODELS AND RATINGS

MICROTRAN PART NO.	TAMURA PART NO.	VA (SIZE)	SECONDARY			
			PARALLEL CONNECTED		SERIES CONNECTED	
			AC VOLTS	RMS AMPS	AC VOLTS	RMS AMPS
PF2.5-10	3FL10-250	2.5	5.0	.500	10.0 CT	.250
PF6-10	3FL10-600	6.0	5.0	1.200	10.0 CT	.600
PF12-10	3FL10-1200	12.0	5.0	2.400	10.0 CT	1.200
PF24-10	PF24-10	24.0	5.0	4.800	10.0 CT	2.400
PF2.5-12	3FL12-200	2.5	6.3	.400	12.6 CT	.200
PF6-12	3FL12-475	6.0	6.3	.900	12.6 CT	.450
PF12-12	3FL12-950	12.0	6.3	1.900	12.6 CT	.950
PF24-12	PF24-12	24.0	6.3	3.800	12.6 CT	1.900
PF2.5-16	3FL16-150	2.5	8.0	.300	16.0 CT	.150
PF6-16	3FL16-350	6.0	8.0	.700	16.0 CT	.350
PF12-16	3FL16-700	12.0	8.0	1.500	16.0 CT	.750
PF24-16	PF24-16	24.0	8.0	3.000	16.0 CT	1.500
PF2.5-20	3FL20-125	2.5	10.0	.250	20.0 CT	.125
PF6-20	3FL20-300	6.0	10.0	.600	20.0 CT	.300
PF12-20	3FL20-600	12.0	10.0	1.200	20.0 CT	.600
PF24-20	PF24-20	24.0	10.0	2.400	20.0 CT	1.200
PF2.5-24	3FL24-100	2.5	12.0	.200	24.0 CT	.100
PF6-24	3FL24-250	6.0	12.0	.500	24.0 CT	.250
PF12-24	3FL24-500	12.0	12.0	1.000	24.0 CT	.500
PF24-24	PF24-24	24.0	12.0	2.000	24.0 CT	1.000
PF2.5-30	3FL30-85	2.5	15.0	.170	30.0 CT	.085
PF6-30	3FL30-200	6.0	15.0	.400	30.0 CT	.200
PF12-30	3FL30-400	12.0	15.0	.800	30.0 CT	.400
PF24-30	PF24-30	24.0	15.0	1.600	30.0 CT	.800
PF2.5-34	3FL34-75	2.5	17.0	.150	34.0 CT	.075
PF6-34	3FL34-170	6.0	17.0	.340	34.0 CT	.170
PF12-34	3FL34-340	12.0	17.0	.700	34.0 CT	.350
PF24-34	PF24-34	24.0	17.0	1.400	34.0 CT	.700
3FL40-60	3FL40-60	2.5	20.0	.120	40.0 CT	.060
3FL40-150	3FL40-150	6.0	20.0	.300	40.0 CT	.150
3FL40-300	3FL40-300	12.0	20.0	.600	40.0 CT	.300
PF2.5-56	3FL56-45	2.5	28.0	.090	56.0 CT	.045
PF6-56	3FL56-100	6.0	28.0	.200	56.0 CT	.100
PF12-56	3FL56-200	12.0	28.0	.420	56.0 CT	.210
PF24-56	PF24-56	24.0	28.0	.850	56.0 CT	.430
3FL88-28	3FL88-28	2.5	44.0	.056	88.0 CT	.028
3FL88-65	3FL88-65	6.0	44.0	.130	88.0 CT	.065
3FL88-130	3FL88-130	12.0	44.0	.260	88.0 CT	.130
3FL120-20	3FL120-20	2.5	60.0	.040	120.0 CT	.020
3FL120-50	3FL120-50	6.0	60.0	.100	120.0 CT	.050
3FL120-100	3FL120-100	12.0	60.0	.200	120.0 CT	.100
3FL230-10	3FL230-10	2.5	115.0	.020	230.0 CT	.010
3FL230-25	3FL230-25	6.0	115.0	.050	230.0 CT	.025
3FL230-50	3FL230-50	12.0	115.0	.100	230.0 CT	.050





PIN DIMENSIONS 0.091 X 0.02

TRIPLE OUTPUT TRANSFORMERS FOR REGULATED & UNREGULATED POWER SUPPLIES

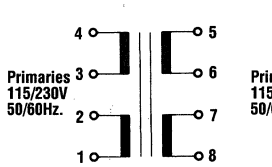
MICROTRAN PART NO.	TAMURA PART NO.	VA (SIZE)	SECONDARY #1		SECONDARY #2		DC OUTPUT #1		DC OUTPUT #2	
			AC VOLTS	RMS AMPS	AC VOLTS	RMS AMPS	CT FW DC VOLTS	mA DC	CT FW DC VOLTS	mA DC
3FL612	3FL612	6	17.5 CT	.155	31.5 CT	.065	+5	135	±12	40
3FL615	3FL615	6	17.5 CT	.155	37.5 CT	.060	+5	135	±15	35
3FL1212	3FL1212	12	17.0 CT	.340	29.0 CT	.140	+5	270	±12	85
3FL1215	3FL1215	12	17.0 CT	.340	36.0 CT	.115	+5	270	±15	70
PFT12-35	PFT12-35	12	16.0 CT	0.360	35.0 CT	.150	+8.75*	300	±22*	85
PFT12-28	PFT12-28	12	16.0 CT	0.360	28.0 CT	.187	+8.75*	300	±17.6	106
PFT24-35	PFT24-35	24	16.0 CT	0.720	35.0 CT	.300	+8.75*	600	±22*	170
PFT24-28	PFT24-28	24	16.0 CT	0.720	28.0 CT	.375	+8.75*	600	±17.6	212

* +8.75, ±17.6 or ±22DCV output volts are for inputs to +5V and ±12 or ±15V IC Voltage Regulators. See PFT schematic.
Line input 115/230V±10%

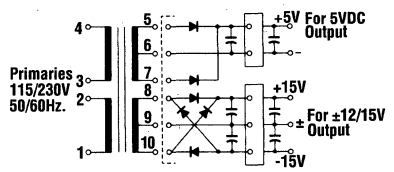
DIMENSIONS AND WEIGHTS [1]

VA	A	B	C	L	W	H	WT
2.5	1.60	0.375	0.187	1.87	1.56	0.650	5
6.0	1.60	0.375	0.187	1.87	1.56	0.850	7
12.0	2.00	0.500	0.250	2.50	2.00	1.065	11
24.0	1.90	0.530	0.300	2.87	2.25	1.250	15

Note 1: Dimensions in inches. Weight in oz.
Note 2: Output config has 10 pins all others 8 pins (omit pin 6 & 9).



SPLIT SECONDARY SCHEMATIC



TRIPLE OUTPUT SCHEMATIC

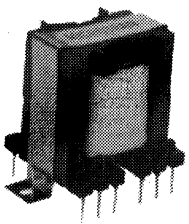
Refer to Tamura in this section for additional specifications and model numbers.

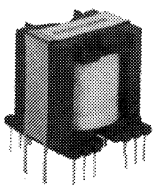
Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

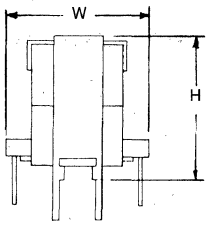
tamura

MICROTRAN

CUSTOM POWER TRANSFORMERS







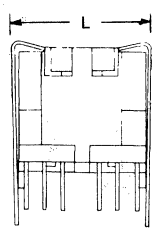


FIG. C

TRANSFORMERS FOR SWITCHING POWER SUPPLIES

Utilizes latest core materials and shape factor to provide smallest possible volume and minimum PC board footprint for effective manufacturing cost reduction. These transformers are available in standard size/power rating from 25 to 880 watts output for use over a wide frequency range. Standard configuration allows short turn-around time on custom-design samples.Other packaging and styles are available, such as horizontally mounted units. For application assistance, contact our Engineering Department.

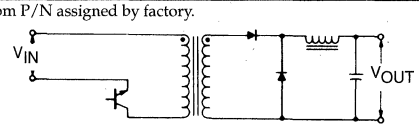
- Standardized components speeds delivery.
- VDE, IEC, UL, CSA compatible.
- Frequency range 20kHz-300kHz and higher.
- Core material for newest generation of higher frequency SMPS.

TRANSFORMER OUTPUT POWER VS. FREQUENCY AND TEMPERATURE RISE

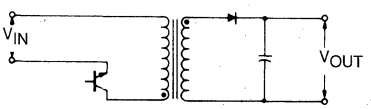
SIZE SERIES	POWER (W) 50kHZ			POWER (W) 100kHZ			MAX. DIMENSIONS (INCHES)			WT. OZ.	FIG.
	20°C	30°C	40°C	20°C	30°C	40°C	L	W	H		
SP2016-(*)	25	35	40	40	55	63	.92	.92	.83	.8	C
SP2020-(*)	35	45	55	55	70	80	.92	.92	1.00	.9	C
SP2620-(*)	60	80	95	90	115	135	1.15	1.17	1.00	1.5	C
SP2625-(*)	70	90	110	105	130	160	1.15	1.17	1.17	1.8	C
SP3220-(*)	80	110	130	120	155	190	1.26	1.34	1.00	2.2	C
SP3230-(*)	115	150	185	155	210	260	1.36	1.34	1.40	3.2	C
SP3535-(*)	170	220	265	230	315	355	1.48	1.55	1.60	4.4	C
SP4040-(*)	225	325	385	350	460	525	1.67	1.67	1.76	6.9	C
SP5050-(*)	310	445	525	580	740	880	2.10	2.10	2.10	12.9	C

* Custom P/N assigned by factory.

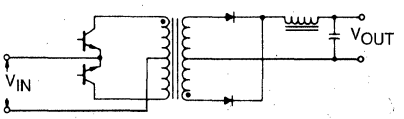
Note: The power ratings are based on forward converter circuitry with 40% duty cycle. Flyback circuits provide less power; bi-polar circuits will provide more. If the design is to meet VDE or IEC requirements, derate output power by 20%.



TYPICAL FORWARD COVERTER



TYPICAL FLYBACK CONVERTER



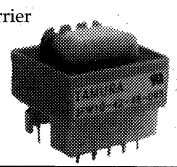
TYPICAL BI-POLAR PUSH-PULL CONVERTER

CUSTOM 50/60 Hz POWER AND AUDIO TRANSFORMERS

INTERNATIONAL POWER TRANSFORMERS-UL, CSA, IEC, MITI

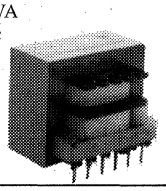
PEPF SERIES

- Ratings-0.7 to 6VA
- Physical Barrier Between Primary, Secondary & Core



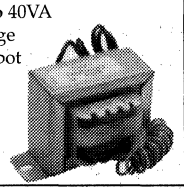
PEPY SERIES

- Ratings-4 to 20VA
- Physical Barrier Between Primary, Secondary & Core



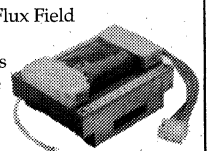
PEE SERIES

- Ratings-0.7 to 40VA
- 8mm Creepage
- 4000VAC hi-pot



PMZF SERIES

- 10 to 80VA
- Minimum Flux Field for CRT applications
- Low Profile

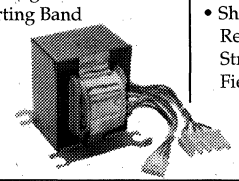


PEB SERIES

- Ratings-70 to 300VA
- Horizontal Mounting
- CU Flux Shorting Band
- Concentric Wound Coils
- "CY Type" Bobbin Construction

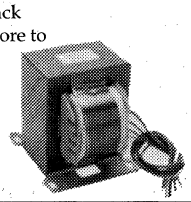
PEBT SERIES

- Ratings-70 to 300VA
- Vertical Mounting
- CU Flux Shorting Band
- Concentric Wound Coils
- "CY Type" Bobbin Construction



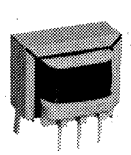
PEKT SERIES

- Ratings-70 to 200VA
- Welded Stack
- Shielded Core to Reduce Stray Field



EPH SERIES AUDIO TRANSFORMERS

- Double Protection System
- 3500VAC hi-pot
- Isolation for TV Audio and Video External Connections



Aaltam DISTRIBUTION CENTER

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

DC TO DC CONVERTER TRANSFORMERS

tamura MICROTRAN

APPLICATIONS:
- Portable Radiation Monitors
- Infra-Red Detectors
- Op-Amp Power Supplies
- DC Isolation
- Geodetic-Oceanographic-Medical Equipment
- Mobile Equipment
- High Intensity Flashers
- DC Supply for Modular Equipment

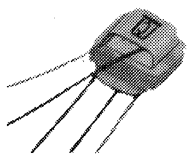


FIG. A

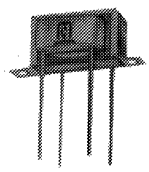


FIG. C

FIG. E

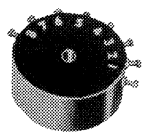


FIG. B

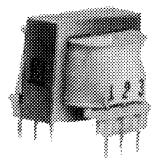


FIG. D

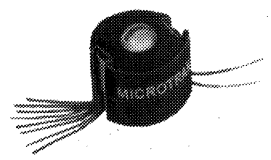


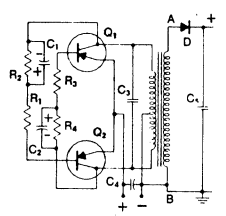
FIG. F

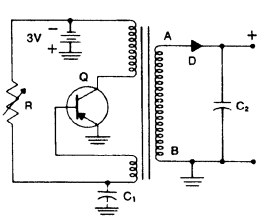
SELECT UNIT TO MEET YOUR POWER AND SIZE REQUIREMENTS	PART NO.	TOTAL VA OUTPUT	DC INPUT VOLTS	DC OUTPUT BRIDGE VOLTS	DC OUTPUT BRIDGE MA	DC OUTPUT CT FULL WAVE VOLTS	DC OUTPUT CT FULL WAVE MA	SWITCH FREQ. HZ. APPROX	TYPICAL TRANSISTOR	DIMENSIONS (INCHES) L	W	H	MOUNTING CENTERS MD	MOUNTING CENTERS MW	TYPE OF CONSTRUCTION	FIG.	SCHEMATIC	APPROX. WT. OZ
25mW	M8149	25mW	3.0	1000*	25μA	—	—	400	2N670	1.016	.953	.844	—	—	Printed circuit	D	2	1.25
to	M8050	25mW	3.0	1000*	25μA	—	—	400	2N670	1.690	.812	.844	1.375	—	Open Frame	C	2	1.25
190mW	M8073	25mW	4.0	425-500*	50μA	—	—	50-3k†	2N1305	.375	.375	.375	—	—	Open Frame	A	3	0.10
HIGH VOLTAGE	M8074	50mW	3.0	535*	90μA	—	—	400	2N414	1.690	.812	.844	1.375	—	Open Frame	C	4	1.25
LOW POWER	M8072	190mW	2.7	480*	400μA	—	—	800	2N1307	1.690	.812	.844	1.375	—	Open Frame	C	1	1.25
MINIATURE	M8092	190mW	2.7	480*	400μA	—	—	800	2N1307	1.030	.875	.800	—	—	Open Frame	D	1	1.25
DESIGN	M8120	190mW	28.0	480*	400μA	—	—	3.5k	2N4355	1.690	.812	.844	1.375	—	Open Frame	C	7	1.25
3VA	M8121	3	5.0	190*	15	—	—	20k	2N6121	.563 D x .344H-‡					Pot Core	F	8	0.30
	M8115	5	13.8	±250 or 500	10	250	20	6k	2N3054	1.25 D x .75H—0.140 CI Hole					Molded Toroid	B	6	1.10
5VA LOW PROFILE	M8117	5	28.0	±250 or 500	10	250	20	6k	2N3054	1.25 D x .75H—0.140 CI Hole					Molded Toroid	B	5	1.10
ENCAPSULATED	M8122	5	5.0	±15 or 30	175	15	350	20k	2N3055	.875D x .531H					P.C. MoldedToroid	E	5	1.10
30VA LOW PROFILE	M8132	30	13.8	±15 or 30	1000	15	2000	20k	2N3055	1.25D x.75H—0.140 CI Hole					Molded Toroid	B	5	1.10
ENCAPSULATED	M8133	30	28.0	±15 or 30	1000	15	2000	20k	2N3055	1.25D x .75H—0.140 CI Hole					Molded Toroid	B	5	1.10

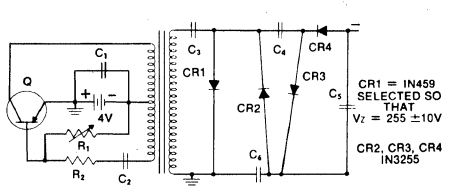
‡Supplied with 4-40 nylon mfg. screw and nut in center hole.
* Output when used with schematic indicated.
† Frequency depends on load and bias conditions.

All Converter Transformers are Supplied with Engineering Bulletin Listing Component Values.

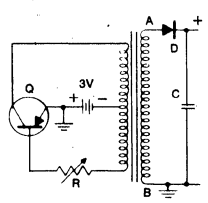
TYPICAL DC-DC CONVERTER TRANSFORMER CIRCUITS

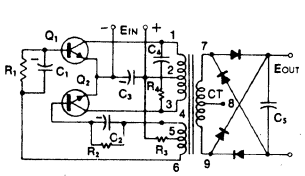

SCHEMATIC 1

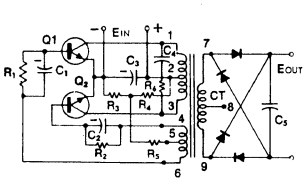

SCHEMATIC 2

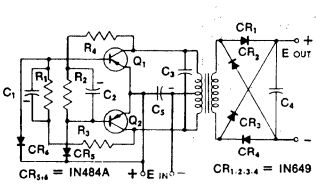


SCHEMATIC 3

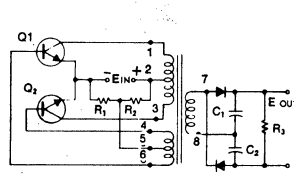

SCHEMATIC 4


SCHEMATIC 5


SCHEMATIC 6



SCHEMATIC 7


SCHEMATIC 8

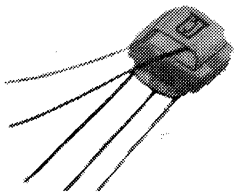
Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

tamura

MICROTRAN

MINIATURIZED AUDIO TRANSFORMERS

Open Frame and Encapsulated Styles for PC Boards

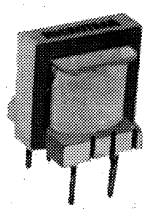


To order add-F to Part No., i.e. UM22-F. Wt. 0.08 oz. 4" #30 color coded leads.
MIL Designation: TF6S21ZZ

OPEN FRAME UM-F
See Figure 1

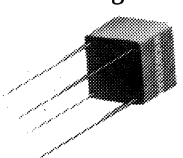
To order add-M to Part No., i.e. UM22-M. Wt. 0.14 oz.
MIL Designation: TF5S21ZZ

MOLDED UM-M
See Figure 2



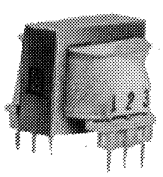
Small Footprint Plug-in Printed Circuit Construction Vacuum Varnish Impregnated. Wt. 0.16 oz.

OPEN FRAME PRINTED CIRCUIT VM-PC
See Figure 3



Epoxy molded. Wt. 0.25 oz. To order add -M to Part No., i.e. VM2-M.
MIL Designation: TF5S21ZZ

MOLDED VM-M
See Figure 4



DCM SERIES
See Figure 5

ULTRA-MINIATURE-UM SERIES
Frequency Response ±2dB 300 to 10,000 Hz

Measured at level stated for 300 Hz. Miniaturized design offers a relatively high power level and printed circuit packaging. Response measured at level stated for 300 Hz. Mfd. per MIL-T-27.

PART NO.	PRIMARY IMPEDANCE	SECONDARY IMPEDANCE	PRI. UNBAL. mADC	PRI. DCR	SEC. DCR	LEVEL mW@ 300Hz	LEVEL mW@ 1 kHz
UM26-(*)	400	11	3.0	35	1.5	15	500
UM27-(*)	400 CT	11	6.0	35	1.5	15	500
UM25-(*)	400	50	3.0	35	5.0	15	500
UM29-(*)	600 CT	600 CT	7.0	45	60.0	5	400
UM24-(*)	1000	50	3.0	65	10.0	5	500
UM33-(*)	1000 CT	600	6.0	80	65.0	5	500
UM32-(*)	1500 CT	600	5.0	135	65.0	5	500
UM39-(*)	2500 CT	600 CT	2.0	250	50.0	5	500
UM34-(*)	10,000 CT	600 CT	2.0	850	40.0	5	500
UM31-(*)	10,000 CT	1200 CT	2.0	850	120.0	5	500
UM37-(*)	10,000	2000 CT	1.0	850	200.0	5	500
UM35-(*)	15,000 CT	15,000 CT	1.0	930	1210.0	5	300
UM36-(*)	20,000 CT	800 CT	0.5	1100	80.0	5	500
UM22-(*)	20,000	1000	0.5	1100	100.0	5	300
UM23-(*)	20,000	1200 CT	0.5	1100	110.0	5	300
UM21-(*)	100,000	1000	0.0	1900	135.0	5	70
UM30-(*)	Choke	1.5 H (0 mA) 0.7 H (2 mA) 100 DCR					
UM28-(*)	Choke	10 H (0 mA) 8 H (0.5 mA) 650 DCR					
UM90	Magnetic Shield Mu-metal slip-on can for UM-M series. 20 dB shielding 0.594"D x 0.562" high.						

* Add either -F, or -M, to Part No. to designate construction. See Photos.
Power levels shown are for 7.5% maximum distortion.

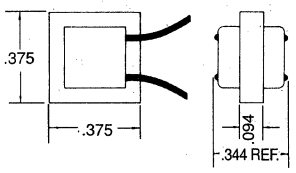


FIGURE 1 OUTLINE

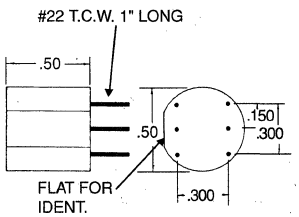


FIGURE 2 OUTLINE

VERY-MINIATURE-VM SERIES
Frequency Response ±2dB 200 to 10,000 Hz

PART NO.	PRIMARY IMPEDANCE	SECONDARY IMPEDANCE	PRI. UNBAL. mADC	PRI. DCR	SEC. DCR	LEVEL mW@ 1 kHz
VM1-(*)	50	600	5.500	7	90.0	15.0
VM7-(*)	500	3.4	3.500	50	0.5	15.0
VM16-(*)	500 CT	250 CT	7.500	50	25.0	15.0
VM14-(*)	600 CT	600 CT	7.000	50	65.0	15.0
VM8-(*)	1250	3.4	2.000	135	0.5	15.0
VM9-(*)	1250	50	2.000	135	6.5	15.0
VM10-(*)	2500	2500 CT	1.500	225	215.0	3.0
VM17-(*)	10,000 CT	5000 CT	0.000	400	300.0	5.0
VM12-(*)	20,000	1000	0.160	625	85.0	5.0
VM13-(*)	20,000	1000 CT	0.160	625	85.0	5.0
VM3-(*)	25,000	600	0.150	720	45.0	5.0
VM5-(*)	50,000	600	0.100	830	55.0	5.0
VM15-(*)	50,000 CT	50,000 CT	0.000	2000	2600.0	5.0
VM6-(*)	100,000	1200 CT	0.070	2000	150.0	5.0
VM2-(*)	200,000	600	0.050	3000	110.0	2.5
VM4-(*)	200,000	1200	0.035	3100	165.0	5.0
VM11-(*)	Choke	20 H (0 mA) 12 H (0.5 mA)			1000.0	
VM90	Magnetic shield Mu-metal slip-on can for VM-M series. 20dB shielding. 0.625" x 0.625" x 0.531" high.					

* Add either -FPB, -M, or -PC to Part No. to designate construction. See Photos.

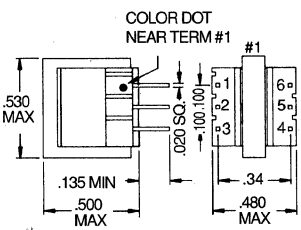


FIGURE 3 OUTLINE

DECI-MINIATURE-DCM SERIES
Frequency Response 200-15,000 Hz ±2dB

PART NO	PRIMARY IMPEDANCE	SECONDARY IMPEDANCE	PRI UNBAL mA DC	OPERATING LEVEL dBm
DCM1-PC	25,000 CT	1200 CT	2	18
DCM2-PC	15,000 CT	15,000 CT	3	19
DCM3-PC	15,000 CT	600 CT	3	19
DCM4-PC	10,000 CT	5,000 CT	4	20
DCM5-PC	10,000	2500/625 SPLIT	2	20
DCM6-PC	10,000 CT	1500 CT	4	20
DCM7-PC	5000 CT	80,000 CT	6	15
DCM8-PC	4000 CT	1200 CT	6	20
DCM9-PC	4000 CT	600 CT	6	20
DCM10-PC	4000	600/150 SPLIT	3	20
DCM11-PC	2500 CT	2500 CT	8	20
DCM12-PC	2500	2500/625 SPLIT	4	20
DCM13-PC	2500 CT	625 CT	8	20
DCM14-PC	2500 CT	200 CT	8	20
DCM18-PC	600 CT	50,000 CT	16	20
DCM19-PC	600	8000/2000 SPLIT	8	20
DCM20-PC	600 CT	200 CT	16	20
DCM21-PC	600 CT	600 CT	16	20
DCM22-PC	250 CT	600 CT	25	20
DCM51-PC	Choke	10 H @ 0 mA DC	5 H @ 3 mA DC	300 DCR
DCM52-PC	Choke	5 H @ 0 mA DC	2 H @ 5 mA DC	155 DCR
DCM53-PC	Choke	2.5 H @ 0 mA DC	1 H @ 7 mA DC	75 DCR

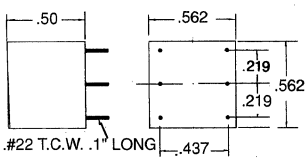


FIGURE 4 OUTLINE

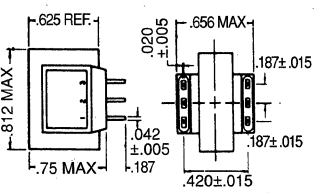


FIGURE 5 OUTLINE

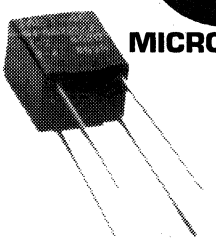
Refer to Tamura in this section for additional specifications and model numbers.

Aaltam DISTRIBUTION CENTER
Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

MINIATURE ENCAPSULATED TRANSFORMERS AND INDUCTORS

Telecommunications, Input, Interface, Isolation & Output Impedance Matching

tamura MICROTRAN



FEATURES

- FCC Part 68 Models Available.
- Miniature: 0.31" x 0.41" x 0.465".
- Tested to MIL-T-27 Specifications.
- Dielectric Strength: 1kVrms.
- Insulation Resistance: 10kMΩ.
- Oper. Temp: ≤105°C (Class S).
- Thermal Shock: 5cyc, -55≈105°C.
- Freq. Response: ±2dB, .3≈100kHz.
- Max. Distort: 10-25% @ rated pwr.
- Impedance: 3.2 to 200kΩ.
- Solder Plated Nickel Leads.
- Molded Case Constr/Base Mtg., Pad.

MINIATURE ENCAPSULATED TRANSFORMERS

TAMURA PART NO.	MICROTRAN PART NO.	MATCHING Z PRI:SEC[3]	PRI maDC	DCR (Ω) PRI	DCR (Ω) SEC	PWR[3] (MW)	TURN RATIO PRI	TURN RATIO SEC	FIG. No.
MET-01	PM3-M	200kCT:1000CT	0.00	5300	120	10	14.10	1	1
MET-02	MET-02	100kCT:1000CT	0.00	4300	120	10	10.00	1	1
MET-03	PM7-M	50kCT:1000CT	0.00	3800	90	25	7.07	1	1
MET-04	PM9-M	50k:1kCT*	0.00	3800	90	25	14.10	1/1	2
MET-05	PM11-M	25kCT:1000CT	0.50	1600	95	30	5.00	1	1
MET-06	PM13-M	25k:1kCT*	0.25	1600	95	30	10.00	1/1	2
MET-07	MET-07	25kCT:600CT	0.50	1600	95	30	6.45	1	1
MET-09	PM17-M	10kCT:10kCT	1.00	1000	1300	40	1.00	1	1
MET-10	MET-10	10kCT:4000CT	1.00	1000	500	40	1.58	1	1
MET-11	PM19-M	10kCT:2000CT	1.00	1000	300	40	2.23	1	1
MET-12	PM21-M	10K:2kCT*	0.50	1000	300	40	4.47	1/1	2
MET-12	MET-13	10kCT:1500CT	1.00	1000	260	40	2.58	1	1
MET-14	PM23-M	10kCT:1.2kCT	1.00	1050	280	40	2.76	1	1
MET-15	PM25-M	10K:1.2kCT*	0.50	1000	220	40	5.77	1/1	2
MET-17	PM29-M	10kCT:500CT	1.00	1000	80	40	4.47	1	1
MET-18	MET-18	10kCT:4.0	1.00	1200	1	40	50.00	1	3
MET-19	MET-19	10k:3.2	0.50	1200	0.8	40	55.90	1	4
MET-20	MET-20	8000CT:3.2	1.00	1000	0.8	40	50.00	1	3
MET-21	MET-21	5000CT:2000CT	1.00	490	300	40	1.58	1	1
MET-22	PM31-M	2500CT:2500CT	1.00	280	350	40	1.00	1	1
PM31-F[5]	PM31-F[5]	2500CT:2500CT	1.00	280	350	40	1.00	1	1
MET-23	MET-23	1600CT:3.2	2.50	186	0.8	50	22.30	1	3
MET-24	PM33-M	1500CT:600	3.00	160	95	50	1.58	1	3
PM33-F[5]	PM33-F[5]	1500CT:600	3.00	160	95	50	1.58	1	3
MET-25	MET-25	1200CT:3.2	3.00	125	0.7	50	19.40	1	3
MET-26	MET-26	1000CT:1000CT	3.00	80	100	50	1.00	1	1
MET-27	MET-27	1000CT:600CT	3.00	95	85	50	1.29	1	1
MET-28	MET-28	1000:50	3.00	110	8	50	4.47	1	4
MET-29[1]	MET-29[1]	900CT:600	3.00	80	95	50	1.22	1	3
MET-31[1]	PM34-M[1]	600CT:600CT	3.00	70	95	50	1.00	1	1
PM34-F[5]	PM34-F[5]	600CT:600CT	3.00	70	95	50	1.00	1	1
MET-32	MET-32	600:600CT*	3.00	70	95	50	2.00	1/1	2
MET-33	MET-33	600CT:250CT	3.00	70	35	50	1.55	1	1
MET-35	MET-35	600CT:8	4.50	60	1.5	50	8.66	1	3
MET-36	MET-36	600CT:3.2	4.50	60	0.7	50	13.70	1	3
MET-37	MET-37	500CT:600	3.00	65	95	50	0.91	1	3
MET-38	PM36-M	500:500CT*	3.00	72	85	50	1.88	1/1	2
PM36-F[5]	PM36-F[5]	500:500CT*	3.00	72	85	50	1.88	1/1	2
MET-39	PM35-M	500:50	3.00	55	8	50	3.16	1	4
PM35-F[5]	PM35-F[5]	500:50	3.00	55	8	50	3.16	1	4
MET-40	MET-40	320CT:3.2	6.00	35	0.7	50	10.00	1	3
MET-41	PM38-M	300CT:600	7.00	41	98	50	0.71	1	3
PM38-F[5]	PM38-F[5]	300CT:600	7.00	41	98	50	0.71	1	3
MET-42	MET-42	150:12	10.00	20	2.5	50	3.54	1	4
MET-43	PM37-M	120CT:3.2	10.00	13	0.7	50	6.12	1	3
PM37-F[5]	PM37-F[5]	120CT:3.2	10.00	13	0.7	50	6.12	1	3
MET-44	MET-44	300CT:12	7.00	42	3.4	50	5.00	1	3
MET-45	MET-45	10k:10kCT*	1.00	1100	1300	50	2.00	1/1	2
MET-46[1]	PM32-M[1]	600:600	3.00	72	93	50	1.00	1	4
PM32-F[5]	PM32-F[5]	600:600	3.00	72	93	50	1.00	1	4
MET-49	MET-49	600:600/600	3.00	72	210	50	1.41	1/1	2
MET-50	MET-50	10k:125	0.00	1100	28	10	8.62	1	4
MET-59	MET-59	600:600CT	3.00	70	95	50	2.00	1/1	2A
MET-60	MET-60	135:135CT	10.00	10	10	50	1.00	1	1
MET-51	PM-5M	200k:1k	0.00	5300	110	10	14.07	1	4
PM-27M	PM-27M	10k:1.2k	0.50	1050	280	50	0.36	1	4
PM27-F[5]	PM27-F[5]	10k:1.2k	0.50	1050	280	50	0.36	1	4
MET-52	PM-15M	25k:1k	0.25	1700	110	40	0.21	1	4
METC-99	PM90	MU METAL SHIELD	—	—	—	—	—	—	—

MINIATURE ENCAPSULATED INDUCTORS

TAMURA PART No.	MICROTRAN PART No.	INDUCTANCE H(min) @ 300Hz	Q (MIN) @1V 1kHz	DCR (Ω)	DC (ma)	FIG. No.
MEI-01	PM39-M	6 @ 15V	5.0	1800	2.0	5
PM-39-F[5]	PM39-F[5]	6 @ 15V	5.0	1800	2.0	5
MEI-02	PM40-M	3.5 @ 15V	4.0	1200	2.0	5
MEI-03	MEI-03	1.25 @ 3V	3.5	180	2.0	5
MEI-04	PM41-M	0.3 @ 3V	3.0	40	4.0	5
PM41-F[5]	PM41-F[5]	0.3 @ 3V	3.0	40	4.0	5
MEI-05	MEI-05	0.1 @ 3V	2.0	15	5.0	5

MET & MEI SCHEMATIC & CONNECTION DIAGRAMS

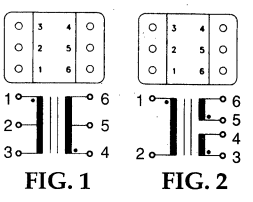


FIG. 1 FIG. 2

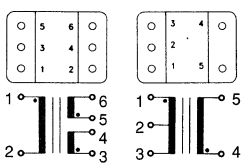


FIG. 2A FIG. 3

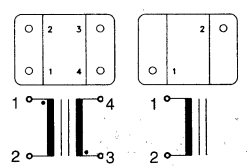
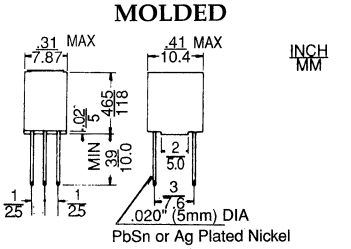
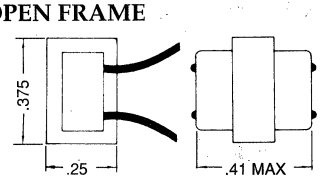


FIG. 4 FIG. 5

MECHANICAL DIMENSIONS- MOLDED



MECHANICAL DIMENSIONS- OPEN FRAME



Note 1: Meets FCC part 68 (hi-pot 1.5kV or 1.0kV).
Note 2: PRI maDC-Primary maximum rated unbalanced current in milli-amps, DC.
Note 3: PWR (mW)-Maximum power level in milli-watts @ 300Hz.
Note 4: CT*-Winding can be connected as a center tapped winding or as two isolated windings.
Note 5: -F is open frame construction.

Refer to Tamura in this section for additional specifications and model numbers.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

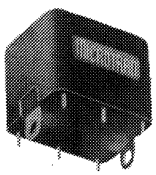
tamura
MICROTRAN.

MINIATURE AUDIO TRANSFORMERS

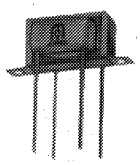
Open Frame, Molded & Hermetic Cased Styles

MINIATURE AUDIO M & MT AND MM, MMT SERIES

Tamura's miniaturized audio transformers offer a wide spectrum of electrical & mechanical specifications. All units are manufactured in accordance with the requirements of MIL-T-27. All units are available in molded or open-frame construction, with aluminum or hermetically sealed cases. The low profile of the Microminiature series makes them ideal for use in plug-in printed circuit boards.

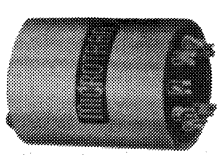


MOLDED M-M
See Fig. 1

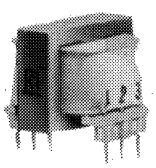


OPEN FRAME WITH CHANNEL M-FB
See Fig. 2

HERMETIC M-H
See Fig. 3



ALUMINUM CASED M-A
See Fig. 4



OPEN FRAME PRINTED CIRCUIT M-PC
See Fig. 5

PART NO.*	PRIMARY IMPEDANCE	SECONDARY IMPEDANCE	PRIMARY UNBALANCE mA DC	OPERATING LEVEL DBM	FREQUENCY RESPONSE ±2DB
M3-(*)•	7.5/30	50,000	0	5	20-20,000
M12-(*)	50/250 CT	50/250/600 CT	0	8	20-20,000
M1-(*)•	50/250/600 CT	50,000	0	5	20-20,000
M1-S	Same as M1 above-with dual nickel alloy shield				
M2-(*)•	50/250/600 CT	50,000 CT	0	5	20-20,000
M14-(*)	200	1/2 Megohm	0	9	80-3,000
M15-(*)	10,000	1 Megohm	0	11	100-2,500
M8-(*)	15,000	50/250/600 CT	0	8	20-20,000
M9-(*)	15,000	50/250/600 CT	4	21	150-20,000
M4-(*)	15,000	60,000	0	6	20-15,000
M5-(*)	15,000	60,000	4	14	200-20,000
M6-(*)	15,000	95,000 CT	0	5	20-15,000
M7-(*)	15,000	95,000 CT	4	11	200-20,000
M10-(*)•	30,000 CT	50/250/600 CT	0	8	30-50,000
M11-(*)•	50,000	50/250/600 CT	0	5	20-20,000
M13-(*)	Reactor 300hy. 0 DC	50 hy. @ 3mA	6000Ω D.C.R.		
M90	Magnetic Shield Mu-Metal slip on can for M-A Series 25 dB shielding				
MT-2(*)	100	10 CT/40 CT	100	27	200-20,000
MT-30(*)	250 CT	500	10	30	200-15,000
MT23-(*)	250 CT	1000	10	30	200-15,000
MT14-(*)	400	10	50	25	200-20,000
MT15-(*)	500 CT	210	30	27	300-20,000
MT-1(*)	600	600	10	23	200-15,000
MT35-(*)‡	600	600 CT & 600 CT	0	5	40-20,000
MT36-(*)†	600 CT	600 CT	0	15	50-15,000
MT26-(*)	600 CT	600 CT	20	23	200-15,000
MT9-(*)	600 CT	1,200 CT	4	23	200-15,000
MT33-(*)	600/150 Split	600/150 Split	20	23	200-20,000
MT22-(*)	600/150 Split	1,200 CT	4	23	200-15,000
MT29-(*)	1600 CT	450	15	30	200-15,000
MT12-(*)	2,000	3.4	10	32	200-15,000
MT24-(*)	2,500	600 CT	10	32	200-15,000
MT13-(*)	4,000 CT	3.4	3	32	200-15,000
MT11-(*)	4,000 CT	600 CT	3	32	200-15,000
MT21-(*)	4,000 CT	600/150 Split	3	32	200-15,000
MT25-(*)	7,500 CT	600 CT	8	32	200-15,000
MT34-(*)	10,000/2500 Split	2000/500 Split	4	20	200-20,000
MT10-(*)•	25,000	600	3	22	200-15,000
MT7-(*)•	25,000	1,200 CT	3	22	200-15,000
MT-18(*)•	25,000 CT	1,200 CT	6	22	200-15,000
MT5-(*)•	50,000	6	3	20	300-15,000
MT3-(*)	50,000	600	3	20	300-15,000
MT8-(*)•	50,000 CT	1,200 CT	3	20	300-15,000
MT20-(*)•	50,000 CT	1200/300 Split	3	20	300-15,000
MT6-(*)•	100,000	1,200 CT	1.4	17	200-15,000
MM1-(*)	200/50	250,000/62,500	0	4	200-10,000
MMT1-(*)	600	600	8	22	200-15,000
MMT26-(*)	600 CT	600 CT	16	22	200-15,000
MMT33-(*)	600 CT	600/150 Split	16	22	200-15,000
MMT9-(*)	600 CT	1200 CT	16	22	200-15,000
MMT32-(*)	600 CT	1200/300 Split	16	22	200-15,000
MMT31-(*)	2000 CT	500 CT	10	28	200-15,000
MMT11-(*)	4000 CT	600 CT	5	28	200-15,000
MMT21-(*)	4000 CT	600/150 Split	5	28	200-15,000
MMT17-(*)	10,000 CT	200 CT	6	20	200-15,000
MMT28-(*)	10,000 CT	1500 CT	2	20	200-15,000
MMT29-(*)	10,000 CT	10,000 CT	2	20	200-15,000
MMT7-(*)	25,000	1200 CT	1	20	200-15,000
MMT18-(*)	25,000 CT	1200 CT	2	20	200-15,000
MMT3-(*)	50,000	600	0.7	20	200-15,000
MMT4-(*)	50,000 CT	600 CT	1.4	20	200-15,000

* Add either -M, -FB, -PC, -A or -H to Part No. to designate construction according to table
• These items not available in -PC construction.
‡ For telephone line coupling or hybrid telephone line.
† Broadcast fidelity line matching transformer. Frequency response ±0.5 dB.

TRANSFORMER	M/MT SERIES				MM/MMT SERIES		
STYLE	FIG	W	D	H	W	D	H
Molded (-M)	1	1.156	0.750	0.875	.875	0.781	0.531
Open Frame (-FB)	2	1.047	1.375	0.844	0.800	0.655	0.469
Hermetic Seal (-H)	3	0.938		1.438			
Al Case (-A)	4	0.875		1.187			
Open Frame (-PC)	5	1.030	1.000	0.875			

Note: To order a particular style add Suffix (-M, -FB, etc.) to Part no.

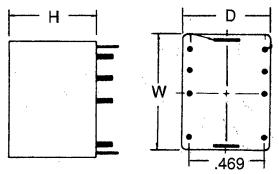


FIG. 1-M
MIL Designation: TF5S21ZZ

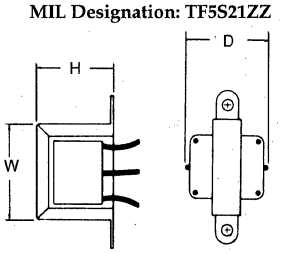


FIG. 2-FB
MIL Designation: TF6S21ZZ

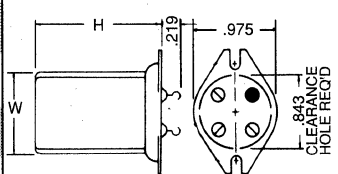


FIG. 3-H
MIL Designation: TF4R21YY

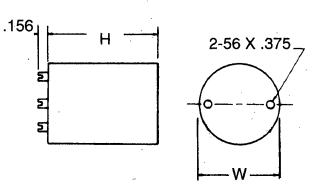


FIG. 4-A
MIL Designation: TF6R21ZZ

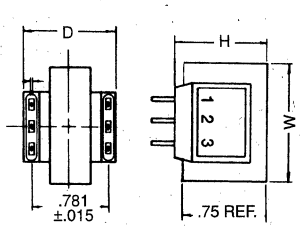


FIG. 5-PC
MIL Designation: TF6S21ZZ

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

POWER TRANSFORMERS AND INDUCTORS

tamura
MICROTRAN

50/60Hz CONTROL & POWER SUPPLY-MIL/COMMERCIAL

Designed for solid state and low voltage power supply applications. Primary 105/115/125 Volts. Part numbers listed on left are hermetically sealed per MIL Designation: TF4S03XX. Part numbers listed on right are open frame construction.

MIL		COMMON ELECTRICAL RATINGS				COMMERCIAL					
		SECONDARY		RECTIFIER CIRCUIT				OPEN FRAME DIMENSIONS			
MIL PART NO.	FIG. A MIL CASE XX	AC VOLTS	RMS AMPS	CT DC VOLTS**	FW BRIDGE DC VOLTS**	OPEN FRAME PART NO.	FIG.	L	W	H	MOUNTING CENTERS
M8042	AJ	6.3 CT	6.00	1.9	3.8	M8242	B	2.375	1.375	1.500	2.000
M8043	FB	6.3 CT	2.00	1.9	3.8	M8243	B	3.250	1.625	1.940	2.812
M8086	GA	6.3 CT	6.00	1.9	3.8	M8286*	B	3.688	2.125	2.250	3.125
M8087	GA	12.6 CT	3.00	4.7	9.4	M8247	B	3.688	2.125	2.250	3.125
—	—	12.0 CT	4.00	9.9 (series)	19.8 (series)	M8247†	C	4.125	3.125	3.750	3.437X2.500
		12.0	4.00	9.9 (series)	19.8 (series)						
M8044	JB	12.6 CT	2.00	10.5 (series)	21.0 (series)	M8244	C	3.375	2.875	3.094	2.812X2.500
		12.6	2.00	10.5 (series)	21.0 (series)						
M8022	JB	18.5 CT	3.00	7.4	14.8	M8222	C	3.375	2.500	3.094	2.812X2.125
M8088	HA	26.0 CT	2.50	10.8	21.6	M8288	C	3.000	2.750	2.750	2.500X3.375
M8152	AJ	28.0 CT	0.15	11.7	23.4	—	—	—	—	—	—
M8045	FA	28.0 CT	6.00	11.7	23.4	M8245	B	3.250	2.125	1.940	2.812
M8055	JA	30.0 CT	2.50	12.5	25.0	M8255	C	3.750	2.750	3.469	3.125X2.250
M8089	AJ	40.0 CT	1.00	17.0	34.0	M8289	B	2.375	1.375	1.500	2.000
M8090	EA	40.0 CT	3.00	17.0	34.0	M8290	B	2.812	1.625	1.625	2.375
M8091	GB	40.0 CT	.75	17.0	34.0	M8291	B	3.688	2.125	2.250	3.125
M8046	LA	49.0 CT	2.50	21.0	42.0	M8246	C	4.500	3.250	4.031	3.750X2.500
M8056	HA	80.0 CT	6.00	35.0	70.0	M8256	C	3.000	2.625	2.750	2.500X2.375

† Secondary may be connected in series to provide 24V @ 4A or parallel for 12V @ 8A. *60Hz only.
**DC Output for resistive or inductive loads. Output volts based on approx. 1V drop per rectifier.

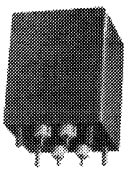


FIGURE A
Hermetically Sealed per MIL-T-27.
MIL Designation: TF4S03XX.
See MIL Case Dimension Chart.

50/60Hz ISOLATION/POWER-MIL/COMMERCIAL

Center tap permits use in either F.W. Bridge or F.W. CT circuitry. Electrostatic shielding. Part numbers listed on left are hermetically sealed per MIL Designation: TF4S03XX. Part numbers listed on right are open frame construction.

MIL		COMMON ELECTRICAL RATINGS				COMMERCIAL					
								OPEN FRAME DIMENSIONS			
MIL PART NO.	FIG. A MIL CASE XX	INPUT VOLTAGE	OUTPUT VOLTAGE	CURRENT RMS AMPS	VA RATING	OPEN FRAME PART NO.	FIG.	L	W	H	MOUNTING CENTERS
M8094	AH	115	115 CT	0.0085	1	M8294	B	2.125	1.125	1.187	1.750
M1851	FA	115	115 CT	0.1300	15	M8251	B	3.250	1.625	1.940	2.812
M8096*	GA	115	115 CT	0.3500	40	M8296*	B	4.000	2.250	2.562	3.562
M8078	KA	115	115 CT	0.9000	100	M8278*	C	3.750	3.125	3.469	3.125X2.750

* Primary 105/115/125V.

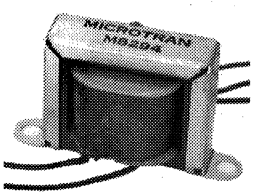


FIGURE B
Commercial

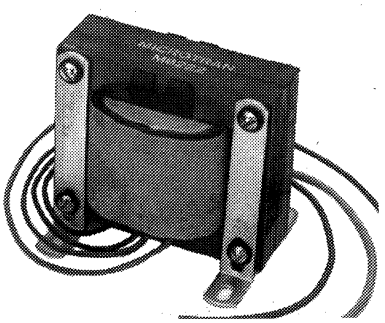


FIGURE C
Commercial

FILTER INDUCTORS-MIL/COMMERCIAL

For 50/60 and 400 Hz Power Supplies. 1500 Test Volt. May be connected in series or parallel for inductive requirements. Part numbers listed on left are hermetically sealed per MIL designation: TF4S03XX. Part numbers listed on right are open frame construction. Inductance values shown are for 60 Hz, except M8102 120 Hz.

MIL		COMMON ELECTRICAL RATINGS						COMMERCIAL					
		SERIES CONNECTED			PARALLEL CONNECTED					OPEN FRAME DIMENSIONS			
MIL PART NO.	FIG. A MIL CASE XX	INDUCTANCE HENRYS	DC AMPS	DCR OHMS	INDUCTANCE HENRYS	DC AMPS	DCR OHMS	OPEN FRAME PART NO.	FIG.	L	W	H	MOUNTING CENTERS
M8098	AH	3.50	0.050	200	0.875	0.10	50.0	M8198	B	2.125	1.125	1.189	1.750
M8099	AJ	1.00	0.150	65	0.250	0.30	16.0	M8199	B	2.375	1.250	1.500	2.000
M8100	EB	0.50	0.300	30	0.125	0.60	7.5	M8200	B	2.812	1.375	1.625	2.375
M8101	FB	0.32	0.600	16	0.080	1.20	4.0	M8201	B	3.250	1.625	1.940	2.812
M8102	JA	0.20	1.000	4	0.050	2.00	1.0	M8202	C	3.375	2.375	3.094	2.812X2.125

FIGURE D
Epoxy molded with .50" pins for printed circuit applications. MIL Designation: TF5S03XX.

400Hz POWER SUPPLY

For Silicon Rectifier Circuitry, and Filament Applications. Primary 105/115/125 Volts.

	SECONDARY		RECTIFIER CIRCUIT		FIG. A MIL CASE XX
PART NO.	AC VOLTS	RMS AMPS	CT FW DC VOLTS**	FW BRIDGE DC VOLTS**	
M8064†	6.3 CT	0.6	1.9	3.8	AH
M8039	12.6	0.8	10.5 (series)	21 (series)	AJ
	12.6 CT	0.8	10.5 (series)	21 (series)	AJ
M8065	26 CT	1.5	10.8	21.6	EA
M8066	26 CT	3	10.7	21.5	FA
M8067	30 CT	1.5	12.5	25	FB
M8070†	65 CT	0.170	28.4	56.8	AH

400Hz TOROIDAL SUPPLY

Toroidal cores permit smaller height and package and greater efficiency. Size savings up to 30%. Printed circuit pins can be bent for chassis mounting. Low phase shift. Primary 115 Volts.

PART NO.	SECONDARY		VA	DIMENSIONS		NOMINAL WT. OZ	FIG.
	AC VOLTS	RMS mA		DIA	HEIGHT		
M8106	28 CT	320	9	1.156	1.125	2	D
M8107	28 CT	710	20	1.500	1.250	4	D
M8108	56 CT	160	9	1.156	1.125	2	D
M8109	56 CT	356	20	1.500	1.250	4	D
M8111	115 CT	170	20	1.500	1.250	4	D

400 Hz/115V ISOLATION/POWER

Center Tap. Permits Use in Either FW Bridge or FW CT Circuitry. Electrostatic Shielding. Primary 115 Volts.

	SECONDARY			FIG. A MIL CASE XX
PART NO.	AC VOLTS	RMS AMPS	VA	
M8059	115 CT	0.35	40	EB
M8060	115 CT	1.3	150	GA
M8061*	115 CT	2.6	300	JA
M8062*	115 CT	4.4	500	KA

Aaltam DISTRIBUTION CENTER
Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

TELECOMMUNICATIONS TRANSFORMERS- FCC PART 68

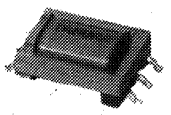
MICROTRAN

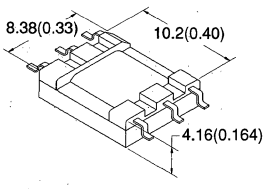
File No's. 138028
142035

File No. LR81383

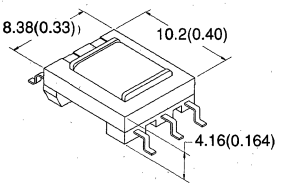
International, coupling, hybrid, voice, and data applications.

SURFACE MOUNT FOR V.32 & V.34 APPLICATIONS, PCMCIA, AND MODEM CARDS





TSL103



TSL203

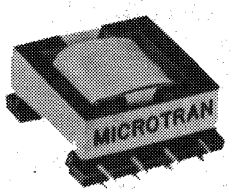
MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR ±dB	PRI DCR	SEC DCR
TSL103	TTC-103SL	600:346	0	2.7	0.15/-0.35	127	150
TSL203	TTC-203SL	600:346	0	2.7	0.15/-0.35	127	150
TSL501	TTC-8324	600:301	0	2.7	0.15/-0.35	157	146
TSL506	TTC-8404	600:301	0	2.7	0.15/-0.35	157	146

Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.

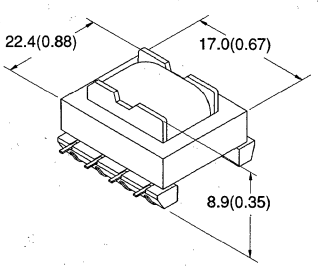
SCHEMATIC

Refer to Tamura page A•2390 for additional specifications and model numbers.

SURFACE MOUNT FOR VOICE AND MODEM APPLICATIONS



SCHEMATIC



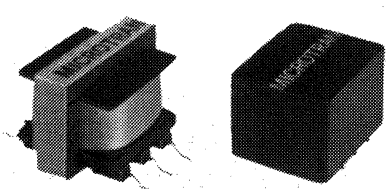
TS3104/3154

MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL DB	FR ±dB	PRI DCR	SEC DCR	APPLICATION NOTES
TS3104	TS3104	600:600	0	1.4	±0.5	76	135	Modem
TS3154	TS3154	600:600	0	1.4	±0.5	54	67	Voice/Data

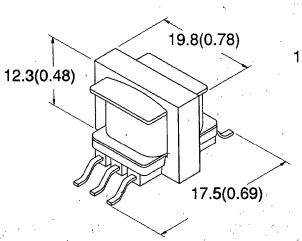
Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.

Refer to Tamura page A•2391 for additional specifications and model numbers.

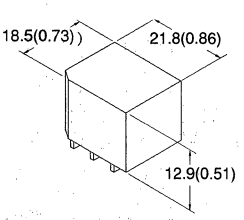
SURFACE MOUNT FOR COMMERCIAL AND SEVERE ENVIRONMENTAL APPLICATIONS



SCHEMATIC



TS1104



TS1104-M

MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR ±dB	PRI DCR	SEC DCR
TS1104	TS1104	600:600	0	1.0	±0.5	46	63
TS1104-M2	TS1104-M2	600:600	0	1.0	±0.5	46	63

Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.
Note 2: Constructed to MIL-T-TF5S21ZZ. hi-pot 3750V.

Refer to Tamura page A•2391 for additional specifications and model numbers.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

TELECOMMUNICATIONS TRANSFORMERS-FCC PART 68

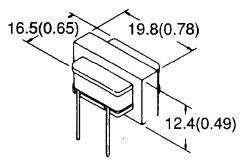
c UL us File No's. 138028 142035

CSA File No. LR81383

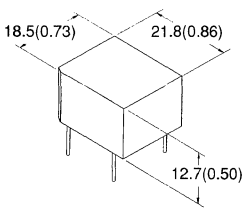
tamura MICROTRAN

International, coupling, hybrid, voice, and data applications.

VERY LOW PROFILE FOR COMMERICAL AND SEVERE ENVIRONMENT APPLICATIONS

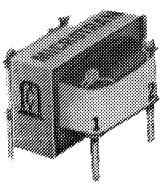


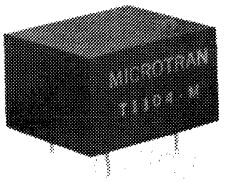
T1104



T1104-M

SCHEMATIC



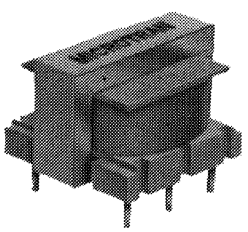


MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR1 ±dB	PRI DCR	SEC DCR
T1104	T1104	600:600	0	1.0	±0.25	46	63
TTC-272N	TTC-272N	600:600	0	1.0	±0.50	46	63
T1104-M[2]	T1104-M[2]	600:600	0	1.0	±0.25	46	63

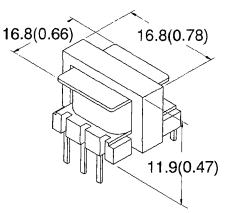
Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.
Note 2: Constructed to MIL-T-TF5S21ZZ. hi-pot 3750V.

Refer to Tamura page A•2394 for additional specifications and model numbers.

VERY LOW PROFILE PLUG-IN



SCHEMATIC

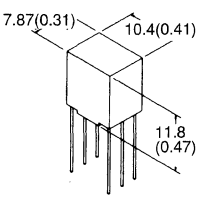


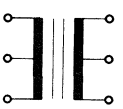
TL1104

MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR1 ±dB	PRI DCR	SEC DCR
TL1104	TL1104	600:600	0	1.0	±0.3	46	63

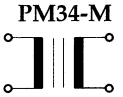
Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.

VERY LOW PROFILE MOLDED



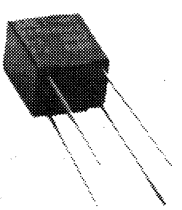


PM34-M



PM32-M

SCHEMATICS

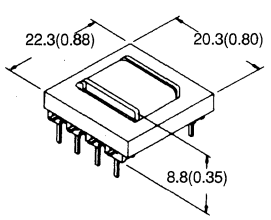


MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR1 ±dB	PRI DCR	SEC DCR
PM32-M	MET-46	600:600	3.0	1.6	±2	72	93
PM34-M	MET-31	600CT:600CT	3.0	1.6	±2	70	95

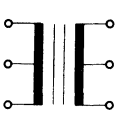
Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.

Refer to Tamura pages A•2395 and 2393 for additional specifications and model numbers.

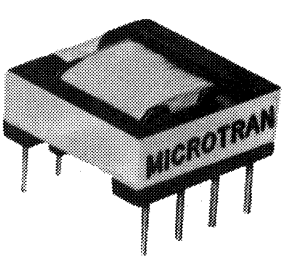
VERY LOW PROFILE PLUG-IN FOR VOICE AND MODEM APPLICATIONS



TP3104/TP3154
SCHEMATIC



TP3106
SCHEMATIC



MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR1 ±dB	PRI DCR	SEC DCR	APPLICATION NOTES
TP3104	TP3104	600:600	0	1.4	±0.5	76	135	Modem
TP3106	TP3106	600CT:600CT	0	1.4	±0.5	76	135	Modem
TP3154	TP3154	600:600	0	1.4	±0.1	52	67	Voice/Data

Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.

Refer to Tamura page A•2393 for additional specifications and model numbers.

Aaltam DISTRIBUTION CENTER
Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

TELECOMMUNICATIONS TRANSFORMERS- FCC PART 68

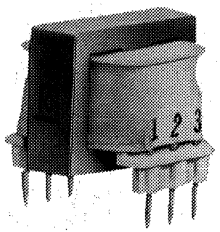
MICROTRAN

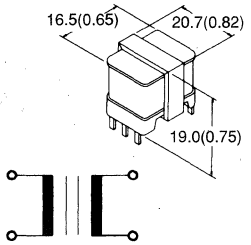
File No's. 138028
142035

File No. LR81383

International, coupling, hybrid, voice, and data applications.

PLUG-IN PC BOARD APPLICATIONS



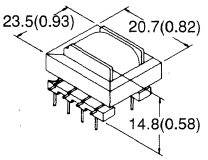


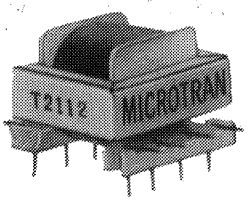
SCHEMATIC

MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR† ±dB	PRI DCR	SEC DCR
T2113	TTC-105	600:600	90	2.0	±0.1	71	117

Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.

LOW PROFILE PLUG-IN





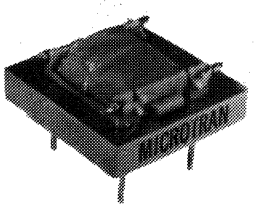
SCHEMATIC

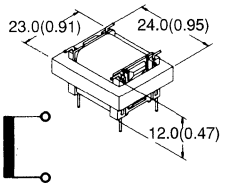
MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR† ±dB	PRI DCR	SEC DCR
T2111	TTC-109N	600:600	90	2.0	+0.1/-2.75	71	117

Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.

Refer to Tamura page A•2396 for additional specifications and model numbers.

LOW PROFILE HI DC CURRENT



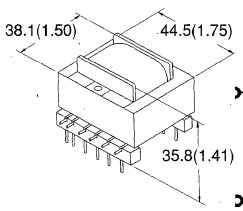


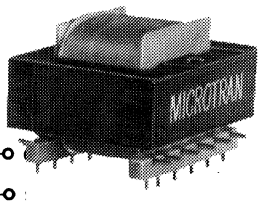
SCHEMATIC

MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR† ±dB	PRI DCR	SEC DCR
TM105	TTC-264	600:470	100	2.5	+1.0/-4.0	120	
TM106	TTC-265	600:470	100	2.0	+1.0/-4.0	95	120

Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.

INTERNATIONAL HYBRID APPLICATIONS





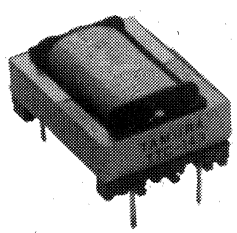
SCHEMATIC

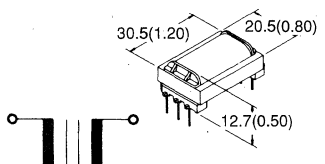
MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR† ±dB	PRI DCR	SEC DCR
TH5220	TH5220	(4W)600:600/600	(2W)100	0.7	±0.5	50	30/30

Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM. Add 3db to IL for single hybrid use with balancing network on 2-wire side.

Refer to Tamura pages A•2396 and 2399 for additional specifications and model numbers.

VOICE AND MODEM APPLICATIONS



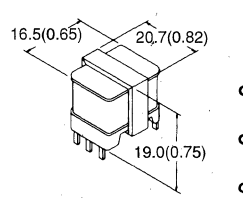


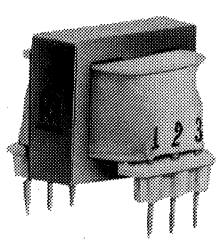
SCHEMATIC

MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR† ±dB	PRI DCR	SEC DCR
T9311	TTC-142	600:600	90	1.8	+0.3/-2.5	75	100
TTC-143	TTC-143	600:600	90	1.6	+0.2/-2.0	75	100

Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.

FREQUENCY 300Hz TO 100kHz





SCHEMATIC

MICROTRAN NO	TAMURA NO	IMPEDANCE PRI:SEC	maDC UNBAL	IL DB	FR† ±DB	PRI DCR	SEC DCR
DCM20-PC	DCM20-PC	600CT:200CT	16	2.0	±0.5	35	15
DCM21-PC	TTC-108	600CT:600CT	16	2.0	±0.5	44	56

Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.

Refer to Tamura pages A•2397 and 2396 for additional specifications and model numbers.

Aaltam DISTRIBUTION CENTER
Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

TELECOMMUNICATIONS TRANSFORMERS- FCC PART 68

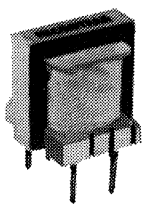
File No's. 138028
142035

File No. LR81383

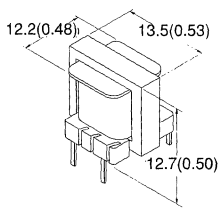
tamura
MICROTRAN

International, coupling, hybrid, voice, and data applications.

SMALL FOOTPRINT



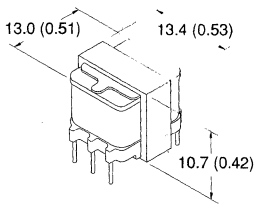
SCHEMATIC



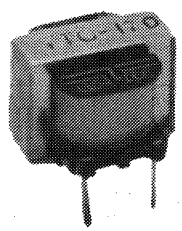
MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR: ±dB	PRI DCR	SEC DCR
TV104	TV104	600:600	2.5	2.2	±0.5	50	65

Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.

LOW PROFILE PLUG-IN



SCHEMATIC

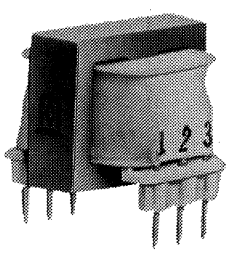


MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR: ±dB	PRI DCR	SEC DCR
TTC-170	TTC-170	600:600	0	1.5	±0.7	47	61

Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.

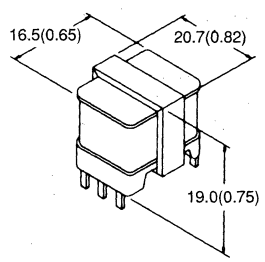
Refer to Tamura page A•2394 for additional specifications and model numbers.

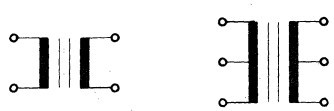
PLUG-IN BOARD FOR DOMESTIC AND INTERNATIONAL APPLICATIONS



MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR: ±dB	PRI DCR	SEC DCR	FIG/ SCHEMATIC
T2104	TTC-110	600:600	0	1.0	±0.5	36	50	A
T2106	TTC-09	600CT:600CT	0	1.0	±0.5	36	50	B
T2108	TTC-112	600:900	0	1.0	±0.5	39	83	A
T2316	T2316	4000:600	0	1.0	±0.5	340	51	A
TH2104[2]	TH2104[2]	600:600	0	1.0	±0.5	38	52	A
TH2106[2]	TH2106[2]	600CT:600CT	0	1.0	±0.5	38	52	B

Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.
Note 2: International series. 3750V hi-pot between windings. 1250V between windings and core



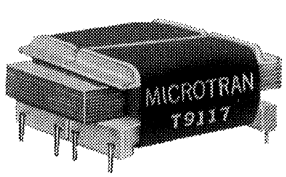


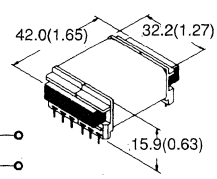
A B

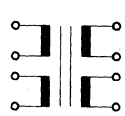
FIG'S./ SCHEMATICS

Refer to Tamura page A•2396 for additional specifications and model numbers.

LOW CROSSTALK APPLICATIONS





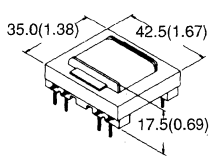


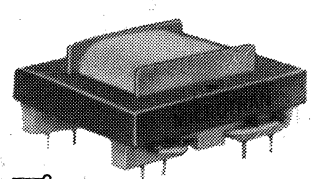
SCHEMATIC

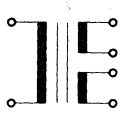
MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR: ±dB	PRI DCR	SEC DCR
T9116	TTC-125	600S:600S	80	2.0	±0.5	95	180

Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.

FLAT PROFILE PLUG-IN







SCHEMATIC

MICROTRAN NO.	TAMURA NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL dB	FR: ±dB	PRI DCR	SEC DCR
T5114	T5114	600:600S	75	1.7	±0.5	100	49/49

Note 1: Typical Frequency Response (FR) from .3 to 3.5kHz, relative to 1kHZ at rated maDC & 0 dBM.

Refer to Tamura pages A•2398 and 2399 for additional specifications and model numbers.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080 • www.aaltam.com

Abbott TECHNOLOGIES, INC.

QPL and Military Transformers

Since 1961, Abbott Technologies, Inc. has been commited to providing high quality, reliable power transformers and inductors to the aerospace and defense industries. Abbott now offers over 850 QPL models which have been fully pre-qualified to MIL T 27, which can eliminate transformer qualification costs for project approval. We also offer a vast range of Military-Off-The-Shelf (MOTS) magnetics, and Commercial-Off-The-Shelf (COTS) magnetics which have sucessfully performed in a wide range of demanding applications . We also specialize in the design, manufacture, and testing of custom magnetics.

QPL Models	Input Freq. (Hz)	Phase	Construction	Output Power(VA)	Output Voltages
M27/312-322	50-65	1	Grade-4	5-300	5-220
M27/326-331	50-65	1	Grade-4	5-170	5-120
M27/332-337	380-420	1	Grade-5	7-200	5-120
M27/338-343	380-420	1	Grade-5	2-175	5-220
M27/350-354	380-420	1	Grade-5	15-100	5-115
M27/344-349	380-420	3	Grade-5	90-375	5-200

Military-Off-The-Shelf (MOTS)

Model Family	Input Freq. (Hz)	Phase	Construction	Output Power (VA)	Output Voltages
P	50-65	1	Grade-4	5-300	5-1000
6C	50-65	1	Grade-4	5-170	5-120
6DM	50-65	3	Grade-5	200-3000	5-200
4A	380-420	1	Grade-5	10-200	5-120
E	380-420	1	Grade-5	2-175	5-1000
TM	380-420	1	Grade-5	15-100	5-115
R	380-420	1	Grade-5	1.5-25	5-300
4D	380-420	3	Grade-5	90-5000	5-200
TL	3-100Khz	1	Toroidal Inductor	------	8.0-10000uH

Commercial-Off-The-Shelf (COTS)

Model Family	Input Freq. (HZ)	Phase	Construction	Output Power (VA)	Output Voltages
6B	50-65	1	Open-Frame	5-1300	5-120
6H	47-65	1	Open-Frame	250-10000	120-480
6J	47-65	3	Open-Frame	250-50000	120-480
6DF	50-65	3	Open-Frame	200-3000	5-200
6T	50-70	1	Toroidal	85-600	5-116

Abbott Technologies also specializes in the design and manufacture of custom magnetic devices for aerospace, defense and other related applications. Please see the next two pages for a description of our capabilities.

Call us toll-free at **1-800-367-8200**

MAIN OFFICE:
8203 Vineland Avenue, Sun Valley, CA 91352 - (818) 504-0644 - FAX: (818)367-8200
Visit our website at www.abbott-tech.com and on line quote form at wayne.lovett@abbott-tech.com.

Abbott TECHNOLOGIES, INC.

Custom-Designed MIL-SPEC Magnetics

Abbott is a leading source of custom-designed magnetics which comply with the rigorous requirements of today's aerospace and military environment. Abbott custom magnetics have successfully performed in a wide range of demanding applications. A sampling of these is shown on the next page.

A Broad Range of Capabilities

Abbott's design team is experienced with a broad range of magnetic technologies, and can develop solutions to your magnetic problems, in a very short amount of time. Our custom designs reflect the same high standards and conservative design margins of our standard products. The table below describes our normal capabilities.

Our designs normally comply with MIL-STD-454, and MIL-T-27. Special testing can be performed on these units to demonstrate compliance with MIL-STD-810, and MIL-STD-202. Other testing is available upon request. Abbott has it's own testing facility with advanced equipment used to simulate extreme electrical and environmental conditions in addition to many years experience testing magnetics to a wide range of Mil-Specs.

Many custom requirements can be satisfied by modifying an existing product which can shorten the time needed for delivering the initial prototype. Often we can qualify a modified standard unit to various MIL SPECS by SIMILARITY, thereby reducing testing costs. We have the capability of providing customers QPL qualification on their custom or modified standard designs.

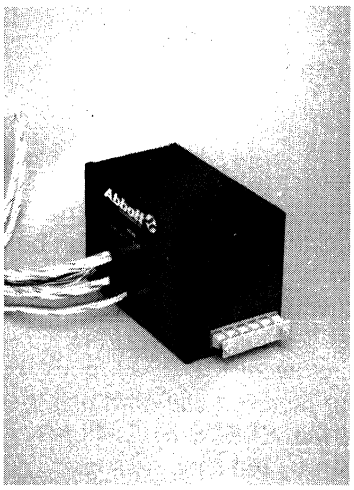
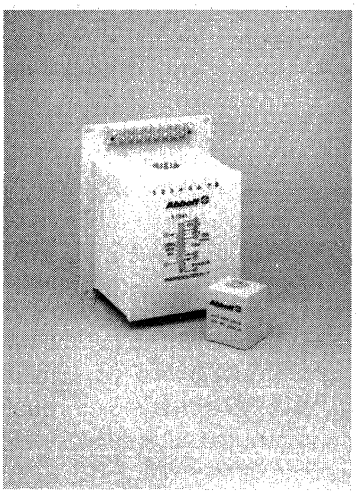
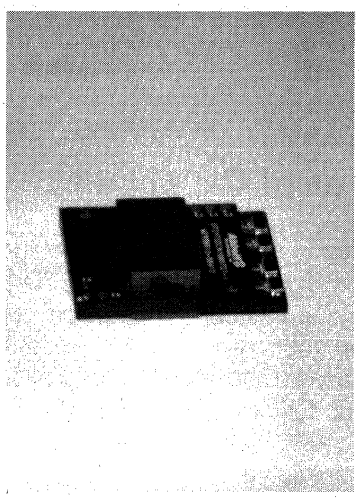
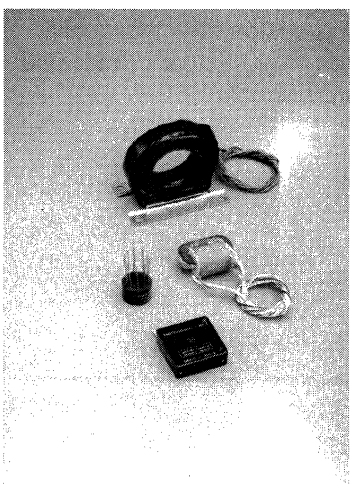
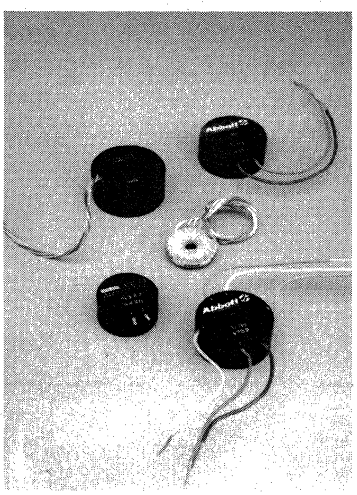
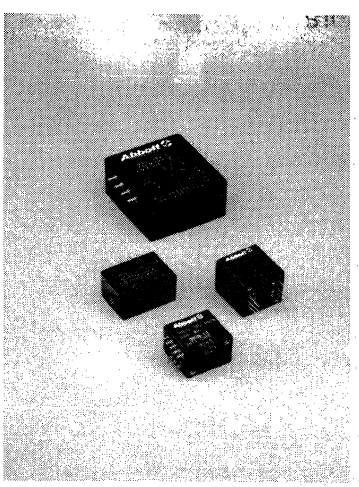
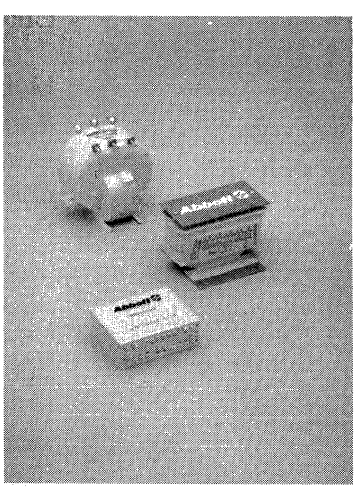
Device Types	Size	Frequency	Construction
Power Transformers (single and multiple phase)	Subminature up to 750 lbs.	Up to 1 Megahertz	Laminated
Signal Transformers			Toroidal
Autotransformers			Ferrite
Planar Transformers			Cut-Core
Pulse Transformers			Metal Cased
Switching Transformers			Epoxy Cased
Multiple and Complex Windings			Hermetically Sealed
Instrument Transformers			Open Frame
Magnetic Amplifiers			Conformal Coated
Current Transformers			Diallyl Phthalate Cased
Inductors			Hermetically Sealed Headers
Scott-T			Turret Terminals
Passive Filters			Hooked Pins
3-Phase AC to DC converters (500 VA to 10 KVA)			Lead wires
Pulse-Forming Networks			Quick Disconnects
			Surface Mount

Call us toll-free at **1-800-367-8200**

MAIN OFFICE:
8203 Vineland Avenue, Sun Valley, CA 91352 - (818) 504-0644 - FAX: (818)367-8200
Visit our website at www.abbott-tech.com and on line quote form at wayne.lovett@abbott-tech.com.

Abbott TECHNOLOGIES, INC.

Custom-Designed MIL-SPEC Magnetics

At the present time Abbott magnetics are used in some of the most visible and demanding applications currently in service. These include:

-Spacecraft
-Tactical Missiles
-Strategic Missiles
-Munitions
-Missile Defense Systems
-Fighter Aircraft
-Bomber Aircraft
-Combat Helicopters
-Military Transport Aircraft
-Naval Torpedos
-Naval Shipboard Systems
-Submarine Equipment
-Commercial Aircraft

Call us toll-free at **1-800-367-8200**

MAIN OFFICE:
8203 Vineland Avenue, Sun Valley, CA 91352 - (818) 504-0644 - FAX: (818)367-8200
Visit our website at www.abbott-tech.com and on line quote form at wayne.lovett@abbott-tech.com.

MINIGLOSSARY SERVO COMPONENTS

SPECIFICATIONS

Excitation: The input voltage and frequency.

Transformation Ratio: The ratio of the output voltage, at maximum coupling, to the input voltage.

Phase Shift: The lead or lag of the output voltage with respect to the input voltage. For most synchros and resolvers, the phase shift can be approximated by the angle whose tangent is the ratio of the primary winding's DC resistance to its reactive component.

Impedance: Specified as R + jX, where R is the AC resistive component and X is the reactive component. Important impedances are: (a) Z_{po} (or Z_{ro} for rotor primary units), which is the impedance of the primary winding with the secondary open; (b) Z_{so}, which is the impedance of the secondary winding with the primary open; and (c) Z_{ss}, which is the impedance of the secondary with the primry shorted (essentially when driven by a low impedance).

Null Voltage: The voltage remaining when the unit is at electrical zero or in the minimum coupling position.

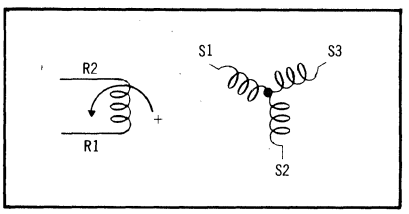
Accuracy: The error of the position of the rotor with respect to the electrical angle. It is defined as the output voltage driven by the "speed" (pole pairs) of the unit, referenced to the starting point of the calibration (usually the electrical zero position). Error is commonly expressed in minutes of arc (1/60 of a degree) or in seconds of arc.

Loads: For a transmitting unit, the impedance that the output voltage signal faces. This can be a receiver, a differential with its load, a control transformer, an A/D converter, etc.

Operation Temperature: The ambient temperature range over which the unit performs its primary function.

FUNCTIONS

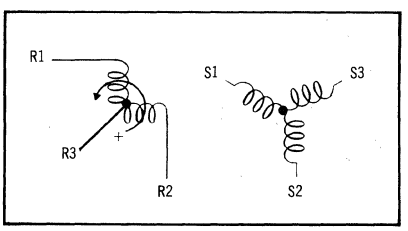
Transmitter: A unit with a Y-connected stator that outputs a signal proportional to the position of its single-phase excited rotor. High power units, called "torque transmitters," are used to drive one or more receivers. Low power transmitters are used to drive control transformers.



Receiver: A unit with a three-phase stator excited by the input, usually from a torque transmitter, and a single-phase rotor that follows the resulting stator field. Usually used to drive a position pointer.

Control Transformer: A unit with a three-phase stator excited by the input from a transmitter and a single-phase rotor mechanically driven to the null position by an external motor or other device.

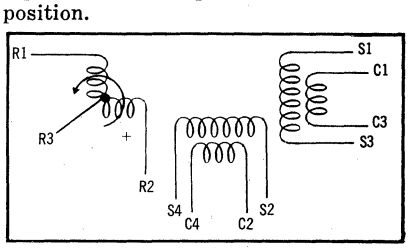
Differential: A unit with a three-phase stator and a three-phase rotor. It is usually connected between a transmitter, which excites its stator, and a receiver or control transformer. It can be used to "dial in" correction factors for the synchro chain.



Transolver: A unit with a three-phase stator and a two-phase rotor that can be used either as a control transmitter (with one rotor phase excited and the other shorted), or as a control transformer with the signal obtained from one phase of the rotor—making sure the other phase is equally loaded to prevent unbalances.

Differential Resolver: A unit with a two-phase stator and a three-phase rotor that is used as a transolver with the advantage that when connected as a control transformer, the signal does not travel through slip rings.

Resolver: A unit with a two-phase rotor and a two-phase stator that is used to create or receive SIN-COS signals such as vector resolutions for solving inertial platform coordinate transformations, unknowns of right triangles, etc. Resolvers can also be used as transmitting, differential, or receiving elements by proper choice of impedances. It is also possible to use resolvers as phase shifters where, in one mode, one rotor phase is excited and the two stator windings are feeding an appropriate RC network and indicating a phase shift, referred to the input, that corresponds to the rotor position.



Compensated Resolver: A unit with a "2×2" phase stator and a two-phase rotor used as a resolver with the added benefit of feedback windings in parallel with the stator windings that increase the useful accuracy over a wide range of environmental operating conditions.

Linear Transformer: A unit with a single-phase stator and single-phase rotor designed to provide a linear output voltage that is directly proportional to the rotor input angle. It operates over a range of less than ±90°, and is analogous to a potentiometer providing infinite resolution, but without contact between the elements. It can be used only with AC voltages.

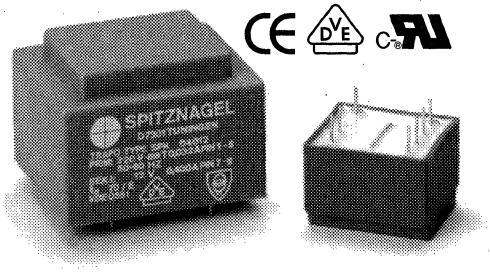
Brushless Synchro: Available in two types—hairspring and bobbin. Hairspring synchros use spiral wound conductor springs to pick off the rotor signal, and are generally limited to a ±165° rotation. Most have mechanical stops to prevent damage due to overrotation. Bobbin synchros pick off the rotor signal with rotary transformers inside the unit, allowing the rotor unlimited motion.

Pancake Unit: A name derived from the physical dimensions of the unit, which has a diameter that exceeds axial length. Sizes range from under 1" to 20" or more. The unit is frequently used as a gimbal pickoff element and is designed to fit a particular application envelope. It can be supplied as a rotor and stator only.

Advanced Components Industries, Inc.
FAX: (310) 328-0062
TOLL FREE: (800) 841-0994

SPK - SPACE LIMITING SERIES

Space Limiting SPK Series with International Approvals VDE EN60742, c-UL506 and c-UL1585



This series of encapsulated Power Transformers is available with power ratings from **0.35 VA up to 5.5 VA** (Ratings up to 50 VA on request). Please note the new low power packages SPK003, SPK004, SPK005 and SPK007.

- High Isolation – 5,000 V RMS HiPot Testing is standard, up to 15,000 V RMS HiPot Testing on request. Surge Testing up to 15,000 V can be added.
- Low Capacitive Coupling, which eliminates the electro-static shield.

The Space Limiting Series is manufactured with a split bobbin. The primaries and secondaries are wound non-concentrically, i.e. side-by-side rather than on top of each other. The complete line is encapsulated under vacuum.

The line is available in:

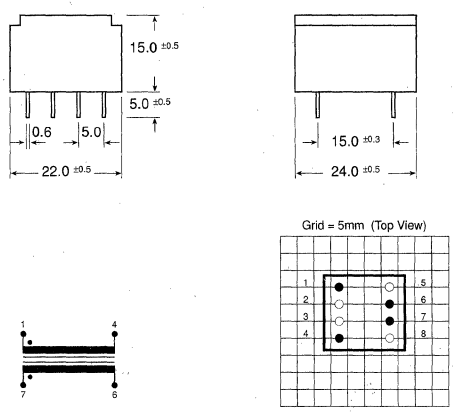
- **Single Primary 115 V, 50-60 Hz or 230 V, 50-60 Hz Single Secondary**
- **Single Primary 115 V, 50-60 Hz or 230 V, 50-60 Hz Dual Secondary**
- **Dual Primary 115/230 V, 50-60 Hz Dual Secondary**

Single Primary 115 V, 50-60 Hz or 230 V, 50-60 Hz Single Secondary

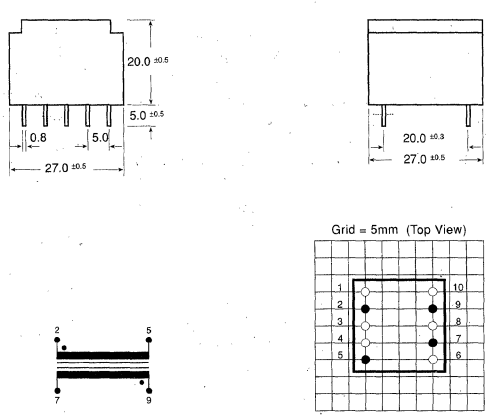
RMS Rating Volts, @ mA	No-Load Volts	Power VA	PART NUMBER Primary 115 V	PART NUMBER Primary 230 V	Price 100 pcs
4 V @					
113 mA	6.0	**0.45**	SPK **004**0400-10000	SPK **004**0400-00000	$3.96
375 mA	6.3	**1.5**	**014**0400-10000	**014**0400-00000	3.84
450 mA	7.0	**1.8**	**018**0400-10000	**018**0400-00000	4.50
550 mA	6.7	**2.2**	**022**0400-10000	**022**0400-00000	4.70
950 mA	5.6	**3.8**	**040**0400-10000	**040**0400-00000	5.63
1.37 A	5.3	**5.5**	**060**0400-10000	**060**0400-00000	6.51
6 V @					
58 mA	10.9	**0.35**	SPK **003**0600-10002*	SPK **003**0600-00000*	$4.64
75 mA	9.0	**0.45**	**004**0600-10000	**004**0600-00000	3.96
117 mA	11.0	**0.7**	**007**0600-10001	**007**0600-00000	5.30
250 mA	9.4	**1.5**	**014**0600-10000	**014**0600-00000	3.84
300 mA	10.3	**1.8**	**018**0600-10000	**018**0600-00000	4.50
366 mA	9.9	**2.2**	**022**0600-10000	**022**0600-00000	4.70
633 mA	8.5	**3.8**	**040**0600-10000	**040**0600-00000	5.63
917 mA	7.9	**5.5**	**060**0600-10000	**060**0600-00000	6.51
9 V @					
39 mA	16.3	**0.35**	SPK **003**0900-10002*	SPK **003**0900-00000*	$4.64
50 mA	13.6	**0.45**	**004**0900-10000	**004**0900-00000	3.96
78 mA	16.5	**0.7**	**007**0900-10001	**007**0900-00000	5.30
167 mA	14.1	**1.5**	**014**0900-10000	**014**0900-00000	3.84
200 mA	15.4	**1.8**	**018**0900-10000	**018**0900-00000	4.50
244 mA	14.9	**2.2**	**022**0900-10000	**022**0900-00000	4.70
422 mA	12.7	**3.8**	**040**0900-10000	**040**0900-00000	5.63
611 mA	11.9	**5.5**	**060**0900-10000	**060**0900-00000	6.51
12 V @					
29 mA	21.7	**0.35**	SPK **003**1200-10002*	SPK **003**1200-00000*	$4.64
38 mA	18.1	**0.45**	**004**1200-10000	**004**1200-00000	3.96
58 mA	21.5	**0.7**	**007**1200-10001	**007**1200-00000	5.30
125 mA	18.8	**1.5**	**014**1200-10000	**014**1200-00000	3.84
150 mA	20.5	**1.8**	**018**1200-10000	**018**1200-00000	4.50
183 mA	19.8	**2.2**	**022**1200-10000	**022**1200-00000	4.70
317 mA	16.9	**3.8**	**040**1200-10000	**040**1200-00000	5.63
458 mA	15.8	**5.5**	**060**1200-10000	**060**1200-00000	6.51
15 V @					
23 mA	27.2	**0.35**	SPK **003**1500-10002*	SPK **003**1500-00000*	$4.64
30 mA	22.7	**0.45**	**004**1500-10000	**004**1500-00000	3.96
47 mA	27.4	**0.7**	**007**1500-10001	**007**1500-00000	5.30
100 mA	23.6	**1.5**	**014**1500-10000	**014**1500-00000	3.84
120 mA	25.7	**1.8**	**018**1500-10000	**018**1500-00000	4.50
146 mA	24.8	**2.2**	**022**1500-10000	**022**1500-00000	4.70
253 mA	21.1	**3.8**	**040**1500-10000	**040**1500-00000	5.63
367 mA	19.8	**5.5**	**060**1500-10000	**060**1500-00000	6.51

*no approvals

Mechanical Data for Part Numbers SPK003XXXX-XXXXX



Mechanical Data for Part Numbers SPK007XXXX-XXXXX

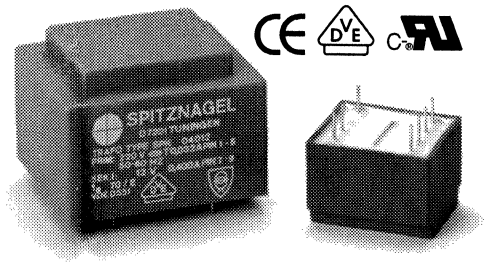


1218 El Prado Ave., Suite 134, Torrance CA 90501 • (310) 328-0060 • (800) 841-0994 • Fax (310) 328-0062
E-mail info@advancedcomponents.com • www.advancedcomponents.com

Advanced Components Industries, Inc.
FAX: (310) 328-0062
TOLL FREE: (800) 841-0994

SPK - SPACE LIMITING SERIES

Space Limiting SPK Series with International Approvals
VDE EN60742, c-UL506 and c-UL1585

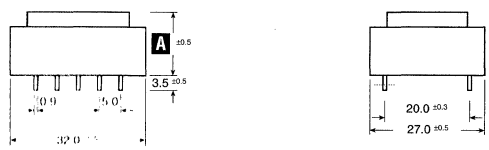


Single Primary 115 V, 50-60 Hz or 230 V, 50-60 Hz Single Secondary *Continued*

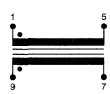
RMS Rating Volts, @ mA	No-Load Volts	Power VA	PART NUMBER Primary 115 V	PART NUMBER Primary 230 V	Price 100 pcs
18 V @					
19 mA	32.6	**0.35**	SPK **003**1800-10002*	SPK **003**1800-00000*	$4.64
25 mA	27.2	**0.45**	**004**1800-10000	**004**1800-00000	3.96
39 mA	32.9	**0.7**	**007**1800-10001	**007**1800-00000	5.30
83 mA	28.3	**1.5**	**014**1800-10000	**014**1800-00000	3.84
100 mA	30.8	**1.8**	**018**1800-10000	**018**1800-00000	4.50
122 mA	29.7	**2.2**	**022**1800-10000	**022**1800-00000	4.70
211 mA	25.4	**3.8**	**040**1800-10000	**040**1800-00000	5.63
306 mA	23.7	**5.5**	**060**1800-10000	**060**1800-00000	6.51
24 V @					
15 mA	43.4	**0.35**	SPK **003**2400-10002*	SPK **003**2400-00000*	$4.64
19 mA	36.2	**0.45**	**004**2400-10000	**004**2400-00000	3.96
29 mA	43.9	**0.7**	**007**2400-10001	**007**2400-00000	5.30
63 mA	37.7	**1.5**	**014**2400-10000	**014**2400-00000	3.84
75 mA	41.0	**1.8**	**018**2400-10000	**018**2400-00000	4.50
92 mA	39.6	**2.2**	**022**2400-10000	**022**2400-00000	4.70
158 mA	33.8	**3.8**	**040**2400-10000	**040**2400-00000	5.63
229 mA	31.6	**5.5**	**060**2400-10000	**060**2400-00000	6.51

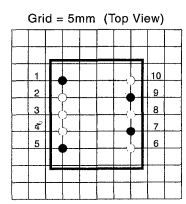
**no approvals*

Mechanical Data for Part Numbers
SPK004XXXX-XXXXX
SPK014XXXX-XXXXX
SPK018XXXX-XXXXX
SPK022XXXX-XXXXX

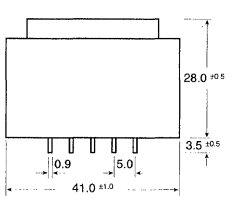


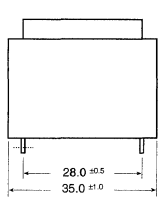
A This measurement varies as follows:
Part No.'s –SPK 004 = 15.0
014 = 21.8
018 = 24.0
022 = 27.0

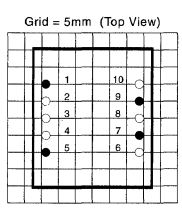




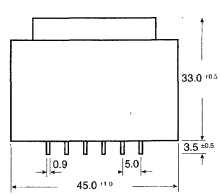
Mechanical Data for Part Numbers
SPK040XXXX-XXXXX

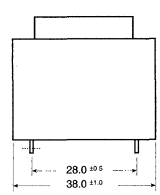


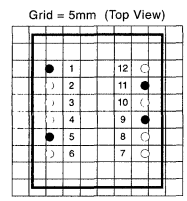


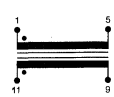


Mechanical Data for Part Numbers
SPK060XXXX-XXXXX







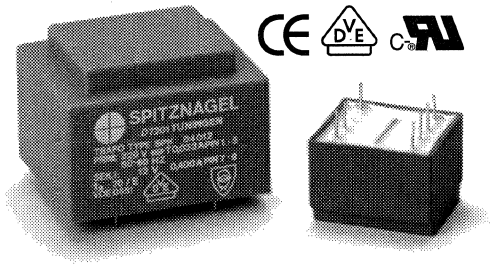


1218 El Prado Ave., Suite 134, Torrance CA 90501 • (310) 328-0060 • (800) 841-0994 • Fax (310) 328-0062
E-mail info@advancedcomponents.com • www.advancedcomponents.com

Advanced Components Industries, Inc.
FAX: (310) 328-0062
TOLL FREE: (800) 841-0994

SPK - SPACE LIMITING SERIES

Space Limiting SPK Series with International Approvals
VDE EN60742, c-UL506 and c-UL1585

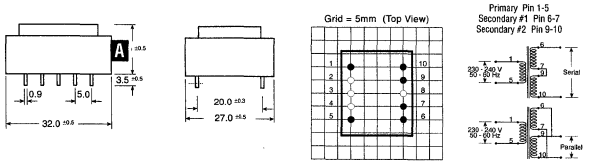


Single Primary 115 V, 50-60 Hz or 230 V, 50-60 Hz Dual Secondary

SECONDARY RMS RATING		No-Load Volts	Power VA	PART NUMBER		Price 100 pcs
Serial Connection Volts, @ mA	Parallel Connection Volts, @ mA			Primary 115 V	Primary 230 V	
8 V @	***4 V @***					
56 mA	113 mA	6.0	**0.45**	SPK **004**0404-10000	SPK **004**0404-00000	$4.40
187 mA	375 mA	6.3	**1.5**	**014**0404-10000	**014**0404-00000	4.40
225 mA	450 mA	7.0	**1.8**	**018**0404-10000	**018**0404-00000	5.06
275 mA	550 mA	6.7	**2.2**	**022**0404-10000	**022**0404-00000	5.19
475 mA	950 mA	5.6	**3.8**	**040**0404-10000	**040**0404-00000	6.14
687 mA	1.37 A	5.3	**5.5**	**060**0404-10000	**060**0404-00000	7.05
12 V @	***6 V @***					
38 mA	75 mA	9.0	**0.45**	SPK **004**0606-10000	SPK **004**0606-00000	$4.40
125 mA	250 mA	9.4	**1.5**	**014**0606-10000	**014**0606-00000	4.40
150 mA	300 mA	10.3	**1.8**	**018**0606-10000	**018**0606-00000	5.06
183 mA	366 mA	9.9	**2.2**	**022**0606-10000	**022**0606-00000	5.19
316 mA	633 mA	8.5	**3.8**	**040**0606-10000	**040**0606-00000	6.14
458 mA	917 mA	7.9	**5.5**	**060**0606-10000	**060**0606-00000	7.05
18 V @	***9 V @***					
25 mA	50 mA	13.6	**0.45**	SPK **004**0909-10000	SPK **004**0909-00000	$4.40
83 mA	166 mA	14.1	**1.5**	**014**0909-10000	**014**0909-00000	4.40
100 mA	200 mA	15.4	**1.8**	**018**0909-10000	**018**0909-00000	5.06
122 mA	244 mA	14.9	**2.2**	**022**0909-10000	**022**0909-00000	5.19
211 mA	422 mA	12.7	**3.8**	**040**0909-10000	**040**0909-00000	6.14
306 mA	611 mA	11.9	**5.5**	**060**0909-10000	**060**0909-00000	7.05
24 V @	***12 V @***					
18 mA	38 mA	18.1	**0.45**	SPK **004**1212-10000	SPK **004**1212-00000	$4.40
62 mA	125 mA	18.8	**1.5**	**014**1212-10000	**014**1212-00000	4.40
75 mA	150 mA	20.5	**1.8**	**018**1212-10000	**018**1212-00000	5.06
92 mA	183 mA	19.8	**2.2**	**022**1212-10000	**022**1212-00000	5.19
158 mA	317 mA	16.9	**3.8**	**040**1212-10000	**040**1212-00000	6.14
229 mA	458 mA	15.8	**5.5**	**060**1212-10000	**060**1212-00000	7.05
30 V @	***15 V @***					
127 mA	253 mA	21.1	**3.8**	SPK **040**1515-10000	SPK **040**1515-00000	$6.14

Mechanical Data for Part Numbers

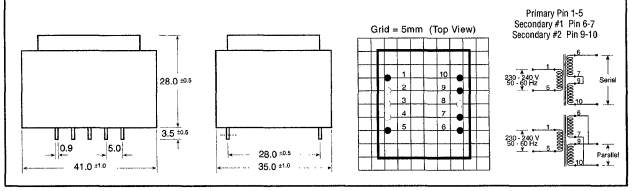
SPK004XXXX-XXXXX
SPK014XXXX-XXXXX
SPK018XXXX-XXXXX
SPK022XXXX-XXXXX



A This measurement varies as follows:
Part No.'s – SPK004 = 15.0
014 = 21.8
018 = 24.0
022 = 27.0

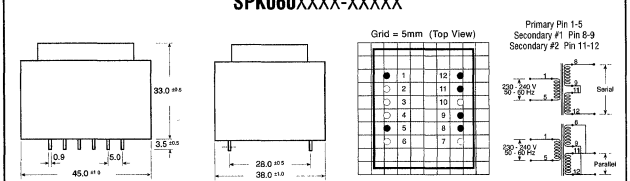
Mechanical Data for Part Numbers

SPK040XXXX-XXXXX



Mechanical Data for Part Numbers

SPK060XXXX-XXXXX

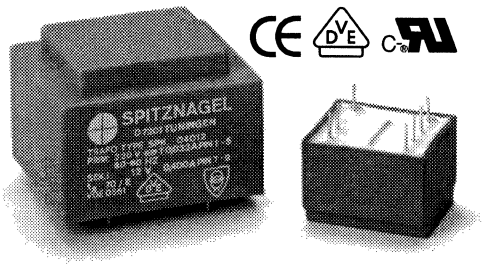


1218 El Prado Ave., Suite 134, Torrance CA 90501 • (310) 328-0060 • (800) 841-0994 • Fax (310) 328-0062
E-mail info@advancedcomponents.com • www.advancedcomponents.com

Advanced Components Industries, Inc.
FAX: (310) 328-0062
TOLL FREE: (800) 841-0994

SPK - SPACE LIMITING SERIES

Space Limiting SPK Series with International Approvals
VDE EN60742, c-UL506 and c-UL1585

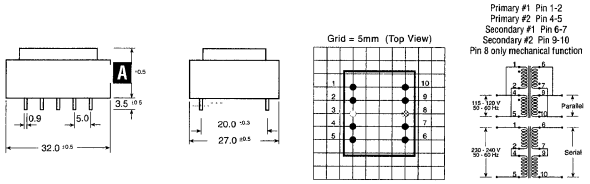


Dual Primary 115/230 V, 50-60 Hz
Dual Secondary

SECONDARY RMS RATING		No-Load Volts	Power VA	PART NUMBER	Price 100 pcs
Serial Connection Volts, @ mA	Parallel Connection Volts, @ mA			SPK Series	
8 V @	***4 V @***				
56 mA	113 mA	6.0	**0.45**	SPK **004**0404-70000	$4.90
187 mA	375 mA	6.3	**1.5**	SPK **014**0404-70000	4.90
225 mA	450 mA	7.0	**1.8**	SPK **018**0404-70000	5.56
275 mA	550 mA	6.7	**2.2**	SPK **022**0404-70000	5.69
475 mA	950 mA	5.6	**3.8**	SPK **040**0404-70000	6.64
687 mA	1.37 A	5.3	**5.5**	SPK **060**0404-70000	7.55
12 V @	***6 V @***				
37 mA	75 mA	9.0	**0.45**	SPK **004**0606-70000	$4.90
125 mA	250 mA	9.4	**1.5**	SPK **014**0606-70000	4.90
150 mA	300 mA	10.3	**1.8**	SPK **018**0606-70000	5.56
183 mA	366 mA	9.9	**2.2**	SPK **022**0606-70000	5.69
316 mA	633 mA	8.5	**3.8**	SPK **040**0606-70000	6.64
458 mA	917 mA	7.9	**5.5**	SPK **060**0606-70000	7.55
18 V @	***9 V @***				
25 mA	50 mA	13.6	**0.45**	SPK **004**0909-70000	$4.90
83 mA	166 mA	14.1	**1.5**	SPK **014**0909-70000	4.90
100 mA	200 mA	15.4	**1.8**	SPK **018**0909-70000	5.56
122 mA	244 mA	14.9	**2.2**	SPK **022**0909-70000	5.69
211 mA	422 mA	12.7	**3.8**	SPK **040**0909-70000	6.64
306 mA	611 mA	11.9	**5.5**	SPK **060**0909-70000	7.55
24 V @	***12 V @***				
18 mA	37 mA	18.1	**0.45**	SPK **004**1212-70000	$4.90
62 mA	125 mA	18.8	**1.5**	SPK **014**1212-70000	4.90
75 mA	150 mA	20.5	**1.8**	SPK **018**1212-70000	5.56
92 mA	183 mA	19.8	**2.2**	SPK **022**1212-70000	5.69
158 mA	317 mA	16.9	**3.8**	SPK **040**1212-70000	6.64
229 mA	458 mA	15.8	**5.5**	SPK **060**1212-70000	7.55
30 V @	***15 V @***				
127 mA	253 mA	21.1	**3.8**	SPK **040**1515-70000	$6.64

Mechanical Data for Part Numbers

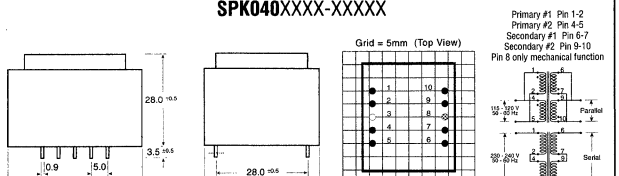
SPK004XXXX-XXXXX
SPK014XXXX-XXXXX
SPK018XXXX-XXXXX
SPK022XXXX-XXXXX



A This measurement varies as follows:
Part No.'s – SPK004 = 15.0
014 = 21.8
018 = 24.0
022 = 27.0

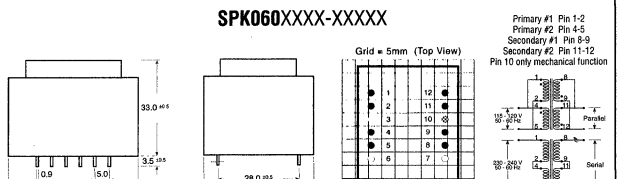
Mechanical Data for Part Numbers

SPK040XXXX-XXXXX



Mechanical Data for Part Numbers

SPK060XXXX-XXXXX



1218 El Prado Ave., Suite 134, Torrance CA 90501 • (310) 328-0060 • (800) 841-0994 • Fax (310) 328-0062
E-mail info@advancedcomponents.com • www.advancedcomponents.com

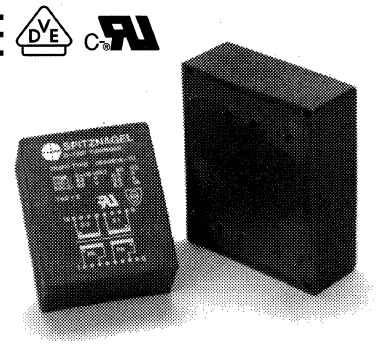
Advanced Components Industries, Inc.
FAX: (310) 328-0062
TOLL FREE: (800) 841-0994

SPF - HEIGHT LIMITING SERIES

Height Limiting SPF Series with International Approvals VDE EN60742, UL1411

This series of encapsulated Power Transformers is available with power ratings from 3.0 VA up to 25 VA (Ratings up to 50 VA on request). The low-profile design of the SPF Series allows closer board stacking (Height from 17 mm up to 35 mm).

The Height Limiting Series is manufactured with a split bobbin. The primaries and secondaries are wound non-concentrically, i.e. side-by-side rather than on top of each other. The complete line is encapsulated under vacuum.



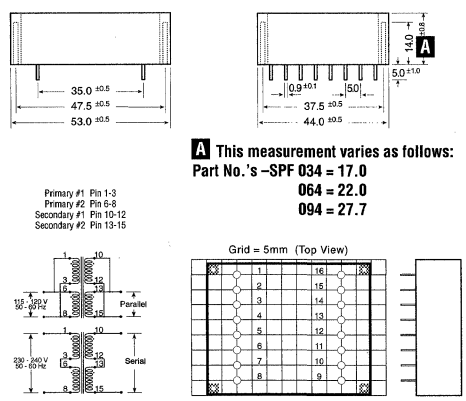
Dual Primary 115/230 V, 50-60 Hz Dual Secondary

SECONDARY RMS RATING				PART NUMBER	
Serial Connection Volts, @ mA	Parallel Connection Volts, @ mA	No-Load Volts	Power VA	SPF Series	Price 100 pcs
12 V @	**6 V @**				
250 mA	500 mA	9.5	**3.0**	SPF**034**0606-00000	$ 7.62
500 mA	1.0 A	8.3	**6.0**	**064**0606-00000	8.37
833 mA	1.67 A	7.5	**10.0**	**094**0606-00000	8.85
833 mA	1.67 A	8.2	**10.0**	**103**0606-00001*	8.85
1.17 A	2.33 A	7.8	**14.0**	**143**0606-00001*	10.65
1.5 A	3.0 A	7.7	**18.0**	**183**0606-00001*	12.27
2.08 A	4.17 A	7.3	**25.0**	**253**0606-00001*	14.67
18 V @	**9 V @**				
160 mA	333 mA	14.2	**3.0**	SPF**034**0909-00000	$ 7.62
333 mA	666 mA	12.5	**6.0**	**064**0909-00000	8.37
555 mA	1.11 A	11.3	**10.0**	**094**0909-00000	8.85
556 mA	1.11 A	12.3	**10.0**	**103**0909-00001*	8.85
778 A	1.56 A	11.6	**14.0**	**143**0909-00001*	10.65
1.0 A	2.0 A	11.5	**18.0**	**183**0909-00001*	12.27
1.39 A	2.78 A	11.0	**25.0**	**253**0909-00001*	14.67
24 V @	**12 V @**				
125 mA	250 mA	19.0	**3.0**	SPF**034**1212-00000	$ 7.62
250 mA	500 mA	16.7	**6.0**	**064**1212-00000	8.37
417 mA	833 mA	15.0	**10.0**	**094**1212-00000	8.85
417 mA	833 mA	16.4	**10.0**	**103**1212-00001*	8.85
583 mA	1.17 A	15.5	**14.0**	**143**1212-00001*	10.65
750 mA	1.5 A	15.3	**18.0**	**183**1212-00001*	12.27
1.04 A	2.08 A	14.6	**25.0**	**253**1212-00001*	14.67
30 V @	**15 V @**				
100 mA	200 mA	23.7	**3.0**	SPF**034**1515-00000	$ 7.62
200 mA	400 mA	20.9	**6.0**	**064**1515-00000	8.37
333 mA	666 mA	18.8	**10.0**	**094**1515-00000	8.85
333 mA	666 mA	20.5	**10.0**	**103**1515-00001*	8.85
467 mA	933 mA	19.3	**14.0**	**143**1515-00001*	10.65
600 mA	1.2 A	19.2	**18.0**	**183**1515-00001*	12.27
833 mA	1.67 A	18.3	**25.0**	**253**1515-00001*	14.67
36 V @	**18 V @**				
278 mA	555 mA	22.5	**10.0**	SPF**094**1818-00000	$ 8.85
278 mA	556 mA	24.6	**10.0**	**103**1818-00001*	8.85
389 mA	778 mA	23.3	**14.0**	**143**1818-00001*	10.65
500 mA	1.0 A	23.0	**18.0**	**183**1818-00001*	12.27
694 mA	1.39 A	22.0	**25.0**	**253**1818-00001*	14.67
48 V @	**24 V @**				
208 mA	417 mA	32.8	**10.0**	SPF**103**2424-00001*	$ 8.85
292 mA	583 mA	31.0	**14.0**	**143**2424-00001*	10.65
375 mA	750 mA	30.7	**18.0**	**183**2424-00001*	12.27
521 mA	1.04 A	29.3	**25.0**	**253**2424-00001*	14.67

*no VDE approval

Mechanical Data for Part Numbers

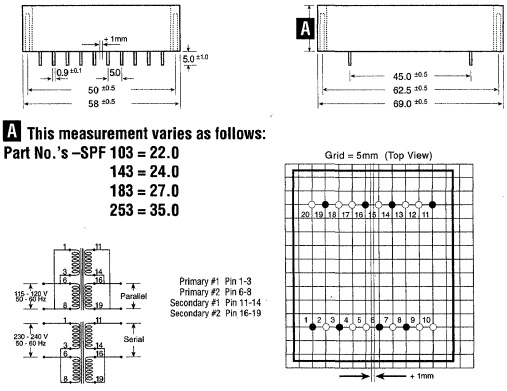
SPF034XXX-XXXXX
SPF064XXX-XXXXX
SPF094XXX-XXXXX



A This measurement varies as follows:
Part No.'s –SPF 034 = 17.0
064 = 22.0
094 = 27.7

Mechanical Data for Part Numbers

SPF103XXXX-XXXXX
SPF143XXXX-XXXXX
SPF183XXXX-XXXXX
SPF253XXXX-XXXXX



A This measurement varies as follows:
Part No.'s –SPF 103 = 22.0
143 = 24.0
183 = 27.0
253 = 35.0

1218 El Prado Ave., Suite 134, Torrance CA 90501 • (310) 328-0060 • (800) 841-0994 • Fax (310) 328-0062
E-mail info@advancedcomponents.com • www.advancedcomponents.com

Advanced Components Industries, Inc.

FAX: (310) 328-0062
TOLL FREE: (800) 841-0994

CUSTOM DESIGN SPECIFICATION FORM

By supplying the following information, you can help us get started on your design. For your convenience please use this design data sheet for your custom requirements. This sheet can be copied for multiple use.

(Your Name) (Title) (Company Name)

(Address) (City, State, ZIP) (Phone #) (Fax #)

Type: ❒ Transformer ❒ Inductor ❒ Chokes ❒ Other

Application: Power Transformer (50-60 Hz, 400 Hz) _____

Switch Mode Power Conversion: _____ Other: _____

Frequency: _____ Hz
Inductance: _____ µH
Rated Current: _____ mAmp
Air Gap: _____

Quality Factor: _____ Q
Turns Ratio: _____
DC Resistance: _____ Ω
Power: _____ VA

Input Voltage: _____
Output Voltage: _____
Output Current: _____
Additional Comments: _____

Dielectric Strength (HiPot Testing): _____ KV Impulse Surge Testing: _____ kV max. Ambient: _____ °C

❒ **Have a design engineer call me, best time to call** _____ am/pm ❒ **Quote quantities:** _____

Schematic:

Mechanical Requirements:

1218 El Prado Ave., Suite 134, Torrance CA 90501 • (310) 328-0060 • (800) 841-0994 • Fax (310) 328-0062
E-mail info@advancedcomponents.com • www.advancedcomponents.com

AMECON
The Energy Saver for 26 Years

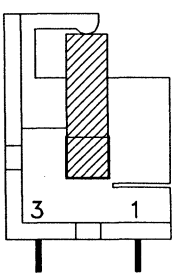
SNAP–ON LOAD DETECTOR "LD–50"

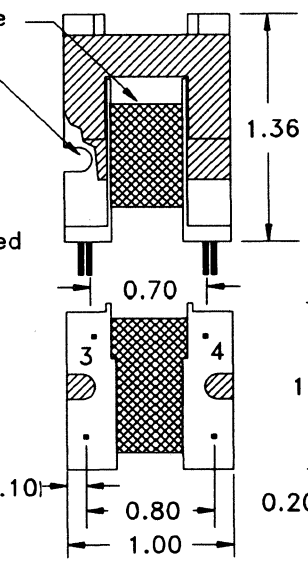
- This new revolutionary snap-on load detector mounts on pre–wired systems without disrupting existing connections. (Field assembleable.)
- Broad frequency response: 30Hz. to 15kHz. (See Curve.)
- Measure currents up to 50 Amps continuous.
- High reliability long lasting magnetic device.
- Output linear to within 3% from 5 to 50Amps input. (See VL/Ip vs. Ip curves.)
- Excellent for low-budget energy management and automation control.
- Available pre-assembled or un assembled, to snap over existing wiring.
- Note: These features have made this new device the answer to a myriad of new applications such as monitoring relays and lamps, Hi/Low current limits, instrumentation, solid-state switchgear, motor controls, closed loop current feed back, and much more.

NEW HIGH SENSITIVITY CURRENT TRANSFORMERS.

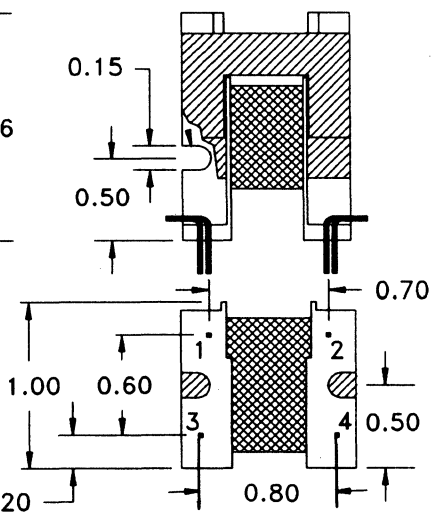
The high–sensitivity series of current transformers has been specifically designed for those applications where a low value of current is to be monitored. A primary winding is supplied (pins 1&2) which helps increase the sensitivity of the transformer.

LD–50





5360 SERIES.

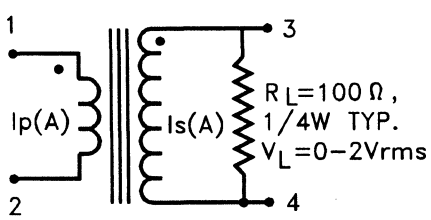


ELECTRICAL SPECS

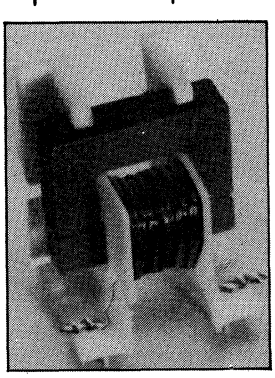
VL Volts	RL Ohms	Is Amps	Sec. DCR Ohms	Sec. Ind. Hy	Accy at 100%	Accy at 10%
2.0*	100	0.02*	36	1.1	1.0	0.3

TEMPERATURE –55°TO120°C.

P/N	Load Current Ip(A)	Turns Ratio	Pri. Ind. mHy	Pri. DCR Ohms
5361	0.05	1000:400	176	15
5362	0.1	1000:200	44	3.7
5363	0.2	1000:100	11	0.93
5364	0.5	1000:40	1.76	0.15
5365	1	1000:20	0.44	0.038
5366	2	1000:10	0.11	0.010
5367	5	1000:4	0.018	0.0025
LD–50	20	1000:1		



The terminating resistor is customer supplied. For LD–50, the one–turn primary is customer supplied.

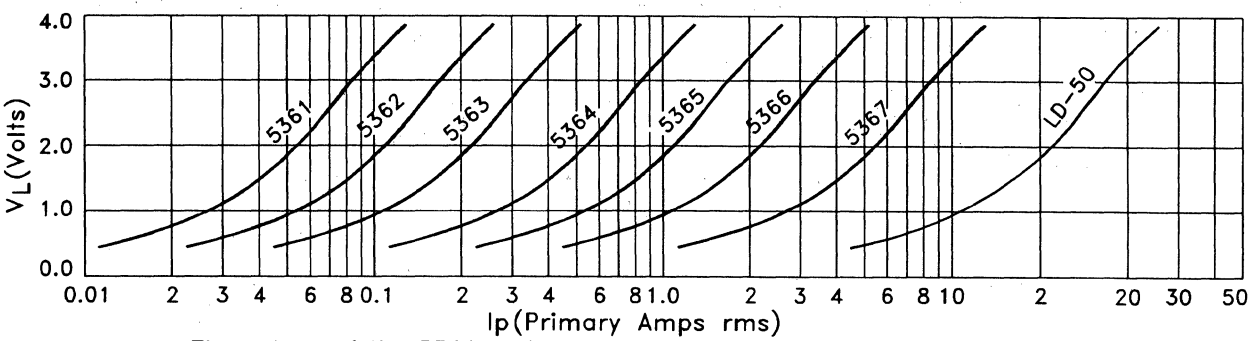


* Many customized output voltages and currents are available on special request, at same low price.

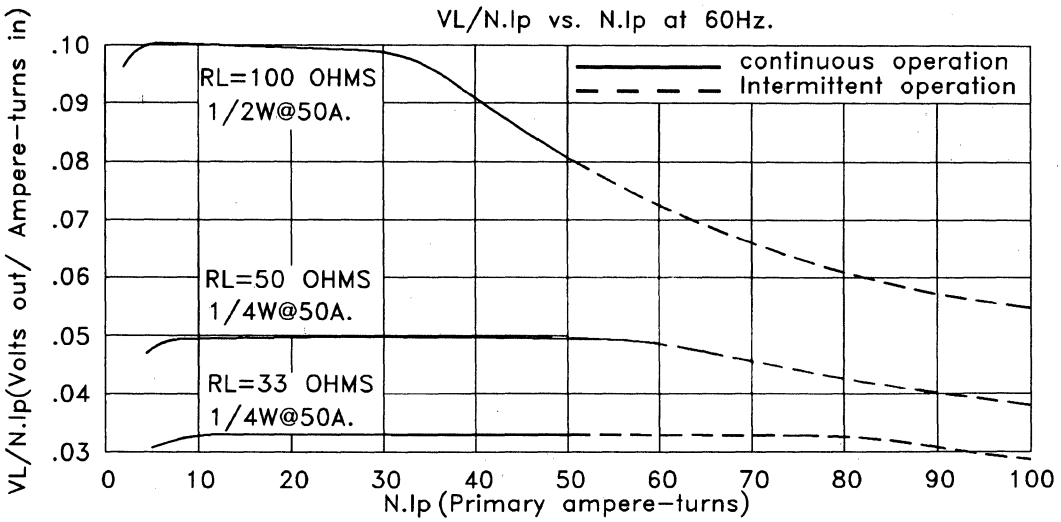
SERVING YOU SINCE 1972 WITH KNOWLEDGE & SENSIBLE PRODUCTS

1900 CHRIS LANE / ANAHEIM, CA 92085 / (714) 634-2220 / FAX (714) 634-0905 / **800-394-2234**

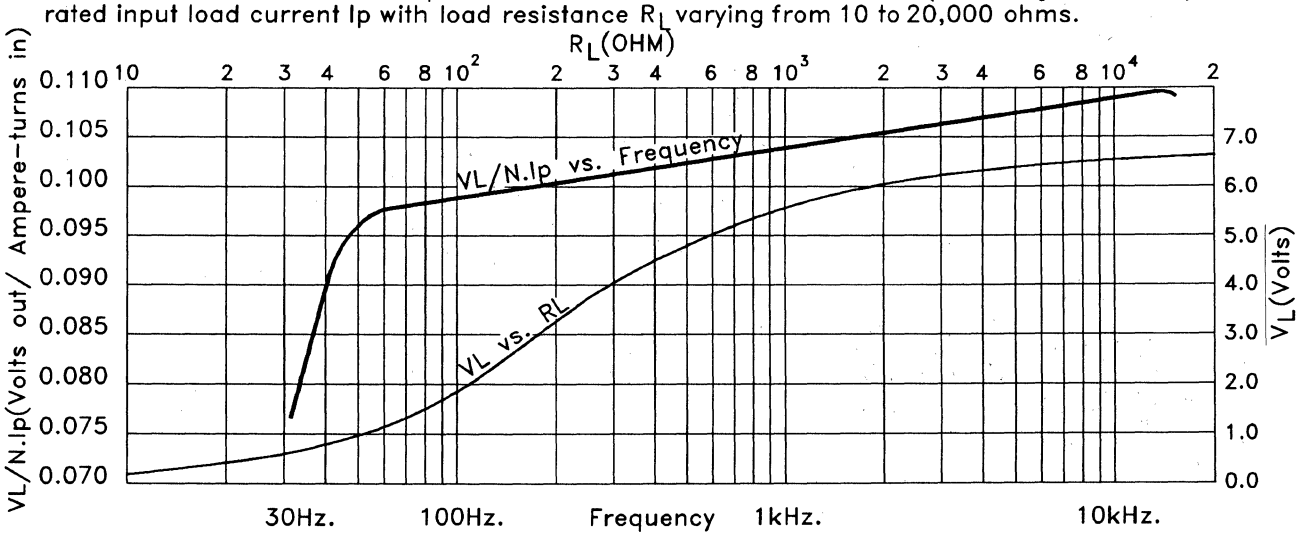
AMECON
The Energy Saver for 26 Years



The output of the 5360 series of load detectors when terminated with a 100 ohm resistor. Ip ranging from 0.25 to 2.5 times the rated current.



VL vs RL curve shows the output of the 5360 series of load detectors (including the LD-50) at rated input load current Ip with load resistance R_L varying from 10 to 20,000 ohms.



VL/N.Ip vs. Frequency curve shows the output of the load sensor as a function of frequency across a 100 ohm terminating resistor at rated primary current. (20A for LD-50)

SERVING YOU SINCE 1972 WITH KNOWLEDGE & SENSIBLE PRODUCTS

1900 CHRIS LANE / ANAHEIM, CA 92085 / (714) 634-2220 / FAX (714) 634-0905 / **800-394-2234**

AMECON
The Energy Saver for 26 Years

LARGEST SELECTION OF TRUE CURRENT TRANSFORMERS FOR DIGITAL CIRCUITS.

	PART NO.	VL	Ip	V/A	RL Ω	RL WATT	Rs	RCF @10%	Iex μARMS	Vex VRMS	WT. LB.	POTTED DIMENSIONS L	ID(MIN)	HT	W	C	D	FIG.
STANDARD ACCURACY MINI CT	5300-0005	2	5	.4	400	.010	79	1.093	572	2.38	.019	.660	.177	.795	.375	.500	–	3
	5300-0010	2	10	.2	200	.020	83	1.048	608	2.83	.019	.660	.177	.795	.375	.500	–	3
	5300-0020	2	20	.1	100	.040	85	1.027	731	3.7	.019	.660	.177	.795	.375	.500	–	3
	5300-0040	2	40	.05	50	.080	85	1.011	1260	5.42	.019	.660	.177	.795	.375	.500	–	3
	5300-5060	2	50	.05	33	.189	14	1.014	1430	3.52	.066	0.931	.370	0.990	.470	.600	.300	2
	5300-1012	2	100	.025	15	.417	7	1.009	1550	3.62	.121	1.188	.500	1.188	.690	.800	.400	1
STANDARD ACCURACY ECONOMY SERIES	5301	.5	5	.1	100	.0025	42	1.041	237	.66	.040	0.931	.370	0.990	.470	.600	.300	2
	5302	1	10	.1	100	.010	42	1.034	386	1.32	.040	0.931	.370	0.990	.470	.600	.300	2
	5303	1.5	15	.1	100	.023	42	1.030	513	1.99	.040	0.931	.370	0.990	.470	.600	.300	2
	5304	2	20	.1	100	.040	42	1.028	628	2.65	.040	0.931	.370	0.990	.470	.600	.300	2
	5305	2.5	25	.1	100	.063	46	1.020	566	3.65	.088	1.188	.500	1.188	.563	.800	.400	1
	5306	3	30	.1	100	.090	46	1.018	644	4.38	.088	1.188	.500	1.188	.563	.800	.400	1
	5307	4	40	.1	100	.16	46	1.020	914	5.82	.105	1.375	.625	1.375	.563	1.00	.400	1
	5308	5	50	.1	100	.25	46	1.019	1090	7.28	.105	1.375	.625	1.375	.563	1.00	.400	1
	5309	6	60	.1	100	.36	24	1.018	1250	7.41	.129	1.500	.688	1.500	.563	1.20	.400	1
	5310	7.5	75	.1	100	.57	24	1.016	1520	9.26	.129	1.500	.688	1.500	.563	1.20	.400	1
	5311	10	100	.1	100	1.0	21	1.014	1740	12.0	.191	1.750	.750	1.750	.563	1.40	.400	1
	5312	15	150	.1	100	2.25	11	1.011	1820	16.6	.442	2.188	.938	2.188	.813	1.80	.500	1
	5313	20	200	.1	100	4.00	11	1.009	2340	22.2	.30	2.188	.938	2.188	.813	1.80	.500	1
HIGH ACCURACY MINI CT	5326	.7	3.5	.2	200	.0025	76	1.030	88	0.97	.028	.660	.177	.795	.720	.500	.32	2
	5327	.5	5	.1	100	.0025	49	1.015	183	0.74	.015	.660	.177	.795	.375	.500	–	3
	5328	1	5	.2	200	.005	61	1.013	158	1.31	.028	.660	.177	.795	.720	.500	.32	2
	5329	.5	10	.05	100	.0025	213	1.006	74	1.57	.015	.660	.177	.795	.375	.500	–	3
	5330	1	10	.1	200	.005	252	1.009	58	2.26	.028	.660	.177	.795	.720	.500	.32	2
WIDE RANGE MINI CT	5300-0405	.5	5	.1	100	.0025	84	1.064	281	.920	.019	.660	.177	.795	.375	.500	–	3
	5300-0410	1	10	.1	100	.010	85	1.050	440	1.85	.019	.660	.177	.795	.375	.500	–	3
	5300-0420	2	20	.1	100	.040	86	1.040	689	3.72	.019	.660	.177	.795	.375	.500	–	3
DIGITAL METERING CT	5381	.2	60	.0033	1	.040	2.1	1.013	1230	.62	.10	1.500	.688	1.500	.563	1.20	.400	1
	5382	.2	120	.0017	1	.040	4.5	1.006	520	2.64	.12	1.500	.688	1.500	.563	1.20	.400	1
	5383	.5	100	.005	5	.05	11	1.008	200	2.14	.32	2.37	.77	2.37	.750	–	–	–
	5384	.5	200	.0025	5	.05	24	1.004	97	2.4	.39	2.37	.77	2.37	.750	–	–	–

CALL FOR INFO ON OUR 25th ANNIVERSARY PRODUCTS!

Ip: Primary current.
V/A: Output volts per input amps.
RL: Terminating resistor.
N: Nominal turns.
Rs: Winding resistance.
RCF: Ratio correction factor. The current reading should be multiplied by this value to obtain the true value of the primary current.
Iex and Vex: Excitation current and voltage at rated operating conditions.
WT: Net weight in pounds.

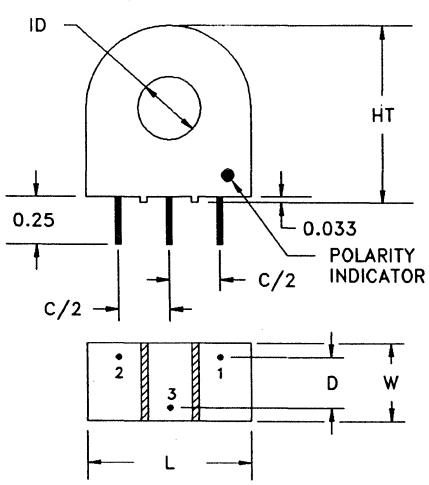


FIG. 1

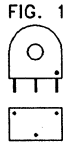


FIG. 2

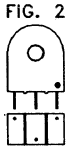
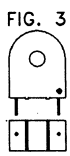


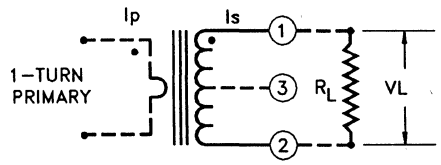
FIG. 3



UNLESS REQUESTED, THE TERMINATING RESISTOR AND THE ONE-TURN PRIMARY ARE CUSTOMER SUPPLIED.

PIN 3: NORMALLY FOR MECHANICAL SUPPORT ONLY; WILL BE USED FOR CENTER-TAPPED DESIGNS.

EACH P/N ADJUSTED TO BE MOST ACCURATE AT SPECIFIED LOAD.



SERVING YOU SINCE 1972 WITH KNOWLEDGE & SENSIBLE PRODUCTS

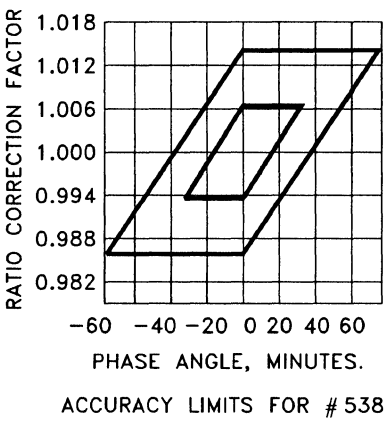
1900 CHRIS LANE / ANAHEIM, CA 92085 / (714) 634-2220 / FAX (714) 634-0905 / **800-394-2234**

AMECON
The Energy Saver for 26 Years

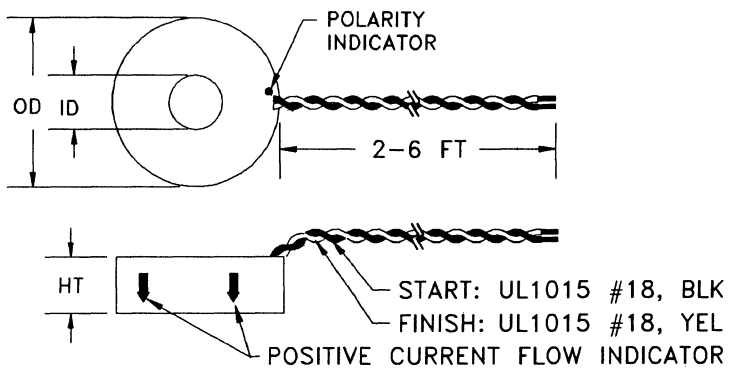
CURRENT TRANSFORMERS FOR ELECTRONIC METERING.

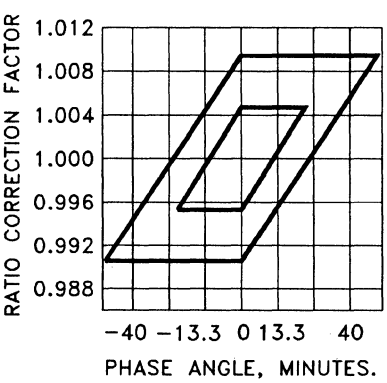
P/N	Ratio	Rated Pri Amps Ip	Rated Sec Amps Is	Rated Sec Burden R_L	Ratio Error (%)		Phase Angle Error (Minutes)		Dimensions		
					at 100%Ip	at 10%Ip	at 100%Ip	at 10%Ip	OD(MAX) (in)	ID (MIN) (in)	HT(MAX) (in)
5381	300:1	60	0.2	1	0.22	0.30	9	29	1.31	0.44	0.81
5382	600:1	120	0.2	1	0.15	0.19	7	19	1.55	0.65	0.55
5383	1000:1	100	0.1	5	0.13	0.20	6	25	2.34	0.75	0.78
5384	2000:1	200	0.1	5	0.06	0.07	3	13	2.34	0.75	0.78

* Accuracy figures are based on a resistive load. (0.9 to unity power factor)
* Meets UL 94–V1 flame retardant specifications.
* Dielectric insulation voltage: 4000 VAC.
* Over–voltage protection available on request.
* Operating Temperature Range: –40°C to +85°C. (–50°C to +125°C on request.)
* Many other ratios and custom–designed CT's available upon request.

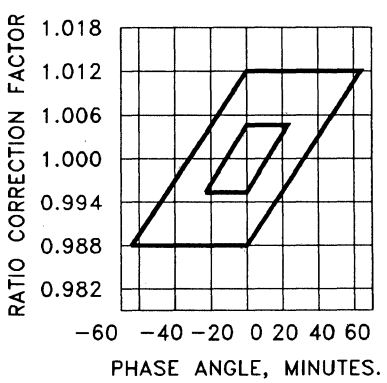


ACCURACY LIMITS FOR # 5381

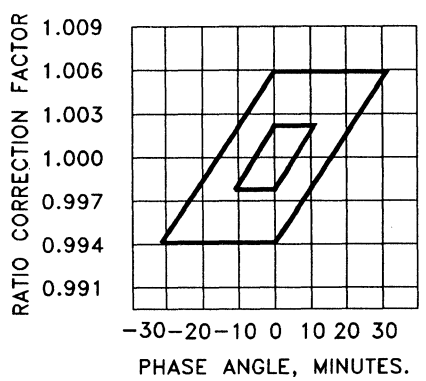




ACCURACY LIMITS FOR # 5382



ACCURACY LIMITS FOR # 5383



ACCURACY LIMITS FOR # 5384

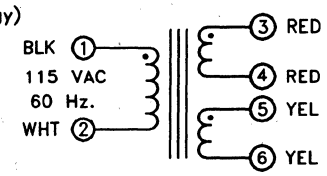
SERVING YOU SINCE 1972 WITH KNOWLEDGE & SENSIBLE PRODUCTS
1900 CHRIS LANE / ANAHEIM, CA 92085 / (714) 634-2220 / FAX (714) 634-0905 / **800-394-2234**

AMECON
The Energy Saver for 26 Years

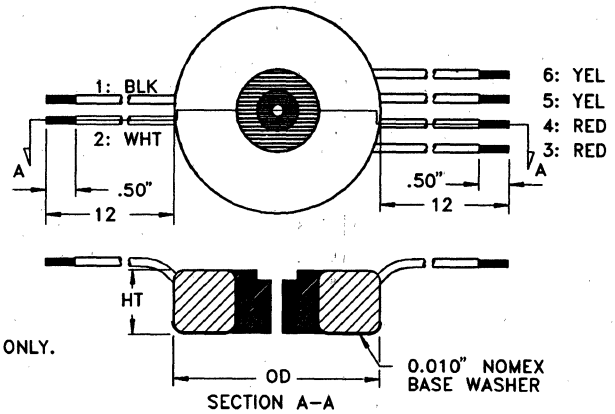
LARGEST SELECTION OF HEAVY DUTY 60Hz. TOROIDAL POWER TRANSFORMERS.

SOME ADVANTAGES OF TOROIDAL POWER TRANSFORMERS COMPARED TO LAMINATED TRANSFORMERS.

- Higher efficiency (Save Energy)
- Lower Mechanical hum.
- Lower electrical noise
- Lower Magnetic leakage
- Easier to electrostatically shield.
- Lower weight
- Smaller dimensions
- And most important price competitive compared to old fashioned laminated transformers.



208, 220 OR 230 VAC PRIMARY ON REQUEST
PIN NUMBERS ARE FOR REFERENCE ONLY.



Part Number	Load Voltage	Load Current
7.5VA Series, 2.2"x1.1" 0.41#, 21% regulation		
1001	9	0.83
1002	12	0.63
1003	15	0.50
1004	18	0.42
1005	24	0.31
1006	28	0.27
10VA Series, 2.4"x1.1" 0.53#, 20% regulation		
1021	9	1.11
1022	12	0.83
1023	15	0.67
1024	18	0.56
1025	24	0.42
1026	28	0.36
15VA Series, 2.5"x1.1" 0.64#, 1% regulation.		
1041	9	1.67
1042	12	1.25
1043	15	1.00
1044	18	0.83
1045	24	0.63
1046	28	0.54
1047	2x9	0.83
1048	2x12	0.63
1049	2x15	0.50
1050	2x18	0.42
1051	2x24	0.31
1052	2x28	0.27
25VA Series, 2.8"x1.2" 0.85#, 18% regulation.		
1061	9	2.78
1062	12	2.08
1063	15	1.67
1064	18	1.39
1065	24	1.04
1066	28	0.89
1067	2x9	1.39
1068	2x12	1.04
1069	2x15	0.83
1070	2x18	0.69
1071	2x24	0.52
1072	2x28	0.45
30VA Series, 2.8"x1.3" 0.98#, 16% regulation.		
1081	9	3.33
1082	12	2.50
1083	15	2.00
1084	18	1.67
1085	24	1.25
1086	28	1.07
1087	2x9	1.67
1088	2x12	1.25
1089	2x15	1.00
1090	2x18	0.83
1091	2x24	0.63
1092	2x28	0.54
50VA Series, 3.2"x1.3" 1.34#, 16% regulation.		
1101	9	5.56
1102	12	4.17
1103	15	3.33
1104	18	2.78
1105	24	2.08
1106	28	1.79
1107	115	0.43
1108	2x9	2.78
1109	2x12	2.08
1110	2x15	1.67
1111	2x18	1.39
1112	2x24	1.04
1113	2x28	0.89
1114	2X48	0.52
1115	2X57.5	0.43
1116	2X115	0.22
75VA Series, 3.3"x1.4" 1.74#, 14% regulation.		
1121	9	8.33
1122	12	6.25
1123	15	5.00
1124	18	4.17
1125	24	3.13
1126	28	2.68
1127	115	0.65
1128	2x9	4.17
1129	2x12	3.13
1130	2x15	2.50
1131	2x18	2.08
1132	2x24	1.56
1133	2x28	1.34
1134	2X48	0.78
1135	2X57.5	0.65
1136	2X115	0.33
100VA Series, 3.8"x1.4" 2.24#, 12% regulation.		
1141	9	11.11
1142	12	8.33
1143	15	6.67
1144	18	5.55
1145	24	4.17
1146	28	3.57
1147	115	0.87
1148	2x9	5.55
1149	2x12	4.17
1150	2x15	3.33
1151	2x18	2.78
1152	2x24	2.08
1153	2x28	1.79
1154	2X48	1.04
1155	2X57.5	0.87
1156	2X115	0.43
120VA Series, 3.8"x1.4" 2.24#, 14% regulation.		
1161	9	13.33
1162	12	10.00
1163	15	8.00
1164	18	6.67
1165	24	5.00
1166	28	4.29
1167	115	1.04
1168	2x9	6.67
1169	2X12	5.00
1170	2x15	4.00
1171	2x18	3.33
1172	2x24	2.50
1173	2x28	2.14
1174	2X48	1.25
1175	2X57.5	1.04
1176	2X115	0.52
150VA Series, 4.2"X1.5" 3.56#, 8% regulation.		
1181	9	16.67
1182	12	12.5
1183	15	10.0
1184	18	8.33
1185	24	6.25
1186	28	5.36
1187	115	1.30
1188	2x9	8.33
1189	2x12	6.25
1190	2x15	5.00
1191	2x18	4.17
1192	2x24	3.13
1193	2x28	2.68
1194	2X48	1.56
1195	2X57.5	1.30
1196	2X115	0.65
200VA Series, 4.5"X1.9" 4.30#, 7% regulation.		
1201	9	22.22
1202	12	16.67
1203	15	13.33
1204	18	11.11
1205	24	8.33
1206	28	7.14
1207	115	1.74
1208	2x9	11.11
1209	2X12	8.33
1210	2x15	6.67
1211	2x18	5.56
1212	2x24	4.17
1213	2x28	3.57
1214	2X48	2.08
1215	2X57.5	1.74
1216	2X115	0.89
300VA Series, 4.8"X2.0" 5.2 #, 6 % regulation.		
1222	12	25.00
1223	15	20.00
1224	18	16.67
1225	24	12.50
1226	28	10.71
1227	115	2.61
1228	2x9	16.67
1229	2X12	12.50
1230	2x15	10.00
1231	2x18	8.33
1232	2x24	6.25
1233	2x28	5.36
1234	2X48	3.13
1235	2X57.5	2.61
1236	2X115	1.30
400VA Series, 5.2"X2.2" 7.2 #, 6 % regulation.		
1243	15	26.67
1244	18	22.22
1245	24	16.67
1246	28	14.29
1247	115	3.48
1248	2x9	22.22
1249	2x12	16.67
1250	2x15	13.33
1251	2x18	11.11
1252	2x24	8.33
1253	2x28	7.14
1254	2X48	4.17
1255	2X57.5	3.48
1256	2X115	1.74
500VA Series, 5.5"X2.3" 8.2 #, 6% regulation.		
1263	15	33.33
1264	18	27.78
1265	24	20.83
1266	28	17.86
1267	115	4.35
1268	2x9	27.78
1269	2x12	20.83
1270	2x15	16.67
1271	2x18	13.89
1272	2x24	10.42
1273	2x28	8.93
1274	2X48	5.21
1275	2X57.5	4.35
1276	2X115	2.17
750VA Series, 6.0"X2.7" 11.6#, 5 % regulation.		
1285	24	31.25
1286	28	26.79
1287	115	6.52
1289	2X12	31.25
1280	2x15	25.00
1291	2x18	20.83
1292	2x24	15.63
1293	2x28	13.39
1294	2X48	7.81
1295	2X57.5	6.52
1296	2X115	3.26
1 kVA Series, 6.8"X2.7" 15.9#, 4% regulation.		
1307	115	8.70
1311	2x18	27.78
1312	2x24	20.83
1313	2x28	17.86
1314	2X48	10.42
1315	2X57.5	8.70
1316	2X115	4.35
1.5kVA Series, 7.1"x3.4" 22#, 4% regulation.		
1317	115	13.04
1322	2x24	31.25
1323	2x28	26.78
1324	2X48	15.63
1325	2X57.5	13.04
1326	2X115	6.52
2.5kVA Series, 7.8"X4.4" 33#, 3% regulation.		
1327	115	21.74
1334	2X48	26.04
1335	2X57.5	21.74
1336	2X115	10.87
6.0kVA Series, 10.5"X5.0" 77#, 2% regulation.		
1356	2X115	26.09
9.0kVA Series, 11.7"X6.0" 116#, 2% regulation.		
1376	2X115	39.13

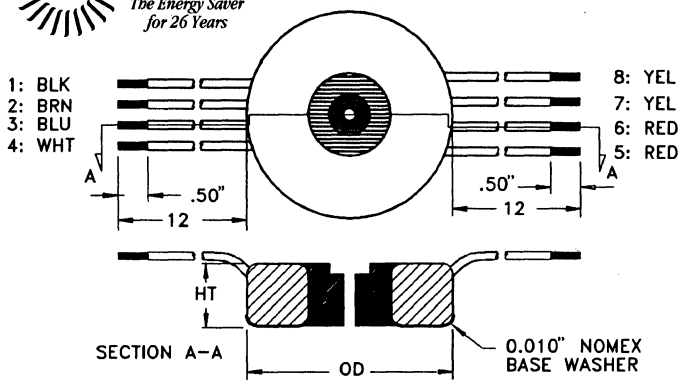
NOTE: Mechanical dimensions and electrical data accurate to within ±3%.
Semi Epoxy Molded. Add 0.20" OD & 0.09" HT. Full Epoxy Molded: Add 0.20" OD & HT.

SERVING YOU SINCE 1972 WITH KNOWLEDGE & SENSIBLE PRODUCTS

1900 CHRIS LANE / ANAHEIM, CA 92085 / (714) 634-2220 / FAX (714) 634-0905 / **800-394-2234**

AMECON
The Energy Saver for 26 Years

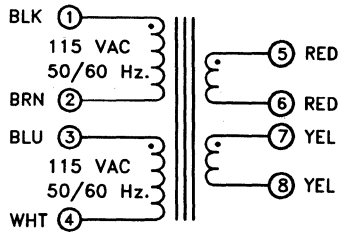
LARGEST SELECTION OF HEAVY DUTY 50/60Hz. TOROIDAL POWER TRANSFORMERS.



For Line Voltage	115V	230V
Apply Input To:	1 & 2	1 & 4
Connect	1 to 3 and 2 to 4	2 to 3

208, 220 OR 240VAC PRIMARY ON REQUEST

PIN NUMBERS ARE FOR REFERENCE ONLY.



Part Number	Load Voltage	Load Current
6VA Series, 2.2"x1.1" 0.44#, 19% regulation		
2001	9	0.67
2002	12	0.50
2003	15	0.40
2004	18	0.33
2005	24	0.25
2006	28	0.21
8VA Series, 2.4"x1.1" 0.53#, 18% regulation		
2021	9	0.88
2022	12	0.67
2023	15	0.53
2024	18	0.44
2025	24	0.33
2026	28	0.28
12VA Series, 2.5"x1.1" 0.72#, 15% regulation.		
2041	9	1.33
2042	12	1.00
2043	15	0.80
2044	18	0.67
2045	24	0.50
2046	28	0.43
2047	2x9	0.67
2048	2x12	0.50
2049	2x15	0.40
2050	2x18	0.33
2051	2x24	0.25
2052	2x28	0.21
20VA Series, 2.8"x1.2" 0.92#, 16% regulation.		
2061	9	2.22
2062	12	1.67
2063	15	1.33
2064	18	1.11
2065	24	0.83
2066	28	0.71
2067	2x9	1.11
2068	2x12	0.83
2069	2x15	0.67
2070	2x18	0.555
2071	2x24	0.42
2072	2x28	0.36
25VA Series, 2.8"x1.3" 1.1#, 15% regulation.		
2081	9	2.78
2082	12	2.08
2083	15	1.67
2084	18	1.39
2085	24	1.04
2086	28	0.89
2087	2x9	1.39
2088	2x12	1.04
2089	2x15	0.83
2090	2x18	0.69
2091	2x24	0.52
092	2x28	0.45
40VA Series, 3.2"x1.3" 1.5#, 15% regulation.		
2101	9	4.44
2102	12	3.33
2103	15	2.67
2104	18	2.22
2105	24	1.67
2106	28	1.43
2107	115	0.35
2108	2x9	2.22
2109	2x12	1.67
2110	2x15	1.33
2111	2x18	1.11
2112	2x24	0.83
2113	2x28	0.71
2114	2X48	0.42
2115	2X57.5	0.35
2116	2X115	0.17
60VA Series, 3.3"x1.4" 1.9#, 13% regulation.		
2121	9	6.66
2122	12	5.00
2123	15	4.00
2124	18	3.33
2125	24	2.50
2126	28	2.14
2127	115	0.52
2128	2x9	3.33
2129	2x12	2.50
2130	2x15	2.00
2131	2x18	1.66
2132	2x24	1.25
2133	2x28	1.07
2134	2X48	0.63
2135	2X57.5	0.52
2136	2X115	0.26
80 VA Series, 3.8"x1.4" 2.5 #, 13% regulation.		
2141	9	8.88
2142	12	6.66
2143	15	5.33
2144	18	4.44
2145	24	3.33
2146	28	2.86
2147	115	0.70
2148	2x9	4.44
2149	2x12	3.33
2150	2x15	2.67
2151	2x18	2.22
2152	2x24	1.67
2153	2x28	1.43
2154	2X48	0.83
2155	2X57.5	0.70
2156	2X115	0.35
100VA Series, 3.8"x1.4" 2.5#, 16% regulation.		
2161	9	11.11
2162	12	8.33
2163	15	6.66
2164	18	5.55
2165	24	4.17
2166	28	3.57
2167	115	0.87
2168	2x9	5.56
2169	2X12	4.17
2170	2x15	3.33
2171	2x18	2.78
2172	2x24	2.08
2173	2x28	1.79
2174	2X48	1.04
2175	2X57.5	0.87
2176	2X115	0.43
120VA Series, 4.2"X1.5" 3.3#, 13% regulation.		
2181	9	13.33
2182	12	10.00
2183	15	8.00
2184	18	6.66
2185	24	5.00
2186	28	4.29
2187	115	1.04
2188	2x9	6.66
2189	2x12	5.00
2190	2x15	4.00
2191	2x18	3.33
2192	2x24	2.50
2193	2x28	2.14
2194	2X48	1.25
2195	2X57.5	1.04
2196	2X115	0.52
160VA Series, 4.5"X1.9" 4.9#, 8 % regulation.		
2201	9	17.77
2202	12	13.33
2203	15	10.66
2204	18	8.88
2205	24	6.66
2206	28	5.71
2207	115	1.39
2208	2x9	8.89
2209	2X12	6.67
2210	2x15	5.33
2211	2x18	4.44
2212	2x24	3.33
2213	2x28	2.86
2214	2X48	1.67
2215	2X57.5	1.39
2216	2X115	0.70
250VA Series, 4.8"X2.0" 6.2#, 8 % regulation.		
2222	12	20.83
2223	15	16.67
2224	18	13.89
2225	24	10.41
2226	28	8.93
2227	115	2.17
2228	2x9	13.88
2229	2X12	10.41
2230	2x15	8.33
2231	2x18	6.94
2232	2x24	5.20
2233	2x28	4.46
2234	2X48	2.60
2235	2X57.5	2.17
2236	2X115	1.09
320VA Series, 5.2"X2.2" 8.1#, 6% regulation.		
2243	15	21.33
2244	18	17.78
2245	24	13.33
2246	28	11.42
2247	115	2.78
2248	2x9	17.77
2249	2x12	13.33
2250	2x15	10.67
2251	2x18	8.89
2252	2x24	6.67
2253	2x28	5.71
2254	2X48	3.33
2255	2X57.5	2.78
2256	2X115	1.39
400VA Series, 5.5"X2.3" 9.4 #, 6% regulation.		
2264	18	22.22
2265	24	16.67
2266	28	14.28
2267	115	3.48
2268	2x9	22.22
2269	2x12	16.67
2270	2x15	13.33
2271	2x18	11.11
2272	2x24	8.33
2273	2x28	7.14
2274	2X48	4.17
2275	2X57.5	3.48
2276	2X115	1.74
600VA Series, 6.0"X2.7" 13.2#, 5 % regulation.		
2285	24	25.00
2286	28	21.42
2287	115	5.22
2289	2X12	25.00
2280	2x15	20.00
2291	2x18	16.67
2292	2x24	12.50
2293	2x28	10.71
2294	2X48	6.25
2295	2X57.5	5.22
2296	2X115	2.61
800VA Series, 6.8"X2.7" 16.8#, 4% regulation.		
2307	115	6.96
2311	2x18	22.22
2312	2x24	16.67
2313	2x28	14.28
2314	2X48	8.33
2315	2X57.5	6.96
2316	2X115	3.48
1.2kVA Series, 7.1"x3.4" 22 #, 4% regulation.		
2327	115	10.43
2332	2x24	25.00
2333	2x28	21.42
2334	2X48	12.50
2335	2X57.5	10.43
2336	2X115	5.22
2.0kVA Series, 7.8"X4.4" 36 #, 3% regulation.		
2347	115	17.39
2354	2X48	20.83
2355	2X57.5	17.39
2356	2X115	8.70
5.0kVA Series, 10.5"X5.0" 77#, 2% regulation.		
2376	2X115	21.74
7.5kVA Series, 11.7"X6.0" 116#, 2% regulation.		
2396	2X115	32.51

IMPORTANT NOTES.

1: All transformers have been designed for 50/60 Hz.
2: 60 Hz TO 400 kHz. Designs available upon request.
3: Custom designs tailored to your specs are made & evaluated on a 2 wk. cycle.
4: 100% electrostatic shielding available on all transformers with a small power derating.
5: Magnetic shielding & lower magnetic leakage designs for sensitive areas such as encountered in computers & audio equipment are available on all transformers.
6: Low profile designs are available upon request.
7: Amecon has the world's most complete toroidal mfg. facilities. We can machine wind toroids in excess of 50"dia & 2000 LB.

SERVING YOU SINCE 1972 WITH KNOWLEDGE & SENSIBLE PRODUCTS

1900 CHRIS LANE / ANAHEIM, CA 92085 / (714) 634-2220 / FAX (714) 634-0905 / **800-394-2234**

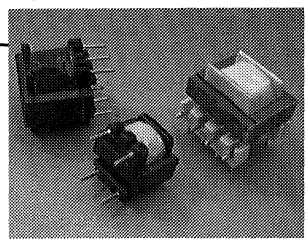
apx TECHNOLOGIES INC.

GENERAL PURPOSE TELECOMMUNICATIONS TRANSFORMERS

Meet FCC Part 68 Requirements

Types:

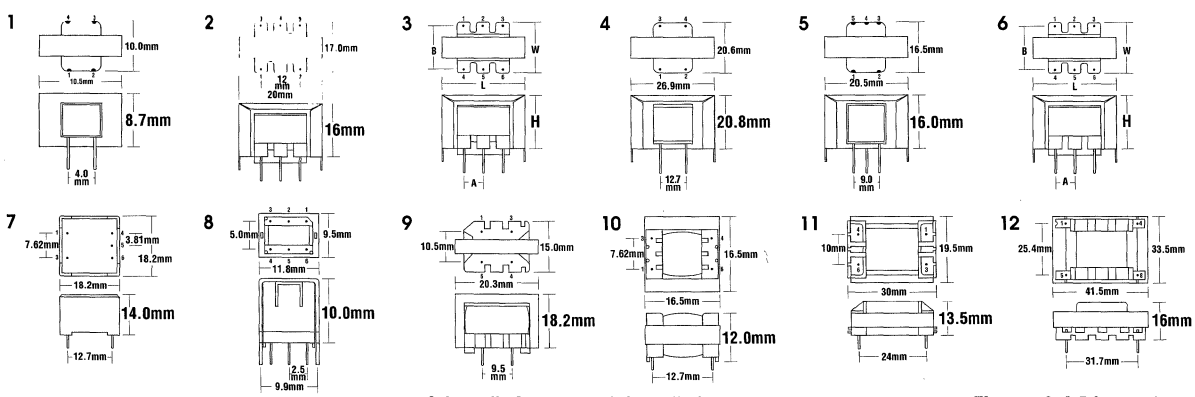
- Audio impedance matching
- Coupling
- Modem
- Pulse
- ISDN and LAN
- Open or encapsulated construction
- PC or surface mount



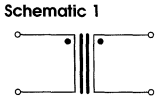
APX excels in the design and production of telephone transformers. Modern offshore manufacturing with stringent quality control afford you the lowest, trouble-free installed cost.

We have the technical expertise to allow you to take your product's performance to where you want, whether your need is general purpose, a plug-in performance upgrade, or a totally new, specialized application. ***APX offers local engineering support to all our customers.***

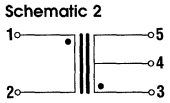
Part Number	Impedence PRI	Impedence SEC	Insertion Loss @1Khz	Return Loss Min @300Hz	Frequency Response 300 to 3500Hz	DCR ±10% PRI	DCR ±10% SEC	Direct Current, Primary	Dielectric Strength,VAC	Figure/Schematic
AP2711	600	600	1.7 dB	14 dB	±1.0 dB	56	72	0	1200	1/1
AP6000	600 C.T.	470 C.T.	1.2 dB	16 dB	±.25 dB	68	102	0	1100	8/3
AP1698	20K C.T.	600 C.T.	NA	NA	±1.0 dB	700	65	0	1200	6A/3
AP1696	500 C.T.	500 C.T.	2.0 dB	21 dB	±.5 dB	44	34	0	1000	6B/3
AP1649	8K C.T.	1.7K C.T.	2.0 dB	NA	±1 dB	500	220	0	1000	6C/3
AP1544	500 C.T.	8 C.T.	1.8 dB	NA	±1 dB	32	1.5	0	1000	6D/3
AP6001	600	10K	0.5 dB	25 dB	±.15 dB	18	425	0	1250	10/1
AP1456	10K C.T.	2K C.T.	2.0 dB	NA	±2 dB	500	200	0	1000	3A/3
AH120	600 C.T.	600 C.T.	1.8 dB	31 dB	±0.1 dB	60	50	0	1000	6E/3
AP1695	10K C.T.	5K C.T.	1.9 dB	NA	±0.5 dB	950	550	0	1000	6F/3
AP1156	620	620 C.T.	1.0 dB	34 dB	±0.5 dB	40	35	5mA	1000	2/2
AP2697	600	600 C.T.	2.5 dB	4 dB	±3 dB	65	86	100 mA	1500	5/2
AP1160	300	600	1.2 dB	33 dB	±0.5 dB	30	50	0	1500	3B/4
AP1697	48 C.T.	8 C.T.	2.0 dB	NA	±1.0 dB	2.5	0.5	0	1200	6G/3
AP6002	12K	2.6K	1.0 dB	NA	±.25 dB	450	135	0	3750	7/1
AP6003	600	600	0.8 dB	26 dB	±0.5 dB	37	51	0	1250	9/1
AP1139	600	600	1.0 dB	13 dB	±1.0 dB	50	30	45 mA	1500	4/1
CR214	600	600	1.8 dB	8 dB	±2.0 dB	72	100	80 mA	3750	11/1
CR108	600 C.T.	600	1.2 dB	27 dB	±0.5 dB	65	80	80 mA	1500	3/5
AL837B	600	600	Telephone Feed Coil/1.5 H Min Inductance			210	210	80 mA	1500	12/1
AP2919	600	600	1.6 dB	26 dB	±0.5 dB	100	94	75 mA	1500	13/5
AP6004	600	600	0.5 dB	12 dB	±0.5 dB	20	20	100 mA	1500	14/6



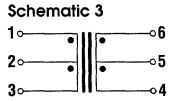
Schematic 1



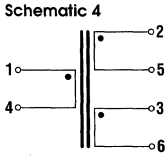
Schematic 2



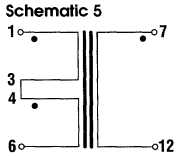
Schematic 3



Schematic 4



Schematic 5



Schematic 6

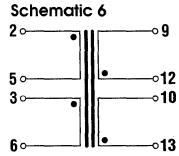


Figure 3,6 Dimensions

Fig.	L	W	H	A	B
3A	14.9	14.8	13.0	3.55	11.3
3B	20.0	18.5	18.5	5.0	12.6
6A	15.0	13.0	11.5	2.5	11.5
6B	15.0	13.0	11.7	3.0	10.0
6C	15.0	13.0	12.0	3.0	11.0
6D	16.0	14.5	12.0	3.0	10.0
6E	15.5	14.8	14.5	3.55	11.3
6F	20.2	16.0	16.0	3.3	14.0
6G	25.5	23.0	19.0	4.5	18.0

Note: All dimensions in millimeters

264 Duffy Avenue, Hicksville, New York 11801
Tel. (516) 433-1313 • Fax: (516) 433-1457 • E-Mail: apx@apxonline.com

apx TECHNOLOGIES INC.

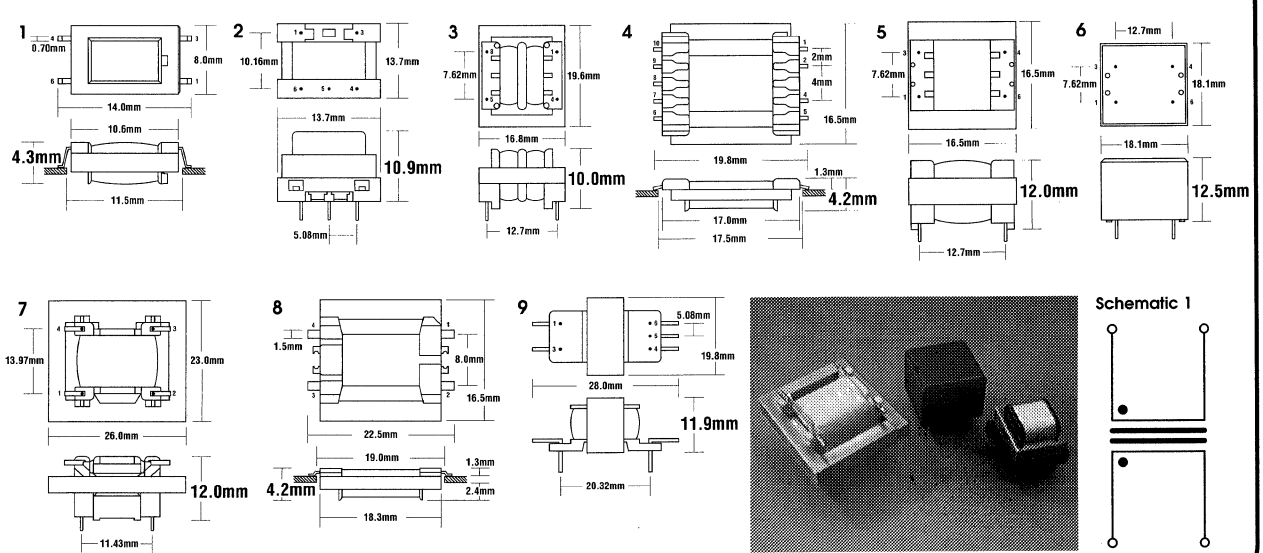
apx

See Our Power Supplies Vol. D, Section 4000 Pages D•1472 – D•1475

HIGH SPEED MODEM TRANSFORMERS

Turns Ratio 1:1 Secondary impedance indicates the terminating resistance value

Part Number	Impedance @1KHz, OdBm Typ PRI	SEC	Inductance Min	Insertion Loss, Max @ 1KHz, OdBm	Return Loss Min @ 1 KHz	Total Harmonic Distortion, Max. @ 600 Hz, -10 dBm	DC Resistance ±10% PRI	SEC	Frequency Response @ 1KHz Typ 300 Hz to 4 KHz	Dielectric Strength VAC	Application	Figure/ Schematic
AP6020	600	348	3.1 H @ 250 Hz, .5 Vrms	2.6 dB	35 dB	-7.8 dB	136	128	± 12 dB	1250	V.32 bis PCMCIA	1/1
AP6021	600	600	600 mH @ 1 KHz, 1 Vrms	1.3 dB	21 dB	-70 dB	55	650	± 5 dB	3750	V.22 bis	2/1
AP6022	600	600	450 mH @ 1 KHz, 1 Vrms	1.0 dB	23 dB	-70 dB	25	25	± 4 dB	3750	V.22 bis	3/1
AP6023	600	295	1.5 H @ 1 KHz, 1 Vrms	3.25 dB	35 dB	-78 dB	160	145	± .25 dB	1250	V.32 bis V.34	4/1
AP6024	600	348	3.9 H @ 250 Hz, .5 Vrms	2.7 dB	35 dB	-82 dB	136	128	± .1 dB	1250	V.34 PCMCIA	1/1
AP6025	600	301	4.0 H @ 250 Hz, .5 Vrms	3.5 dB	35 dB	-82 dB	150	150	± .1 dB	1250	V.34 SMT	1/1
AP6026	600	397	19 H @ 250 Hz, 1 Vrms	2.0 dB	38 dB 250 to 4KHz	-86 dB	115	91	± .2 dB	1500	V.34	5/1
AP6027	600	560	4.8 H @ 200 Hz, .1 Vrms	1.15 dB	23 dB 300 to 4 KHz	-80 dB	65	65	± .19 dB	4000	V.32 bis	6/1
AP6028	600	301	6 H @ 250 Hz, 1 Vrms	3.25 dB	40 dB	-83 dB	160	145	± .1 dB	1250	V.32 PCMCIA	4/1
AP6029	600	397	25 H @ 250 Hz, 1 Vrms	1.9 dB	39 dB 250 to 4KHz	-88 dB	115	91	± 1 dB	1500	V.34	5/1
AP6030	600	422	4 H @ 1 KHz, .1 Vrms	1.7 dB	42 dB	-86 dB	80	100	± .08 dB	3750	V.34	6/1
AP6031	600	600	800 mH @ 1 KHz, 1 Vrms	1.7 dB	25 dB	-84 dB	52	127	± .3 dB	3750	V.34	2/1
AP6032	600	301	35 H @ 250 Hz, 1 Vrms	3.3 dB	32 dB 250 to 4KHz	-86 dB	150	150	± .2 dB	1250	V.34	5/1
AP6033	600	301	21 H @ 200 Hz, 1 Vrms	3.4 dB	30 dB	-88 dB	150	150	± .2 dB	1250	V.34	7/1
AP6034	600	301	35 H @ 250 Hz, 1 Vrms	3.3 dB	32 dB 250 to 4KHz	-86 dB	150	150	± .2 dB	1250	56 K Modem	5/1
AP6035	600	301	28 H @ 250 Hz, 1 Vrms	3.3 dB	32 dB 100 to 20KHz	-85 dB	150	150	± .2 dB	1250	56 K Modem	5/1
AP6036	600	301	5.5 H @ 250 Hz, 1 Vrms	3.2 dB	25 dB 200 to 10KHz	-86 dB	150	150	± .1 dB	1250	56 K Modem	8/1
AP6037	600	361	20 H @ 200 Hz, 1 Vrms	2.5 dB	32 dB 300 to 3.5 KHz	-83 dB	120	120	± .2 dB	1500	56 K Modem	9/1



264 Duffy Avenue, Hicksville, New York 11801
Tel. (516) 433-1313 • Fax: (516) 433-1457 • E-Mail: apx@apxonline.com

apx TECHNOLOGIES INC.

ISDN, DDS, TI, EI, CEPT TRANSFORMERS

APX offers a comprehensive and rapidly expanding family of Transformers developed to support specific chipsets from all widely accepted IC manufacturers, including Motorola, Lucent, Mitel, Seimens, and National. They are available in descrete, potted, dip and SMT packages. Please consult your sales representative with your application for data sheets.

High Frequency Data Transformers

Compliant to IEEE 803.3, Products Include

- ISDN S/T Interface
- ISDN U
- T1
- E1
- CEPT
- DDS
- Filters
- Isolation
- Isolation/Chokes
- Choke Coils
- DC/DC Converters
- Delay Lines

Ethernet Isolation Transformers

Compliant to IEEE 802.3 10 Base-2, 10 Base-5, 16 Pin Dip and SMT packages
Examples are shown here:

Part Number	Turn Ratio (±5%)	Nom. Lp (uH ± 20%)	Primary ET-Const. (v-uS Min)	PRI/SEC Cw/w (pF Max)	PRI/SEC Ls (uH)	DCR (Max)	Hi-Pot Vrms	Figure	Sections
AP6050	1 : 1	35	1.8	8	0.20	0.2	500	A	3
AP6051	1 : 1	50	2.1	9	0.20	0.2	500	A	3
AP6052	1 : 1	75	2.1	10	0.20	0.2	500	A	3
AP6053	1 : 1	75	2.1	10	0.20	0.2	2000	A	3
AP6054	1 : 1	100	2.1	10	0.20	0.3	500	A . B	3
AP6055	1 : 1	100	2.1	10	0.20	0.3	2000	A . B	3
AP6056	1 : 1	150	2.1	12	0.20	0.3	500	A	3
AP6057	1 : 1	35	1.8	8	0.25	0.3	2000	B	3
AP6058	1 : 1	50	2.2	9	0.25	0.3	2000	B	3
AP6059	1 : 1	75	2.4	10	0.25	0.3	2000	B	3
AP6060	1 : 1	100	2.1	10	0.25	0.4	2000	B	3
AP6061	1 : 1	150	3.0	14	0.25	0.5	2000	B	3
AP6062	1 : 1	50	2.1	9	0.20	.2	2000	C	3
AP6063	1 : 1	100	2.1	10	0.30	.3	2000	C	3
AP6064	1 : √2	200	2.1	12	0.20	.3	2000	A	4
AP6065	1 : √2	200	2.1	12	0.50	.5	2000	A	4

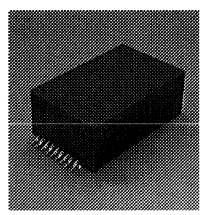
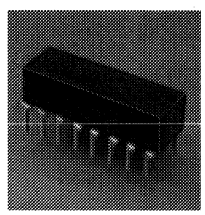
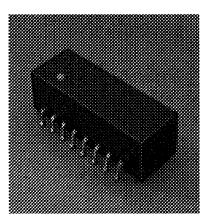
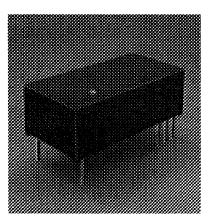





Figure A

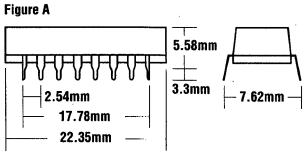


Figure B

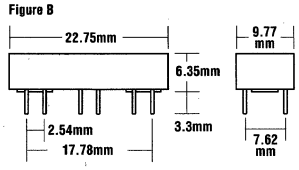
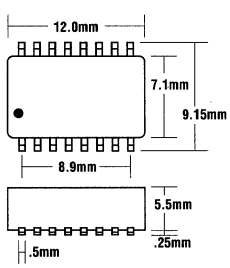
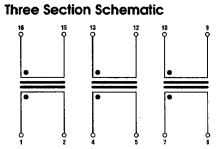


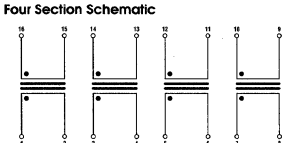
Figure C



Three Section Schematic



Four Section Schematic



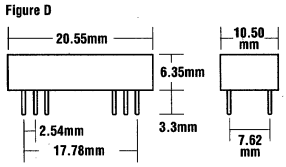
10 Base-T L/P Filters

Compliant to IEEE 802.3, 7 Pole Tramsmitter, 5 Pole Receiver

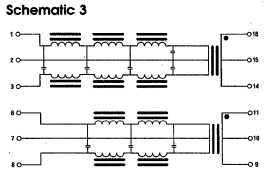
Part Number			Transmit	Receive
AP6075	Insertion Loss Max (1-10 Mhz)		.8 dB	.8 dB
	Return Loss, Min (5 MHz)	15dB		
	Cross Talk, Min (1-10 MHz)	30 dB		
	Dielectric Strength	1500 Vrms		
	Cut-off Frequency	17 Mhz		
	Attenuation, Min (20 MHz)		7 dB	6 dB
	Attenuation, Min (25 MHz)		19 dB	14 dB
	Attenuation, Min (30 MHz)		32 dB	20 dB
	Attenuation, Min (40 Mhz)		35 dB	31 dB

Turn Ratio: 1:1:1:1 Leakage Inductance: (LL): 0.3 uH Max
Primary Inductance: (LP): 18-36 uH Primary Capacitance: (Cww) 25 pF Max

Figure D



Schematic 3



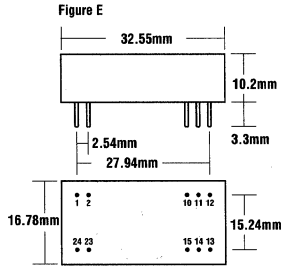
DC to DC Convertors

Compliant to 10 Base-2 IEEE 802.3

Part Number	Output Voltage	Current	Input	Isolation
AP6080	9VDC ± 4% regulated	200mA	5VDC ± 5%	500VDC
AP6081	9VDC ± 4% regulated	200mA	12VDC ± 10%	500VDC
AP6082	9VDC ± 5% unregulated	200mA	5VDC ± 5%	500VDC
AP6083	9VDC ± 5% unregulated	200mA	12VDC ± 5%	500VDC
AP6084	9VDC ± 3% regulated	200mA	5VDC ± 5%	500VDC
AP6085	9VDC ± 3% regulated	200mA	12VDC ± 5%	500VDC

Output Ripple and Noise 100mV p-p Max Operating Temperature: to 70°C
Typical Efficiency: 75% Storage Temperature: to 100°C

Figure E



PIN	Function
1 & 24	+V in
2 & 23	NC
10 & 15	-V out
11 & 14	+V out
12 & 13	-V in

ALSO AVAILABLE:
100 VG Filters,
10/100 Base TX Filters

Consult your sales representative

264 Duffy Avenue, Hicksville, New York 11801
Tel. (516) 433-1313 • Fax: (516) 433-1457 • E-Mail: apx@apxonline.com

apx TECHNOLOGIES INC.

POWER TRANSFORMERS

We are a global manufacturing company with local engineering support. AS such, we are recognized experts in producing specialized custom and standard products, all in our facilities in the Far East.

APX expertise derives from years of experience, originally with packaged power, expanding into a complete portfolio of standard types and an expert ability for custom creation.

Manufacturing is performed in modern, cost-effective plants at APX Taiwan and China to insure you competitive benefits with rigid quality control.

APX is headquartered in New York and represented nationally, providing you with convenient easy access to product design, ongoing engineering support, customer service, and shipment control.

CUSTOM

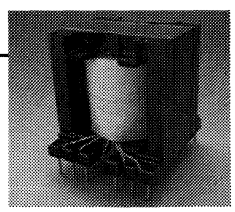
We explore all options and tradeoffs to create designs to optimize your products.

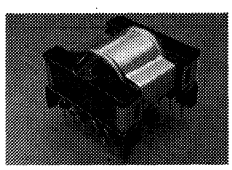
With 20 years of custom solutions for application-specific transformers at effective costs, APX is your ideal partner, with local engineering support.

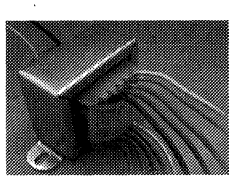
Power and Audio Transformers from micropower to hundreds of watts.

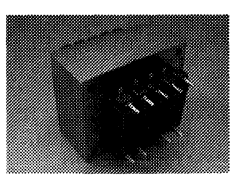
Types:

- Laminated core
- Concentric, non-concentric winding
- Ferrite core
- PC or hardware mount
- Leads, terminals, specific connectors
- Potted construction
- Domestic or international bobbins
- Custom tooling and molding
- Toroidal
- Multi tap







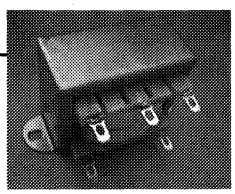


See Our Power Supplies Vol. D, Section 4000 Pages D-1472 - D-1475

STANDARDS

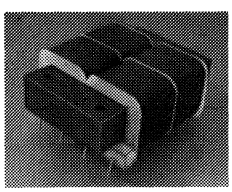
APX is a volume producer of all widely accepted industry families. If you employ a commodity transformer in your design, we offer a drop-in that will bring you the benefits of modern, low cost manufacturing and rigid quality control.

Examples:



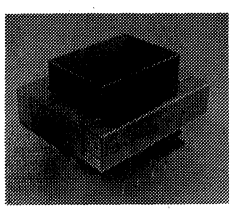
Miniature Split-Bobbin Horizontal PC Mount

- 2500 VRMS Highpot / Class B 130°C Insulation
- Single 115VAC or dual 115/230VAC primaries
- Single or dual secondaries for series or parallel connection
- Power ratings from 1.1 to 36VA



Split Bobbin Vertical Channel Frame Mount

- 2500 VRMS Highpot / Class B 130°C Insulation
- Single 115VAC or dual 115/230VAC primaries
- Single or dual secondaries for series or parallel connection
- Terminal or leads connections
- Power ratings from 2.4 to 100VA



Miniature Low Profile Horizontal PC Mount

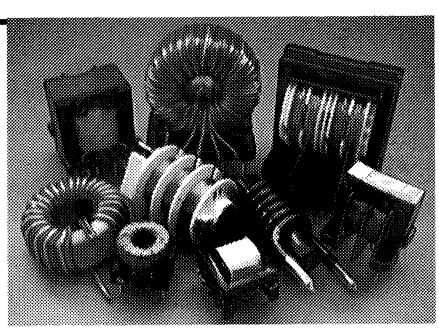
- 1500 VRMS Highpot / Class B 130°C Insulation
- Dual 115/230VAC primaries
- Secondaries for series or parallel connection
- Power ratings from 2.5 to 48VA

International Split Bobbin, VDE Style

- 4000 VRMS Highpot, IEC creepage distances
- 130°C Class B Insulation
- Dual 115/230VAC primaries
- Secondaries can be series or parallel connected
- Horizontal PC power ratings from 2.5 to 56VA
- Vertical Chassis Mount Power from 25 to 175VA

SPECIALIZED MAGNETIC PRODUCTS

- Magnetic and aircore inductors
- Common-mode chokes
- Filter chokes
- Switch mode magnetics
- Trigger coils
- Low voltage flybacks
- Power factor correction inductors
- Power selection transformers
- Inverter Transformers



264 Duffy Avenue, Hicksville, New York 11801
Tel. (516) 433-1313 • Fax: (516) 433-1457 • E-Mail: apx@apxonline.com

CUSTOM MADE TOROIDAL POWER TRANSFORMERS

AVEL

TOROIDS — THE LIGHTER — QUIETER — SMALLER — LOWER IN STRAY FIELD ALTERNATIVE TO LAMINATION TRANSFORMERS

When your design indicates more than an off-the-shelf type, let Avel quote to your specifications.

Consider the options/parameters below when planning your design.

Finishes: Polyester tape ▼ Encapsulated – metal/plastic ▼ Vacuum varnish impregnated.

Terminations: Stranded leads ▼ Solid leads ▼ PCB mountable ▼ Terminals ▼ Tag band.

Method of mounting: Epoxy center with threaded bush / clearance hole ▼ L-bracket for vertical mounting ▼ Omega bracket ▼ Fixing kit (dished metal washer & bolt) ▼ Tie wraps ▼ Mounting frame for above 1KVA or shock above 10g.

Shielding: Can be added to further reduce the inherent low radiated field of the toroidal transformer in the form of exterior metal shielding or for interwinding shielding – copper foil.

Agency standards: Certifications: UL 506 ▼ UL 1411 ▼ EN60 742 ▼ CSA 22.2 ▼ CE Construction to UL 2601, EN60 950 and most international specifications.

- ▼ *EXPERIENCED DESIGN STAFF*
- ▼ *VARIETY OF FINISH & MOUNTING OPTIONS*
- ▼ *VARIETY OF CORE GEOMETRY OPTIONS*
- ▼ *DESIGNED AND CONSTRUCTED FOR HIGH RELIABILITY*
- ▼ *COMPETITIVE PRICING*

▼ SAMPLES OF COMMON SIZES 50/60 HZ ▼

Other sizes available

VA RATING	NOMINAL SIZES IN.	WEIGHTS POUNDS	REGULATION	SUGGESTED FIXING DISC/BOLT
15	2.8 x 1.1	0.77	16%	2 in./3/16 in.
30	2.8 x 1.2	0.93	16%	2 in./3/16 in.
60	3.5 x 1.3	1.87	13%	2.8 in./1/4 in.
100	3.6 x 1.7	2.65	10%	2.8 in./1/4 in.
160	4.5 x 1.7	4.19	9%	3.5 in./1/4 in.
230	4.7 x 2.0	5.89	8%	4.3 in./5/16 in.
330	5.2 x 2.0	7.28	7%	4.3 in./5/16 in.
530	5.9 x 2.4	11.03	6%	4.3 in./5/16 in.
600	6.5 x 3.0	13.23	5%	2 x 1/4-20 Spaced 1 in.
800	7.1 x 3.0	15.44	4%	2 x 1/4-20 Spaced 1 in.
1000	7.7 x 3.2	17.64	4%	2 x 1/4-20 Spaced 1 in.
1500	8.3 x 3.5	19.85	3%	Fixing Bracket
2000	8.5 x 3.9	20.95	3%	Fixing Bracket
2500	8.5 x 4.7	26.46	2.5%	Fixing Bracket
3000	9.6 x 4.7	33.08	2%	Fixing Bracket

Heat rise typically 40°C at 50 Hz.

A smaller transformer will result if design is for 60 Hz only, or if a higher temperature rise is specified.

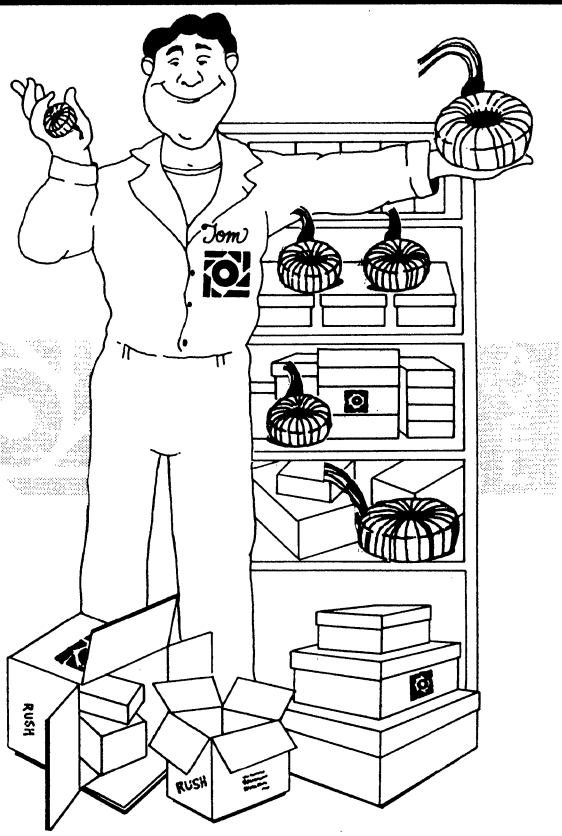
Fixing Bracket will increase height by 0.4 inch.

ISO 9001 certified

Avel Lindberg Inc. • The Power Professionals •
47 South End Plaza, New Milford, CT 06776 • 860-355-4711 • FAX: 860-354-8597
http://www.avellindberg.com • E-mail: avelram@worlnet.att.net

TOROIDAL POWER TRANSFORMERS

AVEL



READY MADE RANGE

In Stock

The polyester tape finish has proved to be the most popular method of constructing toroidal transformers for moderr day electronics.

Choosing from the wide range of toroids, shown in the table, is the most inexpensive way to match J. I. T. schedules. Transformers can be shipped the same day requested!

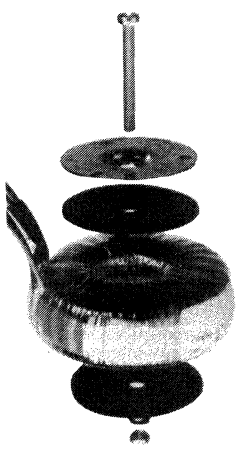
TYPE	LOAD VA	SECONDARY RMS VOLTS V	SECONDARY RMS CURRENT A	DIMENSIONS DIA. INS.	DIMENSIONS HT. INS.	WEIGHT LBS. TYPICAL	MOUNTING
D4000	30	6+6	2.50	2.9	1.3	0.93	
D4001	30	9+9	1.67	2.9	1.3	0.93	2 in. Dished Fixing Plate 0.08 in. Clearance
D4002	30	12+12	1.25	2.9	1.3	0.93	
D4003	30	15+15	1.00	2.9	1.3	0.93	
D4004	30	18+18	0.83	2.9	1.3	0.93	
D4005	30	22+22	0.68	2.9	1.3	0.93	
D4006	30	25+25	0.60	2.9	1.3	0.93	
D4007	30	30+30	0.50	2.9	1.3	0.93	
D4010	60	9+9	3.33	3.5	1.4	1.87	
D4011	60	12+12	2.50	3.5	1.4	1.87	2.75 in. Dished Fixing Plate 0.16 in. Clearance
D4012	60	15+15	2.00	3.5	1.4	1.87	
D4013	60	18+18	1.67	3.5	1.4	1.87	
D4014	60	22+22	1.36	3.5	1.4	1.87	
D4015	60	25+25	1.20	3.5	1.4	1.87	
D4016	60	30+30	1.00	3.5	1.4	1.87	
D4019A	60	120+120	0.25	3.5	1.4	1.87	
D4020	100	12+12	4.17	3.7	1.8	2.65	
D4021	100	15+15	3.33	3.7	1.8	2.65	
D4022	100	18+18	2.78	3.7	1.8	2.65	2.75 in. Dished Fixing Plate 0.16 in. Clearance
D4023	100	22+22	2.27	3.7	1.8	2.65	
D4024	100	25+25	2.00	3.7	1.8	2.65	
D4025	100	30+30	1.67	3.7	1.8	2.65	
D4126	100	110+110	0.45	3.7	1.8	2.65	
D4027	100	220	0.45	3.7	1.8	2.65	
D4029	100	120+120	0.42	3.7	1.8	2.65	
D4030	160	18+18	4.44	4.5	1.8	4.19	
D4031	160	22+22	3.64	4.5	1.8	4.19	3.5 in. Dished Fixing Plate 0.16 in. Clearance
D4032	160	25+25	3.20	4.5	1.8	4.19	
D4033	160	30+30	2.67	4.5	1.8	4.19	
D4034	160	35+35	2.29	4.5	1.8	4.19	
D4038	160	110+110	0.73	4.5	1.8	4.19	
D4039	160	120+120	0.67	4.5	1.8	4.19	
D4040	230	25+25	4.60	4.7	2.0	5.89	4.3 in. Dished Fixing Plate 0.16 in. Clearance
D4041	230	30+30	3.83	4.7	2.0	5.89	
D4042	230	35+35	3.29	4.7	2.0	5.89	
D4043	230	40+40	2.88	4.7	2.0	5.89	
D4047	230	110+110	1.05	4.7	2.0	5.89	
D4049	230	120 + 120	0.96	4.7	2.0	5.89	
D4050	330	25+25	6.60	5.3	2.1	7.28	4.3 in. Dished Fixing Plate 0.16 in. Clearance
D4051	330	30+30	5.50	5.3	2.1	7.28	
D4052	330	35+35	4.71	5.3	2.1	7.28	
D4053	330	40+40	4.13	5.3	2.1	7.28	
D4054	330	45+45	3.67	5.3	2.1	7.28	
D4059	330	120+120	1.38	5.3	2.1	7.28	
D4056	330	220	1.50	5.3	2.1	7.28	
D4060	530	30+30	8.83	6.0	2.4	11.03	4.3 in. Dished Fixing Plate 0.16 in. Clearance
D4061	530	35+35	7.57	6.0	2.4	11.03	
D4062	530	40+40	6.63	6.0	2.4	11.03	
D4063	530	45+45	5.89	6.0	2.4	11.03	
D4064	530	50+50	5.30	6.0	2.4	11.03	
D4069	530	120+120	2.21	6.0	2.4	11.03	

GENERAL SPECIFICATION

Primaries:	120V + 120V
Frequency:	50/60Hz
Operating range:	47 to 400Hz
Secondary voltage tolerance:	within 3% at nominal input & full load.
Primary to secondary insulation:	4000V rms
	105°C rated
Leads:	6 inches long, pvc insulated.

Certified to UL 506, CSA 22.2, CE, (EN 60 065) Certifications also available EN 60 742, IEC 742, UL 1411, as well as compliance to most standards

Load VA	Regulation %	Temp. Rise °C	Iron Loss W	Copper Loss W
30	16	50	0.40	4.8
60	13	50	0.9	7.8
100	10	50	1.2	10
160	9	56	2.0	14.4
230	8	56	2.75	18.4
330	7	58	3.4	23
530	6	60	5.0	32



CE cULus CSA

Recognized Component Underwriters Labs, Inc.

Or, for special needs, let us quote on a custom design with competitive pricing!

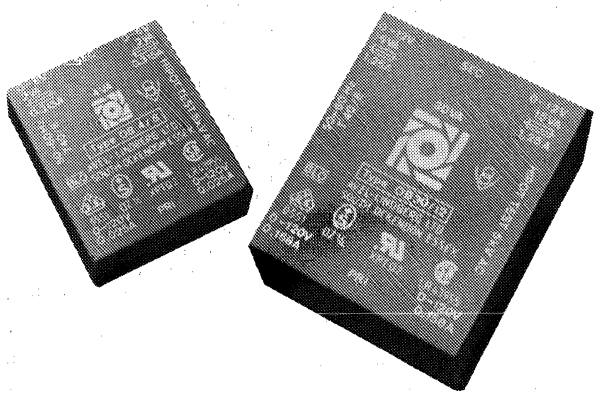
ISO 9001 certified

Avel Lindberg Inc. • The Power Professionals •
47 South End Plaza, New Milford, CT 06776 • 860-355-4711 • FAX: 860-354-8597
http://www.avellindberg.com • E-mail: avelram@worlnet.att.net

LOW PROFILE POWER TRANSFORMERS

AVEL

THE INTERNATIONAL TRANSFORMER



ENCAPSULATED – SLIM LINE – PCB MOUNTED,
LOW INTER-WINDING CAPACITANCE – 5000 V HIPOT TESTED

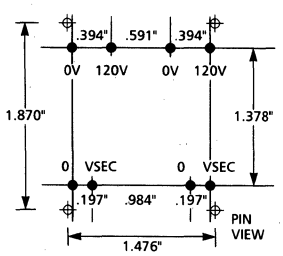
CERTIFIED TO:

UL 506, CSA 22.2, IEC 742, EN60 742,
SEV TP 21/2A, VDE 0551-9.75, CE Marked
Also available EN60 950, IEC 950, VDE 0805

The OB range bobbin transformer was designed for use where a power supply is an integral part of a printed circuit board especially for close card spacing and/or where regulatory agency recognitions are needed.

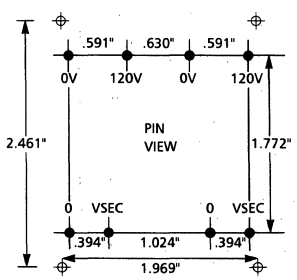
Resin filled under vacuum into a thermoplastic case, allowing for a 5000 V hipot in a low profile package.

BOARD DETAILS –
2, 4, 6 VA.
PIN SIZE 0.04" X 0.02"



TYPE	HEIGHT	WIDTH	DEPTH	FIXING
OB 2	0.692"	2.087"	1.732"	No. 4 Self Tap
OB 4	0.772"			
OB 6	0.889"			

BOARD DETAILS –
0.8, 10, 14, 18, 24, 30 VA.
PIN SIZE 0.04" X 0.02"



TYPE	HEIGHT	WIDTH	DEPTH	FIXING
OB 0.8	0.425"	2.669"	2.244"	No. 4 Self Tap
OB 10	0.898"			
OB 14	0.976"			
OB 18	1.087"			
OB 24	1.236"			
OB 30	1.409"			

ISO 9001 certified

Primary: 120 V + 120 V 50/60 Hz

Secondary voltage tolerance: within 5% at nominal input and input and full load.

Certification to: UL 506, CSA C22.2, VDE 0551, IEC 742, SEV 1003, EN60 742, CE

Type	Load VA	Secondary RMS Rating Series	Secondary RMS Rating Parallel	Regulation Typically	Weight Grams	Weight lbs.
OB.8-5	0.8	10V @ 80mA	5V @ 160mA	30%	107	0.23
OB.8-6	0.8	12V @ 67mA	6V @ 133mA	30%	107	0.23
OB.8-9	0.8	18V @ 44mA	9V @ 88mA	30%	107	0.23
OB.8-12	0.8	24V @ 33mA	12V @ 66mA	30%	107	0.23
OB.8-15	0.8	30V @ 27mA	15V @ 33mA	30%	107	0.23
OB.8-18	0.8	36V @ 22mA	18V @ 44mA	30%	107	0.23
OB.8-24*	0.8	48V @ 17mA	24V @ 33mA	30%	107	0.23
OB2-5	2	10V @ 200mA	5V @ 400mA	25%	115	0.254
OB2-6	2	12V @ 170mA	6V @ 330mA	25%	115	0.254
OB2-9	2	18V @ 110mA	9V @ 220mA	25%	115	0.254
OB2-12	2	24V @ 85mA	12V @ 170mA	25%	115	0.254
OB2-15	2	30V @ 70mA	15V @ 140mA	25%	115	0.254
OB2-18	2	36V @ 55mA	18V @ 110mA	25%	115	0.254
OB2-24*	2	48V @ 40mA	24V @ 80mA	25%	115	0.254
OB4-5	4	10V @ 400mA	5V @ 800mA	22%	145	0.320
OB4-6	4	12V @ 330mA	6V @ 660mA	22%	145	0.320
OB.4-9	4	18V @ 220mA	9V @ 440mA	22%	145	0.320
OB4-12	4	24V @ 165mA	12V @ 330mA	22%	145	0.320
OB4-15	4	30V @ 135mA	15V @ 270mA	22%	145	0.320
OB4-18	4	36V @ 110mA	18V @ 220mA	22%	145	0.320
OB4-24*	4	48V @ 85mA	24V @ 170mA	22%	145	0.320
OB6-5	6	10V @ 600mA	5V @ 1·2A	19%	175	0.386
OB6-6	6	12V @ 500mA	6V @ 1A	19%	175	0.386
OB6-9	6	18V @ 330mA	9V @ 660mA	19%	175	0.386
OB6-12	6	24V @ 250mA	12V @ 500mA	19%	175	0.386
OB6-15	6	30V @ 200mA	15V @ 400mA	19%	175	0.386
OB6-18	6	36V @ 165mA	18V @ 330mA	19%	175	0.386
OB6-24*	6	48V @ 125mA	24V @ 250mA	19%	175	0.386
OB10-5	10	10V @ 1A	5V @ 2A	26%	280	0.617
OB10-6	10	12V @ 830mA	6V @ 1·66A	26%	280	0.617
OB10-9	10	18V @ 550mA	9V @ 1·10A	26%	280	0.617
OB10-12	10	24V @ 420mA	12V @ 840mA	26%	280	0.617
OB10-15	10	30V @ 335mA	15V @ 670mA	26%	280	0.617
OB10-18	10	36V @ 280mA	18V @ 560mA	26%	280	0.617
OB10-24*	10	48V @ 210mA	24V @ 420mA	26%	280	0.617
OB14-5	14	10V @ 1·4A	5V @ 2·8A	18%	315	0.695
OB14-6	14	12V @ 1·15A	6V @ 2·3A	18%	315	0.695
OB14-9	14	18V @ 780mA	9V @ 1·56A	18%	315	0.695
OB14-12	14	24V @ 585mA	12V @ 1·17A	18%	315	0.695
OB14-15	14	30V @ 470mA	15V @ 940mA	18%	315	0.695
OB14-18	14	36V @ 390mA	18V @ 780mA	18%	315	0.695
OB14-24*	14	48V @ 290mA	24V @ 580mA	18%	315	0.695
OB18-5	18	10V @ 1·8A	5V @ 3·6A	17%	375	0.827
OB18-6	18	12V @ 1·5A	6V @ 3·0A	17%	375	0.827
OB18-9	18	18V @ 1·0A	9V @ 2·0A	17%	375	0.827
OB18-12	18	24V @ 750mA	12V @ 1·5A	17%	375	0.827
OB18-15	18	30V @ 600mA	15V @ 1·2A	17%	375	0.827
OB18-18	18	36V @ 500mA	18V @ 1·0A	17%	375	0.827
OB18-24	18	48V @ 375mA	24V @ 750mA	17%	375	0.827
OB24-5	24	10V @ 2·4A	5V @ 4·8A	16%	445	0.981
OB24-6	24	12V @ 2·0A	6V @ 4·0A	16%	445	0.981
OB24-9	24	18V @ 1·33A	9V @ 2·66A	16%	445	0.981
OB24-12	24	24V @ 1·0A	12V @ 2·0A	16%	445	0.981
OB24-15	24	30V @ 800mA	15V @ 1·6A	16%	445	0.981
OB24-18	24	36V @ 670mA	18V @ 1·34A	16%	445	0.981
OB24-24*	24	48V @ 500mA	24V @ 1·0A	16%	445	0.981
OB30-5	30	10V @ 3·0A	5V @ 6·0A	15%	530	1.169
OB30-6	30	12V @ 2·5A	6V @ 5·0A	15%	530	1.169
OB30-9	30	18V @ 1·67A	9V @ 3·33A	15%	530	1.169
OB30-12	30	24V @ 1·25A	12V @ 2·5A	15%	530	1.169
OB30-15	30	30V @ 1·0A	15V @ 2·0A	15%	530	1.169
OB30-18	30	36V @ 830mA	18V @ 1·67A	15%	530	1.169
OB30-24*	30	48V @ 625mA	24V @ 1·25A	15%	530	1.169

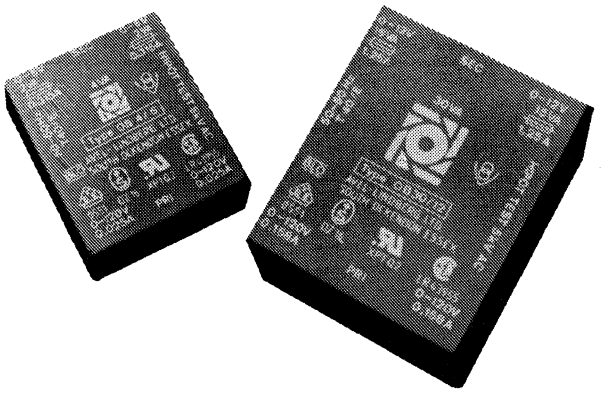
*These transformers meet VDE 0550 only.

Avel Lindberg Inc. • The Power Professionals •
47 South End Plaza, New Milford, CT 06776 • 860-355-4711 • FAX: 860-354-8597
http://www.avellindberg.com • E-mail: avelram@worlnet.att.net

SHORT CIRCUIT PROOF TRANSFORMERS

AVEL

THE PROTECTED TRANSFORMER



SHORT CIRCUIT PROTECTED – NO PROTECTION REQUIRED – PCB MOUNTED – ENCAPSULATED – HIGH ELECTRICAL RELIABILITY – VACUUM EPOXY RESIN TO UL94V-0

CERTIFIED TO:

UL 506, CSA 22.2

ENEC 10, (VDE 0551), EN 60 742

The FLD range, similar to the OB range (previous page), is additionally equipped with a PTC device to protect against over temperature and over current conditions. Once tripped the transformer will resume operating after the power has been turned off and the transformer is allowed to cool down. The FLD range is vacuum filled with UL94-0 epoxy.

TYPE	HEIGHT	LENGTH	WIDTH	FIXING (optional)
FLD4	.9	2.1	1.7	No.4 Self Tap
FLD6	1.1	2.1	1.7	No.4 Self Tap

TYPE	HEIGHT	LENGTH	WIDTH	FIXING (optional)
FLD12	1.1	2.7	2.2	No.4 Self Tap
FLD18	1.2	2.7	2.2	No.4 Self Tap
FLD24	1.4	2.7	2.2	No.4 Self Tap

TYPE	HEIGHT	LENGTH	WIDTH	FIXING (optional)
FLD35	1.5	3.3	2.8	No.6 Self Tap
FLD48	1.9	3.4	2.8	No.6 Self Tap

ISO 9001 certified

Primary: 115 V + 115 V

Markings: UL 506, CSA C22.2, ENEC 10 (VDE 0551), EN 60 742, CE

Compliance to: IEC 558

Type	Load VA	Secondary Voltage	Secondary Current	Regulation	Weight lbs.
FLD4/5	4	2 x 5	2 x 0.400	27%	.39
FLD4/6	4	2 x 6	2 x 0.333	27%	.39
FLD4/8	4	2 x 8	2 x 0.250	27%	.39
FLD4/9	4	2 x 9	2 x 0.222	27%	.39
FLD4/12	4	2 x 12	2 x 0.166	27%	.39
FLD4/15	4	2 x 15	2 x 0.133	27%	.39
FLD4/18	4	2 x 18	2 x 0.111	27%	.39
FLD6/5	6	2 x 5	2 x 0.600	25%	.55
FLD6/6	6	2 x 6	2 x 0.500	25%	.55
FLD6/8	6	2 x 8	2 x 0.375	25%	.55
FLD6/9	6	2 x 9	2 x 0.333	25%	.55
FLD6/12	6	2 x 12	2 x 0.250	25%	.55
FLD6/15	6	2 x 15	2 x 0.200	25%	.55
FLD6/18	6	2 x 18	2 x 0.166	25%	.55
FLD12/5	12	2 x 5	2 x 1.200	24%	.79
FLD12/6	12	2 x 6	2 x 1.000	24%	.79
FLD12/8	12	2 x 8	2 x 0.750	24%	.79
FLD12/9	12	2 x 9	2 x 0.666	24%	.79
FLD12/12	12	2 x 12	2 x 0.500	24%	.79
FLD12/15	12	2 x 15	2 x 0.400	24%	.79
FLD12/18	12	2 x 18	2 x 0.333	24%	.79
FLD18/5	18	2 x 5	2 x 1.800	23%	.97
FLD18/6	18	2 x 6	2 x 1.500	23%	.97
FLD18/8	18	2 x 8	2 x 1.125	23%	.97
FLD18/9	18	2 x 9	2 x 1.000	23%	.97
FLD18/12	18	2 x 12	2 x 0.750	23%	.97
FLD18/15	18	2 x 15	2 x 0.600	23%	.97
FLD18/18	18	2 x 18	2 x 0.500	23%	.97
FLD24/5	24	2 x 5	2 x 2.400	20%	1.14
FLD24/6	24	2 x 6	2 x 2.000	20%	1.14
FLD24/8	24	2 x 8	2 x 1.500	20%	1.14
FLD24/9	24	2 x 9	2 x 1.333	20%	1.14
FLD24/12	24	2 x 12	2 x 1.000	20%	1.14
FLD24/15	24	2 x 15	2 x 0.800	20%	1.14
FLD24/18	24	2 x 18	2 x 0.666	20%	1.14
FLD35/5	35	2 x 5	2 x 3.500	17%	1.60
FLD35/6	35	2 x 6	2 x 2.917	17%	1.60
FLD35/8	35	2 x 8	2 x 2.188	17%	1.60
FLD35/9	35	2 x 9	2 x 1.944	17%	1.60
FLD35/12	35	2 x 12	2 x 1.458	17%	1.60
FLD35/15	35	2 x 15	2 x 1.166	17%	1.60
FLD35/18	35	2 x 18	2 x 0.972	17%	1.60
FLD48/5	48	2 x 5	2 x 4.200	17%	2.24
FLD48/6	48	2 x 6	2 x 3.500	17%	2.24
FLD48/8	48	2 x 8	2 x 2.625	17%	2.24
FLD48/9	48	2 x 9	2 x 2.333	17%	2.24
FLD48/12	48	2 x 12	2 x 1.750	17%	2.24
FLD48/15	48	2 x 15	2 x 1.400	17%	2.24
FLD48/18	48	2 x 18	2 x 1.166	17%	2.24

Avel Lindberg Inc. • The Power Professionals •
47 South End Plaza, New Milford, CT 06776 • 860-355-4711 • FAX: 860-354-8597
http://www.avellindberg.com • E-mail: avelram@worlnet.att.net

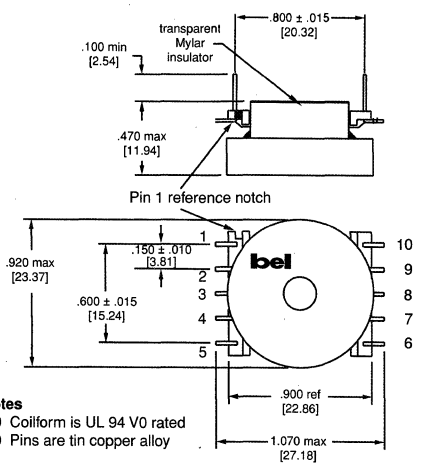
defining a degree of excellence

TELECOMMUNICATIONS IC CROSS REFERENCE

xDSL APPLICATIONS

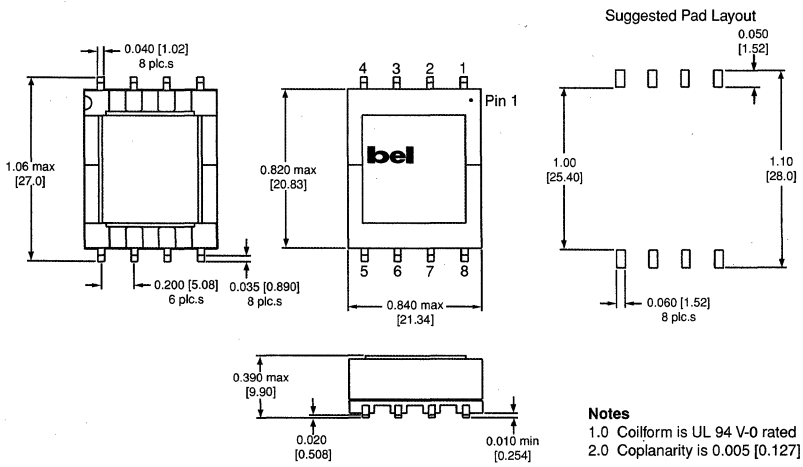
IC Manufacturer	IC Part Number	Bel Part Number*	Application
Rockwell (BrookTree)	Bt8970	0560-6600-01	HDSL @ 1168 Kbps
	Bt8970	0560-6600-02	HDSL @ 784 Kbps
	Bt8970	0560-6600-03	MDSL @ 528 Kbps
	Bt8970	0560-6600-04	MDSL @ 400 Kbps
	Bt8960	0560-6600-05	MDSL @ 400 Kbps
	Bt8960	0560-6600-06	MDSL @ 288 Kbps
	Bt8960	0560-6600-07	MDSL @ 160 Kbps
GlobeSpan	7M640	S560-6600-08	ADSL/RDSL (CO)
	7M640	S560-6600-09	ADSL/RADSL (CPE)
		S560-6600-10	RDSL (CO1)
		S560-6600-11	RDSL (CP1)
Level One	SK70704, SK70707, SK70708	0560-6600-12	HDSL @ 1168 Kbps
	SK70704, SK70706	0560-6600-13	HDSL @ 784 Kbps
	LXK70301	0560-6600-14	HDSL @ 784 Kbps
	SK70720, S70721	0560-6600-15	MDSL @ 784 Kbps
	SK70720, S70721	0560-6600-16	MDSL @ 528 Kbps
	SK70720, S70721	0560-6600-17	MDSL @ 400 Kbps
	SK70720, S70721	0560-6600-18	MDSL @ 272 Kbps
Motorola	MC03AX1456CO	S560-6600-19[1]	ADSL (CO)
	MC03AX1456RT	S560-6600-20[1]	ADSL (CPE)
Analog Devices	AD20MSP910	S560-6600-00[1]	ADSL

[1]Contact Bel for surface mount package dimensions



Notes
1.0 Coilform is UL 94 V0 rated
2.0 Pins are tin copper alloy

Through Hole Package



Notes
1.0 Coilform is UL 94 V-0 rated
2.0 Coplanarity is 0.005 [0.127]

Surface Mount Package

***S prefix indicates surface mount package**

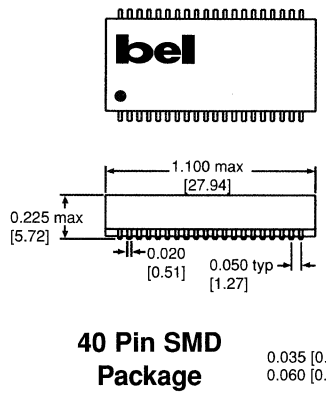
Specifications subject to change without notice.

defining a degree of excellence

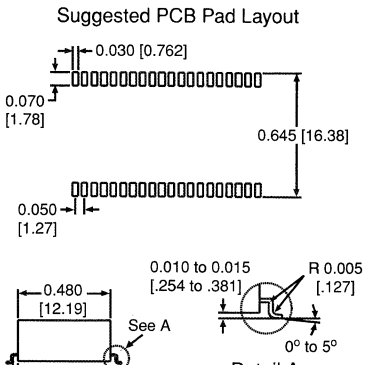
TELECOMMUNICATIONS IC CROSS REFERENCE

T1/E1 TRANSFORMERS
Interface with leading dual and quad transceivers

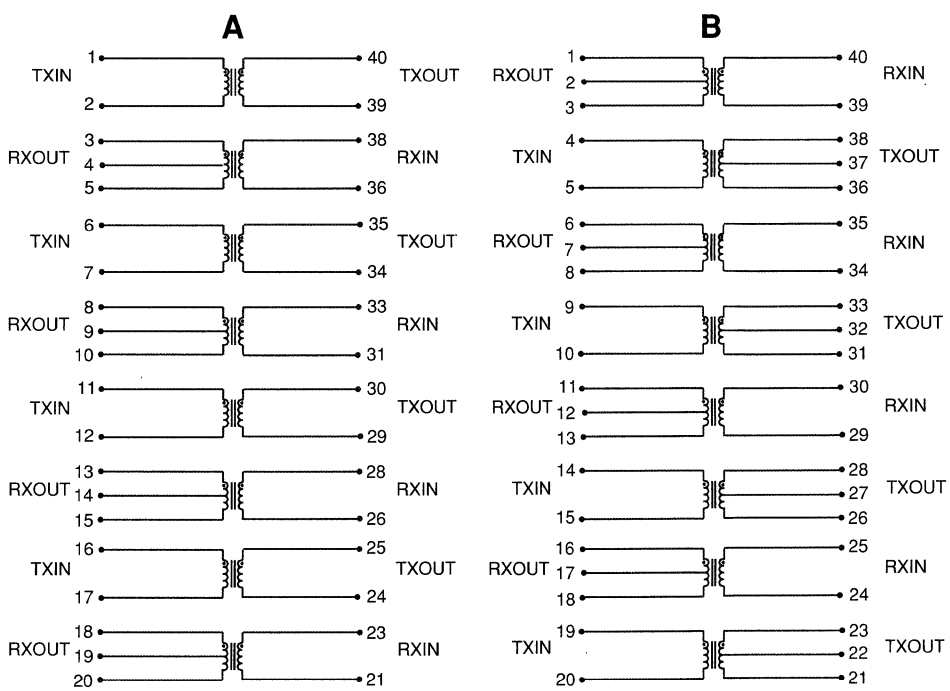
IC Manufacturer	IC Part Number	Bel Part Number
Cirrus	C561584A	S553-6500-35
		S553-5692-09
Level One	LXT334	S553-6500-35
	LXT335	S553-5692-08
		S553-5692-12



40 Pin SMD Package



Bel Part Number	Turns Ratio ± 2% TX in : out	RX in : out	Primary Inductance OCL (mH) min	DC Resistance (Ω) Pri	Sec	Leakage Inductance L_L (µH) max	Interwinding Capacitance C_{ww} (pF)	Isolation Voltage (Vrms)	Schematic
S553-5692-08	1:1.36	1:1.36CT	1.25	1.9	2.8	0.8	35	1500	A
S553-5692-09	1:1.14	1:1.14CT	1.25	2.2	2.6	0.8	35	1500	A
S553-5692-12	1:1.50	1:1.36CT	1.25	0.9	1.8	0.8	35	1500	A
S553-6500-35	1:2CT	1:2CT	1.25	0.9	1.8	0.8	35	1500	B



Specifications subject to change without notice.

bel defining a degree of excellence

TELECOMMUNICATIONS IC CROSS REFERENCE

ISDN - S INTERFACE

IC Manufacturer	IC Part Number	Dual SM Tx & Rx	Single TH Tx & Rx	Dual TH Tx & Rx
AT&T	T7250, T7256, T7259	S559-6200-00	0559-6100-00	0559-6100-04
	T7903, T7901	S559-6200-01	0559-6100-01	0559-6200-01
Mietec	MTC-2072	S559-6200-01	0559-6100-01	0559-6200-01
Mitel	MT8930	S559-6200-01	0559-6100-01	0559-6200-01
Motorola	MC145474, MC145475	S559-6200-02	0559-6100-02	0559-6200-02
	MC145574	S559-6200-00	0559-6100-00	0559-6200-00
National	TP3420, TP3421	S559-6200-01	0559-6100-01	0559-6200-01
SGS Thomson	ST5420, ST5421	S559-6200-01	0559-6100-01	0559-6200-01
Siemens	PEB 2080, 2081, 2084 2085, 2086, & PSB 2186	S559-6200-01	0559-6100-01	0559-6200-01
Yamaha		7405B	S559-6200-01	0559-6100-01
0559-6200-01				

T1/E1/CEPT/ISDN-PRI

IC Manufacturer	IC Part Number	3.0KVRMS Isolation Transmit	Receive
AT & T	T7288, T7289, T7290, T7690	0553-6500-18	0553-6500-18
Brooktree	UGA 510-1	0553-6500-19	0553-6500-18
	R8069, R8069A, R8069B	0553-6500-20	0553-6500-19
Crystal	61534, 61544, 61574, 6158, 61535	0553-6500-18	0553-6500-18
	61535A, 61574A, 61575, 6158A	0553-6500-17	0553-6500-18
	6152		0553-6500-18
	61584	0553-6500-18	0553-6500-18
Dallas	DS2185, DS2186, DS2187		0553-6500-18
	DS2151		0553-6500-19
Exar	T5650, T562, T5675, T5681, T5683	0553-6500-18	0553-6500-18
	56L22, 56L85, C240, C260, C262, C277	0553-6500-18	0553-6500-18
	T5791, T5793, T5794	0553-6500-17	0553-6500-19
	T5684	0553-6500-18	
Level One	LXT 300, LXT 301, LXT 305	0553-6500-18	0553-6500-18
	LXT 304A, LXT 305A	0553-6500-17	0553-6500-18
	LXT 310, LXT 311	0553-6500-18	0553-6500-18
	LXT 312, LXT 313, LXT 315	0553-6500-24	0553-6500-18
	LXT 318, LXT 319	0553-6500-18	0553-6500-17
	LXT 332	0553-6500-18	0553-6500-18
PMC-Sierra	PM4341, PM6341		0553-6500-18
Siemens	PEB 2235, PEB 2235A1, PEB 2235B1, CEPT 75	0553-6500-23	0553-6500-23
	PEB 2235, PEB 2235A1, PEB 2235B1, CEPT 120	0553-6500-22	0553-6500-22
VLSI	VP14Q574 -T1		0553-6500-18
	VP14Q574 - E1	0553-6500-17	0553-6500-18

Specifications subject to change without notice.

defining a degree of excellence

bel

MODEM MAGNETICS

Bel specializes in a standard line of low cost modem transformers available in a small form factor, in either through hole or surface mount packaging. Most meet UL and CSA safety requirements.

MODEM TRANSFORMERS
Through Hole Transformers

Bel Part Number	Modem Speed (max)	DCR W +/-10% Pri	DCR W +/-10% Sec	Return Loss (dB) Typ	Freq Response 300 to 4000Hz (dB)	Pkg (inches) L / W / H	Data Sheet
0574-1000-02	V.32bis	108	120	30	+/-0.25	0.945/1.02/0.472	TM0041
0574-1000-03	V.34	150	150	30	+/-0.25	0.945/1.02/0.472	TM0041
0574-1000-04	V.32bis, V.34	95	100	30	+/-0.15	0.945/1.02/0.472	TM0041
0574-1000-05	V.34bis	135	143	35	+/-0.25	0.55/0.55/0.470	TM0042
0574-1000-07	V.34	108	120	30	+/-0.25	0.780/1.205/0.470	TM0044
0574-1000-08	V.32	41	45	33	+/-0.20	0.780/1.205/0.470	TM0044

Surface Mount Transformers

Bel Part Number	Modem Speed (max)	DCR W +/-10% Pri	DCR W +/-10% Sec	Return Loss (dB) Typ	Freq Response 300 to 4000Hz (dB)	Pkg (inches) L / W / H	Data Sheet
0574-1000-02	V.32bis	108	120	30	+/-0.25	0.945/1.02/0.472	TM0041
S574-1000-01	V.34bis	82.5	87.5	28	+/-0.25	0.70/0.55/0.42	TM0040
S574-1000-06	V.34bis	87.5	82.5	25	+/-0.25	0.52/0.55/0.42	TM0043
S574-5999-00	V.34bis	82.5	87.5	25	+/-0.25	0.70/0.55/0.42	TM0050

V.34 MODEM TRANSFORMERS 56KB/S TECHNOLOGIES
Through Hole Transformers

Bel Part Number	Modem Speed (max)	DCR W +/-10% Pri	DCR W +/-10% Sec	Return Loss (dB) Typ	Freq Response 300 to 4000Hz (dB)	Pkg (inches) L / W / H	Data Sheet
0574-1000-15	56	120	145	40	+/-0.2	0.685/0.650/0.500	TM0054
0574-1000-16	56	120	145	40	+/-0.2	0.685/0.650/0.500	TM0054

Surface Mount Transformers

Bel Part Number	Modem Speed (max)	DCR W +/-10% Pri	DCR W +/-10% Sec	Return Loss (dB) Typ	Freq Response 300 to 4000Hz (dB)	Pkg (inches) L / W / H	Data Sheet
S574-1000-17	56	120	145	37	+/-0.2	0.700/0.550/0.420	TM0053
S574-1000-18	56	120	145	37	+/-0.2	0.575/0.550/0.420	TM0053

Specifications subject to change without notice.

bel defining a degree of excellence

FAST ETHERNET

IC Manufacturer Part Number	Bel Part Number	T	C	TC	P	Xfmr Ratio (Tx, Rx)	Package Style	Pin Centers	Inches (max) L	W	H	Data Sheet
National 83223	0558-5999-14	X	X		0.5	1:1	7/SIP	0.100	0.810 /	0.200 /	0.320	960023
MicroLinear ML 6671-6673	0558-5999-33	X	X		0.5	1:1	7/SIP	0.100	0.810 /	0.200 /	0.320	960023
ICS 1890	S558-0139-00	X	X		0.5	1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960025
GEC Plessey NWK914	S558-3855-00	X	X		0.5	1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960025
SSI (TDK) 78Q2120/2121	S558-5999-02	X	X		0.5	1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960025
TI TNETE 2101	S558-5999-19	X	X		0.5	1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960025
TI TNETE 2104	S558-5999-63	X	X	X	0.5	1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960028
Level One LXT970	S558-5999-07	X	X		0.5	1:1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960026
Intel 82555	S558-5999-16	X	X		0.5	1:1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960027
Rockwell 5800R05	A558-5999-00	X	X		1	1:1, 1:1	16/DIP	0.100	1.000 /	0.500 /	0.370	960063
	A558-5999-01	X	X		1	1:1, 1:1	16/DIP	0.100	1.000 /	0.500 /	0.370	960020
	S558-5999-00	X	X		1	1:1, 1:1	16/J-SMT	0.100	1.000 /	0.500 /	0.400	960063
	S558-5999-01	X	X		1	1:1, 1:1	16/J-SMT	0.100	1.000 /	0.500 /	0.400	960020
	S558-5999-B3	X	X	X	1	1:1, 1:1	16/P-SMT	0.100	0.800 /	0.574 /	0.098	960002
	S558-5999-32	X	X		1	1:1, 1:1	16/P-SMT	0.100	0.800 /	0.574 /	0.098	960002
	S558-5999-59	X	X		1	1:1, 1:1	16/P-SMT	0.100	0.600 /	0.574 /	0.098	960002
	S558-5999-03	X			1	1:1, 1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960031
	S558-5999-43	X	X		1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.235	960063
	S558-5999-44	X	X	X	1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.235	960063
	S558-5999-45	X	X		1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.235	960063
	S558-5999-30	X	X		1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.350	960020
	S558-5999-42	X	X		1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.235	960020
	S558-5999-90	X	X	X	1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.235	960020
	S558-5999-39	X	X	X	1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.350	960004
	S558-5999-46	X	X	X	1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.235	960004
	S558-5999-95	X	X	X	1	1:1, 1:1	14/SMT	0.100	1.000 /	0.395 /	0.350	960004
	S558-5999-75	X	X	X	2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-79	X	X	X	2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-84	X	X		2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-98	X	X		2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-C0	X	X		4	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960008
	S558-5999-74	X	X		4	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960008
	S558-5999-B2	X	X		4	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960008
Broadcom 5203, 5205	S558-5999-75	X	X	X	2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
AMD 79C870/79C874/79C875	S558-5999-79	X	X	X	2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
GEC Plessey NWK954	S558-5999-84	X	X		2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-98	X	X		2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-C0	X	X		4	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960008
	S558-5999-74	X	X		4	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960008
	S558-5999-B2	X	X		4	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960008
Microlinear ML 6692/6694	S558-1287-00	X	X		1	2:1, 1:1:1	16/J-SMT	0.100	1.000 /	0.500 /	0.400	960007
Microlinear ML 6698	S558-1287-01	X	X		1	2:1, 1:1:1	16/SMT	0.100	1.000 /	0.395 /	0.350	960007
	S558-1287-02	X	X		1	2:1, 1:1:1	16/SMT	0.100	1.000 /	0.395 /	0.350	960007
	S558-1287-03	X	X		1	2:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.350	960007
	S558-5999-64	X	X		1	2:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.350	960007
	S558-5999-82	X	X		1	2:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.235	960007
	S558-5999-92	X	X		2	2:1, 1:1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960019
	S558-5999-93	X	X		2	2:1, 1:1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960019
	S558-5999-68	X	X		4	2:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960018
AMD 79C872	S558-5999-72	X	X		2	1:414:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960017
	S558-5999-73	X	X		4	1:414:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960017

DEFINITIONS T = Transformer C = Choke TC = Autotransformer R = Predistortion/Resistor P = Ports

PACKAGE DEFINITIONS P-SMT = PCMCIA surface mount SIP = Single line, through hole J-SMT = J- Leads, surface mount
SMT = Gull wing, surface mount DIP = Dual in line, through hole

Specifications subject to change without notice.

defining a degree of excellence

bel

FAST ETHERNET

IC Manufacturer Part Number	Bel Part Number	T	C	TC	P	Xfmr Ratio (Tx, Rx)	Package Style	Pin Centers	Inches (max) L	W	H	Data Sheet
Broadcom 5208	S558-5999-A4	X	X	X	2	1:1, 1:1	40/SMT	0.05	1.100 /	0.480 /	0.225	960078
	S558-5999-A6	X	X	X	2	1:1, 1:1	40/SMT	0.05	1.100 /	0.480 /	0.225	960078
	S558-5999-A8	X	X		2	1:1, 1:1	40/SMT	0.05	1.100 /	0.480 /	0.225	960078
	S559-5999-A9	X	X		2	1:1, 1:1	40/SMT	0.05	1.100 /	0.480 /	0.225	960078
	S558-5999A47*	X	X		4	1:1, 1:1	40/SMT	0.05	1.100 /	0.480 /	0.225	960078
	S558-5999-J5**	X	X		4	1:1, 1:1	40/SMT	0.05	1.100 /	0.480 /	0.225	
	S558-5999-A5	X	X		4	1:1, 1:1	40/SMT	0.05	1.100 /	0.480 /	0.225	960078
	S558-5999-A7	X	X		4	1:1, 1:1	40/SMT	0.05	1.100 /	0.480 /	0.225	960078
ICS 1890, 2000	0558-5999-14	X	X		0.5	1:1	7/SIP	0.100	0.810 /	0.200 /	0.320	960023
SSI (TDK) 78Q2120/2121	0558-5999-33	X	X		0.5	1:1	7/SIP	0.100	0.810 /	0.200 /	0.320	960023
Level One LXT970	S558-5999-59	X	X		1	1:1, 1:1	12/P-SMT	0.100	0.600 /	0.574 /	0.098	960002
GEC Plessey NWK918/939	S558-5999-32	X	X		1	1:1, 1:1	14/P-SMT	0.100	0.800 /	0.574 /	0.098	960002
Intel 82555	S558-0139-00	X	X		0.5	1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960025
	S558-3855-00	X	X		0.5	1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960025
	S558-5999-02	X	X		0.5	1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960025
	S558-5999-19	X	X		0.5	1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960025
	S558-5999-63	X	X	X	0.5	1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960028
	S558-5999-69	X	X		1	1:1, 1:1	14/P-SMT	0.100	0.800 /	0.574 /	0.098	960002
	A558-5999-00	X	X		1	1:1, 1:1	16/DIP	0.100	1.000 /	0.500 /	0.400	960063
	A558-5999-01	X	X		1	1:1, 1:1	16/DIP	0.100	1.000 /	0.500 /	0.400	960020
	S558-5999-00	X	X		1	1:1, 1:1	16/J-SMT	0.100	1.000 /	0.500 /	0.400	960063
	S558-5999-01	X	X		1	1:1, 1:1	16/J-SMT	0.100	1.000 /	0.500 /	0.400	960020
	S558-5999-03	X			1	1:1, 1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960031
	S558-5999-30	X	X		1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.350	960020
	S558-5999-42	X	X		1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.235	960020
	S558-5999-90	X	X	X	1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.235	960020
	sS558-5999-43	X	X	X	1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.350	960063
	S558-5999-44	X	X	X	1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.235	960063
	S558-5999-45	X	X		1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.235	960063
	S558-5999-75	X	X	X	2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-79	X	X	X	2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-84	X	X		2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-98	X	X		2	1:1, 1:1	40/SMT	0.050	1.1000 /	0.480 /	0.225	960010
	S558-5999-C0	X	X		4	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960008
	S558-5999-74	X	X		4	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960008
	S558-5999-B2	X	X		4	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960008
Level One LXT980-983	S558-5999-D5	X	X	X	2	2:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	970002
Level One LXT974	S558-5999-C4	X	X	X	2	2:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	970002
	S558-5999-F3	X	X		2	2:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	970002
	S558-5999-F5	X	X		2	2:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	970002
	S558-5999-E4**	X	X		4	2:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	970002
	S558-5999-F4	X	X		4	2:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	970002
	S558-5999-J0*	X	X		4	2:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	970002
Level One LXT975	S558-5999-F6	X	X		4	2:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	970005
SEEQ 80220	S558-5999-D5	X	X	X	2	2:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	970002
	S558-5999-C4	X	X	X	2	2:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	970002
	S558-5999-E3	X	X		1	2:1, 1:1	16/SMT	0.100	0.100 /	0.395 /	0.225	970007
	S558-5999-96	X	X		1	2:1, 1:1	16/SMT	0.100	0.100 /	0.395 /	0.225	970007
	S558-5999-F3	X	X		2	2:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	970002
	S558-5999-F5	X	X		2	2:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	970002

* Preferred layout for dual-stack RJ-45 ** Preferred layout for single row RJ-45

DEFINITIONS T = Transformer C = Choke TC = Autotransformer R = Predistortion/Resistor P = Ports

PACKAGE DEFINITIONS P-SMT = PCMCIA surface mount SIP = Single line, through hole J-SMT = J- Leads, surface mount
SMT = Gull wing, surface mount DIP = Dual in line, through hole

Specifications subject to change without notice.

Bel Fuse Inc. 198 Van Vorst Street, Jersey City, NJ 07302 • Tel 201-432-0463 • Fax 201-432-9542 • www.belfuse.com

bel defining a degree of excellence

FAST ETHERNET

IC Manufacturer Part Number	Bel Part Number	T	C	TC	P	Xfmr Ratio (Tx, Rx)	Package Style	Pin Centers	Inches (max) L	W	H	Data Sheet
Microlinear ML 6692/6694	S558-5999-16	X	X		0.5	1:1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960027
Microlinear ML 6698	S558-5999-17	X	X		0.5	2:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960027
	S558-5999-18	X	X		0.5	2:1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	AT0906501
	0558-1060-00	X	X		1	2:1, 1:1	16/DIP	0.100	1.000 /	0.400 /	0.350	960016
	Use with 0556-1060-00 10Base-T Filter											
	S558-5999-62	X	X		1	2:1, 1:1	14/P-SMT	0.100	0.800 /	0.480 /	0.098	960002
	S558-1060-01	X	X		1	2:1, 1:1	16/J-SMT	0.100	1.000 /	0.500 /	0.400	960016
	Use with S556-1060-01 10Base-T Filter											
	S558-1287-00	X	X		1	2:1, 1:1:1	16/J-SMT	0.100	1.000 /	0.500 /	0.400	960007
	S558-1287-01	X	X		1	2:1, 1:1:1	16/SMT	0.100	1.000 /	0.395 /	0.350	960007
	S558-1287-02	X	X		1	2:1, 1:1:1	16/SMT	0.100	1.000 /	0.395 /	0.350	960007
	S558-5999-11	X	X		1	2:1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	AT1202501
	S558-5999-82	X	X		1	2:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.235	960007
	S558-5999-92	X	X		2	2:1, 1:1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960019
	S558-5999-93	X	X		2	2:1, 1:1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960019
National 83223 + 83840	S558-5999-63	X	X	X	0.5	1:1	16/SMT	0.050	0.500 /	0.285 /	0.225	960028
TI TNETE 2101	S558-5999-B3	X	X	X	1	1:1, 1:1	14/P-SMT	0.100	0.800 /	0.574 /	0.098	960002
Level One LXT970	S558-5999-95	X	X	X	1	1:1, 1:1	14/SMT	0.100	1.000 /	0.395 /	0.350	960004
	S558-5999-39	X	X	X	1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.350	960004
	S558-5999-46	X	X	X	1	1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.235	960004
	S558-5999-36	X	X		1	2:1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.350	960029
	S558-5999-37	X	X		1	2:1:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.350	960030
	S558-5999-65	X	X		2	2:1:2, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960011
	S558-5999-91	X	X		2	2:1:2, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960011
	S558-5999-75	X	X	X	2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-79	X	X	X	2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-84	X	X		2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-98	X	X		2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-C0	X	X		4	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960008
	S558-5999-74	X	X		4	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960008
	S558-5999-B2	X	X		4	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960008
Quality 6611	S558-5999-50	X	X		1	1.414:1, 1:1	16/SMT	0.100	1.100 /	0.395 /	0.235	960021
	S558-5999-54	X	X		1	1.414:1, 1:1	16/SMT	0.100	1.100 /	0.395 /	0.235	960021
	S558-5999-29	X	X		1	1.414:1, 1:1	14/P-SMT	0.100	0.800 /	0.574 /	0.098	960002
	S558-5999-70	X	X		1	1.414:1, 1:1	14/P-SMT	0.100	0.800 /	0.574 /	0.098	960002
	S558-5999-57	X	X		1	1.414:1, 1:1	14/P-SMT	0.100	0.800 /	0.574 /	0.098	960002
Quality 6613	S558-5999-D7	X	X		1	1.23:1, 1:1	14/P-SMT	0.100	0.800 /	0.574 /	0.098	960002
	S558-5999-86	X	X	X	1	1.23:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.235	960006
	S558-5999-97	X	X		1	1.23:1, 1:1	16/SMT	0.100	1.000 /	0.395 /	0.235	960006
	S558-5999-83	X	X		2	1.23:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960009
	S558-5999-77	X	X		4	1.23:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960009
Quality 6612	S558-5999-D6	X	X		1	1.23:1, 1:1	14/P-SMT	0.100	0.800 /	0.574 /	0.098	960002
PMC 3304	S558-5999-75	X	X	X	2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
TI TNETE 2104	S558-5999-79	X	X	X	2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-84	X	X		2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-98	X	X		2	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960010
	S558-5999-C0	X	X		4	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960008
	S558-5999-74	X	X		4	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960008
	S558-5999-B2	X	X		4	1:1, 1:1	40/SMT	0.050	1.100 /	0.480 /	0.225	960008

DEFINITIONS T = Transformer C = Choke TC = Autotransformer R = Predistortion/Resistor P = Ports

PACKAGE DEFINITIONS P-SMT = PCMCIA surface mount SIP = Single line, through hole J-SMT = J- Leads, surface mount
SMT = Gull wing, surface mount DIP = Dual in line, through hole

Specifications subject to change without notice.

Bel Fuse Inc. 198 Van Vorst Street, Jersey City, NJ 07302 • Tel 201-432-0463 • Fax 201-432-9542 • www.belfuse.com

defining a degree of excellence

bel

ISOLATION / COMMON MODE

ISOLATION TRANSFORMERS FOR ETHERNET

Bel isolation transformers are designed for the cable-AUI interface in both 10Base-2 and 10Base-5 applications.

Inductance OCL (µH) (+/-20%)	Bel Part Number	Package Style	Pin Centers	Inches (max) L W H	Data Sheet
75	S553-5999-74	12/P-SMT	0.100	0.530 /0.230 /0.094	960035
100	S553-5999-72	12/P-SMT	0.100	0.530 /0.230 /0.094	960035
150	S553-5999-73	12/P-SMT	0.100	0.530 /0.230 /0.094	960035
75	A553-0756-AB	16/DIP	0.100	0.800 /0.290 /0.230	960035
100	A553-1006-AB	16/DIP	0.100	0.800 /0.290 /0.230	960035
150	A553-1506-AB	16/DIP	0.100	0.800 /0.290 /0.230	960035
75	S553-5999-67	16/P-SMT	0.050	0.470 /0.280 /0.094	960035
100	S553-5999-69	16/P-SMT	0.050	0.470 /0.280 /0.094	960035
150	S553-5999-68	16/P-SMT	0.050	0.470 /0.280 /0.094	960035
50	S553-0506-AE	16/SMT	0.050	0.500 /0.285 /0.225	960035
75	S553-0756-AE	16/SMT	0.050	0.500 /0.285 /0.225	960035
100	S553-1006-AE	16/SMT	0.050	0.500 /0.285 /0.225	960035
150	S553-1506-AE	16/SMT	0.050	0.500 /0.285 /0.225	960035
350	S553-0745-01	16/SMT	0.050	0.500 /0.285 /0.225	960035

COMMON MODE CHOKES

Bel Part Number	Number of Signal Lines (1)	Pin Centers	Inductance OCL (µH) (+/-20%)	Package Style	Inches (max) L W H	Data Sheet
S555-5999-23	2 x 1	0.100	36	6/SMT	0.300 /0.280 /0.215	960046
S555-5999-27	2 x 1	0.100	42	8/SMT	0.475 /0.400 /0.340	960046
S555-0139-01	2 x 2	0.050	80	8/SMT	0.290 /0.285 /0.210	960046
S555-5999-15	2 x 2	0.100	38	8/SMT	0.500 /0.285 /0.230	960046
S555-5999-02	2 x 2	0.100	140	8/SMT	0.475 /0.400 /0.340	960046
S555-5999-28	2 x 2	0.100	140	8/SMT	1.000 /0.395 /0.215	960046
S555-5999-03	4 x 1	0.050	30	8/SMT	0.290 /0.285 /0.210	960046
S555-0379-00	4 x 1	0.050	68	8/SMT	0.300 /0.285 /0.215	960046
S555-5999-04	2 x 1	0.050	86	16/SMT	0.500 /0.285 /0.225	960046
S555-5999-09	2 x 2	0.050	86	16/SMT	0.500 /0.285 /0.225	960046
S555-5999-22	4 x 2	0.050	36	16/SMT	0.500 /0.285 /0.225	960046
0555-5999-16	2 x 1	0.100	18	4/THT	0.410 /0.220 /0.395	960046
0553-3965-00	2 x 1	0.100	80	4/THT	0.410 /0.220 /0.395	960046
0553-3965-08	2 x 1	0.100	140	4/THT	0.410 /0.220 /0.395	960046
0555-5999-13	2 x 1	0.100	140	4/THT	0.410 /0.220 /0.395	960046
A555-0139-01	2 x 2	0.100	80	8/THT	0.500 /0.285 /0.230	960046
0553-5841-01	2 x 2	0.100	140	8/THT	0.500 /0.500 /0.400	960046
A555-5999-25	4 x 1	0.100	24	8/THT	0.500 /0.285 /0.230	960046
0555-5999-04	4 x 1	0.100	24	8/THT	0.400 /0.400 /0.250	960046
A555-5999-21	4 x 1	0.100	68	8/THT	0.500 /0.285 /0.230	960046
A555-3536-01	4 x 1	0.100	80	8/THT	0.500 /0.285 /0.230	960046
S555-2940-00	2 x 3	0.050	80	16/THT	0.500 /0.285 /0.225	960046
A555-1006-AF	2 x 4	0.100	80	16/THT	0.800 /0.285 /0.230	960046
A555-5999-20	4 x 2	0.100	68	16/THT	0.800 /0.280 /0.210	960046
These chokes are designed to operate in 100mBit applications						
S558-5999-08	(2) 2 x 2	0.050	110	16/SMT	0.500 /0.285 /0.225	960046
S555-5999-26	(2) 2 x 2	0.050	30	16/SMT	0.500 /0.285 /0.225	960046

DEFINITIONS T = Transformer C = Choke TC = Autotransformer R = Predistortion/Resistor P = Ports

PACKAGE DEFINITIONS P-SMT = PCMCIA surface mount SIP = Single line, through hole J-SMT = J- Leads, surface mount
SMT = Gull wing, surface mount DIP = Dual in line, through hole

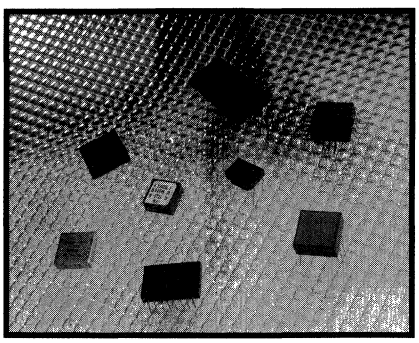
Specifications subject to change without notice.

Bel Fuse Inc. 198 Van Vorst Street, Jersey City, NJ 07302 • Tel 201-432-0463 • Fax 201-432-9542 • www.belfuse.com

BETA TRANSFORMER: THE SOURCE FOR CUSTOM & STANDARD MAGNETICS

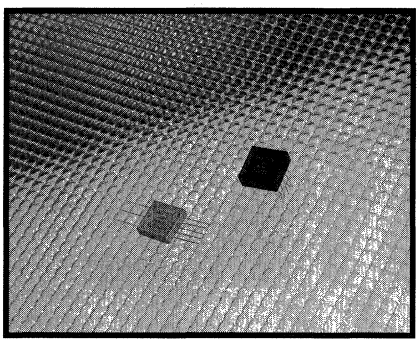
FOR INDUSTRIAL, MILITARY & SPACE APPLICATIONS

BETA TRANSFORMERS is the leader in custom military, commercial and space level magnetic components. Our product line includes MIL-T-21038 pulse transformers, Scott-T, reference transformers, NASA SSQ-22676 space level transformers, and many custom designs built to MIL-T-27 specifications.



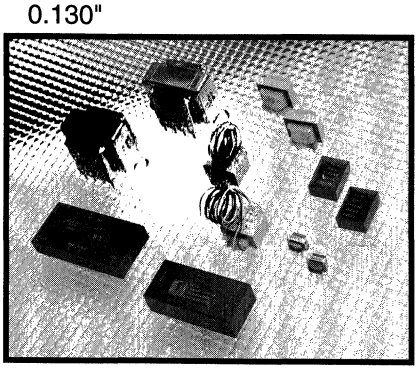
MIL-STD-1553 Pulse Transformers

- Complete line of MIL-T-21038 qualified transformers
- PC mount, flat pack or surface mount packaging
- Custom designs & packaging available
- Low profile versions available - 0.130"



NASA SSQ-22676 Transformers

- Hermetically sealed or epoxy-cased versions
- Low profile available - 0.175"
- Qualified for use on Space Station Alpha



SCOTT-T & REFERENCE Transformers

- Accuracies of 5 ARC seconds; nulls to 0.1 millivolts
- Available in potted or open frame design
- Low power to high power versions available (up to 200 VA)

CUSTOM MAGNETICS

- Custom designs or build-to-print including pot cores and wound inductors
- Fine wire capabilities as small as 51 AWG
- Custom in-line coupler cables

BETA TRANSFORMER TECHNOLOGY CORPORATION
40 Orville Drive, Bohemia, NY 11716 (516) 244-7393 FAX: (516) 244-8893
A Subsidiary of ILC Data Device Corporation

FOR MORE INFORMATION CALL:
Pete Grennan at 1-800-332-5757 ext. 7616 or
E-mail: grennan@bttc.ilcddc.com
Visit our Web site: *www.bttc-beta.com*

Call 800-305-1455 for custom transformers FAST, built to last.

When you do, you'll reach a transformer expert who seems to design as you speak. Who asks all the right questions, and understands your replies.

By the time you've completed the call, you know your Bey transformers will check out just fine.

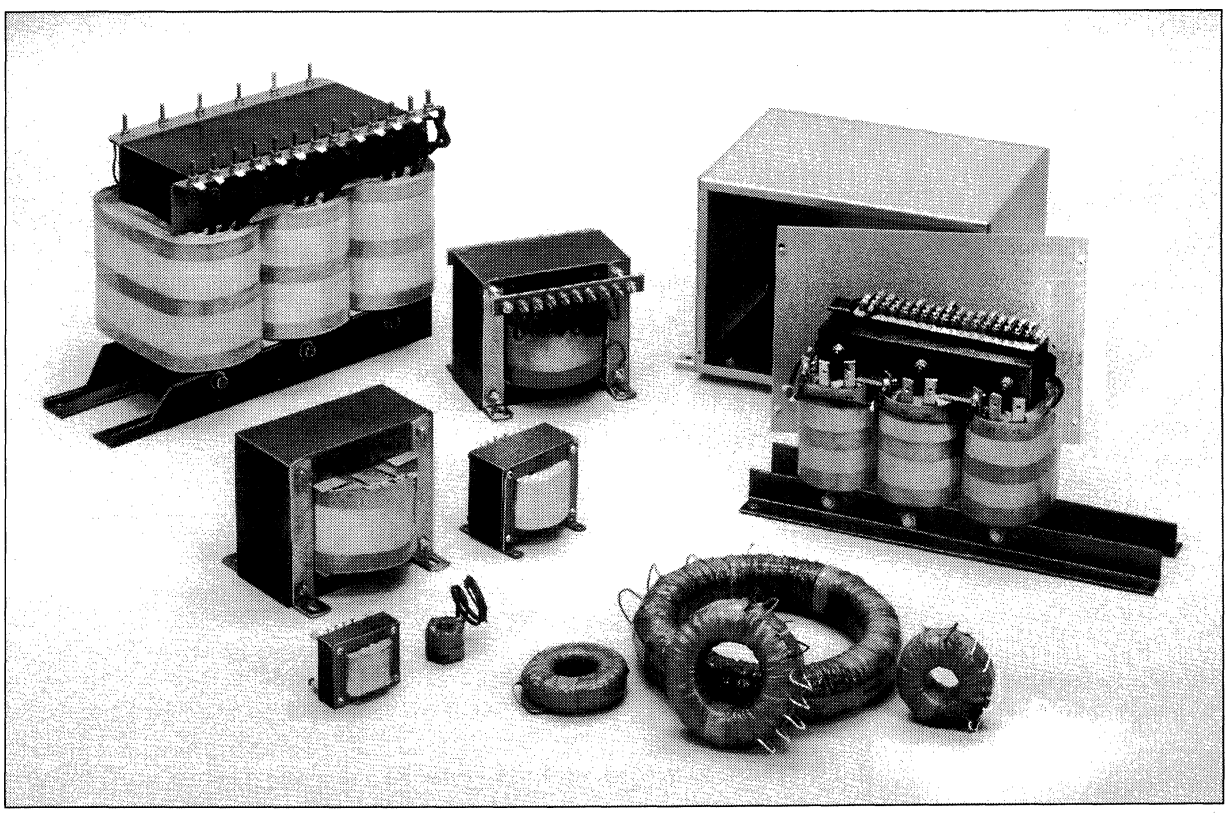
If you need 10 to 400 custom transformers and the first shipment next week, we'll do it. If you need one special transformer with unusual requirements, we'll build it. If you need a prototype in days, let's start working on it *right now.*

Incidentally, meeting military specs (T-27D, T-16315, E917C) is as routine for us as building to UL, VDE, CSA, CE, and other international standards. We've been doing this for more than 30 years. So we know how to get custom transformers out the door, fast, built to last.

- 48-hour turnaround on prototypes
- 10 VA to 500 kVA
- 50/60/400 Hz and higher
- Top-quality materials, long life
- Fast rebuild of large transformers

- Open-type
- Enclosed
- Encapsulated
- Hermetic

- Power transformers
- Current transformers
- Toroids
- High frequency
- Constant voltage
- Chokes



Bey
BEY ELECTRIC

362 Main Street. P.O. Box 548
Lincoln Park, New Jersey 07035
973-694-5000 • FAX 973-694-7975

BICRON Transformer Products

Over 30 Years Designing & Manufacturing Magnetic Components

Visit BICRON OnLine www.bcrn.com for product detail

High Performance Magnetic Components & Transformers

Typical Applications

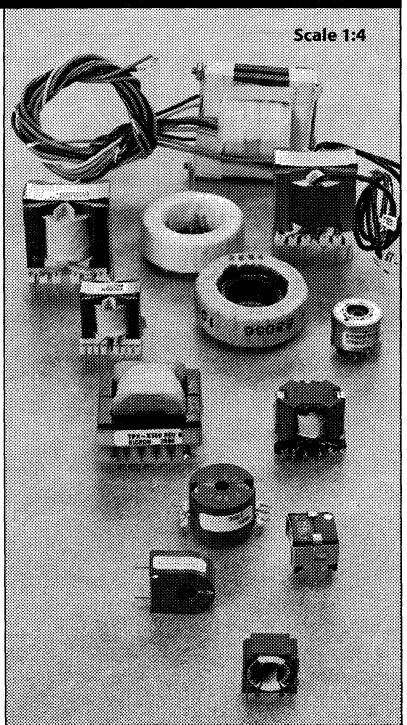
- Medical Equipment (Patient Contact)
- Power Supplies
- Motor Drivers
- High Current Gate Drivers
- Telecommunications
- Battery Chargers
- Industrial Controls
- Inverters
- Industrial Controls
- Defense

Typical Functions

- Chokes
- Coils
- Inductors
- Gate Drivers
- Magnetic Amplifiers
- Reactors
- Switchmode Transformers

The Bicron Advantage

- Over 30 years experience in design of high voltage (20KV+) isolation systems
- Fast prototypes
- Superior design and testing for long term insulation integrity
- Automatic equipment for testing with SPC data



Current Transducers • Current Transformers • Current Sensors

Typical Applications

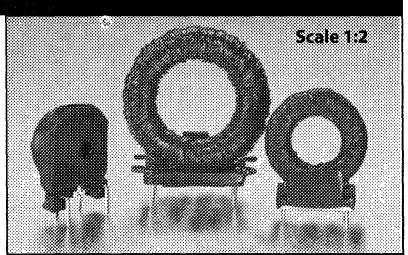
- Conveyers
- Current Signature
- Electrolysis
- Elevators
- Energy Management
- Fans
- Generators
- Induction Furnaces
- Inverters
- Motors
- Pumps
- Refrigeration
- Robotics
- Transportation
- UPS Systems
- Utilities
- Variable Speed Drives
- Welding Equipment

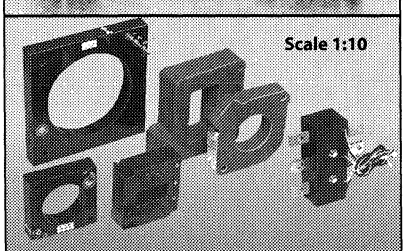
Typical Functions

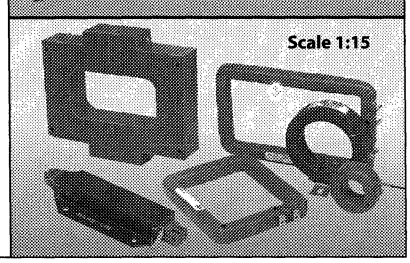
- Feedback
- Ground Fault
- Load Sensing
- Peak Sensing
- Phase Sequence

The Bicron Advantage

- Broad range of standard products
- Low cost custom designs when you need something special
- High accuracy and repeatability for critical operations.
- Economical standard pricing







"Excellence Through Teamwork"

BICRON Electronics Company
50 Barlow Street • Canaan • Connecticut 06018
Tel: 860-824-5125 • Fax: 860-824-1137 • Toll-free Tel: 800-624-2766 • Toll-free Fax: 800-355-5125

Call for information or visit our web site: www.bcrn.com or e-mail: info@bcrn.com

BICRON Transformer Products

Over 30 Years Designing & Manufacturing Magnetic Components

ISO 9001 CERTIFIED

General Purpose Toroidal Power & Auto Transformers

The Toroidal Advantage

- 30% to 50% lower weight & size
- Lower output impedance – superb regulation
- Very low electromagnetic radiation – shielding often not required (0.5 Gauss @1-inch attainable)
- Up to 90% less mechanical noise (hum) (typically <10db)
- 85%-95% efficiency
- Very low off-load power consumption

The Bicron Advantage

- Recognized to UL478, UL544, IEC601-1, UL1141, CSA 22.2.125
- Frequency rating to 400Hz
- Power ratings to 6000VA
- Quick turn around prototypes
- Low cost modifications to our standard designs available for special needs

Typical Size & Weight

Rating VA @50Hz	Size (in) O.D. x H	Weight (lbs)
100VA	4.2 x 1.9	2.3
160VA	4.7 x 2.0	3.1
230VA	4.7 x 2.5	5.5
330VA	4.8 x 3.1	6.8
400VA	5.7 x 2.6	7.5
530VA	5.7 x 3.3	9.8
600VA	5.7 x 3.5	11
750VA	6.2 x 3.5	13
1000VA	6.3 x 3.8	16
1200VA	6.3 x 4.1	16
1500VA	7.9 x 3.5	21
2000VA	7.9 x 4.1	28
3000VA	8.7 x 4.8	36

Medical Recognized Toroidal Isolation Transformers

Features

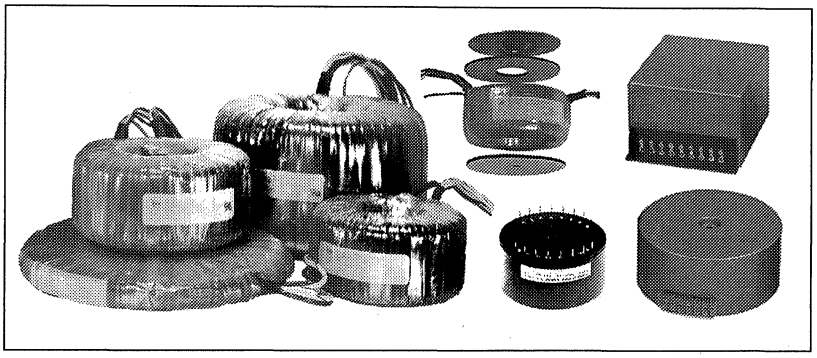
- Primary: 100, 120, 200, 220, 240V, 50/60Hz
- Thermal Protection
- Leads: PVC, Class A, 10" long
- Mounting:
  - Series AM2/AW2 (Type 2) – Supplied with metal mounting disk and two insulating pads
  - Series AM3/AW3 (Type 3) – Supplied with molded-in threaded insert, 0.5x13x1" dp
- Leakage Current: Less than 50µA

TÜV Rheinland BAUART GEPRÜFT

UL544 • IEC601 • CSA22.2.125

Options

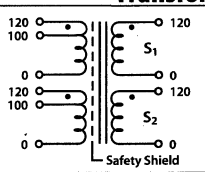
- Modified "Standards"
- Full encapsulation
- Mounting:
  - Terminal Strips
  - PC Pins
  - Molded-in Threaded Insert
  - Washer/Insulators
- Additional magnetic shielding
- Special marking and mounting



50/60Hz Power Rating (VA)	Secondary Full Load Voltage (per Winding)	Reg. Full Load (%)	Size* O.D. x Ht. (inches)	Wgt. (lbs)	Part Number	Mount Type
UL544 / IEC601 Class 1 / CSA22.2.125 Recognized Component — Series AW						
230	120V @ 1.9A	8	4.8 x 2.6	6	AW223AD120S	2
400	120V @ 3.3A	7	5.8 x 2.5	7	AW240AD120S	2
600	120V @ 5.0A	5	5.8 x 3.6	11	AW260AD120S	2
750	120V @ 6.3A	5	6.5 x 3.6	13	AW375AD120S	3
1000	120V @ 4.7A	5	6.5 x 4.2	18	AW31A0D120D	3
1500	120V @ 6.2A	5	8.1 x 4.5	30	AW31A5D120D	3
2000	120V @ 8.3A	4	8.6 x 5.1	41	AW32A0D120D	3
2500	120V @ 10.4A	4	9.2 x 5.2	46	AW32A5D120D	3
3000	120V @ 11.6A	3	9.3 x 5.3	48	AW33A0D120D	3

* Consult factory for dimensions on Bicron's *ULTRATHIN AW* series transformers.

Transformer Connections



Notes:

1. Winding S_2 not supplied with power rating less than 1000VA.
2. Primary windings must be connected in series or parallel.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

"Excellence Through Teamwork"

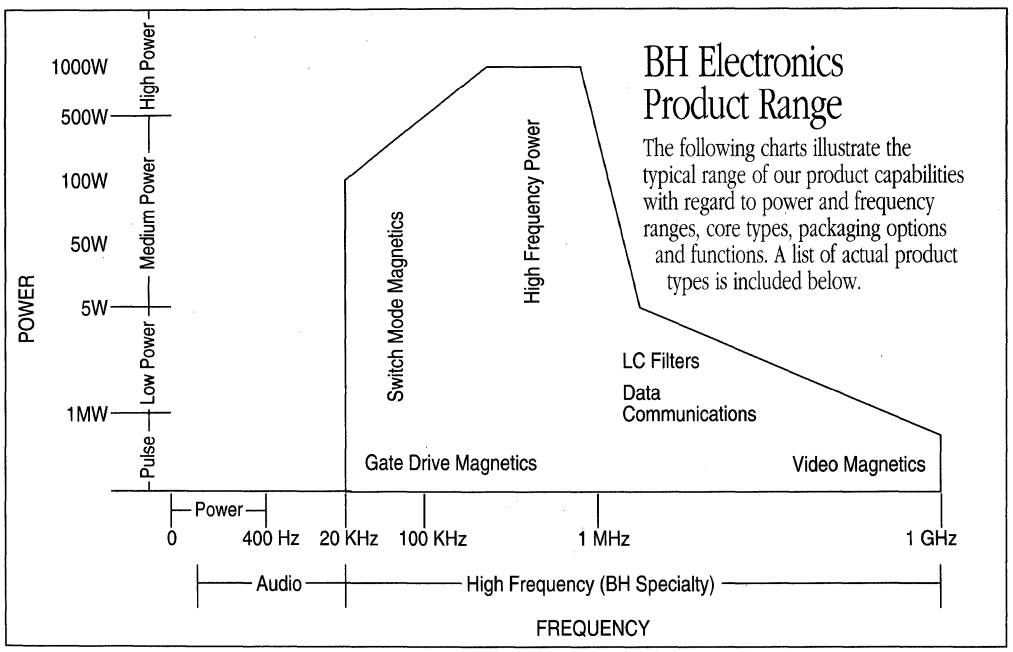
BICRON Electronics Company
50 Barlow Street • Canaan • Connecticut 06018
Tel: 860-824-5125 • Fax: 860-824-1137 • Toll-free Tel: 800-624-2766 • Toll-free Fax: 800-355-5125

Call for information or visit our web site: www.bcrn.com or e-mail: info@bcrn.com

High Frequency Magnetics:

Transformers, Inductors, Filters, Magnetic Assemblies in custom or standard configurations

Applications:
- Voice Data Video Networks
- Medical Electronics
- Power Control Circuits
- LAN-WAN Equipment
- Sensors and Transducers
- Power Conditioning
- Power Supplies
- Automotive Electronics
- CCTV



BH Electronics Product Range

The following charts illustrate the typical range of our product capabilities with regard to power and frequency ranges, core types, packaging options and functions. A list of actual product types is included below.

Products

- Custom magnetic assemblies
- LAN transformers
- Isolation transformers
- Control & signal magnetics
- Switch mode magnetics
- Ethernet to twisted pair converters
- Token Ring media filters
- Gate drive magnetics
- MOSFET driver transformers
- Data line filters
- DC-DC converter transformers
- RS-485 magnetics
- Current transformers
- Trigger transformers
- T-1 magnetics
- L-C filters
- Video/UTP adaptors

Core Type			
Pot Core	PQ Core	EP Core	Toroid
Bobbin Core	RM Core	LP Core	C Core
E Core	U Core	Multi-Aperture	Slab Core
UI Core	ETD Core	Gapped Toroid	EC Core

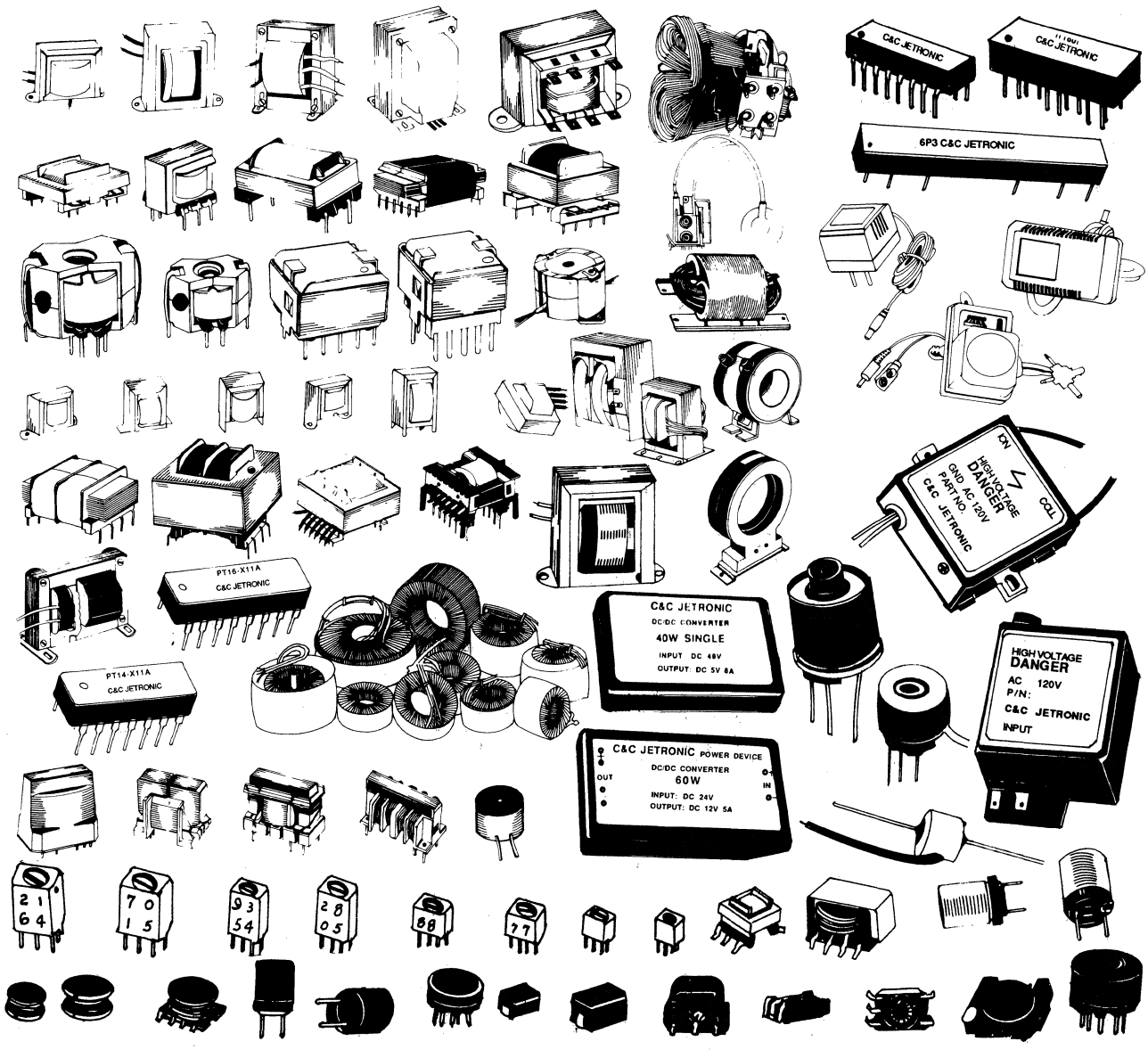
Packaging		
Custom	Surface Mount	Axial Lead
Radial Lead	Encapsulated	Molded

Function			
Pulse	Power	Balun	Inductor
DC-DC Converter	DC-AC Inverter	LC Filter	Broadband Networks
Current Sensing	Common Mode Choke	Power Control	Baseband Networks

BH Electronics

12219 Wood Lake Drive • Burnsville, MN 55337
Phone: 612/894/9590 • FAX: 612/894/9380
http://www.bhelectronics.com

C&C JETRONIC TRANSFORMERS



CUSTOM TRANSFORMERS TO YOUR SPECIFICATIONS

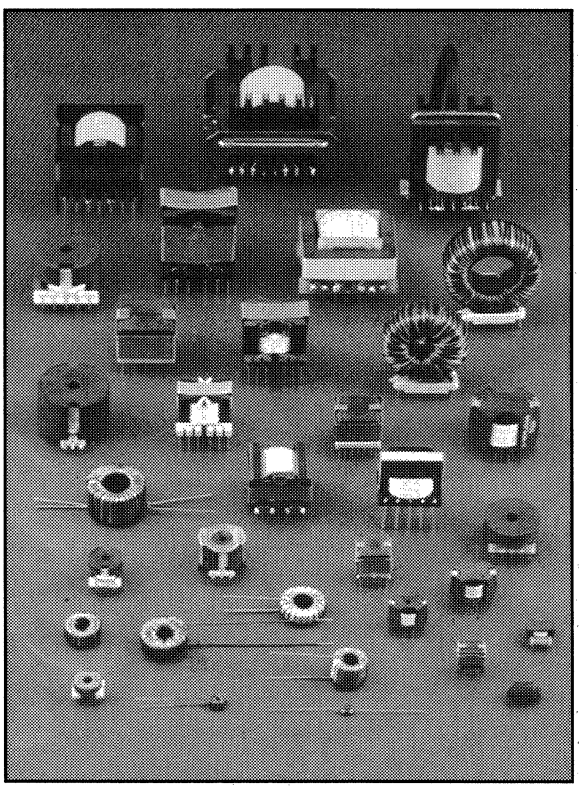
ADAPTERS	DELAY LINES	ION GENERATOR	SMD POWER CHOKE & BALUN
AUDIO	DRIVER & SWITCH MODE	ISOLATION	TELEPHONE & COMMUNICATIONS
BALLAST	FILTER CHOKES & RECTIFIER	NETWORKING	TERMINAL POWER
CONTROL	FLYBACK	P.C. MOUNT	TOKING RING
CURRENT SENSING	GENERAL DIP	POWER	TOROIDAL POWER
DATA COUPLING	HIGH FREQUENCY	PULSE	T1 CARRIER INTERFACE
DC-DC	HIGH VOLTAGE	R-CORE	10 BASE -T FILTER
INVERTER	H.V. GENERATOR	SIGNAL LINE FILTER	VARIABLE
DEFLECTION	I.F.T.	STEP UP & STEP DOWN	

CONTRACT MANUFACTURING AVAILABLE
ASK US FOR A CATALOG

126 Evergreen Rd., New Egypt, New Jersey 08533 • Phone (609) 758-3553 • Fax: (609) 758-6600
E-mail:ccjetronic@eclipse.net

Custom Switching Mode Power Supply Transformers

CET Technology offers a wide range of switching mode power supply transformers built to meet UL/CSA and international safety requirements.



Applications include:

- **Medical**
- **Telecom**
- **Datacom**
- **Power Supplies**
- **Audio Equipment**
- **Industrial Process Control**
- **Information Technology Devices**
- **Fire Protection & Security Systems**

These Switching power supply transformers and common mode chokes are available in a variety of styles including ETD, PQ, EC, RM, EP and toroid style cores just to name a few. Our engineers are available to assist in designing a custom part that is suitable for your power supply needs. Check out CET's competitive pricing and fast dependable service. You will find that its nice to have someone on your side.

Give our sales department a call today with your magnetic needs.

CET TECHNOLOGY

CET Technology

27 Roulston Road
Windham, NH 03087

TEL: 603-894-6100
FAX: 603-894-6161

CET TECHNOLOGY

CET LOW PROFILE MODEM COUPLERS

- UL Approved to UL1459 #E167631
- Small size, low profile
- Designed for modem speeds from V.22 TO V.34

CONTACT FACTORY AT 603-894-6100 FOR ADDITIONAL TELECOM PRODUCTS

Part No.	Fig. No.	Impedance PRI:SEC	maDC Unbal.	IL dB	FR ±dB	PRI DCR	SEC DCR	Sch.	Cross Ref.	Modem Speed	HIPOT VAC
SA-80323	D	600:600	0	1.25	.25	49	65	1	SPT-015		1500
SA-80415-1	A	600:600	0	.85	.20	43	43	1	671-1538	V.32	1250
*SA-801135	E	600:600	0	1.5	.50	52	59	1	671-8240	V.29	3750
SA-810108	E	600:600	0	1.25	.25	46.5	67.6	1	671-1934	V.29	1250
SA-810155	D	600:600	0	1.5	.50	55	60	1		V.32bis	1500
SA-810281	B	600:470	100	2.0	.65	108	120	1	671-8015/ 8001	V.29	1250
*SA-810435	D	600:600	0	1.5	.50	55	60	1		V.32bis	3750
SA-810525	B	600:374	0	2.0	.25	108	120	1	671-8025	V.32 bis	1250
SA-810659	E	600:442	0	2.0	.25	80	87	1	671-8264	V.32bis	3750
SA-810672	B	600:374	0	2.0	.25	108	120	1	671-8031	V.32 bis	1250
SA-810714	E	600:600	0	1.25	.25	46.5	67.6	1	671-8255	V.32	1250
SA-810727	B	600:600	0	1.75	.15	95	100	1	671-8000		1500
SA-810894	C	600:464	80	2.0	.50	80	100	1	671-8273	V.32 bis	1250
*SA-820588	E	600:442	0	2.0	.50	86	91	1	671-8265	V.32bis	3750
*SA-820831	E	600:348	0	3.25	.50	152	151	1	671-8291	V.34	3750
SA-830139	B	600:301	0	2.0	.25	150	150	1	671-8039	V.32 bis	1250
SA-830175	A	600:374	0	2.0	.25	108	120	1	671-8262	V.34	1250
*SA-830305	E	600:475	0	1.5	.50	.59	.80	1	671-8257	V.32	3750
SA-830373	B	600:412	0	1.75	.15	95	100	1	671-8041	V.34	1250
UL-770713	C	600:600	90	2.0	1	68	91	1	TTC142/TTC143		1500
UL-771220	C	600:600	90	3.0	.90	100	210	1	671-1600		1500
UL-790709	C	600:1200CT	90	1.6	.50	75	190	2	671-1489		1500

* Items are built to meet BABT creepage and clearance requirements.

NOTES:

1. Typical Insertion Loss (IL)IN dB @ Rated Unbalanced maDC, 0 dBm & 1kHz.
2. Typical frequency response (FR) from .3 to 3.5kHz.
3. Suitable for Modem speeds from V.29 to V. 34.

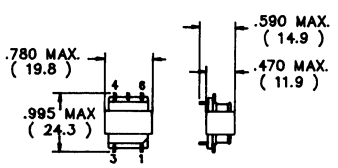


FIGURE A

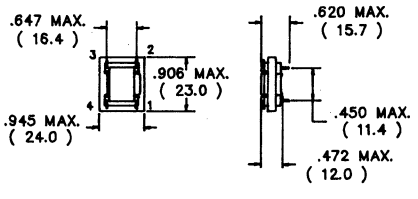


FIGURE B

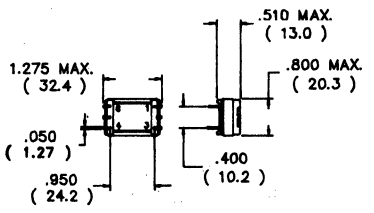


FIGURE C

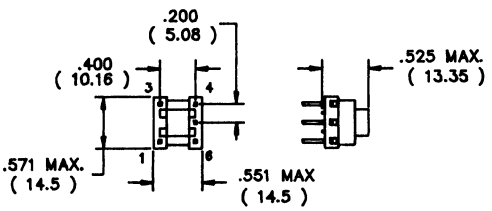


FIGURE D

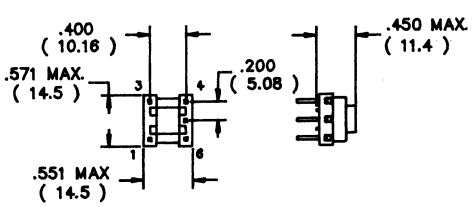


FIGURE E

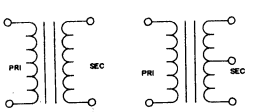
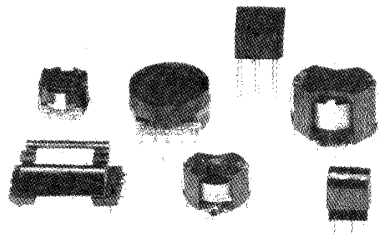


FIGURE 1 FIGURE 2

CET TECHNOLOGY 27 Roulston Rd., Windham, NH 03087 Tel: 603-894-6100 Fax: 603-894-6161

CET TECHNOLOGY

ISDN TRANSFORMERS



- UL APPROVED TO UL1459/1950 FILE #E167631
- CET'S ISDN TRANSFORMERS PROVIDE ISOLATION FOR THE LINE CARD AND TERMINAL IN CONJUNCTION WITH BOTH "S/T" AND "U" INTERFACES
- DESIGNED TO MEET THE CCITT 1.430 PULSE WAVE FORM TEMPLATE REQUIREMENTS
- ISOLATION VOLTAGE LEVELS AVAILABLE FOR US AND INTERNATIONAL APPLICATIONS
- AVAILABLE IN BOTH THROUGH HOLE AND SURFACE MOUNT PACKAGES
- STANDARD AND CUSTOM CONFIGURATIONS AVAILABLE

CONTACT FACTORY AT 603-894-6100 FOR DETAILS ON SCHEMATICS AND PACKAGE DRAWINGS

Standard Electrical Specifications

MODEL	TURNS RATIO	PRIMARY INDUCTANCE MIN. (Mh)	PRIMARY DCR MAX. (Ohms)	SECONDARY DCR MAX. (Ohms)	LEAKAGE INDUCTANCE MAX. (μh)	PRIMARY/ SECONDARY HIPOT (V RMS)	STYLE NUMBER	SCHEMATIC NUMBER
CT-AXF5041	1 CT:2CT	20	1.2	11.0	30	1500	1	1
CT-AXF5042	1 CT:2CT	20	1.2	11.0	30	1500	2	2
CT-AXF5043	1 CT:2CT	20	3.0	4.5	15	1500	4	4
CT-AXF5044	1 CT:2.5CT	22	2.8	6.5	20	1500	1	1
CT-AXF5039	1 CT:1CT	22	2.8	2.8	10	1500	5	6
CT-AXF5045	1 CT:1.8CT	22	2.8	5.5	20	1500	1	1
CT-AXF5046	1 CT:2CT	22	8.0	15.0	30	1500	7	5
CT-AXF5047	1 CT:2CT	22	2.8	5.5	10	2000	9	4
CT-AXF5040	2.5 :1:1	72	8.5	1.0	160	1100	3	3
CT-AXF5048	1 :1:1CT	25	5.5	3.5	20	1100	6	7
CT-AXF5049	4:1:1	30	2.3	1.0	200	1100	8	8
CT-AXF5050	1:1.32	7	0.9	1.5	17	1100	3	5
CT-AXF5051	1 :1:1CT	25	4.3	3.8	20	2000	10	9

Transformer Cross Reference for Transceiver Chips

MODEL	TURNS RATIO	IC MANUFACTURER	IC PART NUMBER
CT-AXF5041	1CT:2CT	SIEMENS	PEB2080/2085
CT-AXF5042	1CT:2CT	SIEMENS	PEB2080/2085
CT-AXF5043	1CT:2CT	AMD MITEL NATIONAL	79C30A MT8930 TP3420
CT-AXF5044	1CT:2.5 CT	INTEL AT&T	29C53 T7250/T7252
CT-AXF5039	1CT:1CT	MOTOROLA	MC145474 MC145475
CT-AXF5045	1CT:1.8CT	INTEL	29C53
CT-AXF5046 CT-AXF5047	1CT:2CT 1CT:2CT	SIEMENS AMD MITEL NATIONAL	PEB2080/2085 79C30A MT8930 TP3420
CT-AXF5040	2.5:1:1	AT&T	T7262/T7263
CT-AXF5048	1:1:1 CT	MOTOROLA	MC145472
CT-AXF5049	4:1:1	MITEL	MT8972
CT-AXF5050	1:1.32	SIEMENS	PEB2091
CT-AXF5051	1:1:1 CT**	MOTOROLA	MC 145472

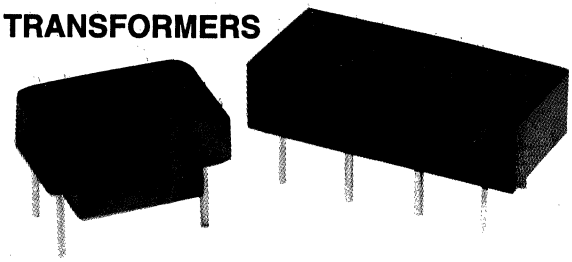
* Hipot voltage will meet International Safety Standards. ** Low Profile.

CET TECHNOLOGY 27 Roulston Rd., Windham, NH 03087 Tel: 603-894-6100 Fax: 603-894-6161

CET TECHNOLOGY

CET T1 / CEPT / ISDN-PRI TRANSFORMERS

- UL APPROVED TO UL1459 #E167631
- SINGLE AND DUAL THROUGH HOLE
- MANY OTHER STANDARD MODELS AVAILABLE IN BOTH SURFACE MOUNT AND THROUGH HOLE
- CONTACT FACTORY FOR DETAILED SCHEMATICS AND PACKAGE DRAWINGS



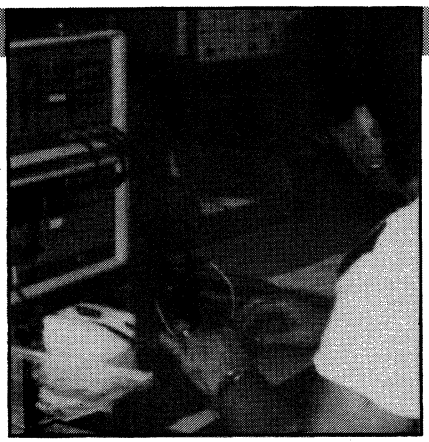
CONTACT FACTORY AT 603-894-6100 FOR INFORMATION ON OTHER CET ISDN PRODUCTS

Part Number	Turns Ratio	OCL mH min.	Cw/w Pf max.	L µH max.	DCR pri Ω max.	DCR sec Ω max.	Package/ Schematic	Primary Pins
CT-64931	1:1:1(2CT)	1.20	25	.50	.70	.70	S1/SS2	
CT-64932	1:1:1	2.00	40	.50	.70	.70	S1/SS2	
CT-64933	1CT:3CT	1.20	30	.50	.70	1.60	S1/SS4	1–5
CT-64934	1:1	1.20	25	.50	.70	.70	S1/SS1	
CT-64935	1:1CT	.06	23	.75	.60	.60	S1/SS3	2–6
CT-64936	1CT:1	1.20	25	.80	.70	.70	S1/SS3	1–5
CT-64937	1:1.36	1.20	35	.80	.70	.70	S1/SS1	5–6
CT-64938	1:1.26CT	.06	23	.75	.60	.60	S1/SS3	2–6
CT-64940	1:1:1.58	.30	30	.60	.40 & .40	.60	S1/SS2	1–4(2,3 SH)
CT-64941	1:1:2	.80	30	.60	.40 & .40	.60	S1/SS2	1–4(2,3 SH)
CT-64942	1:1:2.62	.80	30	.40	.40 & .40	.60	S1/SS2	1–4(2,3 SH)
CT-64943	1CT:2CT	1.20	30	.55(4)	.70	1.10	S1/SS4	1–5
CT-64944	2CT:1CT	2.00	30	1.50	.70	.40	S1/SS4	1–5
CT-64945	2.53CT:1	2.00	20	1.50	1.0	.50	S1/SS3	1–5
CT-65351	1:2CT	1.20	40	.50	.70	1.10	S1/SS3	2–6
CT-65352	1:2CT	2.00	40	.50	.70	1.40	S1/SS3	2–6
CT-65363	1:4CT	.50	40	1.00	.50	1.50	S1/SS5	1–5
CT-65379	1:1.14CT	1.20	35	.80	.70	.80	S1/SS5	1–5
CT-65415	1CT:2CT	1.20	30	.55	.70	1.10	S1/SS4	1–5
CT-65388	1:1,15CT	1.50	35	0.60	0.70	0.90	S1/SS3	2-6
CT-65389	1:1:1.266	1.50	35	0.40	0.70	0.90	S1/SS3	2-6
CT-65558	1:2.3CT	1.20	35	0.80	0.70	1.20	S1/SS5	1-5
CT-65586	1:1.36CT	1.20	35	0.80	0.70	0.90	S1/SS5	1-5
CT-65755	1CT:1CT	1.20	25	0.80	0.80	0.80	S1/SS4	1-5
CT-65340	1:1.36	1.20	35	0.80	0.90	1.20	S1/SS1	5-6
CT-65770	1:1.15CT	1.50	40	0.80	0.90	1.00	S1/SS3	2-6
CT-65771	1CT:2CT	1.20	45	0.60	1.00	2.00	S1/SS4	2-6
CT-65778	1CT:1CT	1.20	50	1.10	1.00	1.00	S1/SS4	1-5
Dual Packages								
CT-64951	1:2CT; 1:2:CT	1.20	30	.50	.70 & .70	1.20 & 1.20	D1/DS1	14–12, 5–7
CT-64952	1:2CT; 1:1.36	1.20	35	.50; .80	.80 & .80	1.20 & 1.0	D1/DS2	14–12, 5–7
CT-64953	1:2CT; 2CT:1	2.00	45	.60; .80	.70 &.70	1.20 & 1.20	D1/DS3	14–12, 10–8
CT-64954	1CT:2CT; 1:1	1.20	30	.55(4); .50	.70 & .70	1.20 & .70	D1/DS4	1–3, 10–8
CT-64955	1.58:2CT; 1.58:1	.80	30	.50	1.60 & 1.60	.70 & .30	D1/DS5	1–3, 5–7
CT-64956	12:2CT; 2:1	.80	30	.60	.50 & .50	.50 & .20	D1/DS5	1–3, 5–7
CT-64957	2.62:2CT; 2.62:1	1.20	30	.80	.60 & .60	.50 & .30	D1/DS5	1–3, 5–7
CT-64958	1:1; 1CT:1	1.20	30	.50; .80	.70 & .70	.70 & .70	D1/DS5	5–7, 14–12
CT-65565	1:1.15CT; 1.2CT	1.50; 1.20	35; 40	.60; .50	.70 & .70	70 & .70	TD1/DSI	14-12,5-7
CT-65566	1:1:1.266; 1:2CT	1.50; 1.20	35; 40	.50; .40	.70 & .70	.90 & 1.10	TD-1/DS1	14-12, 5-7
Extended Temperature Range Dual Transformers								
CT-65567	1:1.15CT & 1:2CT	1.50 & 1.20	40 & 60	.80 & .80	.90 & .90	1.10 & 1.70	TD-1/DS1	14-12,5-7
CT-65568	1:1:1.266 & 1:2CT	150& 1.20	50 & 60	.80 & .80	.90 & .90	1.10 & 1.70	TD-1/DS1	14-12.5-7
CT-65774	1CT:2CT & 1:1.36CT	1.20 & 1.20	50 & 50	.96 & .80	1.00 & 1.00	1.70 & 1.20	TD-1/DS8	14-12,5-7

CET TECHNOLOGY 27 Roulston Rd., Windham, NH 03087 Tel: 603-894-6100 Fax: 603-894-6161

TRANSFORMERS ✦ TOROIDS ✦ BALUNS

COMMUNICATION COIL , INC. ✦ ASSURED RELIABILITY ✦ CUSTOM DESIGNS ✦ TIMELY DELIVERY ✦ MANUFACTURED TO SPEC.



COMMUNICATION COIL, INC. has been designing and producing high reliability Power Magnetics since 1944... to high exacting standards for communications, filters, and power supplies in military, avionics, satellite, telemetry, marine, GPS and commercial applications.

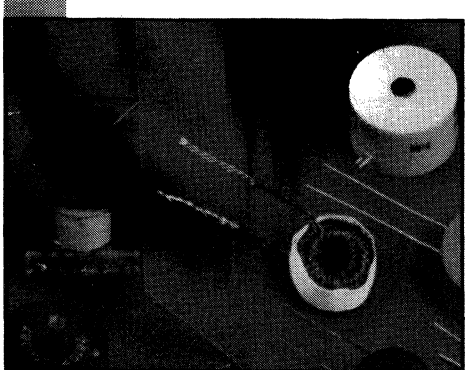
Using the latest CAE and CAD technology our engineers use patented and propriety syntheses software to perform complete simulations of your unique design requirements. Our optimization system enables us to rapidly produce reliable up-to-date designs. We will custom design **power magnetics** to meet your exacting requirements. Our Toroids, SMPS transformers, Inductors, Chokes and Baluns utilize the state-of-the-art high permeability magnetic materials required for tomorrow's needs.

Each and every unit is 100% parametric tested. Our ultra-modern computerized **magnetics** testing equipment can provide complete data on each part, if desired. Complete lot traceability is available.

Our award-winning quality control program is approved by major customers world-wide.

Our **power magnetics** are designed and manufactured in Schiller Park (Chicago), Il U.S.A. to meet rigid global marketplace demands.

Call us at 847/671-1333 today and speak directly to the Communication Coil design & applications engineering staff with your questions, orders or sample requests...or FAX your requirements to 847/671-9191.



POWER MAGNETICS

- FERRITE CORE
- SPLIT BOBBINS
- PC MOUNTING
- POTTED
- MOLDED CASE
- SURFACE MOUNT
- TOROIDAL
- E-CORES
- MINIATURE
- CURRENT SENSE
- TRIGGER
- MIL-T-27
- MIL-C-15305
- MIL-Q-9858A
- BOBBIN CORE
- TOROIDAL
- OPEN
- ENCAPSULATED
- HERMETICALLY SEALED
- MINI-TOROIDAL
- POT CORES
- MULTIPLE WINDOWS
- SUB-MINIATURE
- PULSE
- SWITCH MODE
- MIL-T-21038
- MIL-I-45208

APPLICATIONS • MILITARY • INDUSTRIAL • COMMERCIAL • AVIONICS • TELECOMMUNICATIONS • GPS • RF I • EM I • SWITCHMODE POWER SOURCES • UPS • TELEMETRY • INSTRUMENTATIONS • MEDICAL • MARINE • SATCOM

COMMUNICATION COIL, INC. •
9601 Soreng Avenue
Schiller Park (Chicago), IL 60176
847-671-1333 • FAX 847-671-9191
www.communicationcoil.com

...BALUNS, COILS, CHOKES, INDUCTORS, TOROIDS, FILTERS, TRANSFORMERS...

Cramer
Coil & Transformer Co., Inc.

401 Progress Drive - Saukville, Wisconsin 53080 - (414) 268-2150 - FAX (414) 268-4100
E-mail: techsales@cramerco.com

■ Knowledge.
Our design staff specializes in custom switchmode, linear and toroidal magnetics development and problem solving.

■ Responsiveness.
We offer samples in two weeks - usually at no charge. We stock to build any cataloged magnetic in prototype and production quantities.

■ Standardization.
We attempt to meet your requirements with industry standard materials.

■ Experience.
Cramer has thirty years in the custom magnetics business.

Switching Magnetics

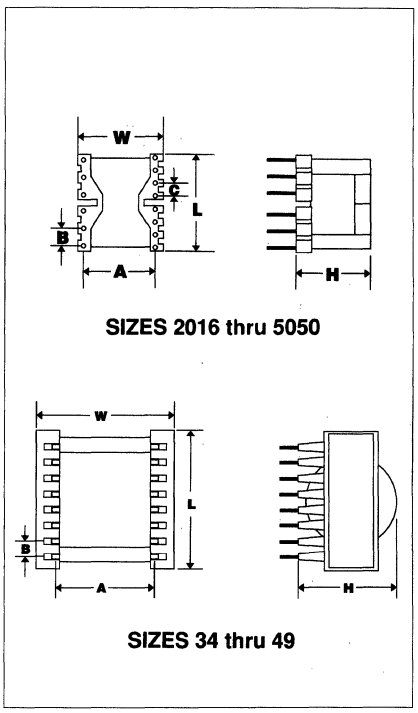
CSM Series Switchmode Power Transformers

The CSM series offers common building blocks for the use as switchmode power transformers.

The materials utilized by this series offer high inductance and negative core loss versus temperature (to 80° C). This means reduced transformer size for modern switchmode supplies. CSM Series transformers are designed for use in all switching topologies (Forward, Flyback, Push-Pull, Bridge and Half-Bridge).

The power output ratings listed on this page are based on a forward converter operating at 50 KHz, 48% duty cycle, 50 ° C ambient temperature, and 1500 volt hipot. Within these conditions the flyback topology reduces power output by 20% or more.

Safety agencies include V.D.E., I.E.C., C.S.A. and U.L. Most designs are constructed to Underwriters Laboratories, Inc. recognized Class 130(B) electrical insulation system (OBJY2), file #110339.



SIZES 2016 thru 5050

SIZES 34 thru 49

Table:						*Power Output		
SIZE	P Out*	L	W	H	A	B	C	#P
2016	30	0.92	0.92	0.85	0.80	.15	.10	14
2020	40	0.92	0.92	1.00	0.80	.15	.10	14
2620	70	1.10	1.20	1.10	1.00	.15	-	12
2625	80	1.10	1.20	1.20	1.00	.15	-	12
3220	100	1.30	1.40	1.10	1.20	.20	-	12
3230	150	1.30	1.40	1.50	1.20	.20	-	12
3535	200	1.40	1.60	1.60	1.40	.20	-	12
4040	300	1.60	1.70	1.80	1.50	.20	-	12
5050	400	2.10	2.10	2.10	1.80	.20	-	12
34	100	1.80	1.60	1.40	1.00	.20	-	14
39	200	1.90	1.80	1.50	1.20	.20	-	16
44	400	2.10	2.00	1.70	1.40	.20	-	18
49	600	2.30	2.20	1.60	1.80	.20	-	20

CVTI Inductors can be manufactured to any inductance, limited only by energy storage rating. They can be supplied selfleading PC mountable or on standard toroid mounts. We use proprietary software to quickly determine turns, wire size, and temperature rise.

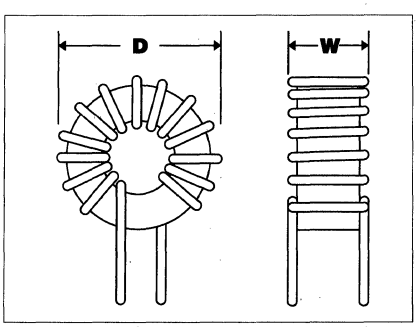


Table:			*Maximum Energy Storage
SIZE	D	W	M.E.S.*
1	0.9	.4	475
2	1.2	.6	1500
3	1.4	.8	2200
4	1.7	.7	3800
5	2.0	.9	8000

Quality Custom Magnetics - Made in the U.S.A.

Cramer
Coil & Transformer Co., Inc.

401 Progress Drive - Saukville, Wisconsin 53080 - (414) 268-2150 - FAX (414) 268-4100
E-mail: techsales@cramerco.com

Linear Magnetics

CHPT Series Power Transformers

Our most economical and versatile linear power tranformers feature low capacitive coupling and 2500 VAC dielectric. Six pins per side allow for multiple primaries either series/parallel or multiple tapped, limited to 480 volts. The secondaries are supplied series/parallel, 3 isolated or 2 isolated centertapped. **Constructed to Underwriters Laboratories Inc., recognized Class 130(B) electrical insulation system (OBJY2). System designation C5; File # E110339.**

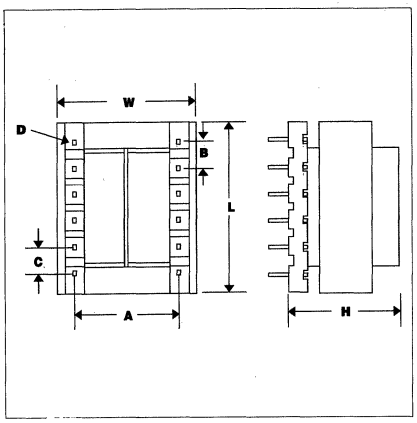


Table:								* Square
SIZE	VA	L	W	H	A	B	C	D*
1	2.0	1.4	1.25	1.15	.87	.15	.20	.036
2	4.4	1.65	1.38	1.18	.95	.20	.25	.025
3	10	1.9	1.58	1.38	1.1	.20	.30	.025
4	20	2.3	1.80	1.58	1.3	.20	.30	.025
5	25	2.3	1.80	1.82	1.3	.20	.30	.025

CIPT Series International Power Transformers

Constructed to meet International safety specifications, the CIPT series offers low capacitive coupling and a standard 4000 volt hipot. PC and chassis mount styles are available. Multiple primaries are supplied in series/parallel or series tapped configurations, limited to 480 volts, and the number of available terminals or pins per side. The secondaries are supplied with series/parallel, multiple tapped or isolated configurations. **Constructed to Underwriters Laboratories Inc., recognized Class 130(B) electrical insulation system (OBJY2). System designation C5; File # E110339.**

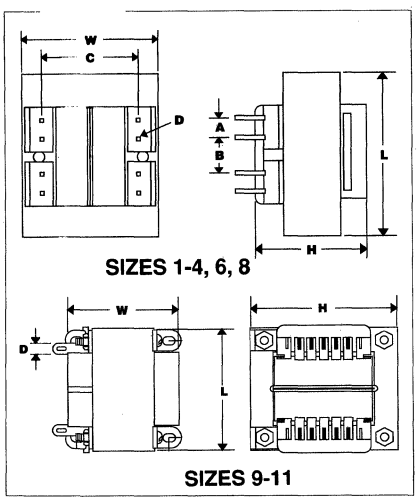


Table:									* Square	PINS/
SIZE	VA	L	W	H	A	B	C	D*	SIDE
1	2.5	1.63	1.31	1.13	.20	.25	1.00	.025	4
2	5.0	1.63	1.31	1.19	.20	.40	1.00	.025	4
3	10	1.87	1.56	1.19	.20	.40	1.14	.038	4
4	20	2.25	1.88	1.60	.40	.40	1.46	.038	6
5	25	2.81	1.88	1.31	-	-	-	.187	5
6	30	2.63	2.19	1.82	.55	.28	1.68	.045	6
7	43	3.13	2.19	2.69	-	-	-	.187	5
8	56	3.00	2.50	1.81	.60	.30	1.90	.045	6
9	80	2.50	2.38	3.00	-	-	-	.187	6
10	130	2.81	2.88	3.38	-	-	-	.250	6
11	175	3.13	2.88	3.75	-	-	-	.250	6

CLF Series Power Transformers

CLF chassis mount power transformers offer small size, low capacitive coupling, a standard 2500 volt hipot and .187 faston tabs for quick installation. They are supplied with single or multiple primaries. Multiple primaries are supplied in series/parallel or series tapped configurations limited to 480 volts and the 4 available lugs. Secondaries are supplied series/parallel or multiple tapped. **Constructed to Underwriters Laboratories Inc., recognized Class 130(B) electrical insulation system (OBJY2). System designation C5; File # E110339.**

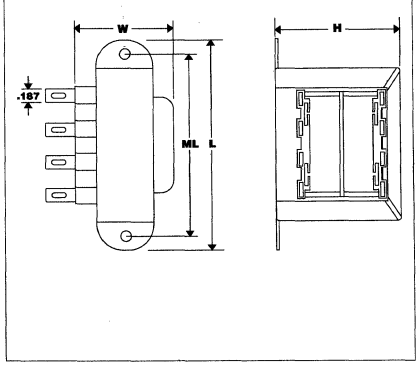


Table:					
SIZE	VA	L	W	H	ML
3	2.4	2.06	1.06	1.19	1.75
4	6.0	2.38	1.25	1.38	2.00
5	12	2.81	1.38	1.63	2.38
6	30	3.25	1.69	1.94	2.81
7	56	3.69	1.81	2.25	3.13
8	100	4.03	2.25	2.56	3.56

Quality Custom Magnetics - Made in the U.S.A.

Cramer

Coil & Transformer Co., Inc.

401 Progress Drive - Saukville, Wisconsin 53080 - (414) 268-2150 - FAX (414) 268-4100
E-mail: techsales@cramerco.com

CSPE Series Slim Pack Power Transformers

The CSPE features low profile, semi-toroidal hum bucking construction, low capacitive coupling and 2500 VAC dielectric. They are supplied with series/parallel primaries and secondaries limited to VA rating. Two isolated secondaries can be supplied when they have approximately equal VA ratings. **Constructed to Underwriters Laboratories Inc., recognized Class 130(B) electrical insulation system (OBJY2). System designation C5; File # E110339.**

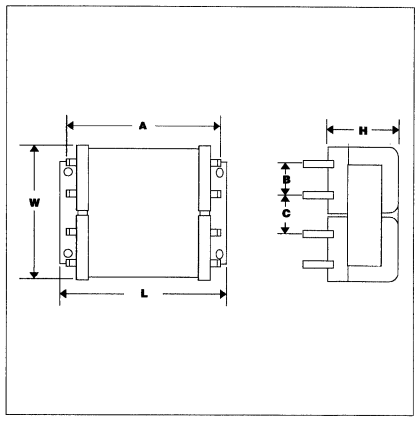


Table:

SIZE	VA	L	W	H	A	B	C	WT
1	2.5	1.87	1.56	0.65	1.60	.38	.38	.42lb
2	6.0	1.87	1.56	0.85	1.60	.38	.38	.58lb
3	12	2.50	2.00	1.07	2.00	.50	.50	.92lb
4	24	2.87	2.25	1.25	1.90	.60	.53	.94lb

CTFE Series Power Transformers

The CTFE series is built around cost-effective industry standard packaging. It features PC board mountability, 2500 VAC dielectric and low capacitive inductance. It can be supplied with single or multiple primaries. **Constructed to Underwriters Laboratories Inc., recognized Class 130(B) electrical insulation system (OBJY2). System designation C5; File # E110339.**

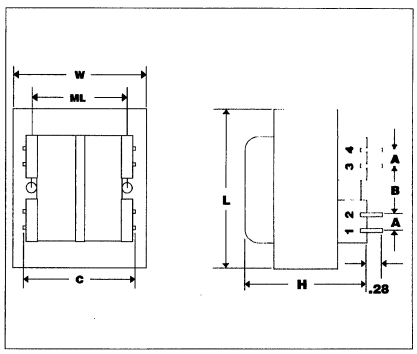
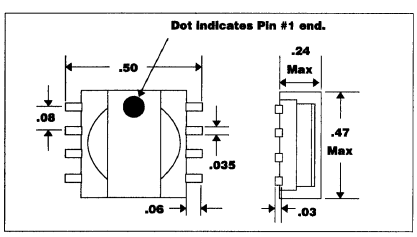


Table:

SIZE	VA	L	W	H	ML	A	B	C
2	1.1	1.38	1.12	0.94	-	.25	.25	1.20
3	2.4	1.38	1.12	1.19	-	.25	.25	1.20
4	6.0	1.63	1.31	1.31	1.06	.25	.35	1.28
5	12	1.87	1.56	1.44	1.25	.30	.40	1.41
6	20	2.25	1.87	1.44	1.50	.30	.40	1.60
7	36	2.63	2.19	1.56	-	.40	.40	1.85

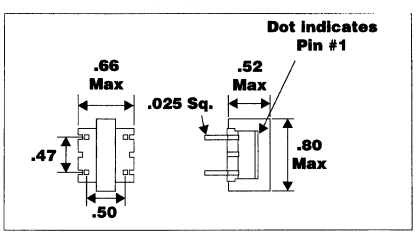
Custom and Telecommunications Magnetics

CTCT 500 Surface Mountable Modem Transformer



Impedance: Primary & Secondary - 600 Ohms each.Designed to reflect 600 Ohms on primary, with 500 ohm load on secondary.
DC Resistance: Primary: 58 ohms +/- 10%, Secondary: 72 ohms +/- 10%.
Insertion loss: 1.0 dB Max @1000 Hz.
Frequency response: 600 - 4000 Hz, +/- .5 dB, Ref. 1000 Hz.
Return Loss: 1 KHz - 20 dB Min., 600 Hz - 16 dB Min., 4 KHz - 26 dB Min.
Dielectric Strength: Primary - Secondary: 1500 Vrms.

CTCT 1104 Coupling Transformer



Impedance: Primary & Secondary - 600 Ohms each.Designed to reflect 600 Ohms on primary, with 600 ohm load on secondary.
DC Resistance: Primary: 30 ohms +/- 15%, Secondary: 40 ohms +/- 15%.
Insertion loss: 1.5 dB Max @1000 Hz.
Frequency response: 300 - 3000 Hz, +/- .5 dB, Ref. 1000 Hz.
Return Loss: 300 Hz - 20 dB Min., 1000 Hz - 26 dB Min., 3000 Hz - 20 dB Min.
Dielectric Strength: Primary - Secondary: 1500 Vrms.

Custom Coils

WE DO MORE!

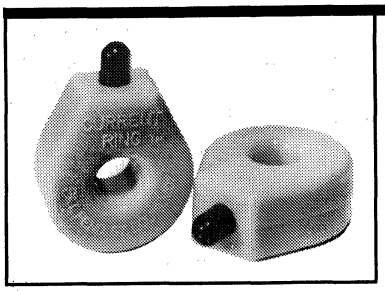
Solenoids, air-core inductors, magnetic pick-ups and lvdts are examples of coils not listed on these pages. Cramer can manufacture these types within machine capabilities. If you have a specific requirement, or simply need help developing a new idea, PLEASE CALL. **Expert engineering support is offered for most custom requirements.**

Quality Custom Magnetics - Made in the U.S.A.

ON-OFF CURRENT INDICATORS and CURRENT TRANSFORMERS

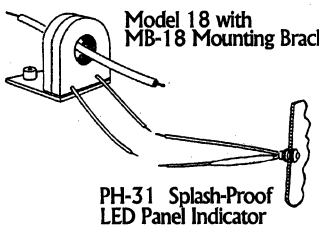
"Specialist in Electrical Current Monitoring"

DOWN LOAD OUR CATALOG AT OUR AWARD WINNING WEB SITE
http://www.crmagnetics.com



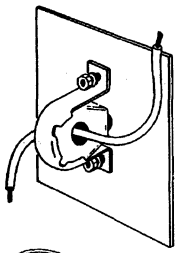
Wire-Mounted On-Off Current Indicator CR-45

One-Wire Pass Two-Wire Pass Three-Wire Pass

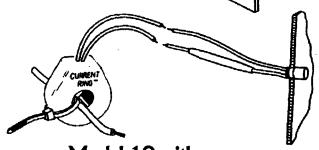


Model 18 with MB-18 Mounting Bracket

PH-31 Splash-Proof LED Panel Indicator

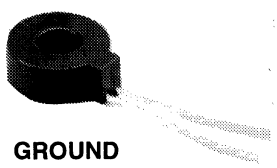


Panel Mounting Bracket MB-45

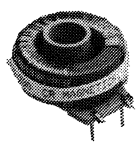


Model 19 with PH-25 Press-In LED Panel Indicator

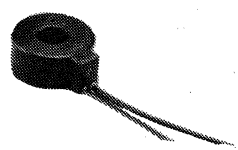
Wide Selection Of Small Current Sensing Transformers

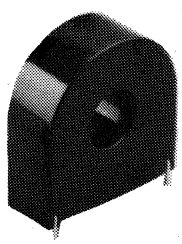


GROUND FAULT

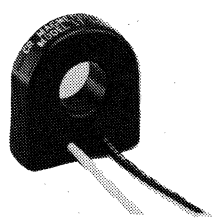


HORIZONTAL MOUNT



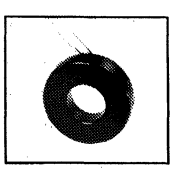


VERTICAL MOUNT

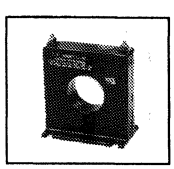


WIRE LEADS

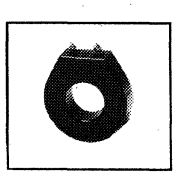
Commercial & Metering Class Current Transformers



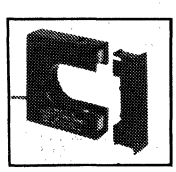
RL



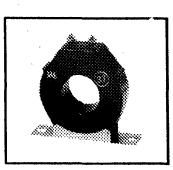
SFT



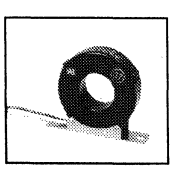
RT



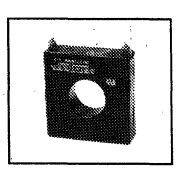
SPLIT-CORE



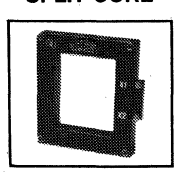
RBT



RBL



SHT



RECTANGULAR

- High Accuracy
- 3-Phase
- Military Grade
- Aerospace Grade
- Laboratory Grade
- Bar Type
- Medium Voltage
- Revenue Class

CR MAGNETICS®

"Specializing in Current Monitoring Excellence"

CR MAGNETICS, INC.
544 Axminister Drive
Fenton (St. Louis), MO 63026 USA

FREE Handbook/Catalog

MOST PRODUCTS ARE IN STOCK

Includes helpful Application Case Studies and product details.
For additional information FAST, just call, e-mail, or fax us.

Phone 314.343.8518 FAX 314.343.5119 E-MAIL sales@crmagnetics.com

HIGH VOLTAGE TRANSFORMERS

Designed To Your Needs

CUSTOM COILS INC.
605-934-2460

FEATURES

OUTPUT VOLTAGE
UP TO 60KV

OUTPUT POWER
UP TO 500VA

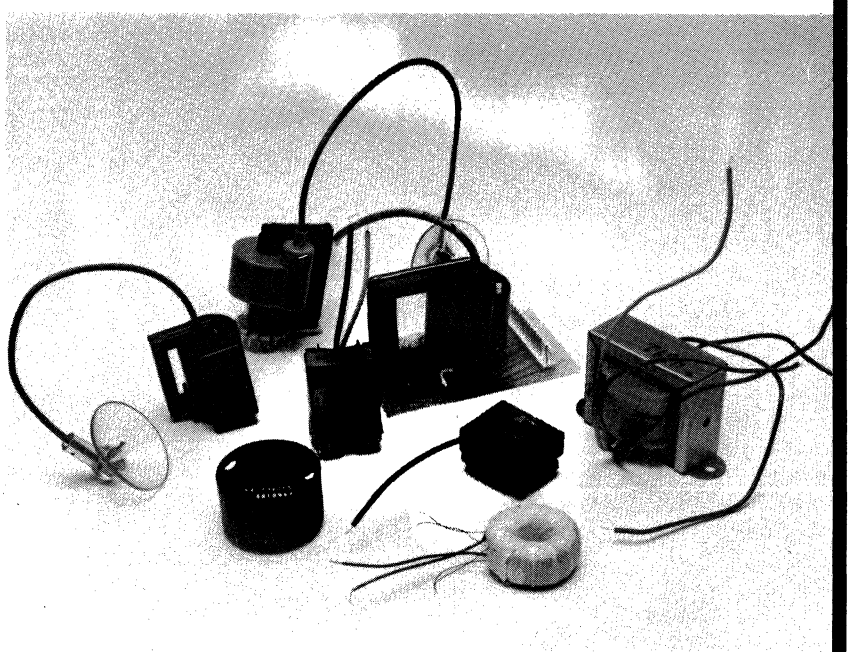
INPUT
115, 57 to 63 Hz
115/230V, 47 to 63 Hz
Switching - up to 100 KHz

FORMATS

PC MOUNT
Low profile • Split section
Horizontal • Vertical
High voltage exit - lead wire or bobbin terminal
Toroids on headers

CHASSIS MOUNT
Low profile • Split section
Lead wire or any type of termination

WINDING TECHNIQUES
Layer winding • Bobbin winding • Pi winding
Concentric winding
Non concentric winding
Toroidal winding



Dependable Personal Service & Consistent Quality

- Design Engineering Assistance
- Fast Sample / Prototype Turnaround
- Materials & Construction Applicable to CSA, TUV, VDE & UL Approvals
- Highest Quality Standards
- Specialists in Design & Manufacture of all types of Custom Transformers & Inductors
- 15,000 sq. ft. of Manufacturing Space
- In Business Since 1967

CUSTOM COILS INC.

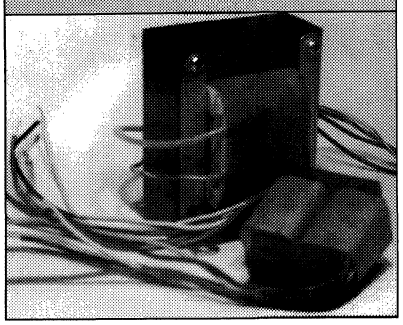
Box 348
109 South Iowa St.
Alcester, South Dakota 57001

Phone 605-934-2460
Fax 605-934-2440
FSCM 34808 EIA 661

Specialists in

Custom Designed Transformers and Coils

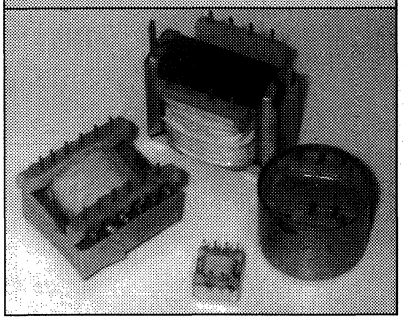
Layer Wound.



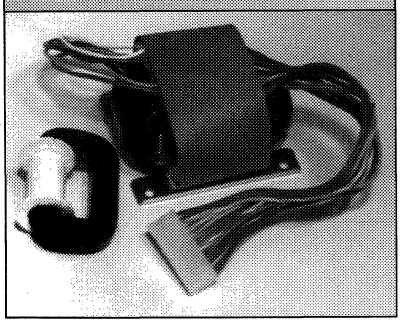
Engineering Expertise

- Solving Problems for 25 Years
- Designed to meet UL, CSA, VDE, IEC
- Innovative and Cost Effective Design Solutions

P.C. Mount



R-Core



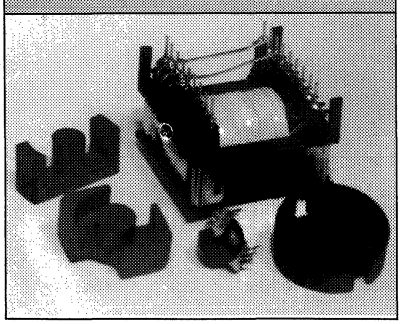
Excellent Employees

- Well Trained and Efficient Workforce
- Precision and Pride from Prototype to Production

Quality Products

- Continuous In-process Inspection — SPC
- 100% Final Testing
- ISO Pending 1998

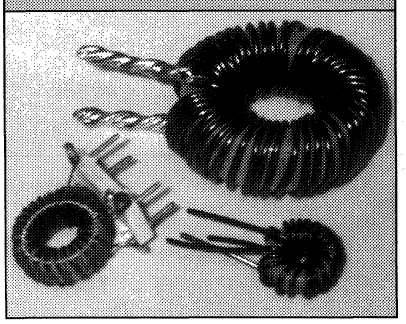
Ferrite Cores



Service Specialists

- Quick Prototypes
- On-time Delivery
- Small Orders Welcome
- Blanket Orders — JIT

Toroidal



All Types of Transformers

Audio	Filament	Line	R-Core
Chokes	High-Frequency	Medical	Single-Phase
Class 2	Impedance	Output	Switchmode
Converter	Inductors	Potential	Three-Phase
Current	Input	Power	Toroidal

CUSTOM MAGNETICS, INC.

Custom Magnetics Inc

801 W. Main Street
North Manchester, IN. 46962
Phone: **219-982-8508** • Fax: **219-982-4942**
e-mail: **sales@custommag.com**
Visit our web site at: **http://www.custommag.com**

DATATRONICS

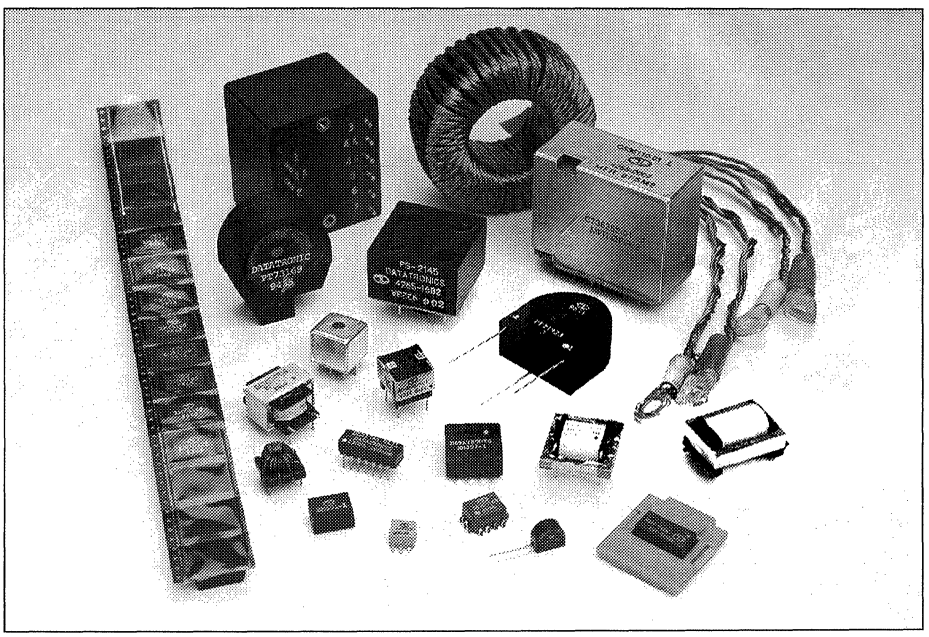
Tel: 909-928-7700 • Fax: 909-928-7701 • E-Mail:Sales@datatronics.com

TRANSFORMERS

✔High Performance ✔SPC Quality ✔Fast Delivery ✔Low Cost ✔Tech Support
✔ISO 9001/9002 Certified ✔BABT, UL, CSA, VDE Approvals Available

Broad Selection With Economical Custom Designs

• ISDN	• Networking	• Switching	• Mil-Spec	• Sealed
• LAN	• Isolation	• Pulse	• SMDs	• Open



CUSTOM MAGNETICS

- Switching Power Supply
- Gate Drive
- Fly Back
- Common Mode Chokes
- Power Inductors
- Current Sense
- Pulse Transformers
- Planar Transformers

TELECOM MAGNETICS

- T1
- T2
- ISDN
- Telephone Line Matching
- Hybrid Transformers
- LAN Filter Modules – See EEM Vol. 1B, Section 2445
- Wide Band RF
- RF Band Pass Filters (Wireless LAN)

PACKAGES

- SMD
- Through - Hole
- Micro Miniature
- Tape-N-Reel
- Tubes
- PCMCIA

CONSTRUCTION

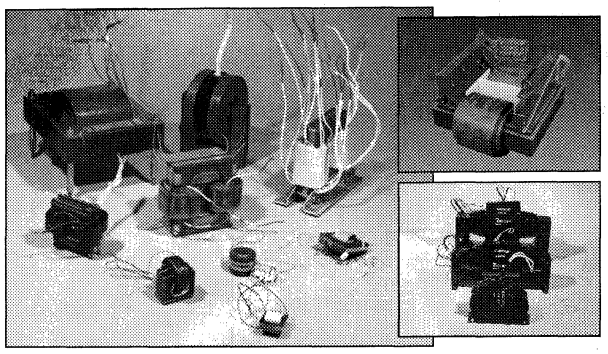
- Toroidal
- Ferrite (All Types)
- Planar
- Fully Encapsulated, Impregnated
- Open Frame

MILITARY

- MIL-T-27
- MIL-T-21038
- MIL-STD-981
- NASA Approved For Space Station

DEL ELECTRONICS CORP.
One Commerce Park, Valhalla, NY 10595
(800) 811-0638 • (914) 686-3600 • Fax (914) 686-5424
www.delpower.com • sales@delpower.com

TRANSFORMERS AND HIGH VOLTAGE MAGNETICS



TRANSFORMER PRODUCTS DESIGN

Since 1958, DEL Electronics has specialized in the design and manufacture of high quality, high voltage transformers for both line and high frequency applications. Transformers are available in the range of 1kV to 300 kV to a maximum of 100 kVA.

Transformers are custom designed utilizing both oil or dry type insulation. Molded epoxy construction is available for units with ratings to 200 kVDC.

DEL facilities include research and development, coil winding equipment, vacuum-pressurized impregnation tanks, baking ovens, lamination cutting equipment and painting facilities.

High voltage DC and AC test equipment is available to ensure customer requirements are met. DEL test and inspection standards meet or exceed MIL-I-45208. DEL will provide fast turnaround prototypes for evaluation and production quantities as required.

APPLICATIONS

- **E-Beam and Ion Implantation**
  Isolation Transformers to 300kV and 100kVA
- **Lasers**
  High Frequency Inverter Transformers
  Flash Tube and Spark Gap Trigger Transformer
- **X-ray**
  Rectifier Transformers - Line and High Frequency
  Filament - High Voltage Line Isolation
- **Radar Transmitter**
  Pulse Transformers
  Charging Reactors
  Trigger Transformers

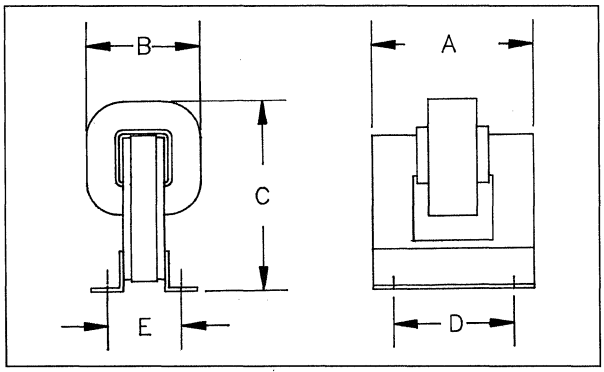
HIGH VOLTAGE - LINE ISOLATION TRANSFORMER

Open Type Construction - Epoxy Coated

- **Features**
- Designed for continuous operation at rated voltage and power
- Epoxy coated, air insulated up to 30 kVDC, oil insulated over 30 kVDC
- Well suited to applications requiring reliable isolated line voltage power ratings up to 1 kVA
- Higher voltage and power levels available

Type	Rating kVA	Size (AXBXC)	Mounting Dimensions (DXE)	Insulation kVdc Wiring
AD 1640	0.200	6 1/8 x 4 x 5 1/8 in 15.5 x 10.2 x 13.0 cm	4 1/2 x 3 in 11.4 x 7.6 cm	10
AD 1641	0.500	7 5/8 x 5 7/8 x 7 3/4 in 19.4 x 14.3 x 19.7 cm	5 3/8 x 4 1/4 in 13.6 x 10.8 cm	10
AD 1642	0.750	9 1/2 x 6 5/16 x 8 1/4 in 24.1 x 16.0 x 21.9 cm	7 1/4 x 4 13/16 in 18.4 x 12.2 cm	10
AD 1643	1.000	8 1/2 x 8 x 9 3/4 in 21.6 x 20.3 x 24.8 cm	6 x 5 in 15.2 x 12.7 cm	10
AD 1644	0.200	8 1/2 x 4 x 5 5/8 in 21.6 x 10.2 x 14.3 cm	6 7/8 x 3 1/8 in 17.4 x 7.9 cm	20
AD 1645	0.500	10 1/4 x 5 5/8 x 7 1/2 in 26.0 x 14.3 x 19.0 cm	8 x 4 1/4 in 20.3 x 10.8 cm	20
AD 1646	0.750	9 3/4 x 6 3/4 x 8 in 24.8 x 17.1 x 20.3 cm	7 1/2 x 4 13/16 in 19.0 x 12.2 cm	20
AD 1647	1.000	11 1/4 x 6 5/8 x 8 3/4 in 28.6 x 16.0 x 22.2 cm	8 3/4 x 4 5/8 in 22.2 x 11.7 cm	20
AD 3060	0.200	8 1/2 x 7 1/4 x 6 1/2 21.6 x 18.4 x 16.5 cm	7 5/16 x 3 3/8 in 18.6 x 8.6 cm	30
AD 3061	0.500	9 3/4 x 7 x 8 3/4 in 24.8 x 17.8 x 22.2 cm	7 13/16 x 3 1/2 in 19.8 x 8.9 cm	30
AD 3062	0.750	10 1/2 x 7 1/2 x 9 1/2 in 26.7 x 19.0 24.1 cm	8 1/2 x 3 5/8 in 21.6 x 9.2 cm	30
AD 3063	1.000	11 x 9 x 9 1/2 in 27.9 x 22.9 x 24.1 cm	8 3/4 x 3 3/4 in 22.2 x 9.5 cm	30
AD 3064	0.200	10 x 7 x 6 1/2 in 25.4 x 17.8 x 16.5 cm	8 13/16 x 3 3/8 in 22.4 x 8.6 cm	40
AD 3065	0.500	11 1/4 x 7 1/4 x 8 3/4 in 28.6 x 18.4 x 22.2 cm	9 1/8 x 3 1/2 in 23.2 x 8.9 cm	40
AD 3066	0.750	12 1/2 x 7 1/2 x 9 1/2 in 31.7 x 19.0 x 24.1 cm	10 1/4 x 3 5/8 in 26.0 x 9.2 cm	40
AD 3067	1.000	12 3/4 x 9 x 9 1/2 in 32.4 x 22.9 x 24.1 cm	10 7/16 x 3 3/4 in 26.5 x 9.5 cm	40
AD 3068	0.200	13 1/4 x 7 1/4 x 6 1/2 in 33.6 x 18.4 x 16.5 cm	12 x 3 3/8 in 30.4 x 8.6 cm	50
AD 3069	0.500	13 1/4 x 7 1/4 x 8 3/4 in 33.6 x 18.4 x 22.2 cm	11 1/8 x 3 1/2 in 28.2 x 8.9 cm	50
AD 3070	0.750	14 1/2 x 7 1/2 x 9 1/2 in 36.8 x 19.0 x 24.1 cm	11 1/8 x 3 1/2 in 28.2 x 8.9 cm	50
AD 3071	1.000	14 3/4 x 9 x 9 1/2 in 37.5 x 22.9 x 24.1 cm	12 7/8 x 3 3/4 12 7/8 in 32.7 x 9.5 cm	50

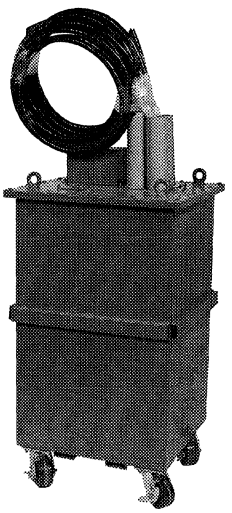
Primaries: 115 V or 230V, 60Hz **Secondaries: 115V**



DEL ELECTRONICS CORP.
One Commerce Park, Valhalla, NY 10595
(800) 811-0638 • (914) 686-3600 • Fax (914) 686-5424
www.delpower.com • sales@delpower.com

TRANSFORMERS AND HIGH VOLTAGE MAGNETICS

HIGH VOLTAGE - LINE ISOLATION TRANSFORMER



OIL FILLED, 300 kV DC MAXIMUM - 150 kVA

- **Features**
- Complete varnish impregnation under vacuum and pressure
- Epoxy anchoring
- Immersed in high grade insulated oil*
- Electrostatic shield between primary and secondary windings
- "AN" type connector provided for input connections
- Good Regulation

*Note: Products are shipped without oil to minimize transportation charges, except when specified otherwise in the order.

- **Specifications**
- Models available with porcelain insulators; also available with polyethylene output cables
- Standard types available for 120 v and 240 v input lines in 1:1, 1:2, and 2:1 voltage ratios with other input and output voltages available upon request
- Recommended for industrial, research and developmental applications

HIGH VOLTAGE - LINE ISOLATION TRANSFORMER

Standard 60Hz Types				
Model No.*	Max. kVA	kV dc Insulation	Tank Size (in.) (WXDXH)**	Insulator Height (in.)***
1-TR-30-XX	1	30	10 x 12 x 11 in 25.4 x 30.4 x 27.9 cm	6
1.5-TR-30-XX	1.5	30	13 x 13 7/8 x 16 1/2 in 33.0 x 35.2 x 27.9 cm	6
1-TR-50-XX	1	50	13 x 13 7/8 x 16 3/8 in 33.0 x 35.2 x 41.9 cm	81/2
1.5-TR-50-XX	1.5	50	13 x 13 7/8 x 16 3/8 in 33.0 x 35.2 x 41.6 cm	81/2
1-TR-60-XX	1	60	9 3/4 x 12 3/8 x 13 3/8 in 24.8 x 31.4 x 31.4 cm	11
2.5-TR-60-XX	2.5	60	16 1/2 x 16 1/2 x 21 3/8 in 41.9 x 41.9 x 54.3 cm	11
3-TR-60-XX	3	60	16 1/2 x 16 1/2 x 21 3/8 in 41.9 x 41.9 x 54.3 cm	11
5-TR-60-XX	5	60	16 1/2 x 16 1/2 x 21 3/8 in 41.9 x 41.9 x 54.3 cm	11
3-TR-75-XX	3	75	16 1/2 x 16 1/2 x 22 in 41.9 x 41.9 x 55.9 cm	11
1-TR-100-XX	1	100	20 3/4 x 17 1/2 x 17 13/16 in 52.7 x 44.4 x 45.2 cm	14
3-TR-100-XX	3	100	20 3/4 x 17 1/2 x 17 13/16 in 52.7 x 44.4 x 45.2 cm	14
1-TR-150-XX	1	150	15 1/2 x 18 3/4 x 24 in 39.4 x 47.6 x 61.0 cm	191/2
3-TR-150-XX	3	150	15 1/2 x 18 3/4 x 24 in 39.4 x 47.6 x 61.0 cm	191/2
0.5-TR-250-XX	0.5	250	25 x 33 x 37 5/16 in 63.5 x 83.8 x 94.8 cm	28 3/4
2-TR-250-XX	2	250	25 x 33 x 37 5/16 in 63.5 x 83.8 x 94.8 cm	28 3/4
3-TR-250-XX	3	250	29 3/4 x 29 3/4 x 36 3/8 in 75.6 x 75.6 x 92.4 cm	28 3/4
5-TR-250-XX	5	250	25 x 33 x 37 1/4 in 63.5 x 83.8 x 94.6 cm	28 3/4
4-TR-300-XX	4	300	39 1/2 x 47 1/2 x 50 1/2 in 100.3 x 120.6 x 128.3 cm	35
Models With Shielded Cables Instead Of Porcelain				
0.5-CTR-250-XX	0.5	250	25 x 33 x 37 5/16 in 63.5 x 83.8 x 94.8 cm	
2-CTR-250-XX	2	250	25 x 33 x 37 5/16 in 63.5 x 83.8 x 94.8 cm	
3-CTR-250-XX	3	250	29 3/4 x 29 3/4 x 36 3/8 in 75.6 x 75.6 x 92.8 cm	
4-CTR-250-XX	4	250	25 x 33 x 37 1/4 in 63.5 x 83.8 x 94.6 cm	
5-CTR-250-XX	5	250	39 1/2 x 47 1/2 x 50 1/2 in 100.3 x 120.6 x 128.3 cm	

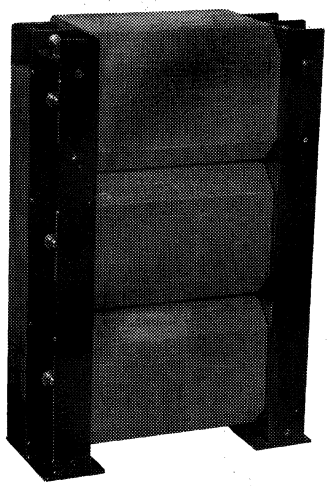
*Note: Add the following suffix in place of XX:

For	Suffix	For	Suffix
120/120	11	240/120	21
120/240	12	240/240	22

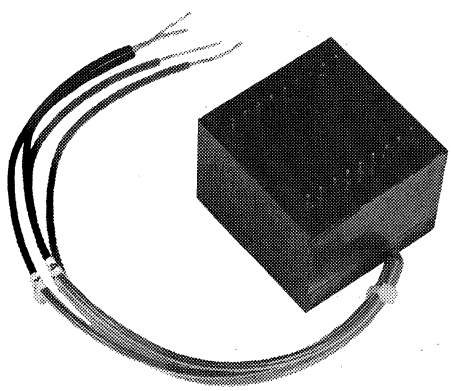
*Note: Dimensions are nominal and outline drawings are available upon request
***Note: If shielded polythyiene output cables are desired in a place of porcelain insulator, designate part number with a "C" prefix, e.g.. 1-CTR-30-XX

DEL ELECTRONICS CORP.
One Commerce Park, Valhalla, NY 10595
(800) 811-0638 • (914) 686-3600 • Fax (914) 686-5424
www.delpower.com • sales@delpower.com

TRANSFORMERS AND HIGH VOLTAGE MAGNETICS

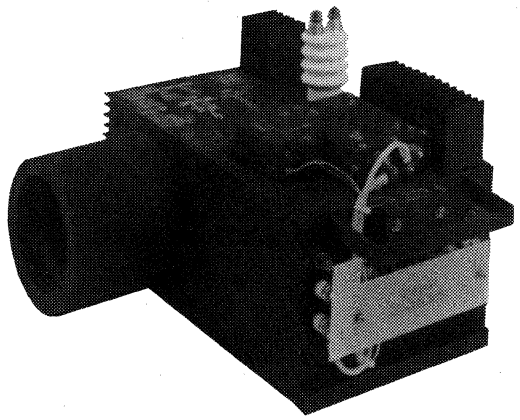


EPOXY-ENCAPSULATED TRANSFORMER
100 kV maximum - 50 kVA
Custom designs for line isolation, pulse, trigger, and rectifier (line and high frequency). Please consult factory for ordering assistance.



INVERTER TRANSFORMERS
Voltage Ratings: 1 kV to 75 kV
Frequency: 5 kHz - 100 kHz
Output Power: 100 w - 200 kV
Packaging: Designed for oil or epoxy packaging.
Custom designed for x-ray, laser, microwave tube, cap charging and other high voltage applications.

DRIVER AND FLYBACK TRANSFORMERS
Transistor, FET, IGBT, SCR, GTO applications
High Voltage Isolation: 1-10 kV



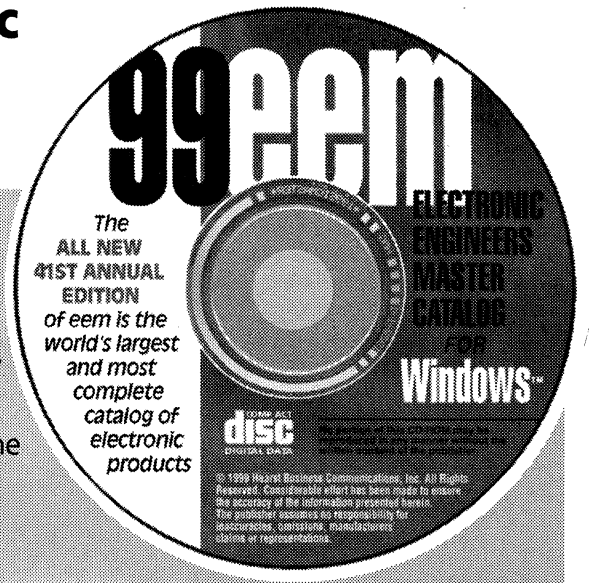
PULSE TRANSFORMER AND CHARGING REACTORS FOR LINE TYPE MODULATORS (Radar and Medical) - Typical Ratings

- **Pulse Transformers - Magnetron**
  output range: 10-40 kV pk (-150 A - 50 A pk current)
  pulse width: 0.25 to 5 microseconds
  Duty: 0.03
- **Pulse Transformers - High Power** 65 kV, 35A
  peak pulse width: 10-65 microsecond
  Duty: 0.03
- **Charging Reactors:** 3 Hy @ 30kV pk - 2.5 A pk
  2.8 Hy @ 15kV pk - 0.4 A pk

Custom designed components for high power microwave applications. Pulse transformer assemblies available with filament transformers for specific tube requirements. Designs available with oil or epoxy dielectric.

1999 EEM CD-ROM *for Windows*

The entire EEM/Electronic Engineers Master on a single compact disk!



With this time-saving search tool on your PC, you have immediate access to all the data that is in the 4-volume 1999 EEM catalog, the world's largest catalog of electronic components, equipment, and services.

The fast and easy-to-use CD-ROM search engine helps you find the Product or Manufacturer you need ... in minutes.

*** Search by Product**
All products are organized by their generic name in 64 main product categories with thousands of sub-categories. Your product search can be as general as "Power Supplies" or as specific as "Power Supplies, Switching, Medical".

*** Search by Manufacturer**
Complete contact information is listed for over 5,300 manufacturers including e-mail and web addresses.

*** Locate, View and Print-Out Product Catalog Data Pages**
Over 4,200 Product Catalog Data Pages supplied by more than 1,000 manufacturers provide you with valuable additional product information.

Save time! Make your job easier!

Order your copy of the

1999 EEM CD-ROM for Windows today!

To order contact Marie Botta at:

Hearst Business Communications, Inc.
645 Stewart Avenue, Garden City, NY 11530
(516) 227-1314 FAX (516) 227-1453
CREDIT CARD HOTLINE: 1-800-833-7138

The EEM CD-ROM for Windows is published annually in October.

See us on the World Wide Web at http://eemonline.com

DYNAGE Power & Magnetics

Division of Oakleaf, Inc.
551 Third Avenue, P.O.Box 95
Canistota, SD 57012
Tel:(605)296-3462
Fax:(605)296-3231

Web Site: www.dynage.com E-Mail: sales@dynage.com

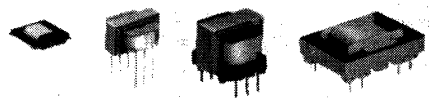
Telecom Transformers

xDSL (Broadband Access) Transformers

- Several ADSL and HDSL transformer products are in the development process at time of printing
- ADSL transformers matched to Analog Devices and Globespan chipsets will be offered
- HDSL transformers matched to Brooktree's chipsets and Level One chipset will be offered
- Also ADSL POTS low pass filters for CPE and CO will be offered, as well as common mode chokes for use in ADSL POTS low pass filters

Telephone Coupling Transformers

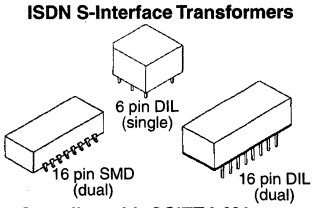
- Low Profile Modem Transformers
- Laptop Modem Transformers
- Telecom Pulse Transformers
- Thru-hole Modem Transformers
- Surface Mount Modem Transformers



Provide line isolation, impedance matching, and line balance and also designed to meet FCC Part 68. Equivalent designs to MicroTran/Tamura, Midcom, Dale, Stancor, and others.
We are your best source for low prices, high quality, and custom designs.

ISDN Transformers

ISDN S-Interface Transformers

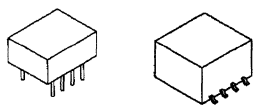


- Complies with CCITT I.430 requirements
- 1.5 kVrms isolation (minimum)
- Models with different turns ratios for various chips

ISDN U-Interface Transformers

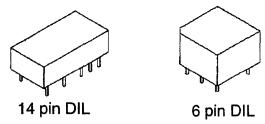
- Models with different turns ratios for various chips
- Complies with ANSI T2.601 requirements
- 1.5 kVrms isolation (minimum)
- Low harmonic distortion

ISDN S/U-Interface Common Mode Chokes



- Reduces common mode noise
- Improves longitudinal conversion loss
- Provides 1.5 kVrms isolation between each winding

ISDN T1/E1-Interface Transformers

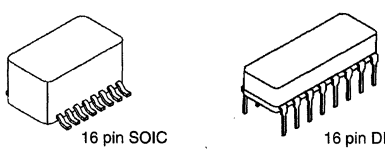


- Single package in 6 pin DIL
- Dual package in 14 pin DIL
- Complies with CCITT G.703 requirements
- Provides 1.5 kVrms isolation between primary and secondary

Transformers and Filters for Local Area Networks

Ethernet AUI Transformers

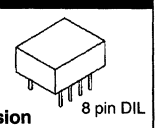
- Transformers for Ethernet 10Base2 and Ethnernet 10Base5 applications
- Provides isolation for AUI (Attachment Unit Interface) ports as required by IEEE 802.3 standards



- Models available in 16 pin DIP (through hole) package and in 16 pin SOIC (surface mount) low profile package

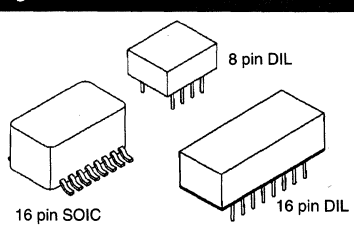
LAN Common Mode Chokes

- For 10BaseT, Token Ring, and 100Mbps applications
- Provides EMI noise suppression
- Devices provide a high impedance to common mode signals over a broad frequency range



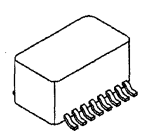
Token Ring Transformers

- These transformers provide the matching impedance required and the isolation necessary for compliance with IEEE 802.5
- Surface mount and through hole models are offered



High Speed LAN Tranformers

- 100Base-TX Fast Ethernet, ATM (over Category 5 UTP cable), and TP/PMD (FDDI over copper) transformer modules with common mode chokes
- 100Mbps and 155Mbps transformers
- Complies with IEEE 802.3 for 100Base-TX, with ANSI x3x12 for TP/PMD and meets requirements as necessary for ATM



Other Transformers

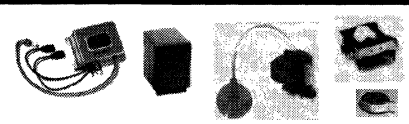
"Pancake" PC Power Transformers

Series PC
- Humbucking (semi-toroidal) type
- 53 models, 24 voltages, 5 sizes
- Dual primaries and secondaries
- VA ratings: 2.5, 6, 12, 24, & 48

Int'l "European Standards" Transformers

Series EP **Series EC**
- Comply to European safety standards
- Dual primaries and dual secondaries
- VA Ratings:2.5, 5, 10, 20, 25, 30, 43, 56, 80, 130, and 175.

Custom Transformers



- Switchmode power, driver, and interstage
- MIL-T-27 transformer types
- High voltage transformers for ignition, capacitor charging, ion generators, etc.
- Standard lamination & toroid type transformers

LOW PRICES *Call or FAX us with your requirements! Ask for product bulletins.* **HIGH QUALITY**

DYNAGE Power & Magnetics

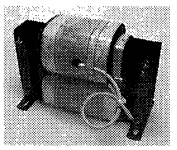
Division of Oakleaf, Inc.
551 Third Avenue, P.O.Box 95
Canistota, SD 57012
Tel:(605)296-3462
Fax:(605)296-3231

Web Site: www.dynage.com *E-Mail: sales@dynage.com*

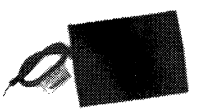
High Voltage Transformers

HV Transformers for Ozone Generators

- Catalog Models up to 15,000 VAC
- Versions include outputs with "one side grounded", center tapped, and floating
- Laminated core type from 50 Hz to 5 KHz
- Ferrite core type to 50 KHz
- Oil-filled versions also available
- Custom transformers can be designed to meet your specific ozone generator application.



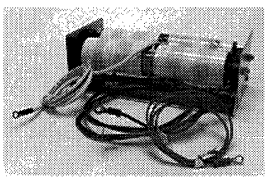
HV Transformer/Multipliers for CRT'S



- Designed to meet FAA and Military Specification Requirements

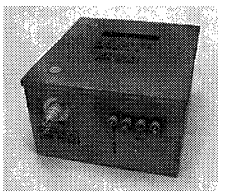
HV Transformers for X-Ray Sources

- Up to 5000 watts power output
- Up to 50 KV peak to peak output voltage for oil-immersed type and up to 20 KV p-p for units not in oil
- Ferrite core type to 50 KHz
- Designed for immersion in oil for some models and unpotted for some models
- Custom transformers can be designed to meet your specific X-ray application



HV Transformer for Air Treatment *(for Produce Storage)*

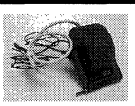
- Unpotted or potted or oil-filled versions available
- Laminated core type up to 1000 Hz frequency
- Up to 25 KV p-p output voltage
- Up to 1000 va power output
- Custom transformers can be designed to meet your specific ozone and free radical air treatment process for reducing produce spoilage in storage and shipment applications



Oil-filled Unit

HV Transformers for Corona Devices *(Automotive)*

- Transformer and driver electronics available for powering corona devices for air pollution control in internal combustion engines
- Driver operates from 12 v battery source and powers the transformer
- Can also be used for powering ozone generators in portable, battery powered applications (deodorizing auto/truck interiors conveniently)



Transformer

Driver

HV Isolation Transformers for Klystron Grid/Filament

- High frequency inverter transformer to provide filament power and grid-to-cathode bias power for Klystron (pulser tube)
- Provides 20 KV normal isolation potential between grid bias winding and three windings, namely two of the filament windings and the input winding; and also between one of the filament windings and the same three windings as listed above.
- Provides 2 KV isolation between the grid bias winding and the one isolated filament winding; and also 2 KV isolation between all other windings.
- Up to 50 KHz input frequency, switched from a 28 vdc source, push-pull

Potted Unit

HV Transformers/Multipliers for Ionization

Applications:
- Powder painting systems
- High voltage meggers for power line maintenance equipment
- Air pollution control units (negative ion generators)
- ESD units

Units are potted under a high vacuum to assure no corona and to provide long life.
Contact us to discuss your specific requirements!

Example of one (1) model
100,000 vdc @ 80 microamps output, 24 vdc input (includes switching DC/DC converter circuitry) and size is 2" diameter by 10" long

Other Custom HV Transformers

Applications Include:

- X-ray machines
- Laser Ignition
- Capacitor charging
- Dog Collar
- ARC Lamps
- Test Equipment

Contact us for any other HV requirements

Wall Plug-In, Desktop, and Wall Mount Adapters

- AC/AC Adapters
  Up to 14 case sizes are offered with a variety of output cord and connector configuations to meet your specific requirement.
- AC/DC Adapters
  These adapters are unregulated, filtered, DC output units offered in up to 14 case sizes with a wide variety of output cord and conector configurations.
- AC/DC Regulated Units (both linear and swithching)
  Both linear and switching regulated units are offered in wall plug-in and desktop case types.
- Custom designs to meet your exact requirements
- Standard designs available with UL, cUL and CE Mark
- UL, cUL, TUV and other safety test submittals upon request
- Quick deliver on preproduction units (made in USA)
- Low Prices
- High Quality

Wall plug-ins for North American receptacles

Wall plug-ins for International receptacles

Desktop and wall mount units

LOW PRICES ***Call or FAX us with your requirements! Ask for product bulletins.*** ***HIGH QUALITY***

EAG ELECTRONICS
http://www.eagelec.com

EAG Electronics
409 Noble Road • Girard, PA 16417
Toll Free: 888-774-3054 • Fax: 814-774-2737

Call factory for technical and design assistance

Standard Electrical Properties

- 115/230V 50/60Hz primary
- 5VAC to 230VAC secondary
- 1VA to 80VA PC mount

Custom Options

- High voltage to 15 KV
- 50/60 Hz up to 5KVA
- 400 Hz up to 10KVA

Standard Construction

- Precision automated winding
- SMT, PC mount, Leads, Terminals
- Split bobbins including low and high profile
- Ferrite, Steel lamination, Powdered iron
- All common Pin configurations

Custom Options

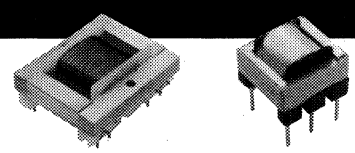
- VDE and International bobbins
- Vacuum Impregnation
- Moisture seal
- Encapsulation

Laminated Power Transformers

Computers, Instruments, Power supplies, Control equipment

- Single and dual primaries
- Dual secondaries
- Split bobbins for high isolation
- Common PIN configurations

Audio - Digital



Telecommunications, Cellular, Modem (TV/Audio)

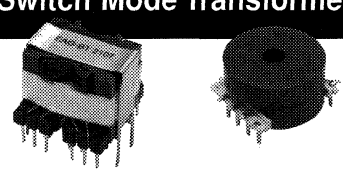
- High voltage isolation and impedance matching
- High grade laminations for flat frequency response
- Low profile construction
- Thru-hole or Surface Mount (SMT)

Surface Mount

Telecommunication - Cellular - Computer

- Smallest footprints available
- 100% Electrical and Mechanical testing
- Precision automated assembly for consistent repeatability and reliability

Switch Mode Transformers



Power, Filter, Current sense

- Frequencies to 1MHz
- VA ratings IVA to 50 KVA
- Wide array of construction options

Pulse - Trigger

- SCR, IGBT, MOSFET
- High dI/dt, dV/dt
- Economical slug core designs for SCR's

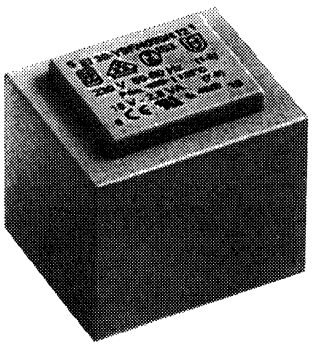
Custom Magnetic Products

- Air coils
- Toroids
- Chokes
- Bobbins
- Inductors
- Cable assemblies
- Wire harnessing

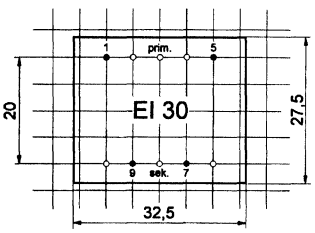
*Toll Free: **888-774-3054** for literature*

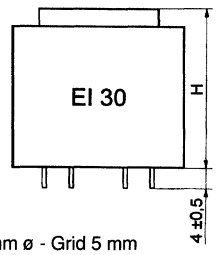
EICHHOFF

Eichhoff offers you advanced technology and custom capability in Miniature and Safety Transformers, to 100VA



Transformers EI30





View from PCB - Solder pins 0.8 mm ø - Grid 5 mm

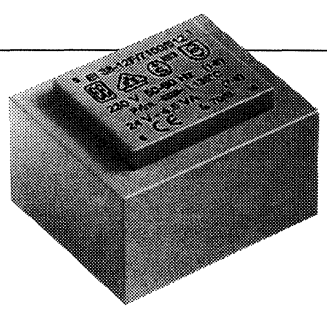
EI30

110-380 VAC input range
0.5-2.8 VA output range

Epoxy encapsulated transformers offer:

- Higher VA Rating in a small package
- UL & VDE Safety Approvals
- Custom Designs Available Upon Request

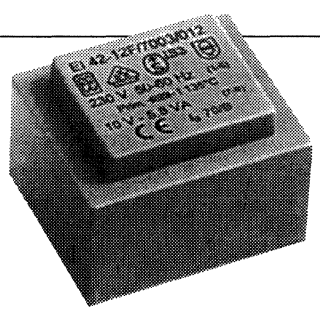
Type	ta	5 PRI 1 — 7 SEC 9	6 SEC 1, 5 PRI 1, 7 9, SEC 2 10	VDE IS3 230V-250V 50-60 Hz	UL 110V-120V 230V-250V 50-60 Hz
EI30-X10/7.../...	70°C/B	6...24V - **0,55 VA**	2x6...12V - **2x0,20 VA**	x	x
EI30-X10/7.../...	70°C/B	6...24V - **0,70 VA**	2x6...12V - **2x0,30 VA**	x	x
EI30-X6/7.../...	70°C/B	6...28V - **1,50 VA**	2x6...14V - **2x0,65 VA**	x	x
EI30-X6/4.../...	40°C/B	6...26V - **1,70 VA**	2x6...13V - **2x0,75 VA**	x	
EI30-Y7/7.../...	70°C/B	6...29V - **1,70 VA**	2x6...14V - **2x0,75 VA**	x	x
EI30-Y7/4.../...	40°C/B	6...27V - **2,00 VA**	2x6...13V - **2x0,90 VA**	x	
EI30-Y8/7.../...	70°C/B	6...28V - **2,00 VA**	2x6...14V - **2x0,90 VA**	x	x
EI30-Y8/4.../...	40°C/B	6...27V - **2,40 VA**	2x6...13V - **2x1,10 VA**	x	
EI30-Y8F/7.../...	70°C/B	6...32V - **2,40 VA**	2x6...16V - **2x1,10 VA**	x	x
EI30-Y9/7.../...	70°C/B	3...28V - **2,30 VA**	2x3...14V - **2x1,00 VA**	x	x
EI30-Y9F/7.../...	70°C/B	6...30V - **2,70 VA**	2x6...15V - **2x1,25 VA**	x	x
EI30-Y9/4.../...	40°C/B	6...28V - **2,80 VA**	2x6...14V - **2x1,30 VA**	x	



EI38

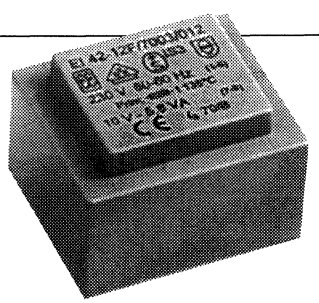
110-380 VAC input range
2.0-4.0 VA output range

- All types up to 100 VA output
- Transformers with or without internal fusing
- Pricing & Delivery



EI42

110-380 VAC input range
4.0-7.5 VA output range



EI48

Safety Transformers

110-380 VAC input range
9.0-12.0 VA output range

Eichhoff Electronics, Inc.
205 Hallene Road, Warwick, RI 02886 • Tel: (401) 738-1440 • Fax: (401) 738-7154
E-mail:sales@eichhoff.com • WebSite:www.eichhoff.com

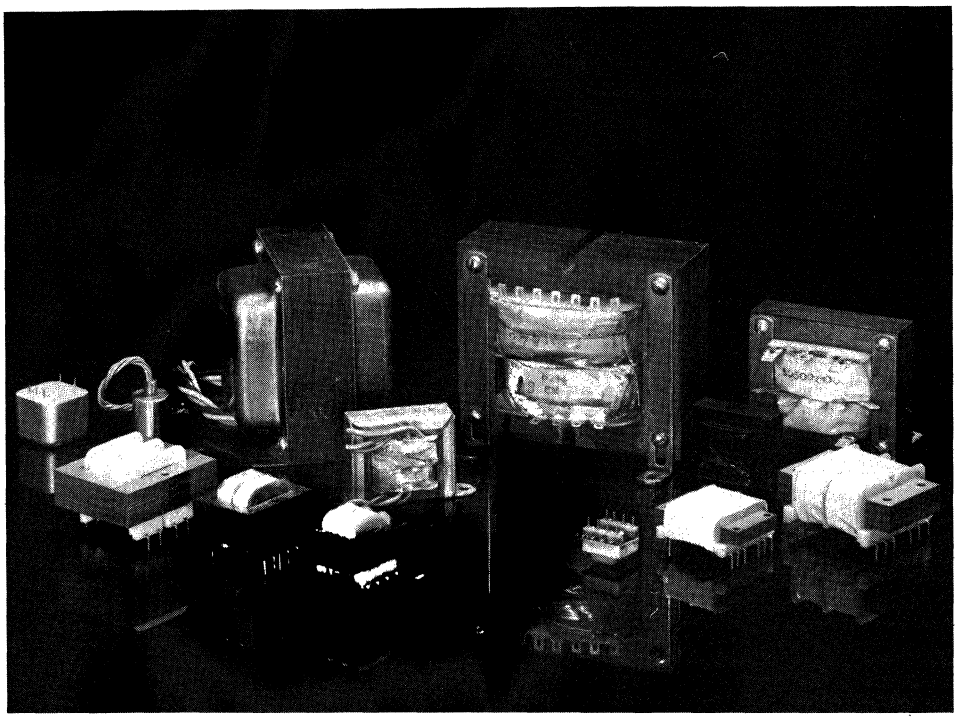
ISO 9001

Toll Free 1-800-678-1040

Electromech

TRANSFORMERS

FULL LINE OF QUALITY MAGNETIC COMPONENTS • TAILORED TO YOUR EXACT NEEDS



- **POWER**
- **ISOLATION**
- **CONTROL**
- **AUTO**
- **STEPUP**
- **STEPDOWN**
- **CURRENT**
- **C.V.T.**
- **CHOKES**
- **HI FREQ**
- **INDUCTORS**

FEATURES

TRANSFORMERS

Power—.5VA to 50KVA

115V, 57 to 63 Hz
115/230V, 47 to 63 Hz
International power input, 47 to 63 Hz
400 Hz
Single or multi outputs
For power supply, control, filament & rectifier circuits (+5, ±12, ±15 or any combination)
• Non concentric winding technique • Minimum inter-winding capacitance • Excellent isolation • Very low leakage • Minimum electrical noise • High efficiency • UL recognized components for Class B (130°C)

Hi Freq—Up to 40 KHz

Ferrite cores
Switching power supply
AC-DC converter
DC-DC converter
Inverter

Current—Up to 500 Amp

Sense
Instrumentation
Measuring devices
AC and DC

INDUCTORS

Power—50, 60, 400 Hz

1 μH to 50H of inductance
1μ Amp to 60 Amp of current

Hi Freq—Up to 100 KHz

1 μH to 50H of inductance
Switching power supply
Ferrite cores
Converter
Inverter

FORMATS

PC MOUNT

(Hi Pot 4K VRMS)

• Low profile • Split pack
• Horizontal • Vertical

CHASSIS MOUNT

(Hi Pot 4K VRMS)

• Low profile • Split pack
• Quick connect, solder tab, lead wire, or any type of termination
Open frame/Closed frame

SERVICES

• Design to your specifications • Design to UL standards • First article engineering sample within one week • No engineering set up charge • O.E.M. services • 100% Q.C.—guaranteed reliability • Our CAD system eliminates the need for a catalog

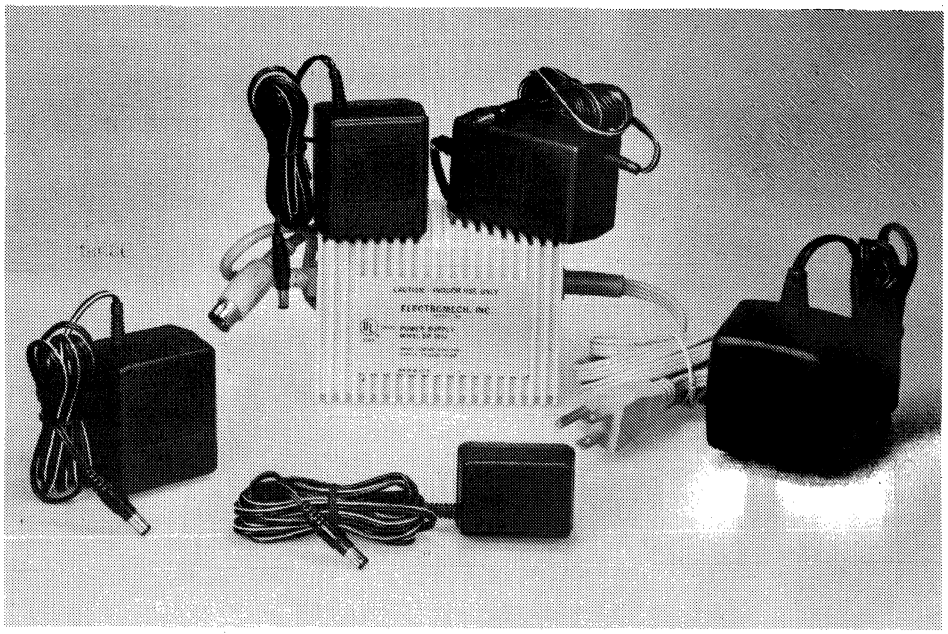
Electromech — THE LAST WORD IN TRANSFORMERS

Electromech • 2 Cordier Street • Irvington, New Jersey 07111 • (973) 318-7999 • FAX (973) 318-7995

Electromech

TRANSFORMERS

WALL PLUG-IN/DESK TOP POWER SOURCES • TAILORED TO YOUR EXACT NEEDS



- **FULL ISOLATION**
- **AC/AC**
- **AC/DC (unreg)**
- **AC/DC (reg)**
- **BATTERY CHARGERS**
- **LINEAR SUPPLIES**

FEATURES

Power—.1VA to 40VA (WALL PLUG-IN)
.1VA to 1KVA (DESK TOP)

Input—100VAC to 240VAC

Freq.—47Hz to 400Hz

Output—.1V to 200V (WALL PLUG-IN)
.1V to 1KV (DESK TOP)

Current—.01A to 5A (WALL PLUG-IN)
.01A to 400A (DESK TOP)

Termination—CONNECTORS, SCREW TERM. ETC.

SERVICES

- DESIGNED TO YOUR SPECIFICATIONS
- DESIGNED TO UL/CSA/VDE/IEC
- FIRST ARTICLE ENGINEERING SAMPLE WITHIN ONE (1) WEEK
- NO MINIMUM ORDER QUANTITY
- NO ENGINEERING CHARGE
- 100% Q.A.

Electromech — **THE LAST WORD IN TRANSFORMERS**

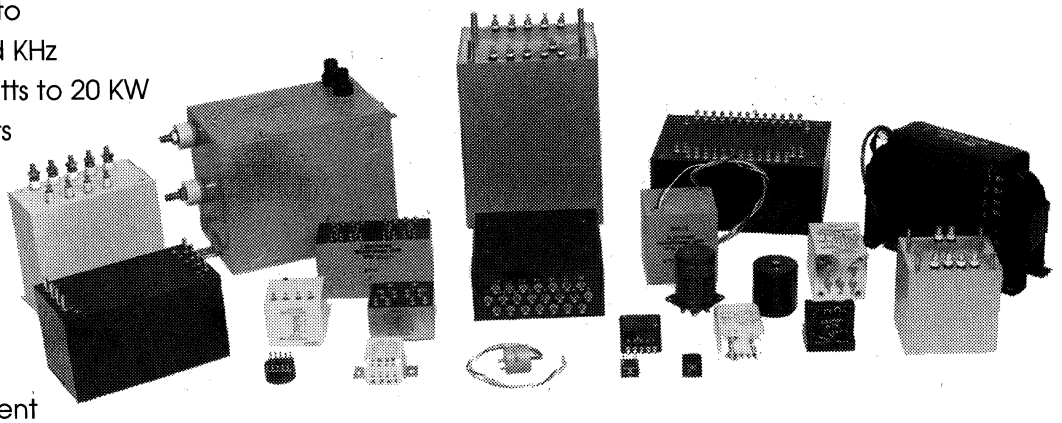
Electromech • 2 Cordier Street • Irvington, New Jersey 07111 • (973) 318-7999 • FAX (973) 318-7995

CUSTOM TRANSFORMERS FOR OVER 60 YEARS

INDUSTRIAL ☆ COMMERCIAL ☆ MEDICAL MILITARY

Our Range of Products:

- ❑ Frequency: DC to several hundred KHz
- ❑ Power: Microwatts to 20 KW
- ❑ Voltage: Millivolts to 10 KV
- ❑ Current: Microamps to 500A
- ❑ Replacement transformers for current equipment



Military, Commercial, Industrial, & Medical:
Manufactured to MIL-T-27 UL, CSA, and UL 544

QPL listed for MIL-T-27E:
Grade 4 - Hermetically sealed - Metal encased
Grade 5 - Encapsulated

Catalog Listing of 12,000 - 5950 Federal Stock Numbers Available Upon Request.

Our Manufacturing facility is housed in a 3 story, 42,000 square foot building containing spacious office and assembly areas as well as our own sheet metal, machine shop and test lab.

Our quality control system is in accordance with MIL-1.45208. We are MIL-STD-2000 soldering certified. All products are 100% tested before shipping.

Prototypes: Complete facilities to design, engineer and produce prototypes.

Our employees, with many years of experience, produce products with quality built in. We guarantee normal usage for 36 months or free replacement.

Products Manufactured

- ❑ Chokes
- ❑ Filter Inductors
- ❑ Power Inductors
- ❑ Reactors
- ❑ Transformers, Audio
- ❑ Transformers, Constant Voltage
- ❑ Transformers, Converter
- ❑ Transformers, Current
- ❑ Transformers, Filament
- ❑ Transformers, High Voltage
- ❑ Transformers, Isolation
- ❑ Transformers, Printed Circuit
- ❑ Transformers, Power
- ❑ Transformers, Pulse
- ❑ Transformers, Precision Ratio
- ❑ Transformers, Step Down & Step Up
- ❑ Transformers, Toroidal
- ❑ Transformers, Three Phase

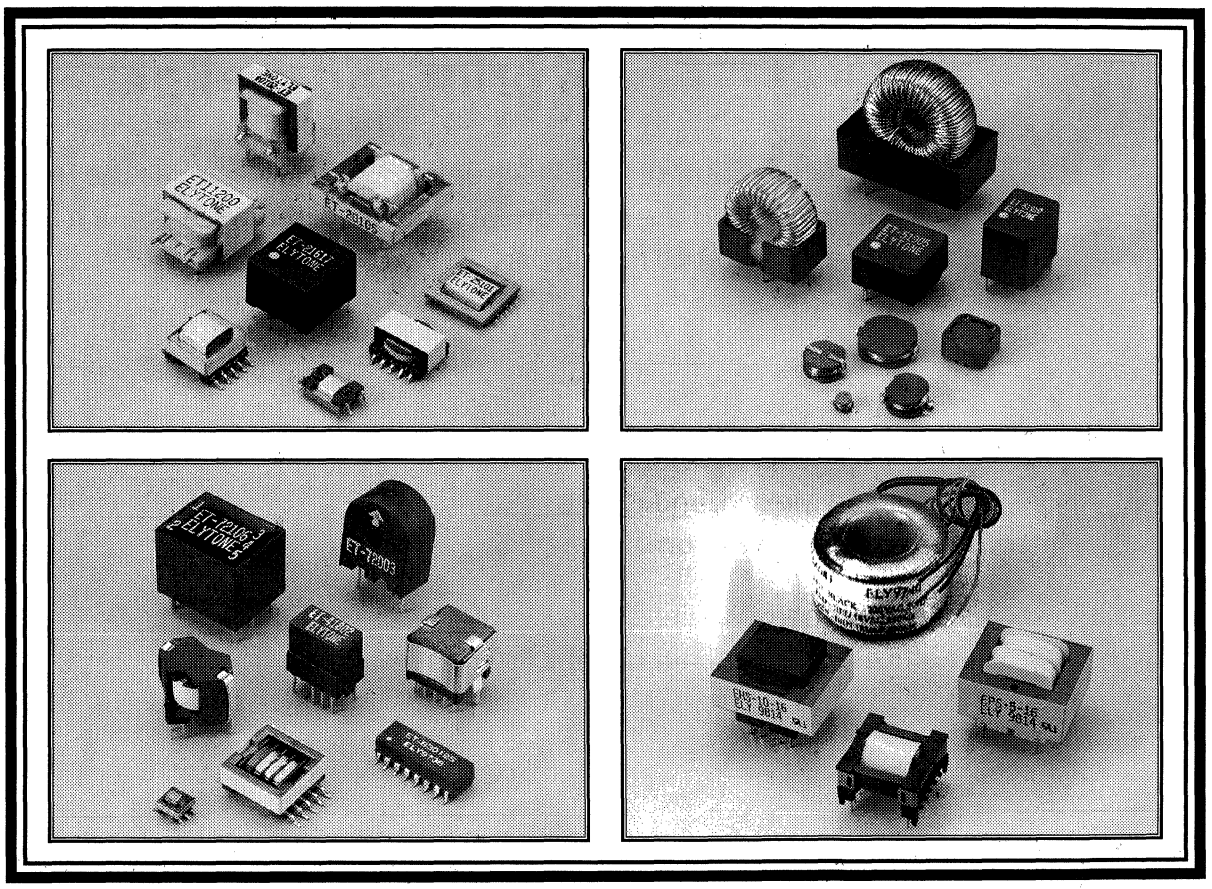
ELECTRONIC TRANSFORMER CORP.
FREED TRANSFORMER CO. DIV. OF

460 TOTOWA AVENUE
PATERSON, NJ 07522
PHONE (973) 942-2222
FAX (973) 942-9014
EMAIL: etcme@ix.netcom.com

音津電子公司

ELYTONE ELECTRONICS CO., LTD.

6175 Commadore Court, Columbia, MD 21045
PHONE: (410) 740-8231 ■ FAX: (410) 997-7037
Email:Elytone@ix.netcom.com



Surface Mount and Thru-hole
Tape and Reel Packaging
Tube and Tray Packaging
Custom Design or
Standard Products
World Class Quality
Low Price
Call Now About
UL Recognized Parts

ISO CERTIFIED 9001

Inductors:

- Common-mode
- Power
- SMD Power
- Filter
- Low Profile

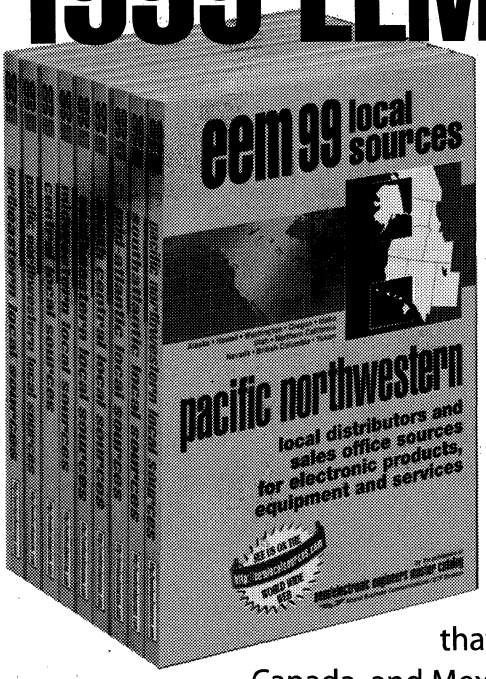
Power Transformers:

- Switching-Mode
- Switching Power
- International Series
- Current Sensor
- Gate Drive

Telecommunications Transformers:

- Pulse (T1)
- Voice Coupling
- Line
- LAN
- Data Coupling
- Hybrid
- Filter
- Isolation
- PCMCIA
- Internat'l Telephone Coupling

1999 EEM Local Sources



You found the part, now you can find the localsource... in print and on-line!

You use EEM/Electronic Engineers Master all the time to find the components you need. But what about a local source for the part?

Now you can turn to **EEM Local Sources** for all your local distributors. This valuable time saver is printed in nine regional editions that cover the United States, Canada, and Mexico, and is on the World Wide Web at **http://eemlocalsources.com.**

EEM Local Sources is a comprehensive directory to local distributors and sales offices for the manufacturers listed in EEM and in EEM's sister publication, the IC MASTER. For easy reference, the **EEM Local Sources** product index lists the products in both EEM and the IC MASTER.

You found the part, now you can find the local source in EEM Local Sources!

EEM Local Sources is your direct link to the distributors and sales offices in your local area. In print, there are nine regional editions:

- ▶ Northeastern
- ▶ Midwestern
- ▶ Mid Atlantic
- ▶ Central
- ▶ South Atlantic
- ▶ Pacific Northwestern
- ▶ Southeastern
- ▶ Pacific Southwestern
- ▶ South Central

To order

a printed copy of the **1999 EEM Local Sources** for your region, contact Marie Botta at:

Hearst Business Communications, Inc.
645 Stewart Avenue
Garden City, NY 11530
(516) 227-1314 • FAX (516) 227-1453
Credit Card Hotline: 1-800-833-7138

See us on the World Wide Web at http://eemlocalsources.com

EEM Local Sources is published annually in October.

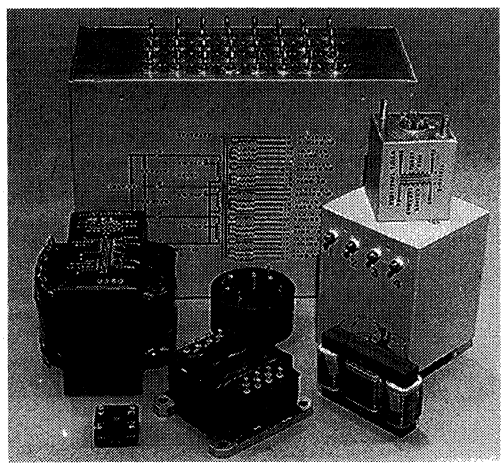
EMS DEVELOPMENT CORPORATION

95 Horseblock Road, PO Box 640, Yaphank, NY 11980
Telephone: 516 345 6200 Fax: 516 345 6216

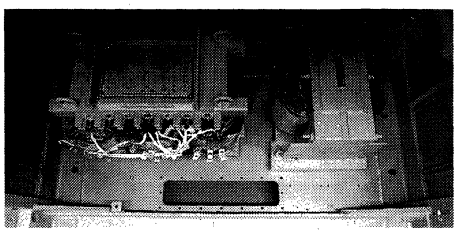
Ultra ELECTRONICS

Custom High Reliability Transformers and Inductors

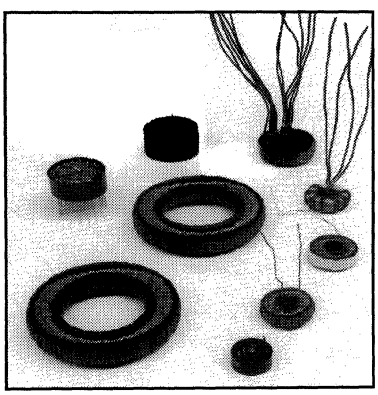
MIL-T-27E • Industrial • Commercial • Aerospace



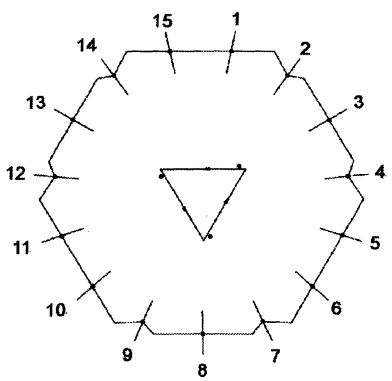
MIL-T-27E Grades 4, 5 & 6
Power Rating to 10 KVA
Frequencies up to 500 Khz.
Single-phase and poly-phase



200° C Insulation System
Welded Construction
Certified to MIL-STD-1595
MIL-S-901 Shock
Power Rating to 60 KVA



Toroids up to 5 inch O.D.
for most applications.



3 phase to 15 phase Ring
Transformer.
For applications where 3%
max. input harmonics must
be met as per
MIL-STD-1399, Sect. 300A.
Power Rating to 25 KVA

- **Highest Quality Materials**
- **Conservative Design Engineering**
- **Custom Designs to meet your Specifications**
- **Computer Aided Design Department**
- **Engineering prototype design**
- **Facility Approved to MIL-I-45208A**
- **Soldering certified J-STD-001.**
- **On-time deliveries**

A subsidiary of Ultra Electronics Defense, Inc.

Web Site: http://www.li-web.com/ems
E-mail: EmsDevCorp@aol.com

Ensign Corporation

Established 1939

CUSTOM TRANSFORMERS

- ISO-9001 CERTIFIED; UL REGISTERED FIRM File #A5402
- FULL ENGINEERING DESIGN SERVICES
- CENTRALLY LOCATED DOMESTIC MANUFACTURING FACILITY
- OFF-SHORE HIGH VOLUME - LOW COST MANUFACTURING AVAILABLE
- ANNUAL VOLUME PRICING BASED UPON ESTIMATED ANNUAL USAGE
- UL, cUL, CSA, VDE, TUV and other INTERNATIONAL SAFETY STANDARDS

We provide for:

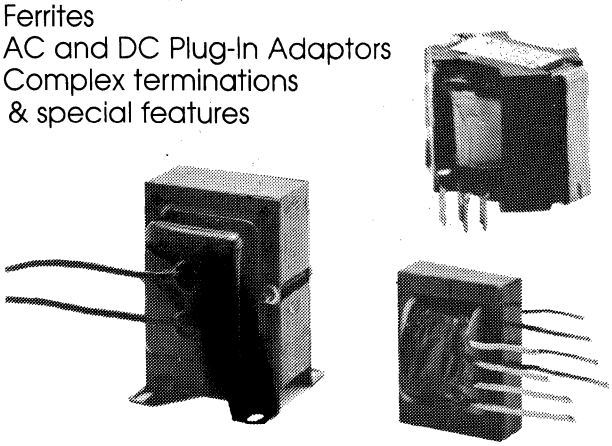
- Expedited and economical UL approval by the use of UL recognized insulation systems, 130°C to 200°C.
- Custom designs up to 1KVA to a wide variety of UL/CSA/International standards.

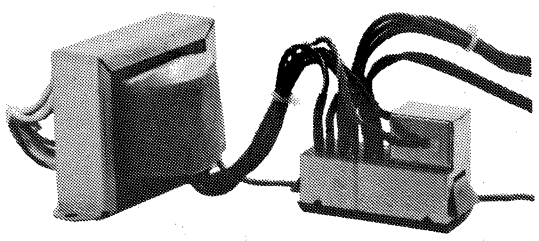
Our designs include:

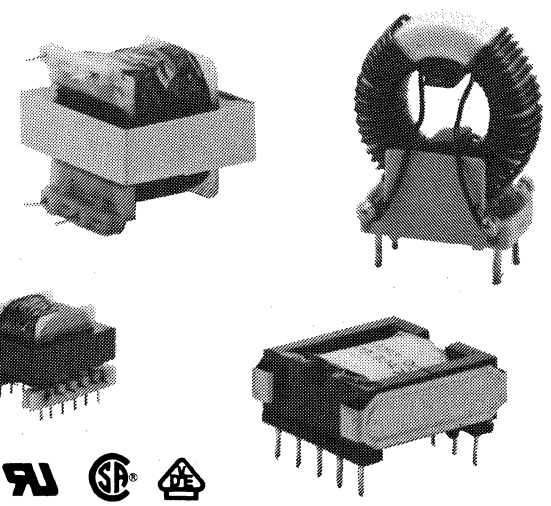
- Power Transformers
- Interstage
- Iron-Core Chokes
- Most other types of Iron-Core Transformers
- Ferrites
- AC and DC Plug-In Adaptors
- Complex terminations & special features

Industry Applications:

- Industrial Controls
- Medical & Dental Equipment
- HVAC
- Lighting & Security
- Information Technology
- Audio & Video Equipment
- Water treatment & distribution
- Consumer Products







AC AND DC PLUG-IN ADAPTORS

UL and cUL listed direct plug-in adaptors.
Available from 3 to 19 watts.
Output voltages ranging from 3 to 24V AC or DC.
Custom designs available for other power levels, output voltages, and international standards.

Ensign Corporation • 7960 S. MADISON STREET, BURR RIDGE, IL 60521 • PHONE: 630/325-9343 • FAX: 630/789-3206

ASK FOR OUR CURRENT LITERATURE

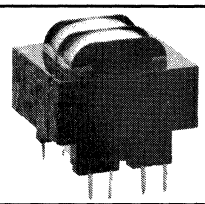
Ensign Corporation

Established 1939

PRE-DESIGNED TRANSFORMERS

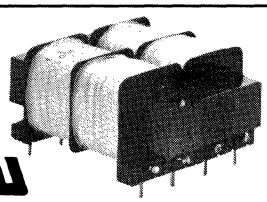
Reduce the time and cost to go from concept to market by using pre-engineered safety agency approved power transformers. Use as is or make custom modifications. UL insulation systems from 130°C to 200°C. Except where noted, all operate in both 50 Hz and 60 Hz applications.

PRINTED CIRCUIT



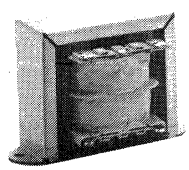
The industry standard for printed circuit applications. Sizes to 36 VA. Output ranges from 5 VAC to 120 VAC.

PRINTED CIRCUIT (LOW PROFILE)



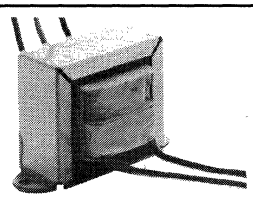
Ideal for multi-layer PCB's, or in tight quarters. Complete winding isolation. Sizes to 48 VA. Output ranges from 5 VAC to 240 VAC.

QUICK-CONNECT/ SOLDER TERMINALS



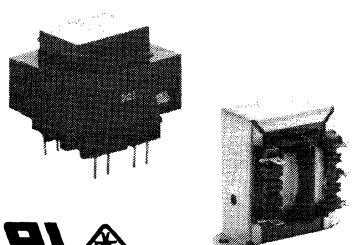
Securely anchored integral terminals function either as convenient solder lugs or 3/16" male quick-connects. Sizes to 100 VA. Output ranges from 10 VAC to 120 VAC. Chassis mount.

COLOR-CODED LEAD WIRES



Inputs and outputs easily identified by 600V rated lead wires. Ready for harnessing or direct soldering. 6" standard, other lengths upon request. Sizes to 100 VA. Output ranges from 10 VAC to 120 VAC. Chassis mount.

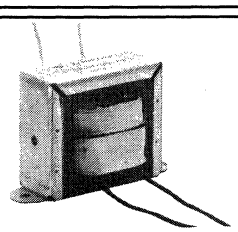
INTERNATIONAL



UL, cUL, VDE approved. 4000V dielectric strength. Provide creepage & clearance distances. Windings enclosed in protective shroud. Single, dual, or multi-tap inputs.

Printed circuit versions in sizes to 80 VA. Chassis mount versions with solder lugs, quick-connect terminals, or color-coded lead wire in sizes to 200 VA. Output ranges from 10 VAC to 240 VAC.

LOW VOLTAGE (12V) LIGHTING



60 Hz applications only. Available in 120V, 120/240, 208, 240, 277, & 120/277V input versions. Output voltage regulation specifically designed for 12V halogen & incandescent lamps.

50 watt & 75 watt sizes standard. UL 200°C insulation systems standard. Available in several chassis mount styles.

Ensign Corporation • 7960 S. MADISON STREET, BURR RIDGE, IL 60521 • PHONE: 630/325-9343 • FAX: 630/789-3206

ASK FOR OUR CURRENT LITERATURE

EPCO Transformers

For the one stop solution to your transformer needs

914-895-2033

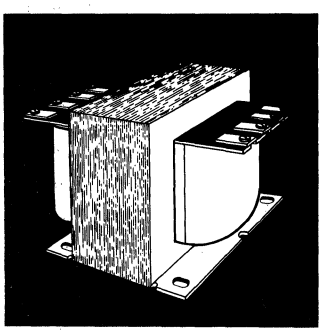
Epco has over forty years of experience in designing and building quality engineered transformers for a broad range of industrial applications. From prototype through production; let us put our extensive engineering database to work on your application.
Give us a call to discuss any new or existing design requirements and experience our personal service and attention to detail.

TRANSFORMER TYPES

- Control
- Isolation
- Current
- Saturable Reactor
- Plate/Filament
- Step Up/Step Down
- Inductor
- Ferroresonant
- Auto
- Potential
- Power
- Choke

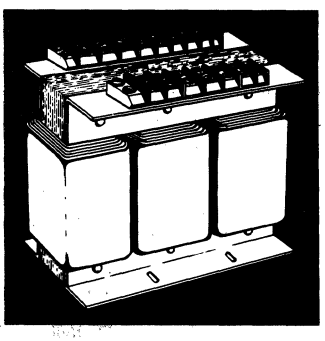
CAPABILITIES

- 50 VA to 100 KVA
- Input & Output Voltage to 5 KV
- Open, Encapsulated, and Enclosed
- Manufactured to Meet CE, UL, VDE, CSA, IEC and MIL T 27 Standards.



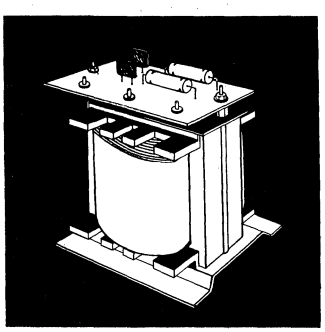
SINGLE PHASE POWER TRANSFORMERS

Applications: Isolation, Auto Transformer, Industrial Controls, Rectifier, Step Up Step Down, Low Voltage. These are just some of the many power transformer applications.
Input and Output Voltage: To 5 KV
Operating Frequency: 50-400 Hz
KVA: To 30 KVA



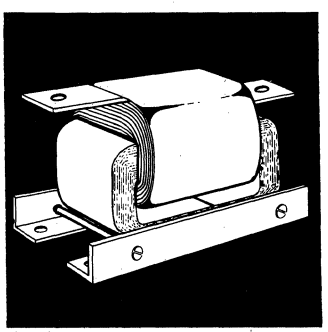
THREE PHASE POWER TRANSFORMERS

Applications: Three phase units will be used in many of the same applications as are listed with the single phase transformer above. As with the single phase transformer, units can be designed to provide a wide variety of lead or terminal arrangements to suit your own particular needs.
Input and Output Voltage: To 5 KV
Operating Frequency: 50-400 Hz
KVA: To 100 KVA



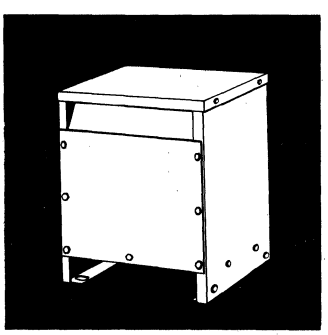
HI FREQUENCY SWITCHERS

Applications: Power DC circuits designed to take advantage of the latest advanced light weight transformer design technology. Hi Frequency inductors designed to accommodate these types of circuits are also available.
Operating Frequency: To 25 Khz
KVA: To 1 KVA



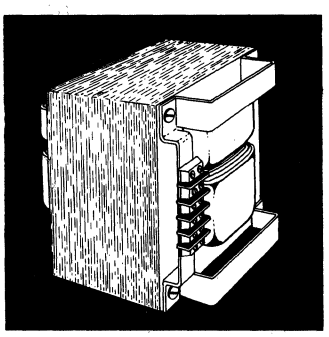
INDUCTORS/REACTORS

Applications: Smoothing Choke, Filtering DC Rectifier Circuits, SCR Circuits, Line Reactors, AC Inductors, Load Banks.
Operating Frequency: 50 Hz to 25 Khz
KVA: To 30 KVA
Load Current: Up to 250 amps



NEMA I ENCLOSED

Applications: Each single phase and three phase unit can be supplied open frame, NEMA I enclosed or in a suitable enclosure of your choice. In addition wall mount and epoxy filled units for outdoor use are available at your request.



FERRORESONANT TRANSFORMERS

Applications: Constant voltage transformers are used wherever circuitry is sensitive to swings in line voltage and are used in many of the same applications as the power transformers. Units typically can be designed to maintain your secondary output within ±1% of nominal while your input varies ±15%.
Operating Frequency: 50, 60 Hz
KVA: To 10 KVA

CALL FACTORY FOR YOUR LOCAL REPRESENTATIVE

EPCO Products, Inc
http://www.epco.com
Box N Cottage Street • Wallkill, NY 12589 (914) 895-2033 • Fax (914) 895-2279

UL1585 (E169010)
UL506 (E73539)

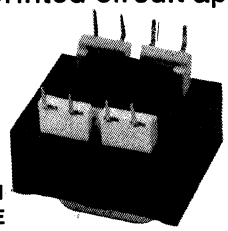
CSA22.2, No. 66
LR68051-2

130B
(OBJY2)
E80130

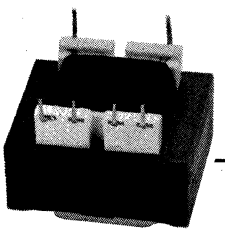
Miniature Split-Bobbin Plug-In Power Transformers

For printed circuit applications

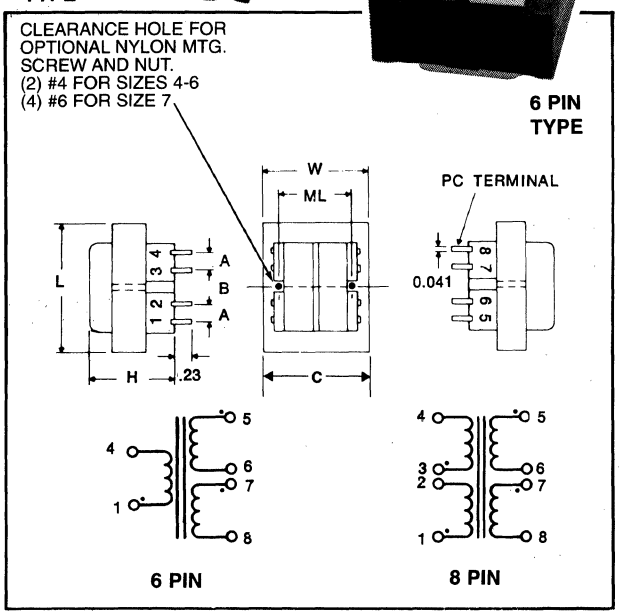
SPLIT BOBBIN — HIGHLY ISOLATED



8 PIN TYPE



6 PIN TYPE



TRANSFORMERS WOUND ON A SPLIT BOBBIN PERMIT THE PRIMARIES AND SECONDARIES TO BE WOUND SIDE BY SIDE RATHER THAN ONE OVER THE OTHER.

FEATURES ARE:

2500V RMS Hipot

Elimination of electro-static shield

No cross-overs of primary and secondary leads

UL Recognized Class B (130 degrees C) insulation system

Secondaries can be series or parallel connected.

Transformers can be supplied with multiple primary ratings:

Primary Rating			
No Letter	115V	50/500Hz	6 pin
C	230V	50/500Hz	6 pin
D	115V/230V	50/500Hz	8 pin
E	277V	50/500Hz	6 pin
H	230V/460V	50/500Hz	8 pin

*UL1585 Approved, Class 2 Not Wet, Class 3 Wet.

Size	VA	L	W	H	ML	A	B	C	Lbs.
2	1.1	1 3/8	1 1/8	15/16	—	.250	.250	1.200	0.17
3	2.4	1 3/8	1 1/8	1 3/16	—	.250	.250	1.200	0.25
4	6	1 5/8	1 5/16	1 5/16	1 1/16	.250	.350	1.280	0.44
5	12	1 7/8	1 9/16	1 7/16	1 1/4	.300	.400	1.410	0.70
6	20	2 1/4	1 7/8	1 7/16	1 1/2	.300	.400	1.600	0.80
7	36	2 5/8	2 3/16	1 9/16	†	.400	.400	1.850	1.10

†Size 7 has 4 mtg. holes on 2 3/16 x 1 3/4 centers.

EWC, Inc. reserves the right to make changes without notice in design and specifications in order to effect product improvement.

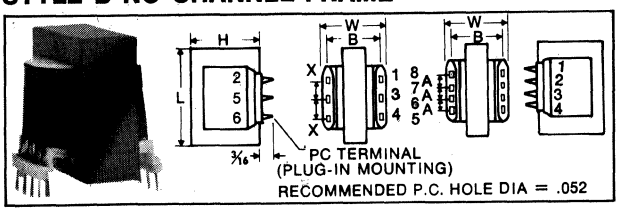
Part Number	Secondary RMS Rating	
	Series	Parallel
_ST 2-10B41*	10V C.T. @ 0.11A	5V @ 0.22A
_ST 3-10B1 *	10V C.T. @ 0.25A	5V @ 0.5A
_ST 4-10B2	10V C.T. @ 0.6A	5V @ 1.2A
_ST 5-10B3	10V C.T. @ 1.2A	5V @ 2.4A
_ST 6-10B4	10V C.T. @ 2A	5V @ 4A
_ST 7-10B51	10V C.T. @ 3.6A	5V @ 7.2A
_ST 2-12B42*	12.6V C.T. @ 0.09A	6.3V @ 0.18A
_ST 3-12B5 *	12.6V C.T. @ 0.2A	6.3V @ 0.4A
_ST 4-12B6	12.6V C.T. @ 0.5A	6.3V @ 1.0A
_ST 5-12B7	12.6V C.T. @ 1.0A	6.3V @ 2.0A
_ST 6-12B8	12.6V C.T. @ 1.6A	6.3V @ 3.2A
_ST 7-12B52	12.6V C.T. @ 2.85A	6.3V @ 5.7A
_ST 2-16B43*	16V C.T. @ 0.07A	8V @ 0.14A
_ST 3-16B9 *	16V C.T. @ 0.15A	8V @ 0.3A
_ST 4-16B10	16V C.T. @ 0.4A	8V @ 0.8A
_ST 5-16B11	16V C.T. @ 0.8A	8V @ 1.6A
_ST 6-16B12	16V C.T. @ 1.25A	8V @ 2.5A
_ST 7-16B53	16V C.T. @ 2.25A	8V @ 4.5A
_ST 2-20B44*	20V C.T. @ 0.055A	10V @ 0.11A
_ST 3-20B13*	20V C.T. @ 0.12A	10V @ 0.24A
_ST 4-20B14	20V C.T. @ 0.3A	10V @ 0.6A
_ST 5-20B15	20V C.T. @ 0.6A	10V @ 1.2A
_ST 6-20B16	20V C.T. @ 1A	10V @ 2A
_ST 7-20B54	20V C.T. @ 1.8A	10V @ 3.6A
_ST 2-24B45*	24V C.T. @ 0.045A	12V @ 0.09A
_ST 3-24B17*	24V C.T. @ 0.1A	12V @ 0.2A
_ST 4-24B18	24V C.T. @ 0.25A	12V @ 0.5A
_ST 5-24B19	24V C.T. @ 0.5A	12V @ 1.0A
_ST 6-24B20	24V C.T. @ 0.8A	12V @ 1.6A
_ST 7-24B55	24V C.T. @ 1.5A	12V @ 3.0A
_ST 2-28B46	28V C.T. @ 0.04A	14V @ 0.08A
_ST 3-28B21	28V C.T. @ 0.085A	14V @ 0.17A
_ST 4-28B22	28V C.T. @ 0.2A	14V @ 0.4A
_ST 5-28B23	28V C.T. @ 0.42A	14V @ 0.84A
_ST 6-28B24	28V C.T. @ 0.7A	14V @ 1.4A
_ST 7-28B56	28V C.T. @ 1.3A	14V @ 2.6A
_ST 2-36B47	36V C.T. @ 0.03A	18V @ 0.06A
_ST 3-36B25	36V C.T. @ 0.065A	18V @ 0.13A
_ST 4-36B26	36V C.T. @ 0.17A	18V @ 0.34A
_ST 5-36B27	36V C.T. @ 0.35A	18V @ 0.7A
_ST 6-36B28	36V C.T. @ 0.55A	18V @ 1.1A
_ST 7-36B57	36V C.T. @ 1A	18V @ 2A
_ST 2-48B48	48V C.T. @ 0.023A	24V @ 0.046A
_ST 3-48B29	48V C.T. @ 0.05A	24V @ 0.1A
_ST 4-48B30	48V C.T. @ 0.125A	24V @ 0.25A
_ST 5-48B31	48V C.T. @ 0.25A	24V @ 0.5A
_ST 6-48B32	48V C.T. @ 0.4A	24V @ 0.8A
_ST 7-48B58	48V C.T. @ 0.75A	24V @ 1.5A
_ST 2-56B49	56V C.T. @ 0.02A	28V @ 0.04A
_ST 3-56B33	56V C.T. @ 0.045A	28V @ 0.09A
_ST 4-56B34	56V C.T. @ 0.11A	28V @ 0.22A
_ST 5-56B35	56V C.T. @ 0.22A	28V @ 0.44A
_ST 6-56B36	56V C.T. @ 0.35A	28V @ 0.7A
_ST 7-56B59	56V C.T. @ 0.65A	28V @ 1.3A
_ST 2-120B50	120V C.T. @ 0.01A	60V @ 0.02A
_ST 3-120B37	120V C.T. @ 0.02A	60V @ 0.04A
_ST 4-120B38	120V C.T. @ 0.05A	60V @ 0.1A
_ST 5-120B39	120V C.T. @ 0.1A	60V @ 0.2A
_ST 6-120B40	120V C.T. @ 0.16A	60V @ 0.32A
_ST 7-120B60	120V C.T. @ 0.3A	60V @ 0.6A

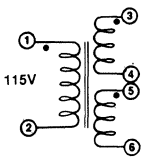
385 HIGHWAY 33, ENGLISHTOWN, NJ 07726
732/446-3110 FAX 732/446-5362
E-MAIL: info@ewcincorporated.com

EWC® INC.

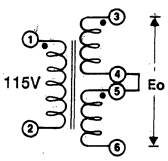
P.C. Power Transformers—Concentric or Split Bobbin & FORM-TRAN® Construction

STYLE B NO CHANNEL FRAME

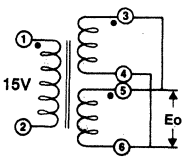




PC-6 PINS

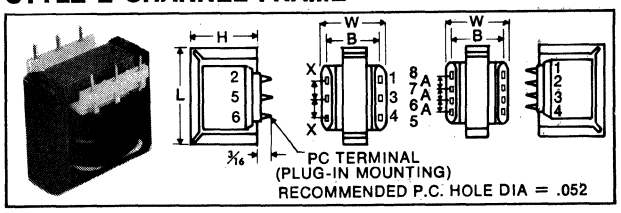


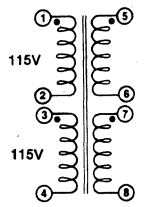
SERIES CONNECTED



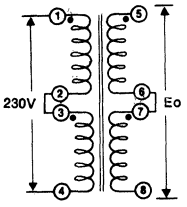
PARALLEL CONNECTED

STYLE E CHANNEL FRAME

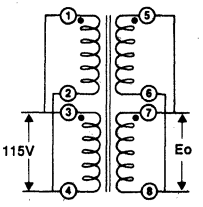




DPC-8 PINS

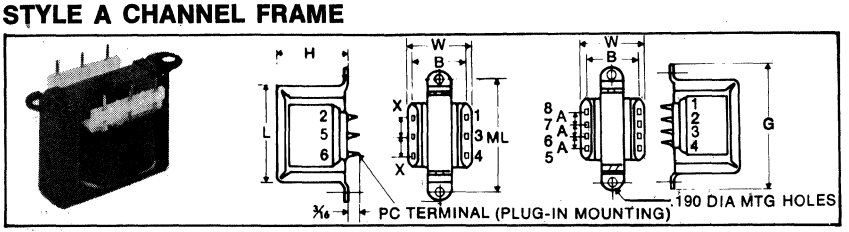


SERIES CONNECTED

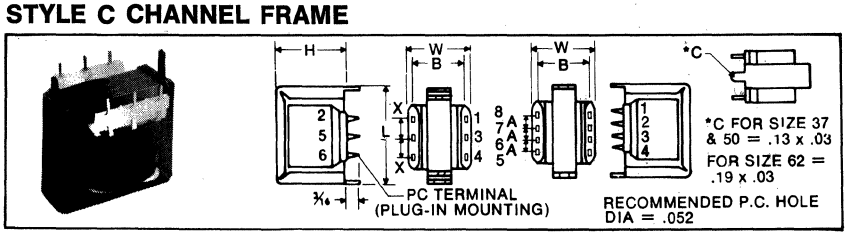


PARALLEL CONNECTED

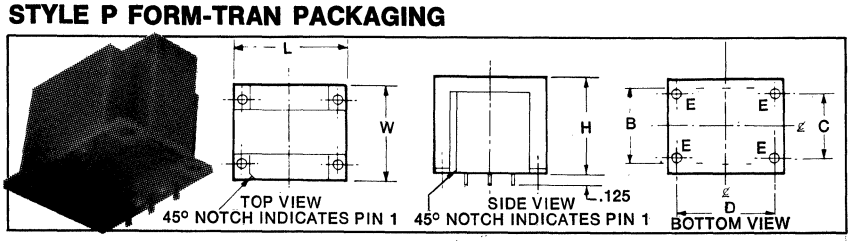
STYLE A CHANNEL FRAME



STYLE C CHANNEL FRAME



STYLE P FORM-TRAN PACKAGING



HOW TO ORDER

D PC - 10 - 2400 B 4

Primary Rating
- No Letter 115V 50/500 Hz 6 pin
- C 230V 50/500 Hz 6 pin
- D 115/230V 50/500 Hz 8 pin
- E 277V 50/500 Hz 6 pin
- F 332V 50/500 Hz 6 pin

Transformer Series
- PC—Single Section Bobbin PC Transformers
- EL—"2" Section" Split Bobbin PC Transformer (50/60 Hz only)

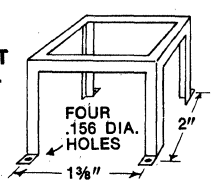
Secondary Voltage Rating in volts RMS

Secondary Current Rating in mA RMS

Individual Spec

Mechanical-Configuration
- A=Channel Frame Mounting—Style A —Screw Mount
- B=No Frame
- C=Channel Frame Mounting—Style C —PC Mount
- E=Channel Frame—No Mounting
- P=Potted—FORM-TRAN™ Construction

"SLIDE ON" BRACKET FOR SIZE 24 P/N B24



SIZE	VA	WT. OZ.	STYLE A, B, C, E, P 6 PIN X	STYLE A, B, C, E, P 8 PIN A	STYLE A, B, C, E, P B	STYLE B L	STYLE B W	STYLE B H	STYLE A, C, E L	STYLE A, C, E W	STYLE A, C, E H	STYLE A G	STYLE A ML	STYLE P L	STYLE P W	STYLE P H	STYLE P B	STYLE P C	STYLE P D	STYLE P E
25	1.0	2.5	0.250	0.200	1.200	1	1.375	0.83	–	–	–	–	–	1.11	1.45	0.92	1.200	N/A	N/A	N/A
37	1.2	3	0.312	0.200	1.000	1.375	1.125	1.188	1.500	1.125	1.220	2.062	1.75	1.52	1.22	1.26	1.000	.840	1.270	.125
50	4.4	5	0.400	0.250	1.100	1.625	1.250	1.375	1.720	1.250	1.400	2.375	2.00	1.77	1.30	1.44	1.100	1.000	1.463	.159
62	10	9	0.400	0.250	1.300	1.875	1.438	1.625	1.970	1.438	1.660	2.813	2.38	2.02	1.50	1.70	1.300	1.125	1.625	.159
24	24	12	0.400	0.250	2.100	1.625	2.250	1.375	**	**	**	**	**	1.70	2.32	1.42	2.100	2.000	1.463	.159

** USE B24 BRACKET

EWC® INC.
385 HIGHWAY 33, ENGLISHTOWN, NJ 07726
732/446-3110 FAX 732/446-5362
E-MAIL: info@ewcincorporated.com

UL506
E73539

CSA22.2, No. 66
LR68051-2

P.C. Power Transformers
Concentric and Split Bobbin Construction

SECONDARY RMS RATING

Series V.C.T.	MA	Parallel @ 2x Current V	MA	Size
10 @	90	5 @	180	25
10 @	120	5 @	240	37
10 @	440	5 @	880	50
10 @	1000	5 @	2000	62
10 @	2400	5 @	4800	24
12.6 @	70	6.3 @	140	25
12.6 @	100	6.3 @	200	37
12.6 @	350	6.3 @	700	50
12.6 @	800	6.3 @	1600	62
12.6 @	2000	6.3 @	4000	24
16 @	55	8 @	110	25
16 @	75	8 @	150	37
16 @	260	8 @	520	50
16 @	640	8 @	1280	62
16 @	1500	8 @	3000	24
20 @	45	10 @	90	25
20 @	60	10 @	120	37
20 @	220	10 @	440	50
20 @	500	10 @	1000	62
20 @	1200	10 @	2400	24
24 @	35	12 @	70	25
24 @	50	12 @	100	37
24 @	180	12 @	360	50
24 @	450	12 @	900	62
24 @	1000	12 @	2000	24
28 @	30	14 @	60	25
28 @	40	14 @	80	37
28 @	160	14 @	320	50
28 @	360	14 @	720	62
28 @	800	14 @	1.6A	24
34 @	25	17 @	50	25
34 @	35	17 @	70	37
34 @	125	17 @	250	50
34 @	300	17 @	600	62
34 @	700	17 @	1400	24
40 @	20	20 @	40	25
40 @	30	20 @	60	37
40 @	110	20 @	220	50
40 @	250	20 @	500	62
40 @	600	20 @	1200	24
56 @	15	28 @	30	25
56 @	20	28 @	40	37
56 @	80	28 @	160	50
56 @	180	28 @	360	62
56 @	420	28 @	840	24
88 @	10	44 @	20	25
88 @	15	44 @	30	37
88 @	50	44 @	100	50
88 @	120	44 @	240	62
88 @	270	44 @	540	24
120 @	8	60 @	16	25
120 @	10	60 @	20	37
120 @	35	60 @	70	50
120 @	85	60 @	170	62
120 @	200	60 @	400	24
180 @	5	90 @	10	25
180 @	6	90 @	12	37
180 @	24	90 @	48	50
180 @	55	90 @	110	62
180 @	130	90 @	260	24
230 @	4	115 @	8	25
230 @	5	115 @	10	37
230 @	20	115 @	40	50
230 @	40	115 @	80	62
230 @	100	115 @	200	24

RATINGS BASED ON 20% REGULATION.

EL SERIES - PRIMARY 50/60Hz ALL OTHERS - PRIMARY 50/500Hz

Single 115V 6 Pin	Single 230V 6 Pin	Dual 115/230V 8 Pin	* Single 277V 6 Pin	* Single 332V 6 Pin
PC-10-90B53	CPC-10-90B53	DPC-10-90B53	Not Available	Not Available
PC-10-120B1	CPC-10-120B1	DPC-10-120B1	EPC-10-120B1	FPC-10-120B1
PC-10-440B2	CPC-10-440B2	DPC-10-440B2	EPC-10-440B2	FPC-10-440B2
PC-10-1000B3	CPC-10-1000B3	DPC-10-1000B3	EPC-10-1000B3	FPC-10-1000B3
PC-10-2400B4	CPC-10-2400B4	DPC-10-2400B4	EPC-10-2400B4	FPC-10-2400B4
PC-12-70B54	CPC-12-70B54	DPC-12-70B54	Not Available	Not Available
PC-12-100B5	CPC-12-100B5	DPC-12-100B5	EPC-12-100B5	FPC-12-100B5
PC-12-350B6	CPC-12-350B6	DPC-12-350B6	EPC-12-350B6	FPC-12-350B6
PC-12-800B7	CPC-12-800B7	DPC-12-800B7	EPC-12-800B7	FPC-12-800B7
PC-12-2000B8	CPC-12-2000B8	DPC-12-2000B8	EPC-12-2000B8	FPC-12-2000B8
PC-16-55B55	CPC-16-55B55	DPC-16-55B55	Not Available	Not Available
PC-16-75B9	CPC-16-75B9	DPC-16-75B9	EPC-16-75B9	FPC-16-75B9
PC-16-260B10	CPC-16-260B10	DPC-16-260B10	EPC-16-260B10	FPC-16-260B10
PC-16-640B11	CPC-16-640B11	DPC-16-640B11	EPC-16-640B11	FPC-16-640B11
PC-16-1500B12	CPC-16-1500B12	DPC-16-1500B12	EPC-16-1500B12	FPC-16-1500B12
PC-20-45B56	CPC-20-45B56	DPC-20-45B56	Not Available	Not Available
PC-20-60B13	CPC-20-60B13	DPC-20-60B13	EPC-20-60B13	FPC-20-60B13
PC-20-220B14	CPC-20-220B14	DPC-20-220B14	EPC-20-220B14	FPC-20-220B14
PC-20-500B15	CPC-20-500B15	DPC-20-500B15	EPC-20-500B15	FPC-20-500B15
PC-20-1200B16	CPC-20-1200B16	DPC-20-1200B16	EPC-20-1200B16	FPC-20-1200B16
PC-24-35B57	CPC-24-35B57	DPC-24-35B57	Not Available	Not Available
PC-24-50B17	CPC-24-50B17	DPC-24-50B17	EPC-24-50B17	FPC-24-50B17
PC-24-180B18	CPC-24-180B18	DPC-24-180B18	EPC-24-180B18	FPC-24-180B18
PC-24-450B19	CPC-24-450B19	DPC-24-450B19	EPC-24-450B19	FPC-24-450B19
PC-24-1000B20	CPC-24-1000B20	DPC-24-1000B20	EPC-24-1000B20	FPC-24-1000B20
PC-28-30B58	CPC-28-30B58	DPC-28-30B58	Not Available	Not Available
PC-28-40B49	CPC-28-40B49	DPC-28-40B49	EPC-28-40B49	FPC-28-40B49
PC-28-160B50	CPC-28-160B50	DPC-28-160B50	EPC-28-160B50	FPC-28-160B50
PC-28-360B51	CPC-28-360B51	DPC-28-360B51	EPC-28-360B51	FPC-28-360B51
PC-28-800B52	CPC-28-800B52	DPC-28-800B52	EPC-28-800B52	FPC-28-800B52
PC-34-25B59	CPC-34-25B59	DPC-34-25B59	Not Available	Not Available
PC-34-35B21	CPC-34-35B21	DPC-34-35B21	EPC-34-35B21	FPC-34-35B21
PC-34-125B22	CPC-34-125B22	DPC-34-125B22	EPC-34-125B22	FPC-34-125B22
PC-34-300B23	CPC-34-300B23	DPC-34-300B23	EPC-34-300B23	FPC-34-300B23
PC-34-700B24	CPC-34-700B24	DPC-34-700B24	EPC-34-700B24	FPC-34-700B24
PC-40-20B60	CPC-40-20B60	DPC-40-20B60	Not Available	Not Available
PC-40-30B25	CPC-40-30B25	DPC-40-30B25	EPC-40-30B25	FPC-40-30B25
PC-40-110B26	CPC-40-110B26	DPC-40-110B26	EPC-40-110B26	FPC-40-110B26
PC-40-250B27	CPC-40-250B27	DPC-40-250B27	EPC-40-250B27	FPC-40-250B27
PC-40-600B28	CPC-40-600B28	DPC-40-600B28	EPC-40-600B28	FPC-40-600B28
PC-56-15B61	CPC-56-15B61	DPC-56-15B61	Not Available	Not Available
PC-56-20B29	CPC-56-20B29	DPC-56-20B29	EPC-56-20B29	FPC-56-20B29
PC-56-80B30	CPC-56-80B30	DPC-56-80B30	EPC-56-80B30	FPC-56-80B30
PC-56-180B31	CPC-56-180B31	DPC-56-180B31	EPC-56-180B31	FPC-56-180B31
PC-56-420B32	CPC-56-420B32	DPC-56-420B32	EPC-56-420B32	FPC-56-420B32
PC-88-10B62	CPC-88-10B62	DPC-88-10B62	Not Available	Not Available
PC-88-15B33	CPC-88-15B33	DPC-88-15B33	EPC-88-15B33	FPC-88-15B33
PC-88-50B34	CPC-88-50B34	DPC-88-50B34	EPC-88-50B34	FPC-88-50B34
PC-88-120B35	CPC-88-120B35	DPC-88-120B35	EPC-88-120B35	FPC-88-120B35
PC-88-270B36	CPC-88-270B36	DPC-88-270B36	EPC-88-270B36	FPC-88-270B36
PC-120-8B63	CPC-120-8B63	DPC-120-8B63	Not Available	Not Available
PC-120-10B37	CPC-120-10B37	DPC-120-10B37	EPC-120-10B37	FPC-120-10B37
PC-120-35B38	CPC-120-35B38	DPC-120-35B38	EPC-120-35B38	FPC-120-35B38
PC-120-85B39	CPC-120-85B39	DPC-120-85B39	EPC-120-85B39	FPC-120-85B39
PC-120-200B40	CPC-120-200B40	DPC-120-200B40	EPC-120-200B40	FPC-120-200B40
PC-180-5B64	CPC-180-5B64	DPC-180-5B64	Not Available	Not Available
PC-180-6B41	CPC-180-6B41	DPC-180-6B41	EPC-180-6B41	FPC-180-6B41
PC-180-24B42	CPC-180-24B42	DPC-180-24B42	EPC-180-24B42	FPC-180-24B42
PC-180-55B43	CPC-180-55B43	DPC-180-55B43	EPC-180-55B43	FPC-180-55B43
PC-180-130B44	CPC-180-130B44	DPC-180-130B44	EPC-180-130B44	FPC-180-130B44
PC-230-4B65	CPC-230-4B65	DPC-230-4B65	Not Available	Not Available
PC-230-5B45	CPC-230-5B45	DPC-230-5B45	EPC-230-5B45	FPC-230-5B45
PC-230-20B46	CPC-230-20B46	DPC-230-20B46	EPC-230-20B46	FPC-230-20B46
PC-230-40B47	CPC-230-40B47	DPC-230-40B47	EPC-230-40B47	FPC-230-40B47
PC-230-100B48	CPC-230-100B48	DPC-230-100B48	EPC-230-100B48	FPC-230-100B48

*** SIZE 24 AND FORMTRAN - UL APPROVED ONLY. EPC AND FPC BUILT TO MEET - NOT SUBMITTED.**

METHOD OF DETERMINING SECONDARY RMS CURRENT:

Rectifier Type	Filter Type	RMS Secondary Current
Full Wave Center Tap	Choke Input	.7 x DC Amps
Full Wave Center Tap	Capacitor Input	1.2 x DC Amps
Full Wave Bridge	Choke Input	1.0 x DC Amps
Full Wave Bridge	Capacitor Input	1.8 x DC Amps

EWC, Inc. reserves the right to make changes without notice in design and specifications in order to effect product improvement.

385 HIGHWAY 33, ENGLISHTOWN, NJ 07726
732/446-3110 FAX 732/446-5362
E-MAIL: info@ewcincorporated.com

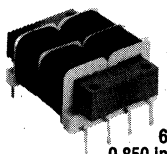
EWC® INC.

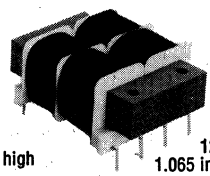
Miniature LO-PROFILE Plug-In Power Transformers

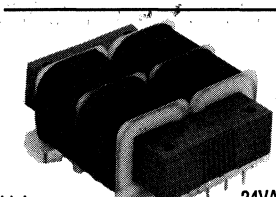
UL506
E73539

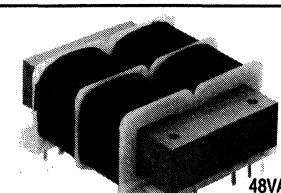
CSA22.2, No. 66
LR68051-2

2.5VA
0.650 inches high


6VA
0.850 Inches high


12VA
1.065 inches high


24VA
1.25 inches high


48VA
1.375 inches high

FIVE SIZES:

EWC's Lo-Profile, plug-in power transformers are designed for low height, critical pc board applications in semiconductor control and instrumentation. Interchangeable with those of other manufacturers, the units are for use in single, dual or reference dc supplies or isolated control circuits. Sizes 2, 6 and 12 are available encapsulated in form-fitting shells to protect against possible damage due to water-soluble or other fluxes as well as electrolytic corrosion experienced on open-type constructions.

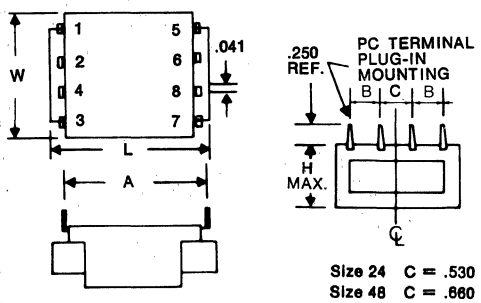


Figure 1

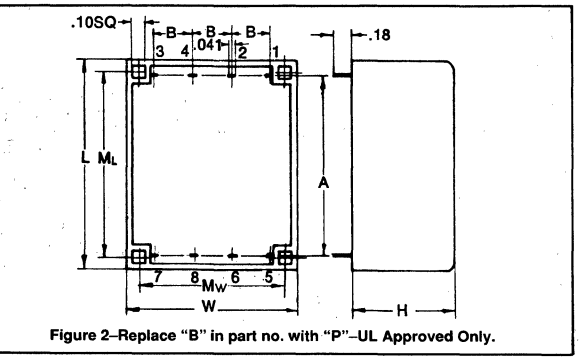
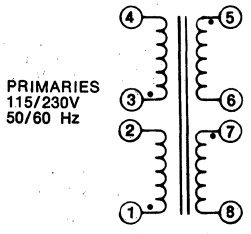


Figure 2–Replace "B" in part no. with "P"–UL Approved Only.



SIZE	FIG.	L	W	H	A	B	ML	MW	Oz.
2	1	1.875	1.562	0.650	1.600	0.375	—	—	5
6	1	1.875	1.562	0.850	1.600	0.375	—	—	7
12	1	2.500	2.000	1.065	2.000	0.500	—	—	11
24	1	2.875	2.250	1.250	1.900	0.600	—	—	15
48	1	3.125	2.500	1.375	2.180	0.600	—	—	21
2	2	2.030	1.635	0.785	1.600	0.375	1.795	1.340	
6	2	2.030	1.635	0.950	1.600	0.375	1.795	1.340	
12	2	2.675	2.126	1.185	2.000	0.500	2.440	1.850	

PART NO.	SIZE	SECONDARY RMS RATINGS SERIES	PARALLEL
LP 10-250B23	2	10V C.T. @ 250mA	5V @ 500mA
LP 10-600B1	6	10V C.T. @ 600mA	5V @ 1.20A
LP 10-1200B2	12	10V C.T. @ 1.20A	5V @ 2.40A
LP 10-2400B89	24	10V C.T. @ 2.40A	5V @ 4.80A
LP 10-4800B90	48	10V C.T. @ 4.80A	5V @ 9.60A
LP 12-200B24	2	12.6V C.T. @ 200mA	6.3V @ 400mA
LP 12-450B3	6	12.6V C.T. @ 450mA	6.3V @ 900mA
LP 12-900B4	12	12.6V C.T. @ 900mA	6.3V @ 1.80A
LP 12-1900B91	24	12.6V C.T. @ 1.90A	6.3V @ 3.80A
LP 12-3800B92	48	12.6V C.T. @ 3.80A	6.3V @ 7.60A
LP 16-150B25	2	16V C.T. @ 150mA	8V @ 300mA
LP 16-350B5	6	16V C.T. @ 350mA	8V @ 700mA
LP 16-700B6	12	16V C.T. @ 700mA	8V @ 1.40A
LP 16-1500B93	24	16V C.T. @ 1.50A	8V @ 3.00A
LP 16-3000B94	48	16V C.T. @ 3.00A	8V @ 6.00A
LP 18-135B105	2	18V C.T. @ 135mA	9V @ 270mA
LP 18-325B106	6	18V C.T. @ 325mA	9V @ 650mA
LP 18-650B107	12	18V C.T. @ 650 mA	9V @ 1.30A
LP 18-1300B108	24	18V C.T. @ 1.30A	9V @ 2.60A
LP 18-2600B109	48	18V C.T. @ 2.60A	9V @ 5.20A
LP 20-125B26	2	20V C.T. @ 125mA	10V @ 250mA
LP 20-300B7	6	20V C.T. @ 300mA	10V @ 600mA
LP 20-600B8	12	20V C.T. @ 600mA	10V @ 1.20A
LP 20-1200B95	24	20V C.T. @ 1.20A	10V @ 2.40A
LP 20-2400B96	48	20V C.T. @ 2.40A	10V @ 4.80A
LP 24-100B27	2	24V C.T. @ 100mA	12V @ 200mA
LP 24-250B9	6	24V C.T. @ 250mA	12V @ 500mA
LP 24-500B10	12	24V C.T. @ 500mA	12V @ 1.00A
LP 24-1000B97	24	24V C.T. @ 1.00A	12V @ 2.00A
LP 24-2000B98	48	24V C.T. @ 2.00A	12V @ 4.00A
LP 28-90B115	2	28V C.T. @ 90 mA	14V @ 180mA
LP 28-215B116	6	28V C.T. @ 215mA	14V @ 430mA
LP 28-430B117	12	28V C.T. @ 430mA	14V @ 860mA
LP 28-850B118	24	28V C.T. @ 850mA	14V @ 1.70A
LP 28-1700B119	48	28V C.T. @ 1.70A	14V @ 3.40A
LP 30-85B125	2	30V C.T. @ 85mA	15V @ 170mA
LP 30-200B126	6	30V C.T. @ 200mA	15V @ 400mA
LP 30-400B127	12	30V C.T. @ 400mA	15V @ 800mA
LP 30-800B128	24	30V C.T. @ 800mA	15V @ 1.60A
LP 30-1600B129	48	30V C.T. @ 1.60A	15V @ 3.20A
LP 34-75B28	2	34V C.T. @ 75mA	17V @ 150mA
LP 34-170B11	6	34V C.T. @ 170mA	17V @ 340mA
LP 34-340B12	12	34V C.T. @ 340mA	17V @ 680mA
LP 34-700B99	24	34V C.T. @ 700mA	17V @ 1.40A
LP 34-1400B100	48	34V C.T. @ 1.40A	17V @ 2.80A
LP 40-60B29	2	40V C.T. @ 60mA	20V @ 120mA
LP 40-150B13	6	40V C.T. @ 150mA	20V @ 300mA
LP 40-300B14	12	40V C.T. @ 300mA	20V @ 600mA
LP 40-600B101	24	40V C.T. @ 600mA	20V @ 1.20A
LP 40-1200B102	48	40V C.T. @ 1.20A	20V @ 2.40A
LP 56-45B30	2	56V C.T. @ 45mA	28V @ 90mA
LP 56-100B15	6	56V C.T. @ 100mA	28V @ 200mA
LP 56-200B16	12	56V C.T. @ 200mA	28V @ 400mA
LP 56-425B103	24	56V C.T. @ 425mA	28V @ 850mA
LP 56-850B104	48	56V C.T. @ 850mA	28V @ 1.70A
LP 88-28B31	2	88V C.T. @ 28mA	44V @ 56mA
LP 88-65B17	6	88V C.T. @ 65mA	44V @ 130mA
LP 88-130B18	12	88V C.T. @ 130mA	44V @ 260mA
LP 120-20B32	2	120V C.T. @ 20mA	60V @ 40mA
LP 120-50B19	6	120V C.T. @ 50mA	60V @ 100mA
LP 120-100B20	12	120V C.T. @ 100mA	60V @ 200mA
LP 230-10B33	2	230V C.T. @ 10 mA	115V @ 20mA
LP 230-25B21	6	230V C.T. @ 25mA	115V @ 50mA
LP 230-50B22	12	230V C.T. @ 50mA	115V @ 100mA

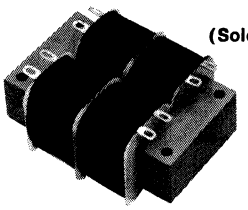
EWC, Inc. reserves the right to make changes without notice in design and specifications in order to effect product improvement.

EWC® INC.
385 HIGHWAY 33, ENGLISHTOWN, NJ 07726
732/446-3110 FAX 732/446-5362
E-MAIL: info@ewcincorporated.com

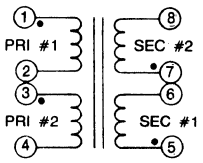
UL506
E73539

LO-PROFILE Hi-Power Humbucking Transformers

Varnish Finish
(Standard)

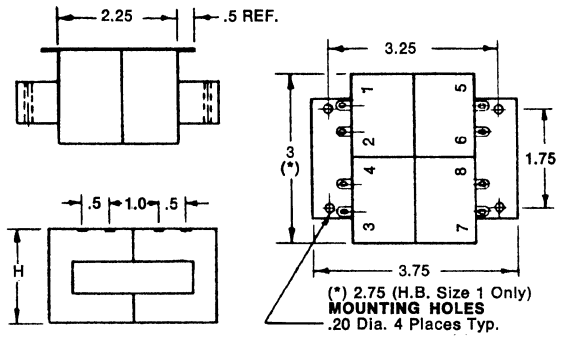


(Solder Terminals)



115/230V 50/60 Hz
DUAL PRI.

SOLDER TERMINALS (.5-1-.5) Approx. Spacing



H.B. Size	H (Max.)	Wt. (lbs.) (Approx.)	VA (Nom.)	Reg. (%) (Typ.)	T. Rise (°C) (Typ.)
I	.850	1.00	20	30	25
II	1.25	1.75	50	30	45
III	1.50	2.25	75	25	55
IV	1.85	3.00	135	20	65
V	2.35	4.25	200	15	75

- **SOLDER TERMINALS**
- **SIDE-BY-SIDE BOBBINS**
- **20VA TO 200VA • 115/230V @ 50/60Hz**
- **1.5KV RMS HIPOT • CLASS B (130°C)**

ADVANTAGES:

- Side-By-Side Bobbins (Secondary Wound alongside of Primary) Lower Interwinding Capacitance — eliminates the need for electro-static shield
- Hum-bucking (Semi-Toroidal) Construction [Lower Radiated Magnetic Fields, Balanced Wdgs., Larger Heat Radiating Surface and Lower Center of Gravity]
- High Power for Low Panel Heights and Narrow Card Spacing

MOUNTING: (4) Lamination Holes .20 Dia. Insulated hardware required.

RATINGS PER SECONDARY OUTPUT: VA-SEC = 0.5 x VA (Output) • V-SEC = V-SEC (Parallel) • I-SEC = I-SEC (Series)

NON-STANDARD RATINGS: Tapped primaries, secondaries different voltages, currents or frequencies can be furnished.

Units with higher VA ratings up to 1.25 KVA can also be supplied.

EWC, Inc. reserves the right to make changes without notice in design and specifications in order to effect product improvement.

PART NO.	Size	SECONDARY RMS RATING SERIES	SECONDARY RMS RATING PARALLEL
LP 10-2B34	I	10V C.T. @ 2.00A	5V @ 4.00A
LP 10-5B35	II	10V C.T. @ 5.00A	5V @ 10.0A
LP 10-7.5B36	III	10V C.T. @ 7.50A	5V @ 15.0A
LP 10-13.5B37	IV	10V C.T. @ 13.5A	5V @ 27.0A
LP 10-20B38	V	10V C.T. @ 20.0A	5V @ 40.0A
LP 12-1.6B39	I	12.6V C.T. @ 1.60A	6.3V @ 3.20A
LP 12-4B40	II	12.6V C.T. @ 4.00A	6.3V @ 8.00A
LP 12-6B41	III	12.6V C.T. @ 6.00A	6.3V @ 12.0A
LP 12-11B42	IV	12.6V C.T. @ 11.0A	6.3V @ 22.0A
LP 12-16B43	V	12.6V C.T. @ 16.0A	6.3V @ 32.0A
LP 16-1.25B44	I	16V C.T. @ 1.25A	8V @ 2.50A
LP 16-3.15B45	II	16V C.T. @ 3.15A	8V @ 6.30A
LP 16-4.75B46	III	16V C.T. @ 4.75A	8V @ 9.50A
LP 16-8.5B47	IV	16V C.T. @ 8.50A	8V @ 17.0A
LP 16-12.5B48	V	16V C.T. @ 12.5A	8V @ 25.0A
LP 18-1.1B110	I	18V C.T. @ 1.10A	9V @ 2.20A
LP 18-2.75B111	II	18V C.T. @ 2.75A	9V @ 5.50A
LP 18-4.2B112	III	18V C.T. @ 4.20A	9V @ 8.40A
LP 18-7.5B113	IV	18V C.T. @ 7.50A	9V @ 15.0A
LP 18-11B114	V	18V C.T. @ 11.0A	9V @ 22.0A
LP 20-1B49	I	20V C.T. @ 1.00A	10V @ 2.00A
LP 20-2.5B50	II	20V C.T. @ 2.50A	10V @ 5.00A
LP 20-3.75B51	III	20V C.T. @ 3.75A	10V @ 7.50A
LP 20-6.75B52	IV	20V C.T. @ 6.75A	10V @ 13.5A
LP 20-10B53	V	20V C.T. @ 10.0A	10V @ 20.0A
LP 24-0.85B54	I	24V C.T. @ 0.85A	12V @ 1.70A
LP 24-2.1B55	II	24V C.T. @ 2.10A	12V @ 4.20A
LP 24-3.15B56	III	24V C.T. @ 3.15A	12V @ 6.30A
LP 24-5.75B57	IV	24V C.T. @ 5.75A	12V @ 11.5A
LP 24-8.5B58	V	24V C.T. @ 8.50A	12V @ 17.0A
LP 28-0.7B120	I	28V C.T. @ 0.70A	14V @ 1.40A
LP 28-1.75B121	II	28V C.T. @ 1.75A	14V @ 3.50A
LP 28-2.7B122	III	28V C.T. @ 2.70A	14V @ 5.40A
LP 28-4.8B123	IV	28V C.T. @ 4.80A	14V @ 9.60A
LP 28-7B124	V	28V C.T. @ 7.00A	14V @ 14.0A
LP 30-0.65B130	I	30V C.T. @ 0.65A	15V @ 1.30A
LP 30-1.65B131	II	30V C.T. @ 1.65A	15V @ 3.30A
LP 30-2.5B132	III	30V C.T. @ 2.50A	15V @ 5.00A
LP 30-4.5B133	IV	30V C.T. @ 4.50A	15V @ 9.00A
LP 30-6.65B134	V	30V C.T. @ 6.65A	15V @ 13.3A
LP 34-0.6B59	I	34V C.T. @ 0.60A	17V @ 1.20A
LP 34-1.5B60	II	34V C.T. @ 1.50A	17V @ 3.00A
LP 34-2.25B61	III	34V C.T. @ 2.25A	17V @ 4.50A
LP 34-4B62	IV	34V C.T. @ 4.00A	17V @ 8.00A
LP 34-6B63	V	34V C.T. @ 6.00A	17V @ 12.0A
LP 40-0.5B64	I	40V C.T. @ 0.50A	20V @ 1.00A
LP 40-1.25B65	II	40V C.T. @ 1.25A	20V @ 2.50A
LP 40-1.9B56	III	40V C.T. @ 1.90A	20V @ 3.80A
LP 40-3.4B67	IV	40V C.T. @ 3.40A	20V @ 6.80A
LP 40-5B68	V	40V C.T. @ 5.00A	20V @ 10.0A
LP 56-0.35B69	I	56V C.T. @ 0.35A	28V @ 0.70A
LP 56-0.9B70	II	56V C.T. @ 0.90A	28V @ 1.80A
LP 56-1.35B71	III	56V C.T. @ 1.35A	28V @ 2.70A
LP 56-2.4B72	IV	56V C.T. @ 2.40A	28V @ 4.80A
LP 56-3.5B73	V	56V C.T. @ 3.50A	28V @ 7.00A
LP 88-0.23B74	I	88V C.T. @ 0.23A	44V @ 0.46A
LP 88-0.575B75	II	88V C.T. @ 0.575A	44V @ 1.15A
LP 88-0.85B76	III	88V C.T. @ 0.85A	44V @ 1.70A
LP 88-1.5B77	IV	88V C.T. @ 1.50A	44V @ 3.00A
LP 88-2.3B78	V	88V C.T. @ 2.30A	44V @ 4.60A
LP 120-0.17B79	I	120V C.T. @ 170mA	60V @ 340mA
LP 120-0.425B80	II	120V C.T. @ 425mA	60V @ 850mA
LP 120-0.625B81	III	120V C.T. @ 625mA	60V @ 1.25A
LP 120-1.1B82	IV	120V C.T. @ 1.10A	60V @ 2.20A
LP 120-1.7B83	V	120V C.T. @ 1.70A	60V @ 3.40A
LP 230-0.09B84	I	230V C.T. @ 90mA	115V @ 180mA
LP 230-0.22B85	II	230V C.T. @ 220mA	115V @ 440mA
LP 230-0.325B86	III	230V C.T. @ 325mA	115V @ 650mA
LP 230-0.6B87	IV	230V C.T. @ 600mA	115V @ 1.20A
LP 230-0.9B88	V	230V C.T. @ 900mA	115V @ 1.80A

385 HIGHWAY 33, ENGLISHTOWN, NJ 07726
732/446-3110 FAX 732/446-5362
E-MAIL: info@ewcincorporated.com

Power Transformers

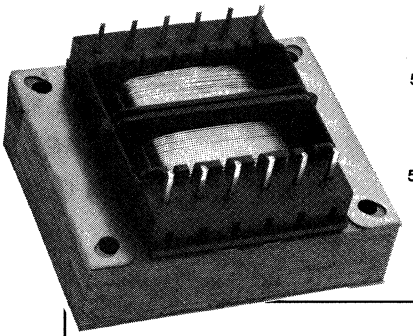
EN 60742/VDE 0551
EN 60950/VDE 0805
License No. 916/88

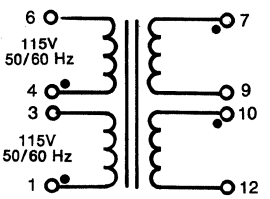
CSA22.2, No. 66
LR68051-2

UL506
E73539

INTERNATIONAL SERIES POWER TRANSFORMERS

UL, VDE, IEC and CSA certified.

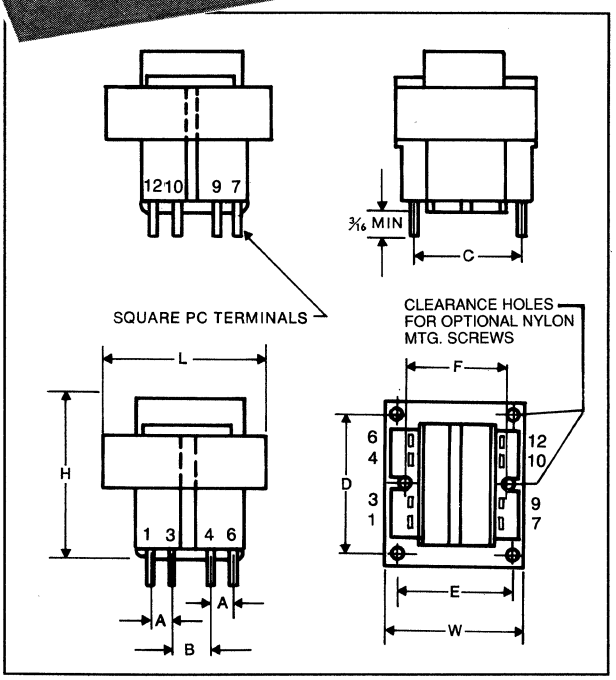




In addition to being certified to VDE 0551, VDE 0805, IEC 742, IEC 950, CSA 22.2 No. 66 and UL506, the EWC series of International Transformers is designed and built to meet most other international safety standards.

These transformers are available in both PC and chassis-mount construction. With power ratings of 2.5VA to 175VA, these transformers are built on dual-bobbins with insulating shrouds to provide 4000V RMS isolation between primary and secondary. The non-concentric construction reduces primary to secondary capacitance and eliminates the need for an electrostatic shield.

PART NO. PC MOUNT	VA (SIZE)	SECONDARY RMS RATING	
		SERIES	PARALLEL
14A-2.5-10B1	2.5	10V C.T. @0.25A	5V @0.5A
14A-5.0-10B2	5.0	10V C.T. @0.5A	5V @1.0A
14A-10-10B3	10.0	10V C.T. @1.0A	5V @2.0A
14A-20-10B4	20.0	10V C.T. @2.0A	5V @4.0A
14A-30-10B5	30.0	10V C.T. @3.0A	5V @6.0A
14A-56-10B6	56.0	10V C.T. @5.6A	5V @11.2A
14A-2.5-12B7	2.5	12.6V C.T. @0.2A	6.3V @0.4A
14A-5.0-12B8	5.0	12.6V C.T. @0.4A	6.3V @0.8A
14A-10-12B9	10.0	12.6V C.T. @0.8A	6.3V @1.6A
14A-20-12B10	20.0	12.6V C.T. @1.6A	6.3V @3.2A
14A-30-12B11	30.0	12.6V C.T. @2.4A	6.3V @4.8A
14A-56-12B12	56.0	12.6V C.T. @4.4A	6.3V @8.8A
14A-2.5-16B13	2.5	16V C.T. @0.15A	8V @0.3A
14A-5.0-16B14	5.0	16V C.T. @0.31A	8V @0.62A
14A-10-16B15	10.0	16V C.T. @0.62A	8V @1.25A
14A-20-16B16	20.0	16V C.T. @1.25A	8V @2.5A
14A-30-16B17	30.0	16V C.T. @1.9A	8V @3.8A
14A-56-16B18	56.0	16V C.T. @3.5A	8V @7.0A
14A-2.5-20B19	2.5	20V C.T. @0.12A	10V @0.24A
14A-5.0-20B20	5.0	20V C.T. @0.25A	10V @0.5A
14A-10-20B21	10.0	20V C.T. @0.5A	10V @1.0A
14A-20-20B22	20.0	20V C.T. @1.0A	10V @2.0A
14A-30-20B23	30.0	20V C.T. @1.5A	10V @3.0A
14A-56-20B24	56.0	20V C.T. @2.8A	10V @5.6A
14A-2.5-24B25	2.5	24V C.T. @0.1A	12V @0.2A
14A-5.0-24B26	5.0	24V C.T. @0.21A	12V @0.42A
14A-10-24B27	10.0	24V C.T. @0.42A	12V @0.84A
14A-20-24B28	20.0	24V C.T. @0.83A	12V @1.66A
14A-30-24B29	30.0	24V C.T. @1.25A	12V @2.5A
14A-56-24B30	56.0	24V C.T. @2.33A	12V @4.66A
14A-2.5-28B31	2.5	28V C.T. @0.09A	14V @0.18A
14A-5.0-28B32	5.0	28V C.T. @0.18A	14V @0.36A
14A-10-28B33	10.0	28V C.T. @0.36A	14V @0.72A
14A-20-28B34	20.0	28V C.T. @0.72A	14V @1.44A
14A-30-28B35	30.0	28V C.T. @1.06A	14V @2.12A
14A-56-28B36	56.0	28V C.T. @2.0A	14V @4.0A
14A-2.5-36B37	2.5	36V C.T. @0.07A	18V @0.14A
14A-5.0-36B38	5.0	36V C.T. @0.14A	18V @0.28A
14A-10-36B39	10.0	36V C.T. @0.28A	18V @0.56A
14A-20-36B40	20.0	36V C.T. @0.56A	18V @1.12A
14A-30-36B41	30.0	36V C.T. @0.82A	18V @1.64A
14A-56-36B42	56.0	36V C.T. @1.56A	18V @3.12A



MECHANICAL DIMENSIONS

VA	WT.	L	W	H	A	B
2.5	0.25	1.625	1.312	1.125	.200	.250
5.0	0.37	1.625	1.312	1.375	.200	.400
10.0	0.53	1.875	1.562	1.375	.200	.400
20.0	0.90	2.250	1.875	1.625	.400	.400
30.0	1.15	2.625	2.187	1.562	.550	.275
56.0	1.70	3.000	2.500	1.812	.600	.300

VA	C	D	E	F	PIN DIM	MTG
2.5	1.000	–	–	1.062	.025 SQ	#4
5.0	1.000	–	–	1.062	.025 SQ	#4
10.0	1.140	–	–	1.250	.038 SQ	#4
20.0	1.460	–	–	1.500	.038 SQ	#4
30.0	1.680	2.18	1.75	–	.045 SQ	#6
56.0	1.900	2.50	2	–	.045 SQ	#6

***The bobbins used on the first 3 parts listed, (2.5, 5.0 & 10.0VA) are supplied with a total of eight pins, four on each side. The A&B dim are as indicated in the table. The remaining 3 units are supplied with 12 pins or 6 on each side (not shown). Terminals 2, 5, 8 & 11 are removed and there dim are as shown.**

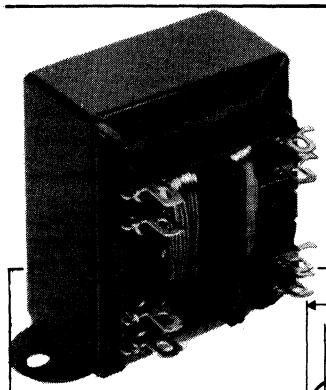
EWC® INC.
385 HIGHWAY 33, ENGLISHTOWN, NJ 07726
732/446-3110 FAX 732/446-5362
E-MAIL: info@ewcincorporated.com

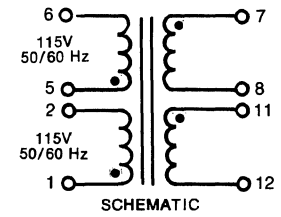
UL506
E73539

CSA22.2, No. 66
LR68051-2

EN 60742/VDE 0551
EN 60950/VDE 0805
License No. 915/88

Power Transformers





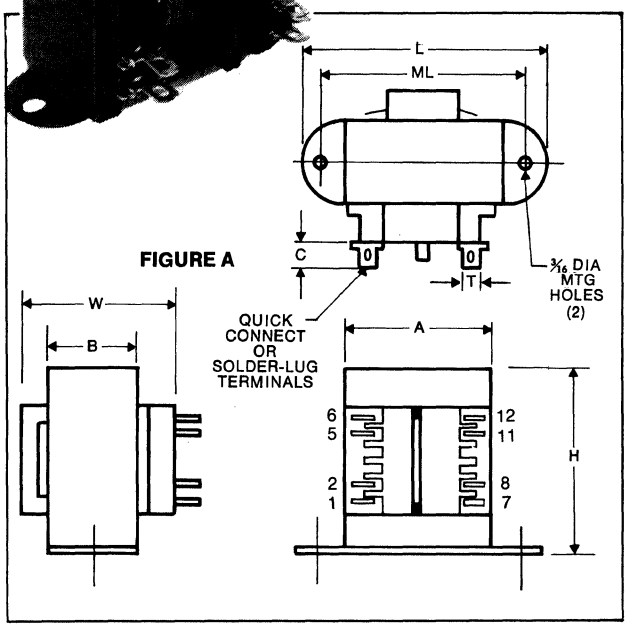
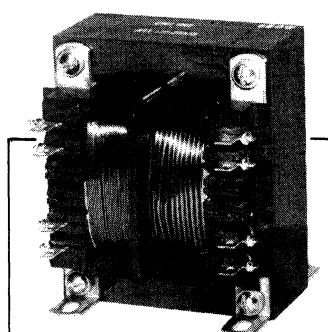


FIGURE A



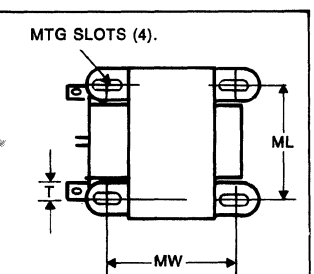
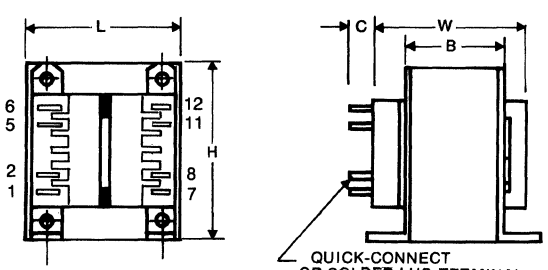


FIGURE B



INTERNATIONAL SERIES POWER TRANSFORMERS

UL, VDE, IEC and CSA certified.

PART NO. CHASIS MOUNT	(SIZE) VA	SECONDARY RMS RATING SERIES	PARALLEL
A41-25-10A1	25	10V C.T. @2.5A	5V @5.0A
A41-43-10A2	43	10V C.T. @4.3A	5V @8.6A
A41-80-10A3	80	10V C.T. @8.0A	5V @16.0A
A41-130-10A4	130	10V C.T. @13.0A	5V @26.0A
A41-175-10A5	175	10V C.T. @17.5A	5V @35.0A
A41-25-12A7	25	12.6V C.T. @2.0A	6.3V @4.0A
A41-43-12A8	43	12.6V C.T. @3.4A	6.3V @6.8A
A41-80-12A9	80	12.6V C.T. @6.3A	6.3V @12.6A
A41-130-12A10	130	12.6V C.T. @10.3A	6.3V @20.6A
A41-175-12A11	175	12.6V C.T. @14.0A	6.3V @28.0A
A41-25-16A13	25	16V C.T. @1.6A	8V @3.2A
A41-43-16A14	43	16V C.T. @2.7A	8V @5.4A
A41-80-16A15	80	16V C.T. @5.0A	8V @10.0A
A41-130-16A16	130	16V C.T. @8.1A	8V @16.2A
A41-175-16A17	175	16V C.T. @11.0A	8V @22.0A
A41-25-20A19	25	20V C.T. @1.25A	10V @2.5A
A41-43-20A20	43	20V C.T. @2.2A	10V @4.4A
A41-80-20A21	80	20V C.T. @4.0A	10V @8.0A
A41-130-20A22	130	20V C.T. @6.5A	10V @13.0A
A41-175-20A23	175	20V C.T. @8.8A	10V @17.6A
A41-25-24A25	25	24V C.T. @1A	12V @2A
A41-43-24A26	43	24V C.T. @1.8A	12V @3.6A
A41-80-24A27	80	24V C.T. @3.3A	12V @6.6A
A41-130-24A28	130	24V C.T. @5.4A	12V @10.8A
A41-175-24A29	175	24V C.T. @7.3A	12V @14.6A
A41-25-28A31	25	28V C.T. @0.9A	14V @1.86A
A41-43-28A32	43	28V C.T. @1.5A	14V @3.0A
A41-80-28A33	80	28V C.T. @2.8A	14V @5.6A
A41-130-28A34	130	28V C.T. @4.6A	14V @9.2A
A41-175-28A35	175	28V C.T. @6.25A	14V @12.5A
A41-25-36A37	25	36V C.T. @0.7A	18V @1.4A
A41-43-36A38	43	36V C.T. @1.2A	18V @2.4A
A41-80-36A39	80	36V C.T. @2.2A	18V @4.4A
A41-130-36A40	130	36V C.T. @3.6A	18V @7.2A
A41-175-36A41	175	36V C.T. @4.8A	18V @9.6A
A41-25-230A42	25	230V C.T. @0.11A	115V @0.22A
A41-43-230A43	43	230V C.T. @0.19A	115V @0.38A
A41-80-230A44	80	230V C.T. @0.35A	115V @0.7A
A41-130-230A45	130	230V C.T. @0.57A	115V @1.14A
A41-175-230A46	175	230V C.T. @0.76A	115V @1.52A

MECHANICAL DIMENSIONS

VA	WT.	L	W	H	A	B
25	1.25	2.812	1.875	2.312	2.000	1.125
43	1.6	3.125	2.062	2.687	2.250	1.125
80	2.8	2.500	2.375	3.000	–	1.375
130	4.1	2.812	2.875	3.375	–	1.625
175	5.5	3.125	2.875	3.750	–	1.625

VA	C	T	ML	MW	MTG.	FIG
25	.312	.187	2.375	–	#6	A
43	.312	.187	2.812	–	#6	A
80	.312	.187	2.000	2.18	#6	B
130	.375	0.25	2.250	2.50	#8	B
175	.375	0.25	2.500	2.50	#8	B

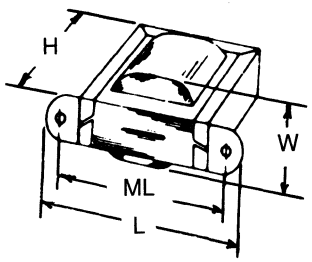
385 HIGHWAY 33, ENGLISHTOWN, NJ 07726
732/446-3110 FAX 732/446-5362
E-MAIL: info@ewcincorporated.com

EWC® INC.

Isolation & Auto Transformers

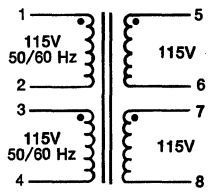
SPLIT BOBBIN ISOLATION TRANSFORMERS

3 VA to 1.25 KVA (50/60 Hz) 230V/230V or 115V/115V or 230V/115V or 115V/230V 1.5 KV RMS Hipot – UL Class B (130°C)

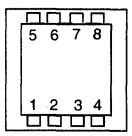


(Mtg. Style: C)
(STD. SIZE I-VIII)

ISOLATION TRANSFORMER	VA MAX.	SIZE
IT 200.3-OF	3	I
IT 200.7-OF	7	II
IT 201.5-OF	15	III
IT 202.5-OF	25	IV
IT 204-OF	40	V
IT 206-OF	60	VI
IT 208-OF	80	VII
IT 212-OF	120	VIII
IT 218-OF	180	IX
IT 225-OF	250	X
IT 235-OF	350	XI
IT 255-OF	550	XII
IT 280-OF	800	XIV
IT 2125-OF	1250	XV



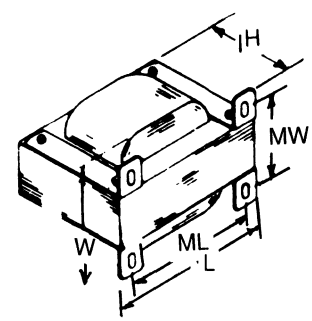
IT SERIES



IT-SOLDER TERMINAL LOCATION

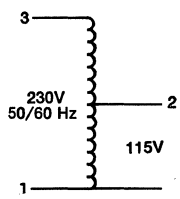
BOBBIN AUTO TRANSFORMERS

10 VA to 2.5 KVA (50-500 Hz) Step Down: 230V/115V or Step Up: 115V/230V 1.5 KV RMS Hipot – UL Class B (130°C)

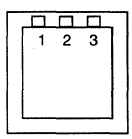


(Mtg. Style B)
(STD: SIZE IX-XVI)

AUTO TRANSFORMER	VA MAX.	SIZE
AT 101-OF	10	I
AT 102-OF	20	II(a)
AT 104-OF	40	III
AT 107-OF	70	IV
AT 110-OF	100	V
AT 112-OF	120	V(a)
AT 115-OF	150	VI
AT 120-OF	200	VII
AT 125-OF	250	VIII
AT 135-OF	350	IX
AT 150-OF	500	IX(a)
AT 175-OF	750	IX(b)
AT 1100-OF	1000	XII
AT 1150-OF	1500	XIV
AT 1250-OF	2500	XV

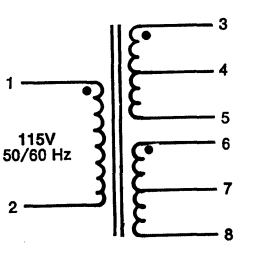


AT SERIES

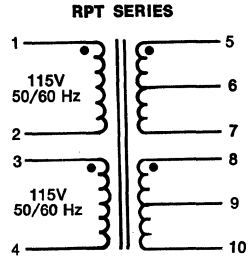


AT-SOLDER TERMINAL LOCATION

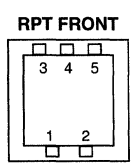
SIZE	WT. (LB.) APPROX.	W	L	H	ML	MW
I	.25	1¼	2 1/16	1 3/16	1¾	–
II	.375	1⅜	2⅜	1⅜	2	–
II(a)	.5	1½	2⅜	1⅜	2	–
III	.625	1½	2 13/16	1⅝	2⅜	–
IV	1.0	1⅝	3¼	1 15/16	2 13/16	–
V	1.25	1⅞	3¼	1 15/16	2 13/16	–
V(a)	1.5	2⅛	3¼	1 15/16	2 13/16	–
VI	1.75	2	3 1/16	2¼	3⅛	–
VII	2.5	2¼	4	2 5/16	3 5/16	–
VIII	3.5	2½	4½	2⅞	4	–
IX	4.75	2¾	3¾	3⅛	3⅛	2¼
IX(a)	6	3¼	3¾	3⅛	3⅛	2¾
IX(b)	8	4	3¾	3⅛	3⅛	3 7/16
X	6.25	3	4⅛	3 7/16	3 7/16	2⅜
XI	8	3¼	4½	3¾	3¾	2½
XII	12	4⅜	4½	3¾	3¾	3½
XIV	17	4½	5¼	4⅜	4⅜	3⅝
XV	25	6	5¼	4⅜	4⅜	5⅛
XVI	22.5	4½	6⅜	5 5/16	5 5/16	3¼



RPT SERIES



DRPT SERIES



RPT/DRPT-SOLDER TERMINAL LOCATION

EWC® INC.
385 HIGHWAY 33, ENGLISHTOWN, NJ 07726
732/446-3110 FAX 732/446-5362
E-MAIL: info@ewcincorporated.com

Split-Bobbin Rectifier Power Transformers

1 VA to 1.5 KVA — 115V @ 50/60 Hz Primary

Primary 115V 50/60 Hz	Secondary Ratings (RMS)		Mtg. Style	Size
	Series	Parallel		
RPT 10-0.1	10V C.T. @ 0.1A	5V C.T. @ 0.2A	C	I
RPT 10-0.25	10V C.T. @ 0.25A	5V C.T. @ 0.5A	C	I
RPT 10-0.5	10V C.T. @ 0.5A	5V C.T. @ 1A	C	II
RPT 10-1	10V C.T. @ 1A	5V C.T. @ 2A	C	III
RPT 10-2	10V C.T. @ 2A	5V C.T. @ 4A	C	IV
RPT 10-4	10V C.T. @ 4A	5V C.T. @ 8A	C	V
RPT 10-6	10V C.T. @ 6A	5V C.T. @ 12A	C	VI
RPT 10-8	10V C.T. @ 8A	5V C.T. @ 16A	C	VII
RPT 10-12	10V C.T. @ 12A	5V C.T. @ 24A	C	VIII
RPT 10-15	10V C.T. @ 15A	5V C.T. @ 30A	B	IX
RPT 10-25	10V C.T. @ 25A	5V C.T. @ 50A	B	X
RPT 10-30	10V C.T. @ 30A	5V C.T. @ 60A	B	XI
RPT 10-50	10V C.T. @ 50A	5V C.T. @ 100A	B	XII
RPT 10-75	10V C.T. @ 75A	5V C.T. @ 150A	B	XIV
RPT 10-100	10V C.T. @ 100A	5V C.T. @ 200A	B	XVI
RPT 12.8-0.1	12.8V C.T. @ 0.1A	6.4V C.T. @ 0.2A	C	I
RPT 12.8-0.25	12.8V C.T. @ 0.25A	6.4V C.T. @ 0.5A	C	II
RPT 12.8-0.5	12.8V C.T. @ 0.5A	6.4V C.T. @ 1A	C	II
RPT 12.8-1	12.8V C.T. @ 1A	6.4V C.T. @ 2A	C	III
RPT 12.8-2	12.8V C.T. @ 2A	6.4V C.T. @ 4A	C	V
RPT 12.8-4	12.8V C.T. @ 4A	6.4V C.T. @ 8A	C	VI
RPT 12.8-6	12.8V C.T. @ 6A	6.4V C.T. @ 12A	C	VII
RPT 12.8-8	12.8V C.T. @ 8A	6.4V C.T. @ 16A	C	VIII
RPT 12.8-12	12.8V C.T. @ 12A	6.4V C.T. @ 24A	B	IX
RPT 12.8-20	12.8V C.T. @ 20A	6.4V C.T. @ 40A	B	X
RPT 12.8-25	12.8V C.T. @ 25A	6.4V C.T. @ 50A	B	XI
RPT 12.8-50	12.8V C.T. @ 50A	6.4V C.T. @ 100A	B	XIV
RPT 12.8-100	12.8V C.T. @ 100A	6.4V C.T. @ 200A	B	XVI
RPT 16-0.1	16V C.T. @ 0.1A	8V C.T. @ 0.2A	C	I
RPT 16-0.25	16V C.T. @ 0.25A	8V C.T. @ 0.5A	C	II
RPT 16-0.5	16V C.T. @ 0.5A	8V C.T. @ 1A	C	III
RPT 16-1	16V C.T. @ 1A	8V C.T. @ 2A	C	IV
RPT 16-2	16V C.T. @ 2A	8V C.T. @ 4A	C	V
RPT-16-4	16V C.T. @ 4A	8V C.T. @ 8A	C	VI
RPT 16-6	16V C.T. @ 6A	8V C.T. @ 12A	C	VIII
RPT 16-8	16V C.T. @ 8A	8V C.T. @ 16A	C	VIII
RPT 16-10	16V C.T. @ 10A	8V C.T. @ 20A	B	IX
RPT 16-12	16V C.T. @ 12A	8V C.T. @ 24A	B	X
RPT 16-20	16V C.T. @ 20A	8V C.T. @ 40A	B	XI
RPT 16-25	16V C.T. @ 25A	8V C.T. @ 50A	B	XII
RPT 16-50	16V C.T. @ 50A	8V C.T. @ 100A	B	XIV
RPT 16-75	16V C.T. @ 75A	8V C.T. @ 150A	B	XVI
RPT 24-0.1	24V C.T. @ 0.1A	12V C.T. @ 0.2A	C	I
RPT 24-0.25	24V C.T. @ 0.25A	12V C.T. @ 0.5A	C	II
RPT 24-0.5	24V C.T. @ 0.5A	12V C.T. @ 1A	C	III
RPT 24-1	24V C.T. @ 1A	12V C.T. @ 2A	C	IV
RPT 24-2	24V C.T. @ 2A	12V C.T. @ 4A	C	VI
RPT 24-3	24V C.T. @ 3A	12V C.T. @ 6A	C	VII
RPT 24-4	24V C.T. @ 4A	12V C.T. @ 8A	C	VIII
RPT 24-6	24V C.T. @ 6A	12V C.T. @ 12A	B	IX
RPT 24-8	24V C.T. @ 8A	12V C.T. @ 16A	B	X
RPT 24-12	24V C.T. @ 12A	12V C.T. @ 24A	B	XI
RPT 24-20	24V C.T. @ 20A	12V C.T. @ 40A	B	XII
RPT 24-25	24V C.T. @ 25A	12V C.T. @ 50A	B	XIV
RPT 24-50	24V C.T. @ 50A	12V C.T. @ 100A	B	XVI
RPT 36-0.1	36V C.T. @ 0.1A	18V C.T. @ 0.2A	C	II
RPT 36-0.25	36V C.T. @ 0.25A	18V C.T. @ 0.5A	C	III
RPT 36-0.5	36V C.T. @ 0.5A	18V C.T. @ 1A	C	IV
RPT 36-1	36V C.T. @ 1A	18V C.T. @ 2A	C	VI
RPT 36-2	36V C.T. @ 2A	18V C.T. @ 4A	C	VII
RPT 36-3	36V C.T. @ 3A	18V C.T. @ 6A	C	VIII
RPT 36-4	36V C.T. @ 4A	18V C.T. @ 8A	B	IX
RPT 36-6	36V C.T. @ 6A	18V C.T.@ 12A	B	X
RPT 36-8	36V C.T. @ 8A	18V C.T. @ 16A	B	XI
RPT 36-12	36V C.T. @ 12A	18V C.T. @ 24A	B	XII
RPT 36-20	36V C.T. @ 20A	18V C.T. @ 40A	B	XIV
RPT 36-25	36V C.T. @ 25A	18V C.T. @ 50A	B	XVI
RPT 36-30	36V C.T. @ 30A	18V C.T. @ 60A	B	XVI
RPT 56-01	56V C.T. @ 0.1A	28V C.T. @ 0.2A	C	II
RPT 56-0.25	56V C.T. @ 0.25A	28V C.T. @ 0.5A	C	IV
RPT 56-0.5	56V C.T. @ 0.5A	28V C.T. @ 1A	C	V
RPT 56-1	56V C.T. @ 1A	28V C.T. @ 2A	C	VI
RPT 56-2	56V C.T. @ 2A	28V C.T. @ 4A	C	VIII
RPT 56-3	56V C.T. @ 3A	28V C.T. @ 6A	B	IX
RPT 56-4	56V C.T. @ 4A	28V C.T. @ 8A	B	X
RPT 56-6	56V C.T. @ 6A	28V C.T. @ 12A	B	XI
RPT 56-8	56V C.T. @ 8A	28V C.T. @ 16A	B	XII
RPT 56-12	56V C.T. @ 12A	28V C.T. @ 24A	B	XIV
RPT 56-20	56V C.T. @ 20A	28V C.T. @ 40A	B	XVI
RPT 56-25	56V C.T. @ 25A	28V C.T. @ 50A	B	XVI

1500V RMS Hipot — UL Class B (130°C) — Open Frame (STD)

Primary 115V 50/60 Hz	Secondary Ratings (RMS)		Mtg. Style	Size
	Series	Parallel		
RPT 68-0.1	68V C.T. @ 0.1A	34V C.T. @ 0.2A	C	III
RPT 68-0.25	68V C.T. @ 0.25A	34V C.T. @ 0.5A	C	IV
RPT 68-0.5	68V C.T. @ 0.5A	34V C.T. @ 1A	C	V
RPT 68-1	68V C.T. @ 1A	34V C.T. @ 2A	C	VII
RPT 68-1.5	68V C.T. @ 1.5A	34V C.T. @ 3A	C	VIII
RPT 68-2	68V C.T. @ 2A	34V C.T. @ 4A	B	IX
RPT 68-3	68V C.T. @ 3A	34V C.T. @ 6A	B	X
RPT 68-4	68V C.T. @ 4A	34V C.T. @ 8A	B	XI
RPT 68-6	68V C.T. @ 6A	34V C.T. @ 12A	B	XII
RPT 68-8	68V C.T. @ 8A	34V C.T. @ 16A	B	XII
RPT 68-12	68V C.T. @ 12A	34V C.T. @ 24A	B	XIV
RPT 68-15	68V C.T. @ 15A	34V C.T. @ 30A	B	XVI
RPT 68-20	68V C.T. @ 20A	34V C.T. @ 40A	B	XVI
RPT 80-0.1	80V C.T. @ 0.1A	40V C.T. @ 0.2A	C	III
RPT 80-0.25	80V C.T. @ 0.25A	40V C.T. @ 0.5A	C	IV
RPT 80-0.5	80V C.T. @ 0.5A	40V C.T. @ 1A	C	VI
RPT 80-1	80V C.T. @ 1A	40V C.T. @ 2A	C	VII
RPT 80-1.5	80V C.T. @ 1.5A	40V C.T. @ 3A	C	VIII
RPT 80-2	80V C.T. @ 2A	40V C.T. @ 4A	B	IX
RPT 80-3	80V C.T. @ 3A	40V C.T. @ 6A	B	X
RPT 80-4	80V C.T. @ 4A	40V C.T. @ 8A	B	XI
RPT 80-6	80V C.T. @ 6A	40V C.T. @ 12A	B	XII
RPT 80-8	80V C.T. @ 8A	40V C.T. @ 16A	B	XIV
RPT 80-12	80V C.T. @ 12A	40V C.T. @ 24A	B	XVI
RPT 88-0.1	88V C.T. @ 0.1A	44V C.T. @ 0.2A	C	III
RPT 88-0.25	88V C.T. @ 0.25A	44V C.T. @ 0.5A	C	IV
RPT 88-0.5	88V C.T. @ 0.5A	44V C.T. @ 1A	C	VI
RPT 88-1	88V C.T. @ 1A	44V C.T. @ 2A	C	VII
RPT 88-2	88V C.T. @ 2A	44V C.T. @ 4A	B	IX
RPT 88-3	88V C.T. @ 3A	44V C.T. @ 6A	B	X
RPT 88-4	88V C.T. @ 4A	44V C.T. @ 8A	B	XI
RPT 88-6	88V C.T. @ 6A	44V C.T. @ 12A	B	XII
RPT 88-8	88V C.T. @ 8A	44V C.T. @ 16A	B	XIV
RPT 88-12	88V C.T. @ 12A	44V C.T. @ 24A	B	XVI
RPT 120-0.1	120V C.T. @ 0.1A	60V C.T. @ 0.2A	C	III
RPT 120-0.25	120V C.T. @ 0.25A	60V C.T. @ 0.5A	C	V
RPT 120-0.5	120V C.T. @ 0.5A	60V C.T. @ 1A	C	VI
RPT 120-1	120V C.T. @ 1A	60V C.T. @ 2A	C	VIII
RPT 120-1.5	120V C.T. @ 1.5A	60V C.T. @ 3A	B	IX
RPT 120-2	120V C.T. @ 2A	60V C.T. @ 4A	B	X
RPT 120-3	120V C.T. @ 3A	60V C.T. @ 6A	B	XI
RPT 120-4	120V C.T. @ 4A	60V C.T. @ 8A	B	XII
RPT 120-6	120V C.T. @ 6A	60V C.T. @ 12A	B	XIV
RPT 120-8	120V C.T. @ 8A	60V C.T. @ 16A	B	XVI
RPT 120-12	120V C.T. @ 12A	60V C.T. @ 24A	B	XVI
RPT 160-0.1	160V C.T. @ 0.1A	80V C.T. @ 0.2A	C	IV
RPT 160-0.25	160V C.T. @ 0.25A	80V C.T. @ 0.5A	C	VI
RPT 160-0.5	160V C.T. @ 0.5A	80V C.T. @ 1A	C	VII
RPT 160-0.75	160V C.T. @ 0.75A	80V C.T. @ 1.5A	C	VIII
RPT 160-1	160V C.T. @ 1A	80V C.T. @ 2A	B	IX
RPT 160-1.5	160V C.T. @ 1.5A	80V C.T. @ 3A	B	X
RPT 160-2	160V C.T. @ 2A	80V C.T. @ 4A	B	XI
RPT 160-4	160V C.T. @ 4A	80V C.T. @ 8A	B	XIV
RPT 160-6	160V C.T. @ 6A	80V C.T. @ 12A	B	XVI
RPT 160-8	160V C.T. @ 8A	80V C.T. @ 16A	B	XVI
RPT 180-0.1	180V C.T. @ 0.1A	90V C.T. @ 0.2A	C	IV
RPT 180-0.25	180V C.T. @ 0.25A	90V C.T. @ 0.5A	C	VI
RPT 180-0.5	180V C.T. @ 0.5A	90V C.T. @ 1A	C	VII
RPT 180-1	180V C.T. @ 1A	90V C.T. @ 2A	B	IX
RPT 180-1.5	180V C.T. @ 1.5A	90V C.T. @ 3A	B	X
RPT 180-2	180V C.T. @ 2A	90V C.T. @ 4A	B	XI
RPT 180-4	180V C.T. @ 4A	90V C.T. @ 8A	B	XIV
RPT 180-6	180V C.T. @ 6A	90V C.T. @ 12A	B	XVI
RPT 180-8	180V C.T. @ 8A	90V C.T. @ 16A	B	XVI
RPT 230-0.1	230V C.T. @ 0.1A	115V C.T. @ 0.2A	C	IV
RPT 230-0.25	230V C.T. @ 0.25A	115V C.T. @ 0.5A	C	VI
RPT 230-0.5	230V C.T. @ 0.5A	115V C.T. @ 1A	C	VIII
RPT 230-0.75	230V C.T. @ 0.75A	115V C.T. @ 1.5A	B	IX
RPT 230-1	230V C.T. @ 1A	115V C.T. @ 2A	B	X
RPT 230-1.5	230V C.T. @ 1.5A	115V C.T. @ 3A	B	XI
RPT 230-2	230V C.T. @ 2A	115V C.T. @ 4A	B	XII
RPT 230-4	230V C.T. @ 4A	115V C.T. @ 8A	B	XVI
RPT 230-6	230V C.T. @ 6A	115V C.T. @ 12A	B	XVI
RPT 300-0.1	300V C.T. @ 0.1A	150V C.T. @ 0.2A	C	V
RPT 300-0.25	300V C.T. @ 0.25A	150V C.T. @ 0.5A	C	VII
RPT 300-0.5	300V C.T. @ 0.5A	150V C.T. @ 1A	B	IX
RPT 300-1	300V C.T. @ 1A	150V C.T. @ 2A	B	XI
RPT 300-2	300V C.T. @ 2A	150V C.T. @ 4A	B	XIV
RPT 300-4	300V C.T. @ 4A	150V C.T. @ 8A	B	XV!

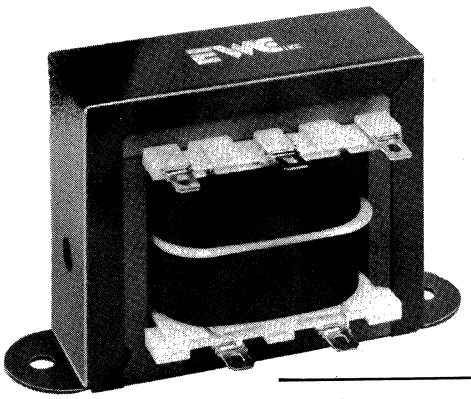
EWC, Inc. reserves the right to make changes without notice in design and specifications in order to effect product improvement.

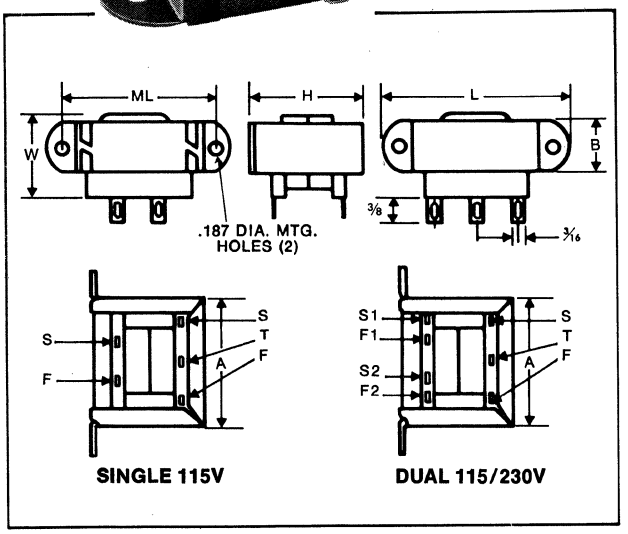
See preceding page for Mechanical Dimensions. NOTE: DRPT also available with 115/230V, 50/60 Hz primary.

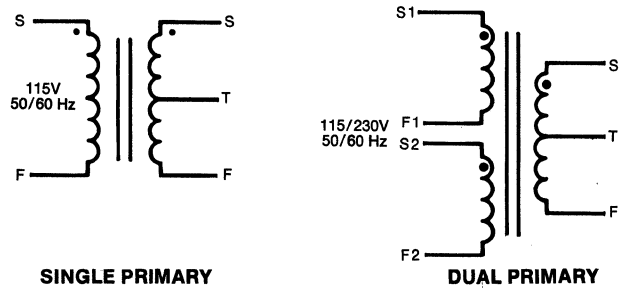
385 HIGHWAY 33, ENGLISHTOWN, NJ 07726
732/446-3110 FAX 732/446-5362
E-MAIL: info@ewcincorporated.com

CHASSIS-TRAN®

CSA22.2, No. 66 UL506
LR68051-2 E73539







SIZE	VA	L	W	H	A	B	ML	LBS.
3	2.4	2 1/16	1 1/16	1 3/16	1 5/8	5/16	1 3/4	0.25
4	6	2 3/8	1 1/4	1 3/8	1 11/16	11/16	2	0.44
5	12	2 13/16	1 3/8	1 5/8	1 15/16	13/16	2 3/8	0.7
6	30	3 1/4	1 11/16	1 15/16	2 5/16	1 1/16	2 13/16	1.1
7	56	3 11/16	1 13/16	2 1/4	2 11/16	1 1/16	3 1/8	1.7
8	100	4 1/32	2 1/4	2 5/16	3 1/16	1 5/16	3 5/16	2.75

QUICK CONNECT POWER TRANSFORMERS

2500 Volt RMS Hipot in a variety of practical sizes. Maximum operating temperature 130°C available with either single 115 or dual 115/230V primary.

EWC's split bobbin and non-concentric winding provide better insulation and high signal isolation, thus eliminating the need for electrostatic shielding.

Adaptations of standard transformers are also available. Dots on schematics shown below indicate like polarity.

PART NUMBER		SECONDARY
SINGLE 115V	DUAL 115/230V	RMS RATING
241-3-10A1	NOT AVAILABLE	10V C.T. @ 0.25A
241-4-10A11	DP 241-4-10A11	10V C.T. @ 0.6A
241-5-10A21	DP 241-5-10A21	10V C.T. @ 1.2A
241-6-10A31	DP 241-6-10A31	10V C.T. @ 3.0A
241-7-10A41	DP 241-7-10A41	10V C.T. @ 5.0A
241-8-10A51	DP 241-8-10A51	10V C.T. @ 10A
241-3-12A2	NOT AVAILABLE	12.6V C.T. @ 0.2A
241-4-12A12	DP 241-4-12A12	12.6V C.T. @ 0.5A
241-5-12A22	DP 241-5-12A22	12.6V C.T. @ 1.0A
241-6-12A32	DP 241-6-12A32	12.6V C.T. @ 2.5A
241-7-12A42	DP 241-7-12A42	12.6V C.T. @ 4.0A
241-8-12A52	DP 241-8-12A52	12.6V C.T. @ 8.0A
241-3-16A3	NOT AVAILABLE	16V C.T. @ 0.15A
241-4-16A13	DP 241-4-16A13	16V C.T. @ 0.4A
241-5-16A23	DP 241-5-16A23	16V C.T. @ 0.8A
241-6-16A33	DP 241-6-16A33	16V C.T. @ 2.0A
241-7-16A43	DP 241-7-16A43	16V C.T. @ 3.5A
241-8-16A53	DP 241-8-16A53	16V C.T. @ 6.25A
241-3-20A4	NOT AVAILABLE	20V C.T. @ 0.12A
241-4-20A14	DP 241-4-20A14	20V C.T. @ 0.3A
241-5-20A24	DP 241-5-20A24	20V C.T. @ 0.6A
241-6-20A34	DP 241-6-20A34	20V C.T. @ 1.5A
241-7-20A44	DP 241-7-20A44	20V C.T. @ 2.8A
241-8-20A54	DP 241-8-20A54	20V C.T. @ 5.0A
241-3-24A5	NOT AVAILABLE	24V C.T. @ 0.1A
241-4-24A15	DP 241-4-24A15	24V C.T. @ 0.25A
241-5-24A25	DP 241-5-24A25	24V C.T. @ 0.5A
241-6-24A35	DP 241-6-24A35	24V C.T. @ 1.25A
241-7-24A45	DP 241-7-24A45	24V C.T. @ 2.4A
241-8-24A55	DP 241-8-24A55	24V C.T. @ 4.0A
241-3-28A6	NOT AVAILABLE	28V C.T. @ 0.085A
241-4-28A16	DP 241-4-28A16	28V C.T. @ 0.2A
241-5-28A26	DP 241-5-28A26	28V C.T. @ 0.42A
241-6-28A36	DP 241-6-28A36	28V C.T. @ 1.1A
241-7-28A46	DP 241-7-28A46	28V C.T. @ 2.0A
241-8-28A56	DP 241-8-28A56	28V C.T. @ 3.6A
241-3-36A7	NOT AVAILABLE	36V C.T. @ 0.065A
241-4-36A17	DP 241-4-36A17	36V C.T. @ 0.17A
241-5-36A27	DP 241-5-36A27	36V C.T. @ 0.35A
241-6-36A37	DP 241-6-36A37	36V C.T. @ 0.85A
241-7-36A47	DP 241-7-36A47	36V C.T. @ 1.5A
241-8-36A57	DP 241-8-36A57	36V C.T. @ 2.8A
241-3-48A8	NOT AVAILABLE	48V C.T. @ 0.05A
241-4-48A18	DP 241-4-48A18	48V C.T. @ 0.125A
241-5-48A28	DP 241-5-48A28	48V C.T. @ 0.25A
241-6-48A38	DP 241-6-48A38	48V C.T. @ 0.63A
241-7-48A48	DP 241-7-48A48	48V C.T. @ 1.2A
241-8-48A58	DP 241-8-48A58	48V C.T. @ 2.0A
241-3-56A9	NOT AVAILABLE	56V C.T. @ 0.045A
241-4-56A19	DP 241-4-56A19	56V C.T. @ 0.11A
241-5-56A29	DP 241-5-56A29	56V C.T. @ 0.22A
241-6-56A39	DP 241-6-56A39	56V C.T. @ 0.54A
241-7-56A49	DP 241-7-56A49	56V C.T. @ 1.0A
241-8-56A59	DP 241-8-56A59	56V C.T. @ 1.8A
241-3-120A10	NOT AVAILABLE	120V C.T. @ 0.02A
241-4-120A20	DP 241-4-120A20	120V C.T. @ 0.05A
241-5-120A30	DP 241-5-120A30	120V C.T. @ 0.1A
241-6-120A40	DP 241-6-120A40	120V C.T. @ 0.25A
241-7-120A50	DP 241-7-120A50	120V C.T. @ 0.5A
241-8-120A60	DP 241-8-120A60	120V C.T. @ 0.85A

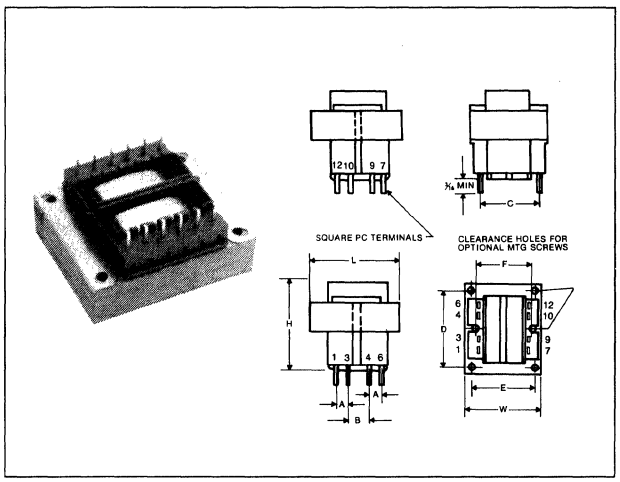
Explanation of part number series 241 Size-4 Sec. Volts — 36 Prefix "DP" used in dual primary versions.

EWC® INC.
385 HIGHWAY 33, ENGLISHTOWN, NJ 07726
732/446-3110 FAX 732/446-5362
E-MAIL: info@ewcincorporated.com

Class 2 Transformers

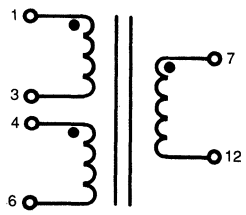
PC BOARD MOUNT

Designed With The Same Construction As Our 14A Series International Transformers. Isolation is 4000V.



VA	Dimensions L	W	H	A	B	C	Pin Dimensions	Mtg. D	E	F	Mtg Size	Screw Quant	Lbs.
2.5	1 5/8	1 5/16	1 1/8	.200	.250	1.000	0.025SQ	-	-	1 1/16	#4	2	0.25
5.0	1 5/8	1 5/16	1 3/8	.200	.400	1.000	0.025SQ	-	-	1 1/16	#4	2	0.37
10.0	1 7/8	1 9/16	1 3/8	.200	.400	1.140	0.038SQ	-	-	1 1/4	#4	2	0.53
20.0	2 1/4	1 7/8	1 5/8	.400	.400	1.460	0.038SQ	-	-	1 1/2	#4	2	0.90
30.0	2 5/8	2 3/16	1 9/16	.550	.275	1.680	0.045SQ	2 3/16	1 3/4	-	#6	4	1.15
50.0	3	2 1/2	1 13/16	.600	.300	1.900	0.045SQ	2 1/2	2	-	#6	4	1.70

115/230V
50/60Hz
DUAL
PRIMARIES

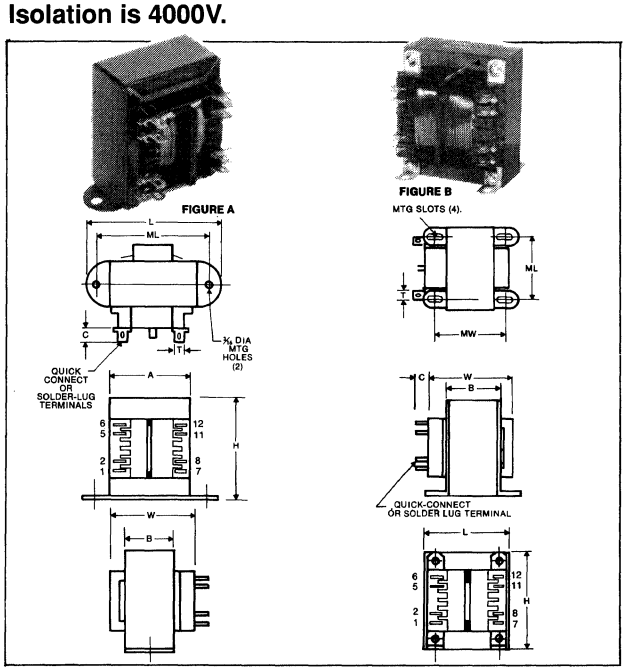


Part Number	Secondary RMS Rating	Secondary Fuse Required
CL2-2.5-12B1	12V@.20A	N/A*
CL2-2.5-24B2	24V@.10A	N/A*
CL2-5.0-12B3	12V@.42A	N/A*
CL2-5.0-24B4	24V@.20A	N/A*
CL2-10-12B5	12V@.83A	N/A*
CL2-10-24B6	24V@.42A	N/A*
CL2-20-12B7	12V@1.66A	N/A*
CL2-20-24B8	24V@.833A	N/A*
CL2-30-12B9	12V@2.50A	3.0A
CL2-30-24B10	24V@1.25A	N/A*
CL2-50-12B11	12V@4.20A	5.0A
CL2-50-24B12	24V@2.10A	2.5A

*Inherently Limited - No Fuse Required.

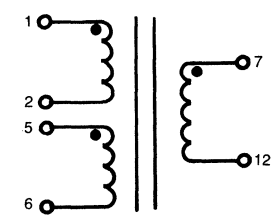
CHASSIS MOUNT

Designed With The Same Construction As Our A41 Series International Transformers. Isolation is 4000V.



VA	Dimensions L	W	H	A	B	C	Terminals	Fig.	Mtg. ML	MW	Mtg. Screw	Lbs.
25	2 13/16	1 7/8	2 5/16	2	1 1/8	3/16	3/16 (.187)	A	2 3/4	-	#6	1.25
40	3 1/8	2 1/16	2 11/16	2 1/4	1 1/8	3/16	3/16 (.187)	A	2 13/16	-	#6	1.6
80	2 1/2	2 3/8	3	-	1 3/8	3/16	3/16 (.187)	B	2	2 3/16	#6	2.8

115/230V
50/60HZ
DUAL
PRIMARIES



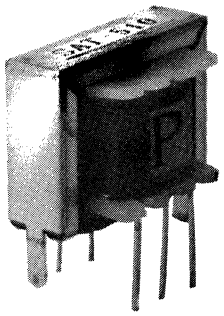
Part Number	Secondary RMS Rating	Secondary Fuse Required
CL2-25-12A1	12V@ 2.10A	2.5A
CL2-25-24A2	24V@ 1.05A	N/A*
CL2-40-12A3	12V@ 3.33A	4.0A
CL2-40-24A4	24V@ 1.66A	2.0A
CL2-80-24A5	24V@ 3.33A	4.0A

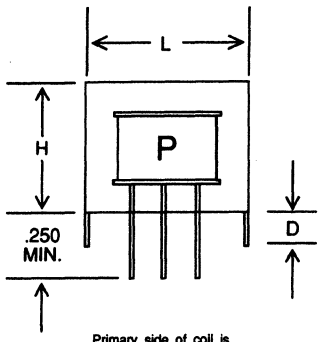
*Inherently Limited - No Fuse Required.

385 HIGHWAY 33, ENGLISHTOWN, NJ 07726
732/446-3110 FAX 732/446-5362
E-MAIL: info@ewcincorporated.com

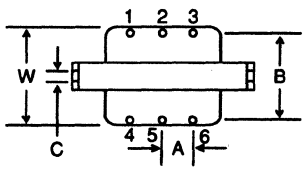
Audio Transformers

Economical off-shore construction, miniature, dry-type (no D.C.), printed circuit mounting, 1000 VAC isolation.

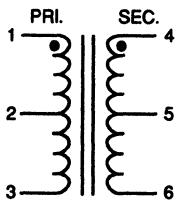




Primary side of coil is designated by the letter P



SCHEMATIC



Size	L	W	H	A	B	C	D	Pins
.075W	.599	.473	.433	.098	.457	.079	.150	26 AWG
.100W	.697	.630	.551	.110	.612	.086	.157	25 AWG
.200W	.800	.571	.640	.118	.553	.086	.165	25 AWG
.460W	1.000	.866	.750	.177	.846	.102	.189	24 AWG

			Impedance ±10% (@1KHz)		Resistance ± 20%	
Part Number	Size	Type	Pri.	Sec.	Pri.	Sec.
43012	.075W	OUTPUT	500 C.T.	8 C.T.	35	.8
43013	.075W	COUPLING	600 C.T.	600 C.T.	45	40
43014	.075W	OUTPUT	1K C.T.	8 C.T.	60	.8
43015	.075W	COUPLING	10K C.T.	600 C.T.	450	100
43016	.075W	DRIVER	10K C.T.	2K C.T.	500	200
43017	.100W	OUTPUT	500 C.T.	8 C.T.	22	.8
43018	.100W	INTERSTAGE	500 C.T.	500 C.T.	30	28
43019	.100W	OUTPUT	1.2K C.T.	8 C.T.	80	.8
43020	.100W	OUTPUT	48 C.T.	8 C.T.	2.5	.5
43021	.100W	OUTPUT	200 C.T.	8 C.T.	12	.8
43022	.200W	OUTPUT	200 C.T.	8 C.T.	12	.8
43023	.200W	OUTPUT	500 C.T.	8 C.T.	26	.8
43024	.200W	COUPLING	600 C.T.	600 C.T.	65	55
43025	.200W	OUTPUT	800 C.T.	8 C.T.	40	.8
43026	.200W	OUTPUT	1.2K C.T.	8 C.T.	80	.8
43027	.200W	INTERSTAGE	1.5K C.T.	500 C.T.	120	50
43028	.200W	COUPLING	10K C.T.	600 C.T.	600	100
43029	.200W	DRIVER	10K C.T.	2K C.T.	600	155
43030	.460W	OUTPUT	48 C.T.	8 C.T.	2.5	.5
43031	.460W	OUTPUT	120 C.T.	8 C.T.	7	.7
43032	.460W	OUTPUT	200 C.T.	8 C.T.	12	.5
43033	.460W	OUTPUT	500 C.T.	8 C.T.	18	.7
43034	.460W	INTERSTAGE	500 C.T.	500 C.T.	35	28
43035	.460W	DRIVER	10K C.T.	2K C.T.	600	155
43036	.460W	OUTPUT	1.2K C.T.	8 C.T.	75	.8
43037	.460W	COUPLING	600 C.T.	600 C.T.	65	55

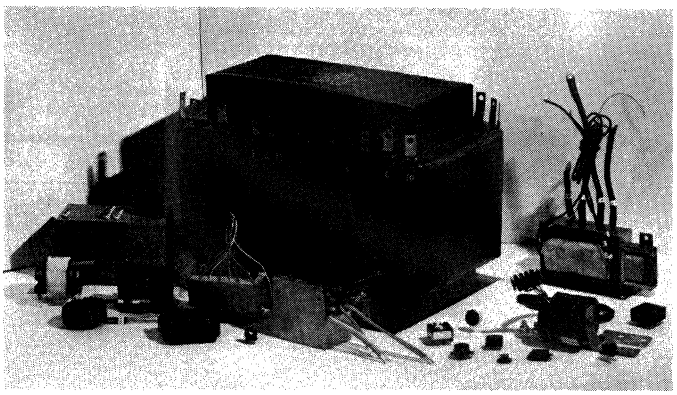
EWC® INC.
385 HIGHWAY 33, ENGLISHTOWN, NJ 07726
732/446-3110 FAX 732/446-5362
E-MAIL: info@ewcincorporated.com

FERNWOOD MAGNETICS

QUALITY MAGNETICS FOR ALL ENVIRONMENTS

• MILITARY • AEROSPACE
• INDUSTRIAL • COMMERCIAL

Fernwood Magnetics will manufacture products from your drawings or from your written requirements through our computer-aided design department. This program will produce optimum design and size for your high frequency requirements. Power range up to 100 KVA and frequencies up to 1 GHZ.



Fernwood Magnetics is fully approved to MIL-STD-981B (NASA), and is on the QPL list for grade 4 and grade 5, MIL-T-27E. Military demands high quality and reliability. Our assembly lines have in-process inspection and all products are tested 100%. Our facility is approved to MIL-45208 and instrument calibration is per MIL-I-STD-45662. Our soldering is certified by NASA per NHB5300.4 (3A-2).

We design to meet UL, CSA, and VDE when required. Our production is computer-controlled so each customer can have a timely flow chart of materials, processes, and delivery dates.

A DIVISION OF

Transistor Devices Inc.

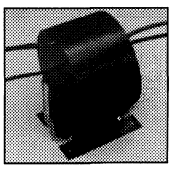
560 Independence St., Belvidere, NJ 07823-2099 Phone: (908) 475-3207 Fax: (908) 475-3242
Web Site: http://www.transdev.com e-mail: info-fm@mailer.transdev.com

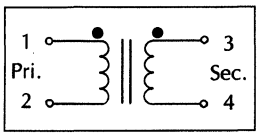
ELECTRO TECHNIK

FETCO

P.O. Box 4050 Clearwater, FL. 33758
Toll Free: 800/576-9579 • Phone: 813/536-7861
Fax: 800/535-3508 • www.electrotechnik.com

Trigger Transformer





Features:

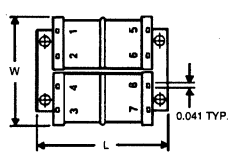
- Applications include Laser firing circuits
- Designed for low cost trigger source isolation in power control circuits
- Epoxy molded for durability and reliability
- Double banded for extra support
- Rugged 16 Ga., plated steel mounting bracket
- Designed to transfer high amplitude or long duration pulses without saturation

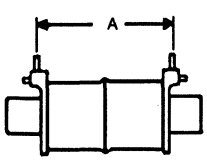
Variations:

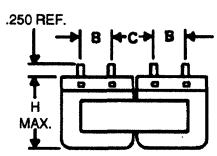
- Choice of terminals and terminal location
- Autotransformer types available

Catalog Number	Peak Output Voltage Maximum (kV)	Rise Time 10-90% (uS)	Pulse Width 50% Amplitude (uS)	Maximum Input DC Source (Volts)	Primary Pulse Current (A)	Turns Ratio Secondary To Primary	Holdoff Primary To Secondary (kVdc)	Secondary Inductance (mH) unsat	Secondary Inductance (uH) sat	Secondary Resistance (ohms)	Maximum Current DC (A)
455-1368-000	30	0.3	0.5	1500	5000	30:1	30	2.3	80	0.025	25
455-1369-000	3	1.0	3.5	1500	180	3:1	30	2.6	80	0.012	25
455-1370-000	30	1.0	3.5	800	1400	50:1	30	15.0	300	0.060	15
455-1371-000	25	0.5	0.8	1500	3000	25:1	30	1.4	60	0.012	40
455-1372-000	30	1.0	1.0	1000	4000	30:1	30	22.0	500	0.060	15
455-1373-000	30	1.0	1.0	1000	4000	30:1	30	22.0	500	0.060	15
455-1374-000	40	0.4	0.8	1500	3500	30:1	30	3.6	125	0.012	80

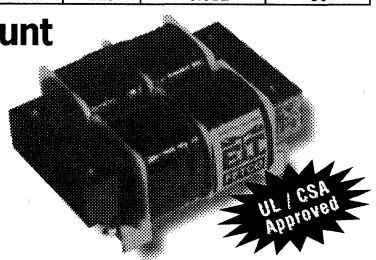
Power Transformers Low Profile / Printed Circuit Mount







Fetco Type	Power Rating (VA)	Secondary Series	Secondary Parallel	Dimensions (Inches) H	W	L	A	B	C	Weight oz.
FPCL	2.5	10.0V CT @ 0.25A 12.6V CT @ 0.2A 16.0V CT @ 0.15A 20.0V CT @ 0.125A 24.0V CT @ 0.1A 30.0V CT @ 0.0008A 34.0V CT @ 0.075A 40.0V CT @ 0.06A 56.0V CT @ 0.045A 88.0V CT @ 0.028A 120.0V CT @ 0.02A 230.0V CT @ 0.01A	5.0V @ 0.5A 6.3V @ 0.4A 8.0V @ 0.3A 10.0V @ 0.25A 12.0V @ 0.2A 15.0V @ 0.16A 17.0V @ 0.15A 20.0V @ 0.12A 28.0V @ 0.09A 44.0V @ 0.056A 60.0V @ 0.04A 115.0V @ 0.02A	0.650	1.562	1.875	1.600	0.375	0.375	5
FPCL	6.0	10.0V CT @ 0.6A 12.6V CT @ 0.475A 16.0V CT @ 0.375A 20.0V CT @ 0.3A 24.0V CT @ 0.25A 30.0V CT @ 0.2A 34.0V CT @ 0.17A 40.0V CT @ 0.15A 56.0V CT @ 0.1A 88.0V CT @ 0.065A 120.0V CT @ 0.05A 230.0V CT @ 0.025A	5.0V @ 1.2A 6.3V @ 0.95A 8.0V @ 0.75A 10.0V @ 0.6A 12.0V @ 0.5A 15.0V @ 0.4A 17.0V @ 0.34A 20.0V @ 0.3A 28.0V @ 0.2A 44.0V @ 0.13A 60.0V @ 0.1A 115.0V @ 0.05A	0.875	1.562	1.875	1.600	0.375	0.375	7
FPCL	12.0	10.0V CT @ 1.2A 12.6V CT @ 0.95A 16.0V CT @ 0.75A 20.0V CT @ 0.6A 24.0V CT @ 0.5A 30.0V CT @ 0.4A 34.0V CT @ 0.34A 40.0V CT @ 0.3A 56.0V CT @ 0.2A 88.0V CT @ 0.13A 120.0V CT @ 0.1A 230.0V CT @ 0.5A	5.0V @ 2.4A 6.3V @ 1.9A 8.0V @ 1.5A 10.0V @ 1.2A 12.0V @ 1.0A 15.0V @ 0.8A 17.0V @ 0.68A 20.0V @ 0.6A 28.0V @ 0.4A 44.0V @ 0.26A 60.0V @ 0.2A 115.0V @ 0.1A	1.062	2.000	2.500	2.000	0.500	0.500	11
FPCL	12.0	10.0V CT @ 2.4A 12.6V CT @ 1.9A 16.0V CT @ 1.5A 20.0V CT @ 1.2A 24.0V CT @ 1.0A 30.0V CT @ 0.8A 34.0V CT @ 0.68A 40.0V CT @ 0.6A 56.0V CT @ 0.4A 88.0V CT @ 0.26A 120.0V CT @ 0.2A 230.0V CT @ 0.1A	5.0V @ 4.8A 6.3V @ 3.8A 8.0V @ 3.0A 10.0V @ 2.4A 12.0V @ 2.0A 15.0V @ 1.6A 17.0V @ 1.36A 20.0V @ 1.2A 28.0V @ 0.8A 44.0V @ 0.52A 60.0V @ 0.4A 115.0V @ 0.2A	1.250	2.250	2.870	2.000	0.600	0.530	15



Features:

- Dual primaries: 115/230V, 50/60 Hz
- Semi-toroid construction reduces magnetic radiation & noise
- Class "B" insulation - 130°C
- Molded - in P.C. terminals: Precision spaced
- Split bobbin: Side by side windings no static shield required
- High isolation: For low leakage applications
- Four sizes to choose from:
  - 2.5VA (0.650") for 0.75" card spacing
  - 6.0VA (0.850") for 1.00" card spacing
  - 12.VA (1.065") for 1.25" card spacing
  - 24.VA (1.250") for 1.87" card spacing

Specifications Electrical:

Output Power Ratings: 2.5VA, 6.0VA, 12.0VA, & 24.0VA

Output Voltage: 5.0V, 6.3V, 8.0V, 10.0V, 12.0V, 15.0V, 17.0V, 20.0V, 24.0V, 28.0V, 30.0V, 34.0V, 40.0V, 44.0V, 56.0V, 60.0V, 88.0V, 115.0V, 120.0V, & 23.0V

Dielectric Strength: 2,000 VRMS

Temperature Class: Insulation class B, 130°C

Specifications Mechanical:

BOBBIN: Split type, Nylon

TERMINALS: Brass, solder coated

RATED: 130°C

WEIGHT: (see table)

FETCO Ordering Information

FPCL - 12 - 24 - S
1 2 3 4

1. FETCO type
2. Power rating (VA)
3. Voltage rating
4. Secondary connection used in specifying the voltage rating

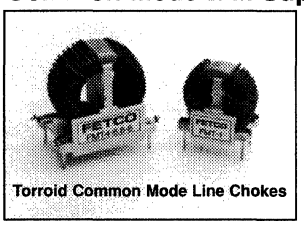
ELECTRO TECHNIK

FETCO

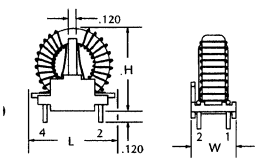
P.O. Box 4050 Clearwater, FL. 33758
Toll Free: 800/576-9579 • Phone: 813/536-7861
Fax: 800/535-3508 • www.electrotechnik.com

TYPE FMT

Common Mode EMI Suppression Inductors



Torroid Common Mode Line Chokes



Features:

- For switching mode supply applications
- Dielectric strength 1250 V rms
- Windings balanced within 1%
- Industry standard footprint
- UL, CSA, and VDE Compatible
- Creepage 3.0 mm between windings
- Other values and sizes available (please consult factory)

FMT-1 Series — Standard Configuration and Electrical Specifications @ 25°C

Type	Inductance @ 1Khz (mh/min)	Current Rating (amps/rms)	(R) dc (ohms/max.)	Leakage Inductance (µh/max)	Lead Diameter (inches) ±.003	Power Rating (va/rms)		Dimensions (inches)				
						115V	230V	A ±.010	B ±.010	L max	W max	H max
FMT-1	.035	6.5	.013	0.45	.040	745	1490	.600	.250	.87	.43	.94
FMT-1	.050	6.5	.015	0.65	.040	745	1490	.600	.250	.87	.43	.94
FMT-1	.080	4.5	.027	1.03	.040	515	1030	.600	.250	.87	.43	.94
FMT-1	.120	3.0	.056	1.55	.040	345	690	.600	.240	.87	.43	.94
FMT-1	.190	2.0	.104	2.45	.040	230	460	.600	.250	.87	.43	.94
FMT-1	.300	1.0	.215	3.85	.040	115	230	.600	.250	.87	.43	.94
FMT-1	.460	0.6	.430	5.90	.040	70	140	.600	.250	.87	.43	.94

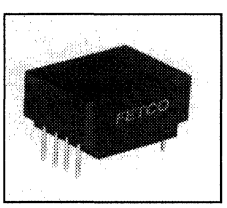
Common Mode Line Chokes

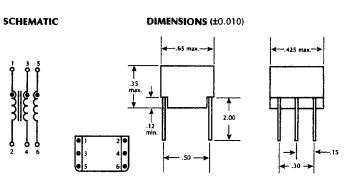
FMT-2 Series — Standard Configuration and Electrical Specifications @ 25°C

Type	Inductance @ 1Khz (mh/min)	Current Rating (amps/rms)	(R) dc (ohms/max.)	Leakage Inductance (µh/max)	Lead Diameter (inches) ±.003	Power Rating (va/rms)		Dimensions (inches)				
						115V	230V	A ±.010	B ±.010	L max	W max	H max
FMT-2	0.30	15.0	.005	6.0	.050	1725	3450	.800	.400	1.20	.650	1.28
FMT-2	0.60	15.0	.006	7.0	.050	1725	3450	.800	.400	1.20	.650	1.28
FMT2	0.60	9.0	.012	11.0	.050	1035	2070	.800	.400	1.20	.650	1.28
FMT-2	1.10	15.0	.008	14.0	.050	1725	3450	.800	.400	1.20	.650	1.28
FMT-2	1.10	9.0	.013	12.0	.050	1035	2070	.800	.400	1.20	.650	1.28
FMT-2	1.10	6.0	.022	19.0	.050	690	1380	.800	.400	1.20	.650	1.28
FMT-2	1.40	12.0	.011	16.0	.050	1380	2760	.800	.400	1.20	.650	1.28
FMT-2	1.70	6.0	.032	34.0	.050	690	1380	.800	.400	1.20	.650	1.28
FMT-2	1.90	9.0	.017	20.0	.050	1035	2070	.800	.400	1.20	.650	1.28
FMT-2	2.10	4.0	.040	36.0	.050	460	920	.800	.400	1.20	.650	1.28
FMT-2	3.70	4.0	.040	40.0	.050	460	920	.800	.400	1.20	.650	1.28
FMT-2	4.00	2.0	.100	70.0	.050	230	460	.800	.400	1.20	.650	1.28
FMT-2	7.50	2.0	.110	74.0	.050	230	460	.800	.400	1.20	.650	1.28
FMT-2	8.00	1.0	.270	125.0	.050	115	230	.800	.400	1.20	.650	1.28
FMT-2	15.00	1.0	.430	234.0	.050	115	230	.800	.400	1.20	.650	1.28

TYPE FMPT-3

Common Mode EMI Suppression Inductors





Features:

- Primary Inductance Range: (0.5mh to 12.5mh)
- Meets MIL-T-21038 Grade 7
- Custom designs available; consult factory

Specifications:

Environmental

Operating Temperature Range: -30 to +80°C

Electrical

Dielectric strength between windings:	250VRMS
Insulation resistance:	10,000 Megohms
Maximum average power:	250mW
Peak pulse voltage:	50 volts
Duty cycle:	25% max
Life:	Greater than 10,000 hrs.
MIL-T-21038 Environments:	Meets or exceeds requirements of Grade 7

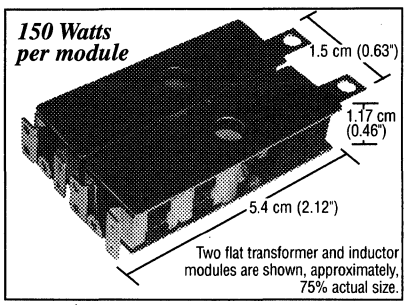
FMPT3 Series — Electrical Specifications @ 25°C

Type Number	Turns Ratio Pri:Sec:Ter	Primary Inductance mhy (±20%)	ET Constant Volt µSec (Min.)	Leakage Inductance µhy (Max.)	Interwinding Capacitance Pf (Max.)	DCR Ω (Max)			Effective Distributed Capacitance 1-2 (1,3,5 Gnd.) Pf (Max.)
						1-2	3-4	5-6	
FMPT-3	1:1:1	0.5	21	0.7	24.0	1.9	1.9	1.9	7
FMPT-3	1:1:1	1.4	35	0.9	36.0	2.9	2.9	2.9	8
FMPT-3	1:1:1	5.0	67	2.2	77.0	5.3	5.3	5.3	9
FMPT-3	1:1:1	12.5	105	3.0	127.0	8.9	8.9	8.9	16
FMPT-3	2:1:1	0.5	21	2.4	14.3	1.9	1.0	1.0	6
FMPT-3	2:1:1	1.4	35	2.6	20.2	2.9	1.6	1.6	7
FMPT-3	2:1:1	5.0	67	9.0	38.5	5.3	2.9	2.9	10
FMPT-3	2:1:1	12.5	105	14.5	57.5	8.9	4.6	4.6	12

FLAT TRANSFORMER TECHNOLOGY CORP.

New Revolutionary Flat Matrix Transformers For Switch Mode Power Converters 500 Watts to 2000 watts Matrix Transformer - Inductor Module for Switch Mode Power Converter

A revolutionary breakthrough in Transformer technology that will reduce your COST by at least 50%, eliminate hot spots, bus bars, and reduce leakages inductances. These transformers have low profile, high dielectric isolation, high density, high power and high coupling between windings. They also offer equal current sharing, and flexibility in designs not available with conventional transformers. Why are these possible?



- The Flat Transformer is a first technological breakthrough in transformer technology in the last 60 years. It overcomes the limitations of a conventional transformer such as hot spots due to poor heat dissipations, high leakage inductance, poor high frequency characteristics, tedious process in manufacturing, and bulkiness in packaging.
- Cost reductions of greater than 50% is made possible by incorporating relatively smaller, simpler, and less expensive squared cores of pressed ferrites in the Flat Transformers. These cores are packaged in a modular block with built-in single turn secondary winding by using simple, stamped and formed parts. The modular blocks are mass produced which further reduces the costs.
- Hot Spots are eliminated as individual elements in Matrix Transformer are small with high surface to volume ratio. Thermal paths are short. Built-up of bulk windings does not exist. The core's geometry results in lower core loss. With excellent heat dissipation, higher flux densities can be used.
- Leakage inductance is low because of excellent coupling between the windings and the absent of multiple turns. Terminations to ancillary components and inductors are kept very short, resulting in excellent control of parasitic impedances. This also allows faster switching times.

The Flat Matrix Transformer and Inductors are ideally suited for Switch Mode Power Converters where low costs, low profile, high current, and high performance are important parameters.

The following data describe only one class of transformers using the matrix transformer technology that are in production. Other classes of transformers are available on requests. Custom designs to suit your unique application are welcomed.

Please call to discuss your needs with our application engineers. FREE Design Assistance, Engineering Kits, Design Manuals, and Samples are available on request.

Specifications

Dimension of each module:
5.4 cm (2.12") x 1.17 cm (0.46") x 1.5 cm (0.63")
Power: 150 watts (5 Volts DC @ 30 Amps) per module
Operation Frequency: 250 Khz - 500 Khz
Suitable for following topologies:
Half Bridge, Full Bridge, Push-Pull
Output Voltage: 0 to 15 Volts DC
Input Voltage: up to 500 Vac depending on number of modules and turns

Schematics

The secondary is configured as push-pull buck converter output, requiring only the addition of a filter capacitor. Primary windings are threaded through all the modules later. Terminals are provided for direct connect to TO-247 dual rectifier for minimum lead inductance. Top and bottom surfaces are output conductors.

Applications

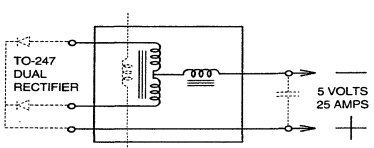
- DC to DC Converters and AC to DC Converters.
- Modules are optimized for 300 watts to 2000 watts power levels. (600 watts requires 4 modules. 2000 watts requires 14 modules.)

Turn Ratios: N X P : 1

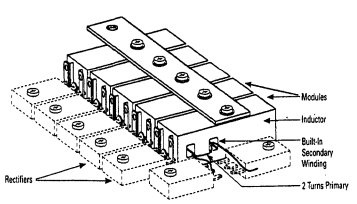
N = Number of modules places side by side with through holes aligned.
P = Number of primary windings through ALL the modules.
Example: For a turn ratio of 8:1,600 watts. Use N = 4 modules, P = 2 turns primary through all modules.

Ordering Information

Part Number: FTI-12x2-1A (for one module).
Multiple modules on common 18mm (0.7") thick base copper plate are available.
Please call for more details.
Technology licensing is available.



Schematic diagram of a flat transformer-inductor module.



5 modules ganged together with 2 turns on primary. Turn ratio = 10 : 1 Power: 750 watts

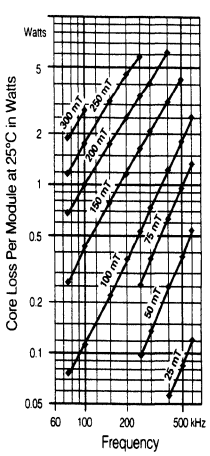
Transformer Section (2 Cores):

- Inductance (min.) of each module, m = 10 µH
- Primary Inductance: m x N x P
- Leakage Inductance (max.) of each module = 4nh per module per turn squared with rectifier terminal shorted.

Inductor Section:

- Inductance (min.) at 20 amps: 2.7 µH
- Inductance (min.) at 25 amps: 2.4 µH

To reduce leakage inductances due to external wiring, the transformer-inductor module is designed to connect directly to rectifiers.



Core Losses: <400 mW

The flat transformer and inductor module is specified for live volt operation at 250 kHz. The 150 watt rating is determined by the rating of the rectifier, conservatively derated, and the inductor has been optimized for the corresponding current of 25 amps.
Core materials: Premium high frequency low loss ferrites. Lower cost core materials are available on request.

For Sales and Technical Information, please call 1-800-898-1883.

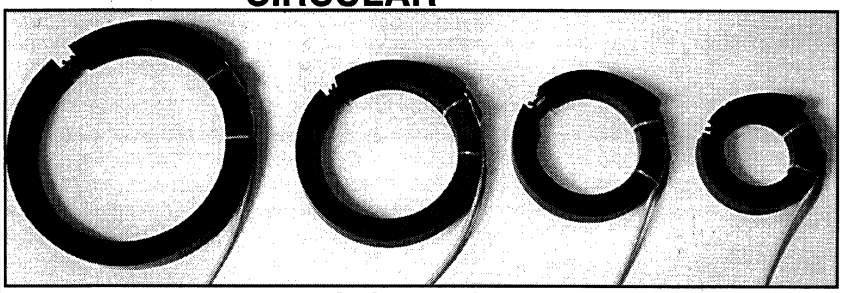
240 Briggs Avenue, Costa Mesa, CA 92626 • Tel: (714) 850-7320 • FAX: (714) 850-1163

SPLIT-CORE CURRENT (INSTRUMENT) TRANSFORMERS

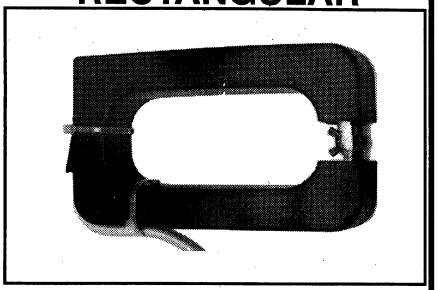
Same Day Shipping on all stock items!

FLEX-CORE Div.
Morlan & Associates, Inc.
6625 McVey Blvd., Columbus, OH 43235
FAX (614) 876-8538
Phone (614) 889-6152
Technical Assistance (614) 876-8308

CIRCULAR



RECTANGULAR



INDOOR - OUTDOOR APPLICATIONS

Five models are available for round conductors plus two for buss bars. Use with any 5 Amp indicating or recording ammeter, or with a Current or Watt transducer. The flexible core is made of directional silicon steel. The secondary windings are copper wire. Encapsulation is silicon rubber to protect against moisture, dirt, oil and corona. Remains flexible from -45° to +200°C. Insulation level is 600 Vac and can be used over insulated conductors at higher voltages. Frequency: 50-400Hz.

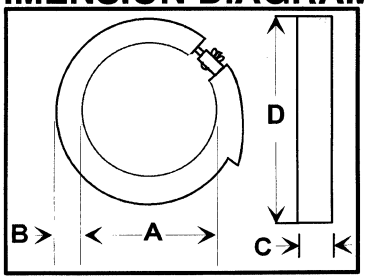
SAFETY FACTOR: A self-contained voltage clamping circuit prevents dangerous high voltage across the secondary windings in case of accidental opening of the output leads when the primary circuit is energized. This circuit will trigger within 10 microseconds when the secondary voltage rises to 40 volts or more, clamping the output to less than 1 volt. Transformer is red and 12 ft. secondary leads are yellow with spade connectors.

CURRENT	ROUND					RECTANGLE		BURDEN		THERMAL
RATIO	4"	6"	8"	11"	18"	23/4"x65/8"	4"x11"	CAPACITY	ACCURACY	FACTOR
200/5	X	-	-	-	-	-	-	2VA	4%	1.25
250/5	X	-	-	-	-	-	-	2VA	4%	1.25
300/5	X	X	-	-	-	-	-	2VA	4%	1.25
400/5	X	X	-	-	-	-	-	2VA	3%	1.25
500/5	X	X	-	-	-	X	-	3VA	3%	1.25
600/5	X	X	-	-	-	X	-	3VA	2%	1.25
800/5	X	X	-	-	-	X	-	5VA	2%	1.25
1000/5	X	X	X	-	-	X	-	10VA	2%	1.25
1200/5	X	X	X	-	-	X	-	10VA	2%	1.25
1500/5	X	X	X	-	-	X	-	10VA	2%	1.25
1600/5	X	X	X	-	-	X	-	10VA	2%	1.25
2000/5	X	X	X	X	X	X	X	10VA	2%	1.25
2400/5	-	X	X	X	X	X	X	10VA	2%	1.25
2500/5	-	X	X	X	X	X	X	10VA	2%	1.25
3000/5	-	X	X	X	X	X	X	10VA	2%	1.25
3500/5	-	X	X	X	X	X	X	10VA	2%	1.25
4000/5	-	X	X	X	X	X	X	10VA	2%	1.25
5000/5	-	X	X	X	X	X	X	10VA	2%	1.25
6000/5	-	X	X	X	X	X	X	10VA	2%	1.25

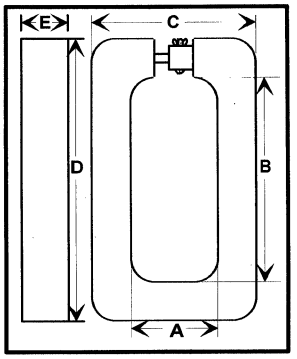
DIMENSIONS - INCHES							
	4"	6"	8"	11"	18"	R	R411
A	4"	6"	8"	11"	18"	2 3/4"	4"
B	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	6 5/8	11
C	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	5 1/2	6 1/2
D	6 1/2	8 1/2	10 1/2	13 1/2	20 1/2	9 3/8	13 3/8
E						1 1/2	1 1/2
AVERAGE WEIGHT - LBS.							
	3.5	4.25	5.5	7.5	11	4.25	6.25

DIMENSION DIAGRAMS

CIRCULAR

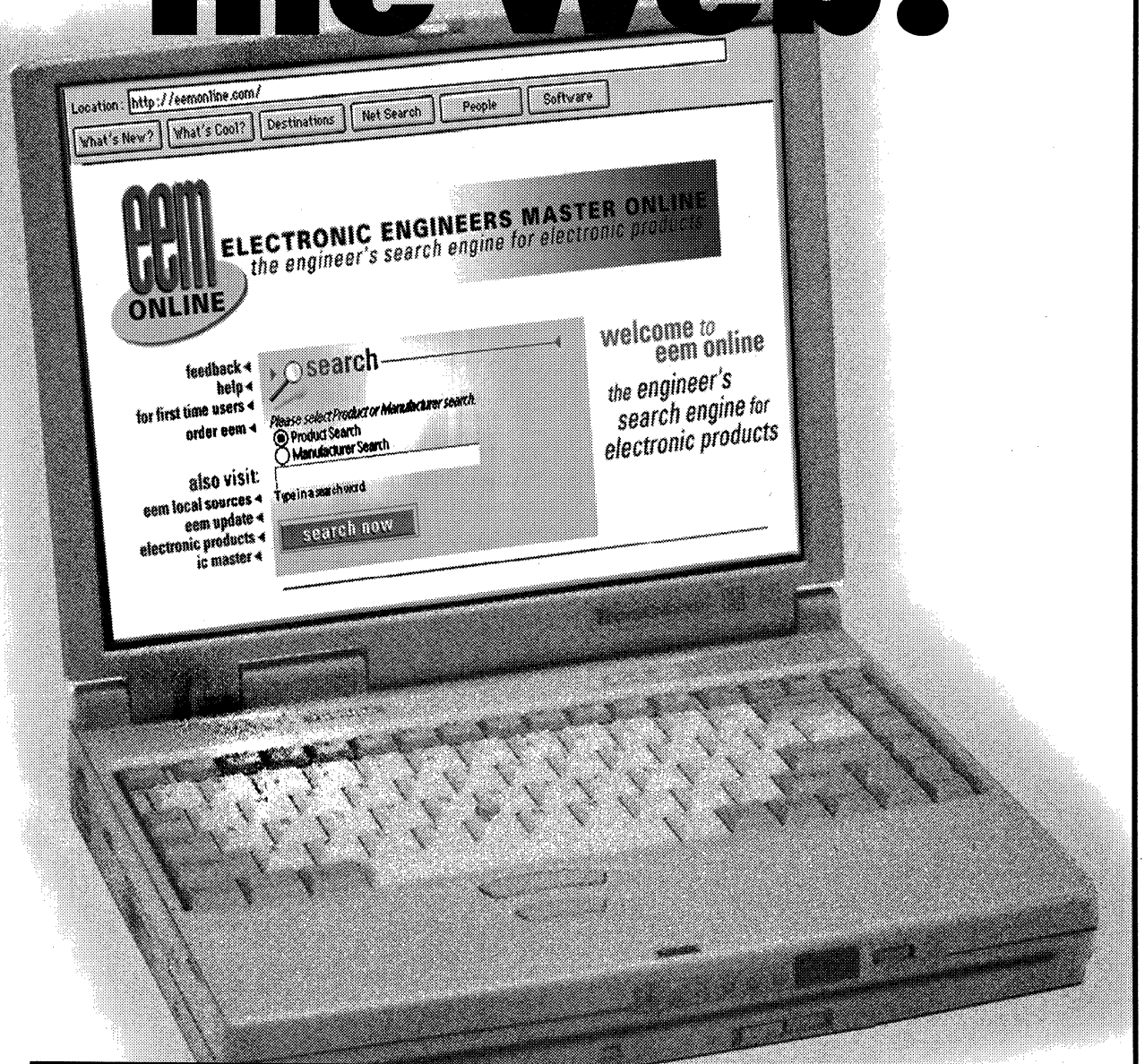


RECTANGULAR



NOTE: Open split-core with a twisting motion only.

EEM is on the Web!



http://eemonline.com

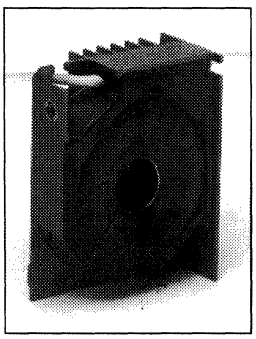
Hearst Business Communications, Inc./UTP Division
645 Stewart Avenue, Garden City, NY 11530 • Tel: 516.227.1300 • FAX: 516.227.1901

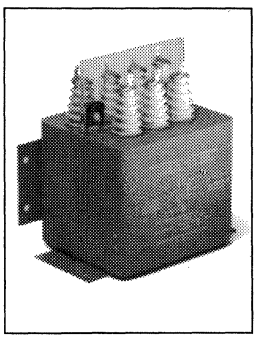
FELCO...Your Source For Transformers!

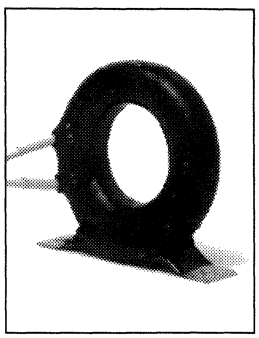
Complete Line of Standard and Custom Transformers for OEMs!

Call for fast quotations, prototype, and deliveries:

- Medical Electronics
- Industrial Controls
- Defense / Aerospace
- Telecommunications
- Commercial
- Many more!







2 Year Warranty on ALL Products!

Transformer Types:

- Audio
- Autotransformers
- Control
- Ferroresonant
- Filament
- High Reactance
- Inverter
- MIL-Spec
- Power
- Pulse
- 3-Phase
- Toroids
- Sizes up to 30 kVA!

Coils:

- Bobbin Wound
- Layer Wound
- Toroidal Wound

Transformer Construction:

- Encapsulated or Conformal Coating
- Hermetically Sealed Cases
- Open
- Unsealed Enclosures

Cores:

- Cut Cores
- Distributed Gap
- Laminated Cores
- Molded Ceramic Ferrite
- 3-Phase EI Laminations
- Wound Cores

⇨ ***UL Listed Insulation Systems***

⇨ ***Quantities of 1 to 1,000,000***

Call Toll Free! **888-86-FOREST (888-863-6737)**

Need more information? Find us on the Internet at: ***http://www.forestelectric.com***

FELCO
FOREST ELECTRIC COMPANY

Forest Electric Company

1001 N. 25th Avenue
Melrose Park, IL 60160

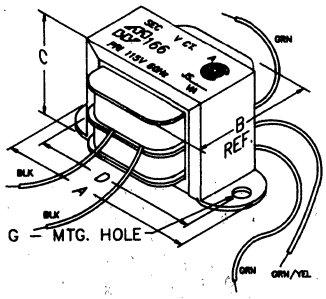
708-681-0180
708-681-0609 (FAX)

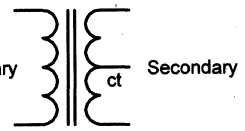
Serving the magnetic needs of leading manufacturers for over 50 years

HAMMOND MANUFACTURING™

Low Voltage Power Transformers

HAMMOND MANUFACTURING™





L.V. POWER/FILAMENT TRANSFORMERS

- Primary 115 VAC, 60 Hz. - continuous duty
- Open, 2 hole, channel bracket "C" mounting
- Split bobbin design
- Flexible leads 6" minimum length
- CSA certified & U.L. recognized

Mtg. Style	Dimensions A	B	C	D	Mtg. Hole
C0H	1.35	0.69	0.69	1.06	0.125
C1H	1.63	1.88	0.81	1.38	0.125
C2H	2.06	1.25	1.19	1.75	0.187
C3H	2.06	1.38	1.19	1.75	0.187
C4H	2.38	1.38	1.38	2.00	0.187
C5H	2.38	1.50	1.38	2.00	0.187
C6H	2.81	1.60	1.69	2.38	0.187
C7H	2.81	1.63	1.69	2.38	0.187
C8H	3.25	1.63	2.00	2.61	0.187
C9H	3.25	1.75	2.00	2.61	0.187
C10H	3.25	2.00	2.00	2.61	0.187
C11H	3.69	1.88	2.31	3.13	0.187
C12H	3.69	2.00	2.31	3.13	0.187
C13H	3.69	2.13	2.31	3.13	0.187
C14H	4.03	2.25	2.63	3.56	0.187
C15H	4.03	2.50	2.63	3.56	0.187
C16H	4.50	2.50	2.88	4.00	0.203

Cat. No.	Secondary F. L. Volts	N. L. Volts	Amps	Dim. Ref.
166F2	2.5ct	3.37	0.25	C2H
166G2	2.5ct	3.09	0.50	C2H
166J2	2.5ct	3.10	1.00	C3H
166K2	2.5ct	3.20	1.50	C4H
166L2	2.5ct	2.90	2.50	C6H
166Q2	2.5ct	3.03	6.00	C8H
166F5	5.0ct	6.11	0.25	C2H
166G5	5.0ct	5.83	0.50	C3H
166J5	5.0ct	6.17	1.00	C5H
166L5	5.0ct	5.50	2.00	C7H
166R5	5.0ct	5.35	8.00	C12H
166S5	5.0ct	5.35	10.0	C13H
166U5	5.0ct	5.30	15.0	C14H
166V5	5.0ct	5.30	20.0	C16H
166E6	6.3ct	7.45	0.15	C2H
166F6	6.3ct	7.10	0.30	C3H
166G6	6.3ct	7.80	0.60	C4H
166J6	6.3ct	7.10	1.00	C6H
166K6	6.3ct	7.25	1.20	C6H
166L6	6.3ct	7.14	2.00	C7H
166N6	6.3ct	6.90	4.00	C9H
166Q6	6.3ct	6.70	6.00	C12H
166S6	6.3ct	6.70	10.0	C14H
166G7	7.0ct	8.30	0.70	C5H
166U7	7.5ct	8.1	15.0	C16H
166G8	8.0ct	9.52	0.50	C4H
166J8	8.5ct	9.60	1.00	C6H
166L8	8.5ct	9.60	2.00	C8H
166M8	8.5ct	9.50	3.00	C9H
166N8	8.5ct	9.04	4.00	C10H
166G9	9.0ct	10.9	0.50	C4H

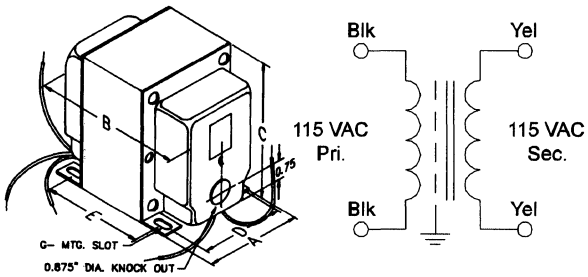
Cat. No.	Secondary F. L. Volts	N. L. Volts	Amps	Dim. Ref.
166F10	10.0ct	12.4	0.30	C3H
166G10	10.0ct	11.0	0.50	C5H
166J10	10.0ct	11.0	1.00	C7H
166L10	10.0ct	10.8	2.0	C9H
166M10	10.0ct	10.5	3.0	C10H
166N10	10.0ct	10.7	4.0	C12H
166P10	10.0ct	10.7	5.0	C13H
166R10	10.0ct	10.6	8.0	C15H
166S10	10.0ct	10.7	10.0	C16H
166P11	11.0ct	11.8	5.0	C13H
166S11	11.0ct	11.8	10.0	C16H
166C12	6.3/12.6ct	7/14	1/.05	C2H
166E12	12.0ct	15.5	0.15	C3H
166K12	12.0ct	14.7	1.2	C8H
166F12	12.6ct	15.7	0.3	C4H
166G12	12.6ct	14.5	0.5	C6H
166J12	12.6ct	14.3	1.0	C7H
166L12	12.6ct	13.8	2.5	C10H
166N12	12.6ct	13.4	4.0	C13H
166Q12	12.6ct	13.6	6.0	C14H
166R12	12.6ct	13.3	8.0	C16H
166E14	14.0ct	17.5	0.15	C3H
166G14	14.0ct	16.1	0.5	C6H
166J14	14.0ct	16.0	1.0	C7H
166L14	14.0ct	16.0	2.0	C10H
166Q14	14.0ct	15.1	6.0	C15H
166F16	16.0ct	18.6	0.25	C4H
166G16	16.0ct	18.0	0.5	C6H
166J16	16.0ct	17.6	1.0	C8H
166L16	16.0ct	17.0	2.2	C10H
166M16	16.0ct	17.4	3.0	C13H
166B18	9.0/18.0ct	10/20	.06/.03	C2H
166K18	18.0ct	19.6	1.5	C9H
166M18	18.0ct	19.4	3.0	C13H
166P18	18.0ct	18.7	5.0	C15H
166D20	20.0ct	24.6	0.1	C3H
166E20	20.0ct	23.5	0.15	C3H
166F20	20.0ct	22.8	0.3	C5H
166G20	20.0ct	22.0	0.5	C7H
166J20	20.0ct	22.0	1.0	C9H
166L20	20.0ct	21.4	2.0	C11H
166A24	12.6/25.2ct	14/28	.05/.025	C2H
166C24	24.0ct	25.3	.085	C3H
166L24	24.0ct	26.7	2.0	C13H
166N24	24.0ct	25.6	4.0	C16H
166D25	25.0ct	28.8	0.1	C3H
166E25	25.0ct	30.8	0.15	C4H
166F25	25.0ct	29.0	0.3	C6H
166G25	25.0ct	28.0	0.5	C7H
166J25	25.0ct	27.5	1.0	C9H
166K25	25.0ct	26.8	1.5	C11H
166L25	25.0ct	28.1	2.0	C13H
166M25	25.0ct	26.6	3.0	C14H
166F28	28.0ct	31.7	0.25	C6H
166G28	28.0ct	32.0	0.5	C7H
166J28	28.0ct	30.8	1.0	C10H
166L28	28.0ct	29.8	2.0	C13H
166E30	30.0ct	37.4	0.15	C4H
166F30	30.0ct	36.1	0.25	C6H
166G30	30.0ct	34.2	0.50	C8H
166J33	33.0ct	35.0	1.0	C10H
166K35	35.0ct	39.0	1.5	C13H
166E36	36.0ct	40.7	0.15	C5H
166F36	36.0ct	39.4	0.3	C7H
166G36	36.0ct	40.0	0.5	C8H
166J36	36.0ct	39.5	1.0	C11H
166L42	42.0ct	43.9	2.0	C15H
166E44	44.0ct	51.6	0.15	C6H
166F44	44.0ct	50.6	0.25	C7H
166G44	44.0ct	48.1	0.50	C9H
166J44	44.0ct	47.4	1.0	C12H
166C50	50.0ct	62.0	0.075	C4H
166F50	50.0ct	57.0	0.3	C8H
166G50	50.0ct	55.0	0.5	C9H
166J50	50.0ct	54.5	1.0	C13H
166L50	50.0ct	53.2	2.0	C16H
166G60	60.0ct	65.2	0.5	C10H
166G80	90.0ct	85.5	0.5	C11H
166G100	100.0ct	107.0	0.5	C13H
166F120	120.0ct	129.2	0.3	C11H

HAMMOND MANUFACTURING CO., 4700 Genesee St., Cheektowaga, NY 14225
Phone: 716-631-5700, Fax: 716-631-1156

HAMMOND MANUFACTURING™

Line Isolating & Autotransformers

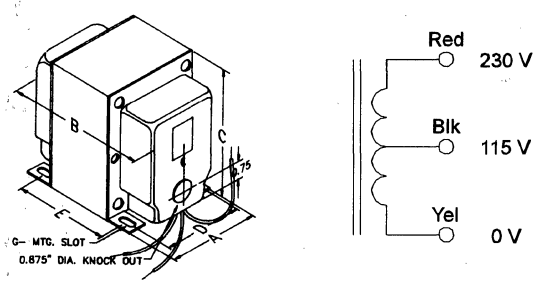
HAMMOND MANUFACTURING™



LINE ISOLATION TRANSFORMER

- Primary 115 VAC, 60 Hz. only.
- Secondary 115 VAC.
- Electrostatic shield included between Pri. and Sec. for circuit isolation and minimum leakage.
- Flexible leads 8" minimum length.
- Type X mounting with knockouts in each end bell for optional above chassis wiring.
- CSA certified.

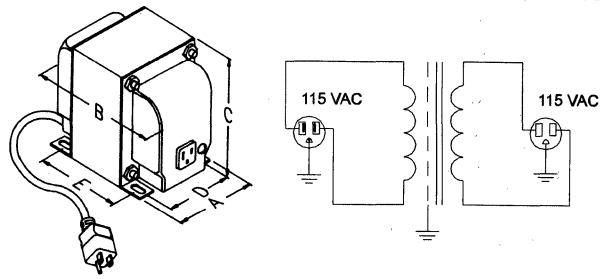
Cat. No.	VA	Sec. mA	Dimensions A	B	C	D	E	Wt. Lb.
169PS	15	130	1.88	2.07	2.50	1.75	1.19	1.3
169QS	40	260	2.19	2.50	2.63	1.75	1.44	2.5
169RS	60	435	2.50	2.75	3.06	2.00	1.69	3.3
169SS	90	650	2.50	3.25	3.06	2.00	2.19	4.5
169TS	135	870	3.13	3.50	3.81	2.50	2.19	6.5
169VS	175	1300	3.13	4.00	3.81	2.50	2.69	7
169WS	250	1700	3.75	4.00	4.56	3.00	2.81	12



LINE AUTO TRANSFORMER

- Can be wired to step down 230 VAC to 115 VAC or can be wired to step up 115 VAC to 230 VAC. 50 or 60 Hz.
- Reduced size & weight but NO ISOLATION operates as an auto transformer.
- Flexible leads 8" minimum length.
- Type X mounting with knockouts in each end bell for optional above chassis wiring. Same case style as 169 series above.

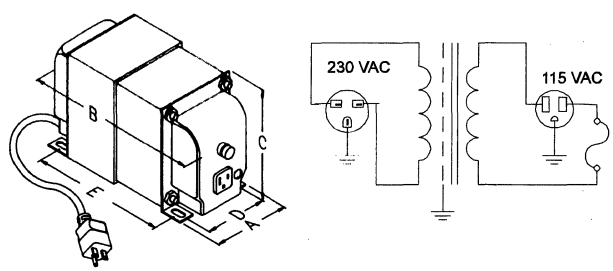
Cat. No.	VA	Dimensions A	B	C	D	E	Wt. Lb.
170	50	2.19	2.63	2.63	1.75	1.56	2
170A	100	2.50	3.00	3.06	2.00	1.94	3
170B	200	3.13	3.50	3.81	2.50	2.19	4.5
170C	300	3.13	4.00	3.81	2.50	2.69	6
170D	500	3.75	4.50	4.56	3.00	3.31	10
170E	750	3.75	5.50	4.56	3.00	4.31	14
170F	1000	3.75	5.50	4.56	3.00	4.31	14.5
170G	1500	4.38	6.63	5.25	3.50	5.10	22
170J	2000	4.38	6.63	5.25	3.50	5.10	23



PLUG IN - LINE ISOLATION TRANSFORMER

- Primary 115 VAC, 50 or 60 Hz.
- Secondary 115 VAC
- Electrostatic shield included between Pri. and Sec. for circuit isolation and minimum leakage
- Single outlet receptacle up to 300 VA, duplex receptacle on 500 & 900 VA models. 6 foot "U ground" cord and plug
- Type X mounting.
- CSA certified

Cat. No.	VA	Dimensions A	B	C	D	E	Wt. Lb.
171A	100	3.75	4.00	5.00	3.00	1.88	6.5
171B	200	3.75	4.50	5.00	3.00	2.38	8
171C	300	3.75	5.00	5.00	3.00	2.88	11
171E	500	3.75	6.00	5.00	3.00	3.88	14
171F	900	4.38	8.00	5.50	3.50	5.44	30



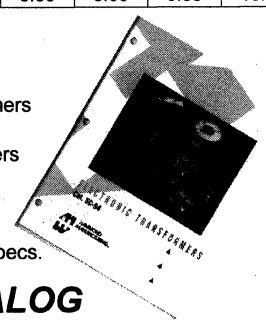
PLUG IN - LINE ISOLATION TRANSFORMER

- Primary 230 VAC, 50 or 60 Hz.
- Secondary 115 VAC - fused
- Electrostatic shield included between Pri. and Sec. for circuit isolation and minimum leakage
- 5 foot "U ground" cord and plug on primary, single fused outlet receptacle on secondary.
- Type X mounting.
- CSA certified

Cat. No.	VA	Dimensions A	B	C	D	E	Wt. Lb.
172A	100	3.75	6.50	5.00	3.00	3.88	6.5
172B	200	3.75	7.00	5.00	3.00	4.38	8.5
172D	500	3.75	8.50	5.00	3.00	5.88	18.5

We also manufacture:

- √ Audio transformers
- √ Broadcast audio matching transformers
- √ Audiophile tube output transformers
- √ P. C. board mount power transformers
- √ High voltage transformers
- √ Chokes & reactors
- √ R. F. Chokes
- √ ***AND*** special transformers to your specs.



CALL, FAX OR WRITE FOR YOUR FREE CATALOG

HAMMOND MANUFACTURING CO., 4700 Genesee St., Cheektowaga, NY 14225
Phone: 716-631-5700, Fax: 716-631-1156

PUT US TO

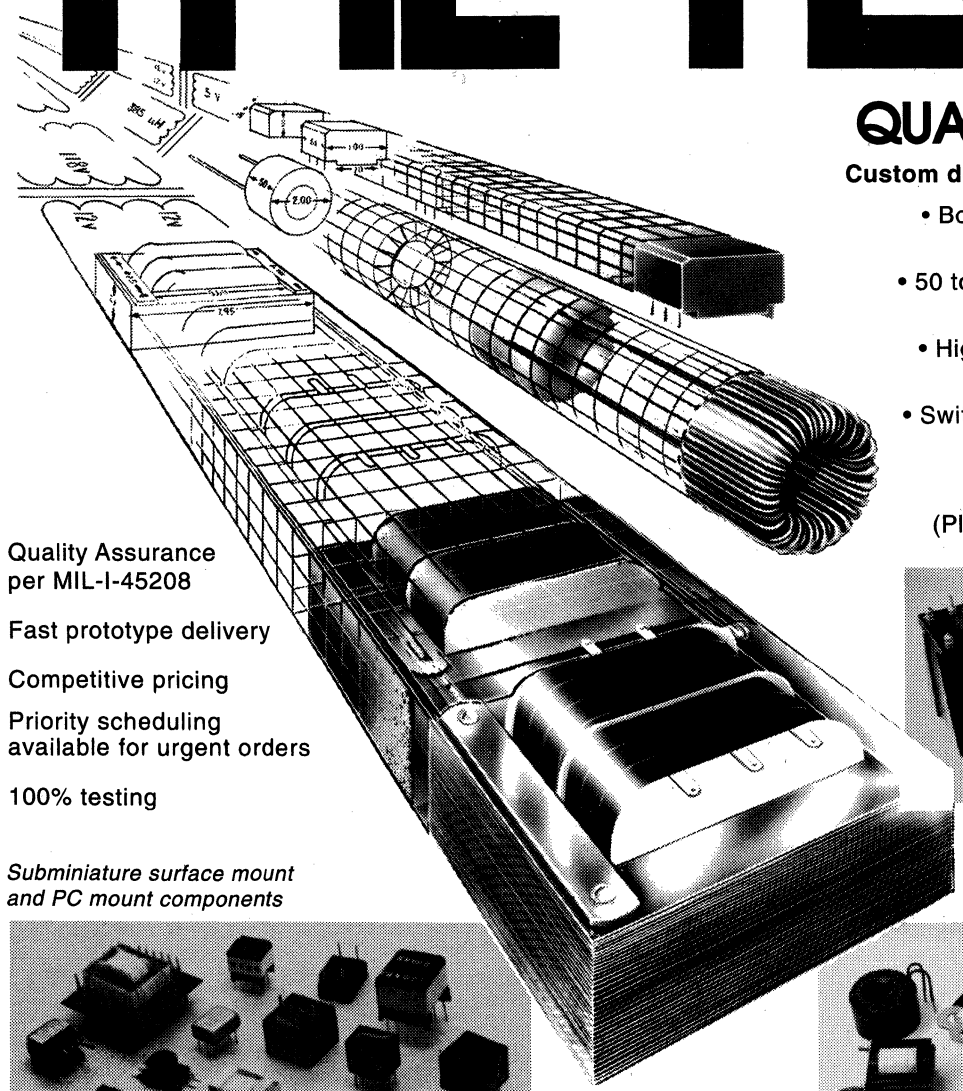
INPHASE INC.

THE TEST

QUALITY...ON TIME

Custom designed and manufactured:

- Bobbin, toroidal or layer wound magnetic components
- 50 to 400 HZ, single and 3 phase power transformers
- High voltage, Wide band, Audio and Current transformers
- Switch mode power transformers
- Varnished or encapsulated
- Chokes and inductors (Please see our ad under Coils)



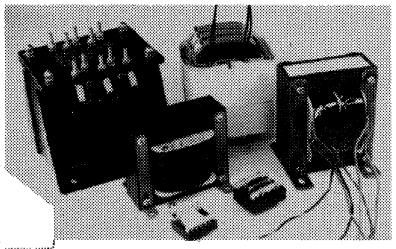
Quality Assurance per MIL-I-45208

Fast prototype delivery

Competitive pricing

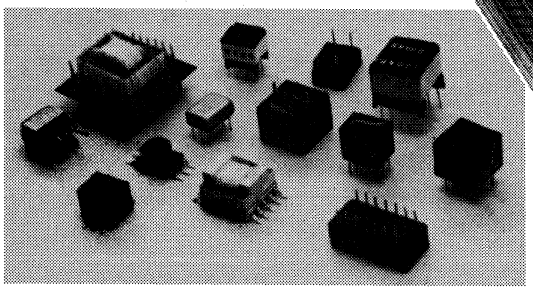
Priority scheduling available for urgent orders

100% testing

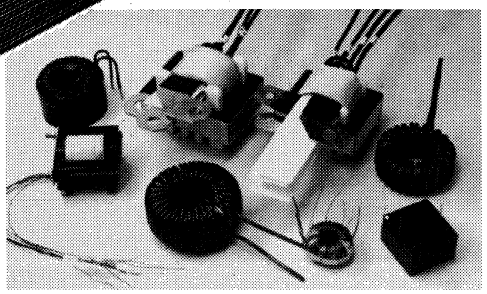


50-400 HZ power transformers

Subminiature surface mount and PC mount components



Switch mode power components



Military, MIL-T-27 • Industrial • Commercial • UL • CSA • VDE

SEE OUR WEB SITE: **www.inphaseinc.com** for more details on our company, products, industry links and downloadable software.

INPHASE INC. • 100 Mill Street, Unit 15, Clifton Heights, PA 19018
(610) 394-9280 • FAX: (610) 394-9281

ISL PRODUCTS INTERNATIONAL LTD.

800-626-6116

Dept. EM, 235 Robbins Lane, Suite 270,
Syosset, NY 11791
(516) 937-3475 • FAX (516) 937-3840
e.mail:info@islproducts.com

1975-1999 **24** YEARS OF EXCELLENCE

- **EUROPEAN APPROVED TRANSFORMERS AVAILABLE**
- **SAFETY AGENCY (UL, CSA, TUV . . .) APPROVED SERVICES AVAILABLE**

TRANSFORMERS

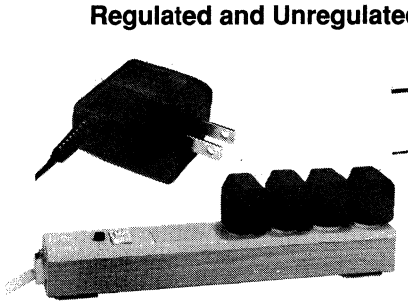
Telecom, Industrial, Power

- Standard and Custom Design
- Power Ranges 75 mW—300W
- UL Construction as Required
- Telecommunications Transformers Meet FCC Specs Part 68
- Split Bobbin and Other Lead Configurations Available

WALL PLUG-IN ADAPTORS POWER SUPPLIES WITH BUILT IN DIPLEXERS

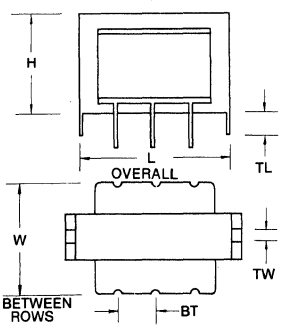
Case Sizes EI - 28 to EI - 76

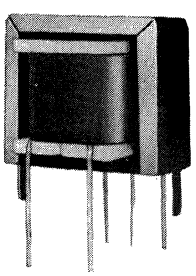
Regulated and Unregulated



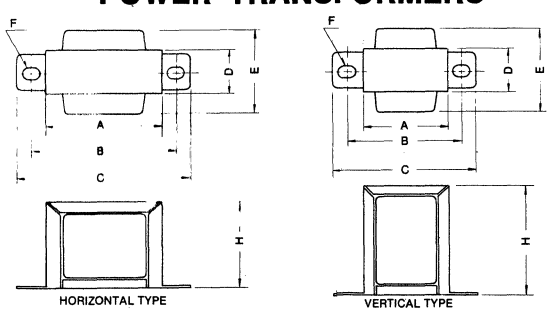
UNIQUE SPACE EFFICIENT DESIGN
EI - 35

AUDIO/COMMUNICATIONS TELEPHONE TRANSFORMERS





POWER TRANSFORMERS



DIMENSIONS: M/M HORIZONTAL TYPE / VERTICAL TYPE

Type	Part No.	Description	Impedance Pri	Impedance Sec	Resistance Pri	Resistance Sec	Dimension
EI-14 Series .075 Watts Max.	AT-141	Output	500C.T.	8	35	.8	L =15.2mm(.599) H =11.0mm(.433) W =12.0mm(.473) TW= 2.0mm(.079) TL = 3.8mm(.150) BT = 2.5mm(.098) All Dimensions Nom
	AT-142	Coupling	600C.T.	600C.T.	45	40	
	AT-143	Output	1KC.T.	8	60	.8	
	AT-144	Coupling	10KC.T.	600C.T.	450	100	
	AT-145	Driver	10KC.T.	2KC.T.	500	200	
EI-16 Series .100 Watts Max.	AT-161	Output	500C.T.	8	22	.8	L =17.7mm(.697) H =14.0mm(.551) W =16.0mm(.630) TW= 2.2mm(.086) TL = 4.0mm(.157) BT = 2.8mm(.110) All Dimensions Nom
	AT-162	Interstage	500C.T.	500C.T.	30	28	
	AT-163	Output	1.2KC.T.	8	80	.8	
	AT-164	Output	48C.T.	8	2.5	.5	
	AT-165	Output	200C.T.	8	12	.8	
EI-19 Series .200 Watts Max.	AT-191	Output	200C.T.	8	12	.8	L =20.3mm(.800) H =16.2mm(.640) W =14.5mm(.571) TW= 2.2mm(.086) TL = 4.2mm(.165) BT =3.0mm(.118) All Dimensions Nom
	AT-192	Output	500C.T.	8	26	.8	
	AT-193	Coupling	600C.T.	600C.T.	65	55	
	AT-194	Output	800C.T.	8	40	.8	
	AT-195	Output	1.2KC.T.	8	80	.8	
	AT-196	Interstage	1.5KC.T.	500C.T.	120	50	
	AT-197	Coupling	10KC.T.	600C.T.	600	100	
	AT-198	Driver	10KC.T.	2KC.T.	600	155	
EI-24 Series .460 Watts Max.	AT-241	Output	48C.T.	8	2.5	.5	L =25.3mm(.100) H =18.4mm(.725) W =16.0mm(.630) TW= 2.6mm(.102) TL = 4.8mm(.189) BT = 4.5mm(.177) All Dimensions Nom
	AT-242	Output	120C.T.	8	7.0	.7	
	AT-243	Output	200C.T.	8	12.0	.5	
	AT-244	Output	500C.T.	8	180	.7	
	AT-245	Interstage	500C.T.	500C.T.	35	28	
	AT-246	Driver	10KC.T.	2KC.T.	600	155	
	AT-247	Output	1.2KC.T.	8	75	.8	
	AT-248	Coupling	600C.T.	600C.T.	65	55	

Metric Size Output (VA)	Input	A	B	C	D	E	F	H
EI-28 (1)	120	29.5	37.5	49.5	9-15	25-34	3.5 x 5.8	28
		27	35	47				31
EI-35 (2)	120	36.5	45	56.5	10-17	31-40	3.5 x 5.8	32.5
		31.5	41	53				38
EI-41 (4.5)	120	42.5	52	61	14-24	32-43	3.5 x 5.8	37
		35	45	57				44
EI-48 (7)	120	50.5	60	69.5	17-25	37-46	3.5 x 5.8	43.5
		42	52	64				51
EI-54 (13)	120	56	67	78	20-26	44-56	4.2 x 6.5	49
		48	59	70				56
EI-57 (18)	120	59	70	80	20-26	44-56	4.2 x 6.5	51
		49.5	61	75				60
EI-60 (25)	120	62	75	89	21-33	45-2	4.2 x 6.5	54
		52	66	78				63
EI-66 (40)	120	68.5	81	92	23-41	53-70	4.2 x 6.5	59
		57.5	74	84				69
EI-76 (75)	120	79	90	100	31-41	60	5 x 7	65
		67	78	89				78
EI-86 (110)	120	87.5	105	107	31-41	67	5 x 7	74
		75	86	97				89
EI-96 (300)	120	98	109	120	40-60	77	5 x 7	84
		85	96	107				98

• Welcome Offer Original Sample and Diagram

SEE OUR PAGES IN SECTIONS 1300, 4750 & 6000 • SEE OUR CATALOG ON THE INTERNET @ http://www.islproducts.com

Split Bobbin Transformers

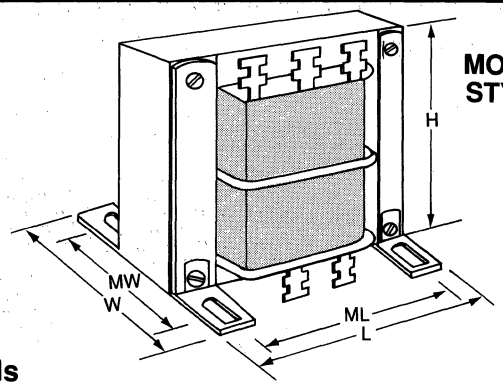
JM transformer
YOUR PRIMARY SOURCE

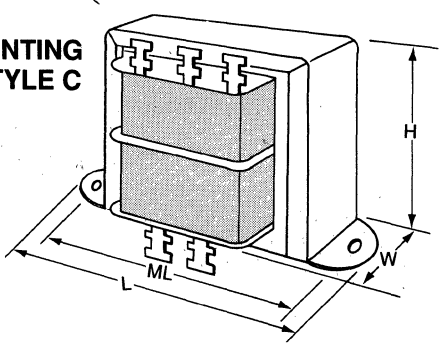
The use of a Split Bobbin allows winding to be nonconcentric (side-by-side), consequently high isolation is achieved at low cost.

- Better insulation — 2500 VRMS hipot is standard.
- Lower capacitance — no need for electro-static shield.
- **Low leakage.**
- **We design to Meet UL, CSA, VDE, IEC, & TUV Standards.**

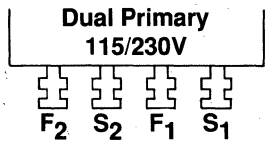
Also available:

- **Units with 4000 VRMS hipot**
- **High voltage transformers**
- Multiple outputs
- Tapped primaries
- **Flexible leads**
- Quick disconnects
- Steel covers





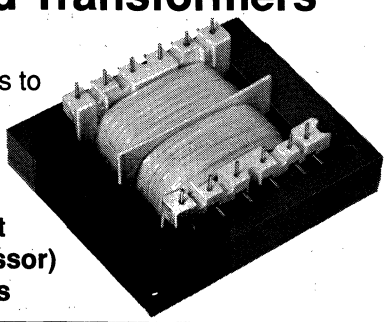
WE SPECIALIZE IN POWER TRANSFORMERS AND ISOLATION TRANSFORMERS FOR MEDICAL ELECTRONICS



CUSTOM PROTOTYPES 1 DAY - 1 WEEK

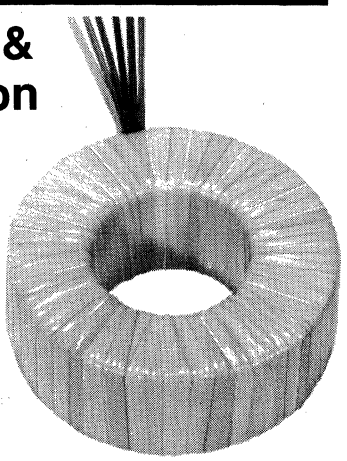
Split Bobbin and Low Profile Split Bobbin PC Board Transformers

- 50/60 Hz
- Power Ratings to 48 VA
- Also available: **Triple Output (Microprocessor) Transformers**



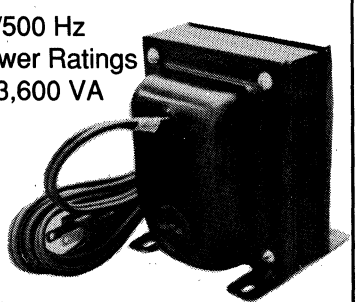
Toroidal Power & Toroidal Isolation Transformers

- 50/500 Hz
- Power Ratings to over 1,000 VA



Auto-transformers

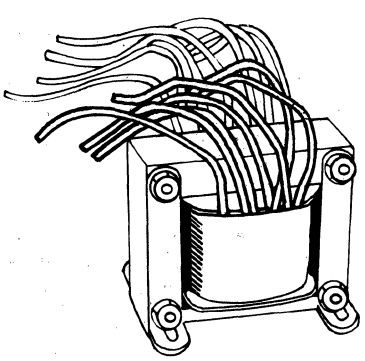
- 50/500 Hz
- Power Ratings to 3,600 VA



Rectifier Power Transformers with Flexible Leads

- 50/500 Hz
- Power Ratings up to 1800 VA

Custom Prototypes 1 Day - 1 Week



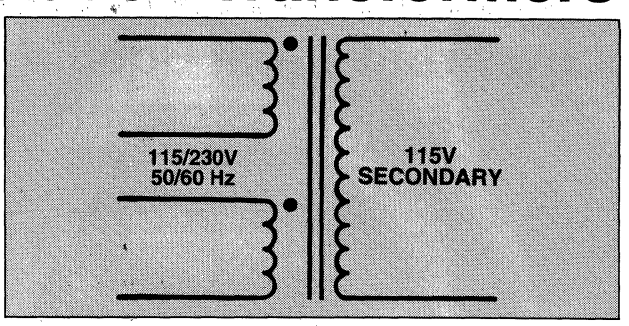
PLEASE CALL OR WRITE FOR OUR CATALOG

J M Transformer Co., Inc. 112 FLORIDA STREET, FARMINGDALE, NY 11735 • (516) 293-0475 • FAX: (516) 293-3923

JM transformer
YOUR PRIMARY SOURCE

Split Bobbin Isolation Transformers

Part Number	Size	Secondary RMS Rating
I-.8	100	115V @ .8A
I-1	120	115V @ 1A
I-1.3	150	115V @ 1.3A
I-1.7	200	115V @ 1.7A
I-2.6	300	115V @ 2.6A
I-4.3	500	115V @ 4.3A
I-6.5	750	115V @ 6.5A
I-9	1000	115V @ 9A
I-15	1800	115V @ 15A



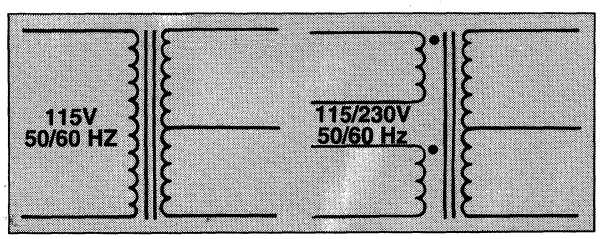
Custom Prototypes
1 Day - 1 Week

Recognized Component
UL 544 (Medical)

Size	Mounting Style	L	W	H	ML	MW	Approx. Lbs.	Typical Power
100	C	4 1/32	2 15/32	2 9/16	3 9/16	—	2 3/4	100VA
120	C	4 1/2	2 15/32	2 7/8	4	—	3	120VA
150	B	3 3/4	2 13/16	3 1/8	3 1/8	2 1/4	4	150VA
200	B	4 1/8	3	3 7/16	3 7/16	2 3/8	5 1/2	200VA
300	B	4 1/2	3 1/4	3 3/4	3 3/4	2 1/2	7	300VA
500	B	4 1/2	4 1/4	3 3/4	3 3/4	3 1/2	11	500VA
750	B	5 1/4	4 1/2	4 3/8	4 3/8	3 5/8	16	750VA
1000	B	6 3/8	4 5/8	5 5/16	5 5/16	3 1/4	20	1000VA
1800	B	7 1/2	5 3/8	6 1/4	6 3/4	3 5/8	32	1800VA

Split Bobbin Power Transformers

Standard Items
Ideal for use in rectifier circuits



Part Numbers Shown Below **Add Prefix D for this configuration**

Part Number	Secondary RMS Rating	Size
10-10*	10V @ 10A	100
10-12*	10V @ 12A	120
10-15*	10V @ 15A	150
12T-8	12.6VCT @ 8A	100
12-10*	12.6V @ 10A	120
12-12*	12.6V @ 12A	150
16T-6	16VCT @ 6A	100
16T-8	16VCT @ 8A	120
16-10*	16V @ 10A	150
16-12*	16V @ 12A	200
20T-5	20VCT @ 5A	100
20T-6	20VCT @ 6A	120
24T-4	24VCT @ 4A	100
24T-5	24VCT @ 5A	120
24T-6	24VCT @ 6A	150
24T-8	24VCT @ 8A	200
24-12*	24V @ 12A	300
28T-3.5	28VCT @ 3.5A	100
28T-4.2	28VCT @ 4.2A	120
28T-5.4	28VCT @ 5.4A	150
28T-7	28VCT @ 7A	200
28-10*	28V @ 10A	300

Part Number	Secondary RMS Rating	Size
32T-3	32VCT @ 3A	100
32T-3.8	32VCT @ 3.8A	120
32T-4.5	32VCT @ 4.5A	150
32T-6	32VCT @ 6A	200
36T-2.8	36VCT @ 2.8A	100
36T-3.3	36VCT @ 3.3A	120
36T-4	36VCT @ 4A	150
36T-5.5	36VCT @ 5.5A	200
36T-8	36VCT @ 8A	300
36-12*	36V @ 12A	500
40T-2.5	40VCT @ 2.5A	100
40T-3	40VCT @ 3A	120
40T-3.8	40VCT @ 3.8A	150
40T-5	40VCT @ 5A	200
40T-7.5	40VCT @ 7.5A	300
48T-2	48VCT @ 2A	100
48T-2.5	48VCT @ 2.5A	120
48T-3	48VCT @ 3A	150
48T-4	48VCT @ 4A	200
48T-6	48VCT @ 6A	300

* These items do not have center-tapped secondaries.

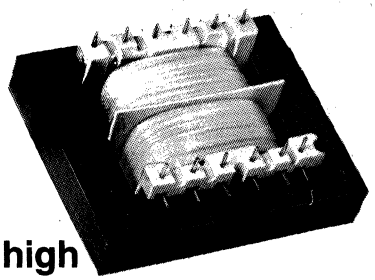
Part Number	Secondary RMS Rating	Size
56T-1.7	56VCT @ 1.7A	100
56T-2.1	56VCT @ 2.1A	120
56T-2.7	56VCT @ 2.7A	150
56T-3.6	56VCT @ 3.6A	200
56T-5.4	56VCT @ 5.4A	300
56-8*	56V @ 8A	500
56-13*	56V @ 13A	750
68T-1.4	68VCT @ 1.4A	100
68T-1.8	68VCT @ 1.8A	120
68T-2.2	68VCT @ 2.2A	150
68T-2.9	68VCT @ 2.9A	200
68T-4.4	68VCT @ 4.4A	300
68-7*	68V @ 7A	500
68-11*	68V @ 11A	750
80T-1.2	80VCT @ 1.2A	100
80T-1.5	80VCT @ 1.5A	120
80T-1.9	80VCT @ 1.9A	150
80T-2.5	80VCT @ 2.5A	200
80T-3.8	80VCT @ 3.8A	300
80T-6	80VCT @ 6A	500
80-9*	80V @ 9A	750
120T-.8	120VCT @ .8A	100

112 FLORIDA STREET, FARMINGDALE, NY 11735 • (516) 293-0475 • FAX: (516) 293-3923 **J M Transformer Co., Inc.**

Custom Prototypes 1 Day - 1 Week

JM transformer
YOUR PRIMARY SOURCE

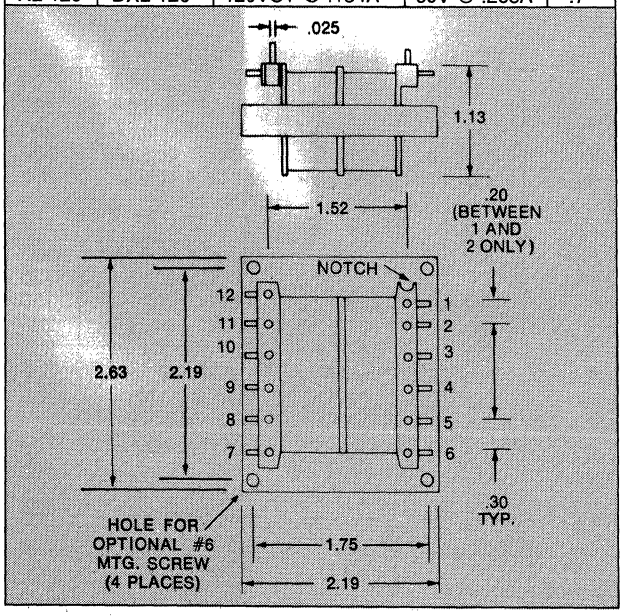
Low Profile Split Bobbin PC Board Transformers



- **Only 1.13" high**

XL Series transformers offer a particularly low profile for 18VA, allowing for 1.25" card spacing.

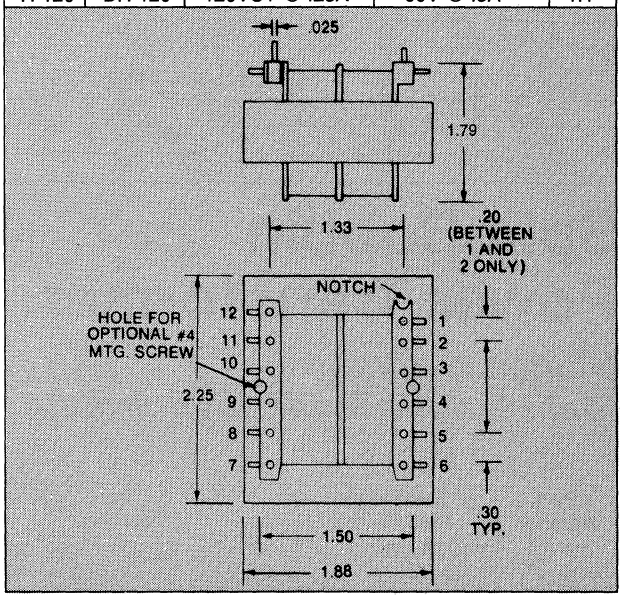
Part Number		Secondary RMS Ratings		Approx. Lbs.
Single 115V Pri.	Dual 115/230V Pri.	Series	Parallel	
XL-10	DXL-10	10VCT @ 1.6A	5V @ 3.2A	.7
XL-12	DXL-12	12.6VCT @ 1.25A	6.3V @ 2.5A	.7
XL-14	DXL-14	14VCT @ 1.28A	7V @ 2.56A	.7
XL-16	DXL-16	16VCT @ 1A	8V @ 2A	.7
XL-18	DXL-18	18VCT @ 1A	9V @ 2A	.7
XL-20	DXL-20	20VCT @ .8A	10V @ 1.6A	.7
XL-22	DXL-22	22VCT @ .8A	11V @ 1.6A	.7
XL-24	DXL-24	24VCT @ .68A	12V @ 1.36A	.7
XL-28	DXL-28	28VCT @ .64A	14V @ 1.28A	.7
XL-32	DXL-32	32VCT @ .5A	16V @ 1A	.7
XL-36	DXL-36	36VCT @ .5A	18V @ 1A	.7
XL-40	DXL-40	40VCT @ .4A	20V @ .8A	.7
XL-44	DXL-44	44VCT @ .4A	22V @ .8A	.7
XL-48	DXL-48	48VCT @ .34A	24V @ .68A	.7
XL-56	DXL-56	56VCT @ .32A	28V @ .64A	.7
XL-72	DXL-72	72VCT @ .25A	36V @ .5A	.7
XL-88	DXL-68	88VCT @ .2A	44V @ .4A	.7
XL-120	DXL-120	120VCT @ .134A	60V @ .268A	.7

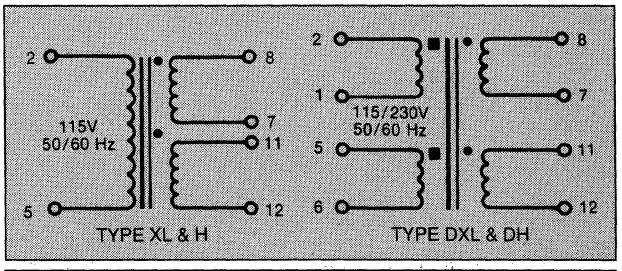


Split Bobbin PC Board Transformers

H Series transformers offer a particularly small footprint for 30VA.

Part Number		Secondary RMS Ratings		Approx. Lbs.
Single 115V Pri.	Dual 115/230V Pri.	Series	Parallel	
H-10	DH-10	10VCT @ 3A	5V @ 6A	1.1
H-12	DH-12	12.6VCT @ 2.4A	6.3V @ 4.8A	1.1
H-16	DH-16	16VCT @ 1.8A	8V @ 3.6A	1.1
H-20	DH-20	20VCT @ 1.5A	10V @ 3A	1.1
H-24	DH-24	24VCT @ 1.25A	12V @ 2.5A	1.1
H-32	DH-32	32VCT @ .95A	16V @ 1.9A	1.1
H-40	DH-40	40VCT @ .75A	20V @ 1.5A	1.1
H-48	DH-48	48VCT @ .625A	24V @ 1.25A	1.1
H-80	DH-80	80VCT @ .375A	40V @ .75A	1.1
H-120	DH-120	120VCT @ .25A	60V @ .5A	1.1



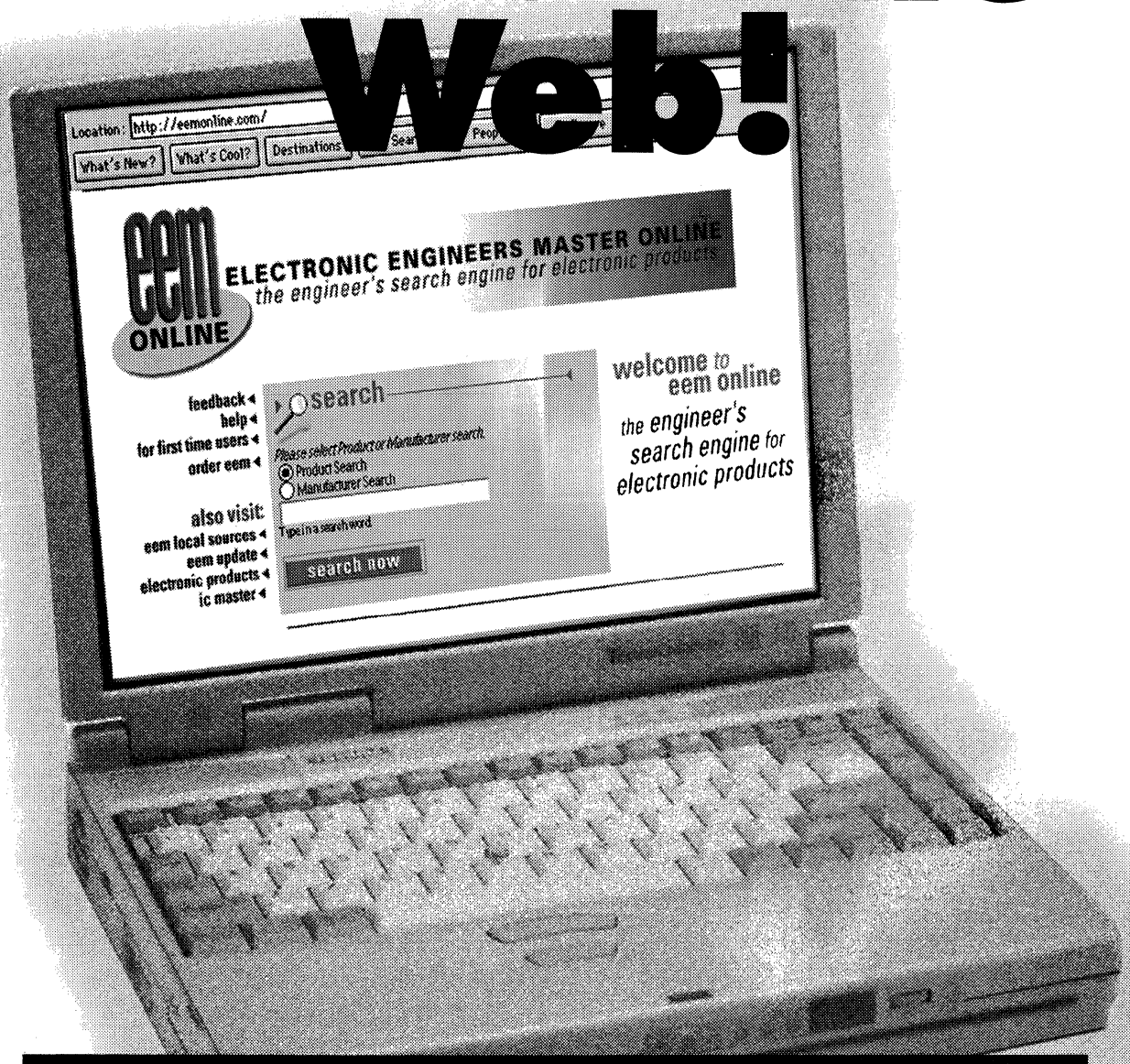


WE SPECIALIZE IN POWER TRANSFORMERS AND ISOLATION TRANSFORMERS FOR MEDICAL ELECTRONICS

PLEASE CALL OR WRITE FOR OUR CATALOG

J M Transformer Co., Inc. 112 FLORIDA STREET, FARMINGDALE, NY 11735 • (516) 293-0475 • FAX: (516) 293-3923

Bookmark EEM on the Web!



http://eemonline.com

Hearst Business Communications, Inc./UTP Division
645 Stewart Avenue, Garden City, NY 11530 • Tel: 516.227.1300 • FAX: 516.227.1901

KAPPA® TECHNOLOGIES INC.

LAN TRANSFORMERS

10Base2 CheaperNet/10Base5 Thick Ethernet[1]

IC Mfr's Name	Station or DTE Controller Chip Part#	Associated CTI Chip Part#	to AUI Port: Ask for **Kappa** P/N
AMD	Am79(C)90/Am7992	Am7996	TP395(*)750
AMD	Am7990/Am7992	Am7997	TP395(*)500
Crystal	CS8005/CS8023A	CS83C92C	TP395(*)101
Fujitsu	MB86950/51	MBL8392A	TP395(*)750
Fujitsu	MB86960	MBL8392A	TP395(*)750
Intel	82586/590/596	82C501AD	TP395(*)750
National	DP8390/91/901	DP8392C	TP395(*)101
National	DP8390/910/932	DP8392C	TP395(*)151
National	DP83916	DP8392C	TP395(*)750
Symbios Logic	92C390/391/901	NCR92C392	TP395(*)101
Philips	86950/NE502A	NE8392A	TP395(*)750
Seeq	8005/8020	83C92	TP395(*)101
Seeq	83C90/83C91	83C92	TP395(*)101
Silicon Sys.	78Q8360	78Q8330	TP395(*)101
SMC	83C690/91C90	SMC83B692	TP395(*)101

10BaseT Ethernet over Twisted-pair Cable[1]

IC Mfr's Name	TPI Chip[2] Part Number	Ask for **Kappa** Transformers: **Standard** Adapter Card & 1-Port Solutions	**Standard** Multiport Repeaters	**Enhanced** (includes CMC) Adapter Card & 1-Port Solutions	**Enhanced** (includes CMC) Multiport Repeaters
AMD	79C984/88	–	TP8003D	–	TP8005D
Crystal	CS8900/20	TP2031(*)	TP8007D	TP2032(*)	TP8008D
Fujitsu	MB86961	TP2031(*)	TP8007D	TP2032(*)	TP8008D
Level 1	LXT901/07	TP2031(*)	TP8007D	TP2032(*)	TP8008D
Level 1	LXT914 (Tx)	TP4003(*)	TP8007D	TP4007W	TP8008D
Level 1	LXT914 (Rx)	TP497(*)101	TP8003D	TP4006W	TP8005D
Level 1	LXT944	–	–	–	TP8004D
µLinear	ML2652/53	–	TP8006D	TP2061(*)	TP8010D
µLinear	ML4652/58	–	TP8006D	TP2061(*)	TP8010D
National	DP83907	–	–	TP3036(*)	TP8009D
National	DP83953	–	TP8006D	TP2061(*)	TP8010D
Seeq	80C24	–	TP8006D	TP2061(*)	TP8010D
T. I.	TNETE100A	TP2031(*)	TP8007D	TP2032(*)	TP8008D
T. I.	TNETE2004	TP2031(*)	TP8007D	TP2032(*)	TP8008D

100BaseX *Fast* Ethernet (CSMA/CD)

IC Mfr's Name	MII or PHY Chip Part#	Ask for **Kappa** Part#: 1-port Solutions[3]	2-port Solutions[3]	4-port Solutions[2,5]	XMT, RCV, Both or Either	Functional Blocks[4] (applied to XMT Channel only): Input CMC	Isolation XFR	Output[3] CMC	CMT[3] Coil
AMD	Am79C871	FM2211GW	TP4018D	TP8011D	Both	√	√	√	√
Broadcom	BCM5203/05/08	–	–	TP8013D	Both		√	√	
Crystal	CS8952	FM2211GW	TP4018D	TP8011D	Both	√	√	√	√
Davicom	DM9101/81	FM2211GW	TP4018D	TP8011D	Both	√	√	√	√
ICS	ICS1890/91	FM2227GW	TP4018D	TP8011D	Both	√	√	√	√
Intel	S82555/58	FM2211GW	TP4018D	TP8011D	Both	√	√	√	√
Level One	LXT970	FM2211GW	TP4018D	TP8011D	Both	√	√	√	√
Level One	LXT974/75/80	FM2240GW	TP8010D	TP8017D	Both	√	√	√	√
Level One	LXT981/82/83	FM2240GW	TP8010D	TP8017D	Both	√	√	√	√
Lucent	LUC3X04/14/24	FM2211GW	TP4018D	TP8011D	Both	√	√	√	√
Lucent	LUC3X54	–	–	TP8011D	Both	√	√	√	√
Micro Linear	ML6672/73	FM2227GW	TP4018D	TP8011D	Both	√	√	√	√
National	DP83223	FM2211GW	TP4018D	TP8011D	Both	√	√	√	√
National	DP83840A	FM2211GW	TP4018D	TP8011D	Both	√	√	√	√
QSI	QS6611/12	FM2241GW	TP4016D	TP8011D	Both	√	√	√	√
Texas Inst.	TNETE2101	FM2211GW	TP4018D	TP8011D	Both	√	√	√	√
Texas Inst.	TNETE2104	–	–	TP8011D	Both		√	√	
TDK	TSC78Q2120	FM2211GW	TP4018D	TP8011D	Both	√	√	√	√

ATM, Fibre Channel and TP-FDDI

IC Mfr's Name	Twisted-pair Interface or PHY Chip Part Number	Application	Ask for **Kappa** Part Number	XMT, RCV, Both or Either	Input Common Mode Choke	Isolation Xfr	L–C Filter	Output Common Mode Choke	Common Mode Term. Coil
IDT	IDT 77105	25.6 ATM	FM2304GW	Both		√	√	√	
Novacom	NOV25PMD6	25.6 ATM	TP2076D	Both		√			
Seeq	93C95	25.6 ATM	TP2076D	Both		√			
Transwitch	ALI25T	25.6 ATM	TP2076D	Both		√			
Micro Linear	ML6674	155 ATM	FM2309S	Either	√	√		√	√
Micro Linear	ML6674	155 ATM	FM2312GW	Both	√	√		√	√
National	DP83223A	155 ATM	FM2311GW	Both	√	√		√	√
PMC Sierra	PM5350	155 ATM	FM2311GW	Both	√	√		√	√
Generic Modules for ATM-155 and TP-FDDI Applications			TP1122D	Either		√		√	
			TP1123D	Either		√		√	√
			TP1124D	Either		√		√	
			FM2306GW	Both	√	√		√	√
			FM2309S	Either		√		√	√
			FM2310GW	Both	√	√		√	√
			FM2311GW	Both	√	√		√	√
			FM2312GW	Both	√	√		√	√
			Series TP-FDDX	Both		√		√	
Generic Modules for Fibre Channel			Series TPFC-0	Either		√			

Kappa Technologies Inc. • 1443 Pinewood St., Rahway, N.J. 07065 • (732) 396-9400 • Facsimile: (732) 388-4786

KAPPA® TECHNOLOGIES INC.

LAN TRANSFORMERS

Token Ring (4/16 Mb/s) over Twisted-pair Cable[1]

IC Mfr's Name	TPI or PHY Chip Part Number	Ask for **Kappa** Part Number	XMT, RCV, Both or Either	Input Isolation and Impedance-Matching	EMI/RFI Noise Suppression	Signal Wave Shaping	Output Isolation and Impedance-Matching	Phantom Drive Connections
Micro Linear	ML6682	TP194(*)251	Either	400 Ω			150 Ω	
		TP294(*)251	Both	400 Ω			150 Ω	
		TP186(*)251	Either	400 Ω			100 Ω	
		TP287*)251	Both	400 Ω			100 Ω	
Texas Instr.	TI380C30/60	TP2040D	Either	150 Ω	√		150 & 100 Ω	√
Texas Instr.	TI380C30/60	FM2298G	Both	150 Ω	√	√	150 & 100 Ω	√
Other Generic Modules for Stations, Hubs, Repeaters, and Active Timing Concentrators		TP186(*)251	Either	600 Ω	√		150 Ω	
		TP287(*)251	Both	600 Ω	√		150 Ω	
		TP187(*)751	Either	150 or 100 Ω	√		150 or 100 Ω	
		TP288(*)751	Both	150 or 100 Ω	√		150 or 100 Ω	
		TP192(*)101	Either	150 Ω	√		100 Ω	
		TP292(*)101	Both	150 Ω	√		100 Ω	
		TP193(*)225	Either	150 Ω	√		150 or 100 Ω	
		TP293(*)225	Both	150 Ω	√		150 or 100 Ω	

1Base5 StarLan[1]

IC Mfr's Name	NIC Chip Mfr's Part Number	Recommended Kappa Transformer	
		Single	Dual
AMD	Am7960	TP181W252	TP282(*)252
AT&T/Lucent	PM4353	TP181W252	TP282(*)252
Intel	82588	TP181W252	TP282(*)252
National	DP8390	TP181W252	TP282(*)252
Thomson CSF	MK5030/33	TP181W252	TP282(*)252

IBM 3270 and 3299 Line Interface[1]

IC Mfr's Name	Transceiver Mfr's Part Number	Recommended Kappa Parts	
		Isolation Transformers	Integrated Line Interface Module
LAN Guys	82C570	TC3026(*)	TX1034/1044(*)
National	DP8340/41	TC3026(*)	TX1034/1044(*)
National	DP8344	TC3027(*)	TX1018(*)
SMC	COM9004	TC3026(*)	TX1034/1044(*)
SMC	COM9064/90C84	TC3026(*)	TX1034/1044(*)

T3, DS3, E3 and STS-1 Interfaces[1]

Kappa Part# (*) = Package Code "F"=6-pin Flatpak "G"=6-pin Gull-wing SMD "P"=6-pin DIP	Schematic	Ω Ratio	Frequency Range (MHz)		Insertion Loss					
					-3 db Freq (MHz)		-2 db Freq (MHz)		-1 db Freq (MHz)	
			MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
TR6T100A1(*)		1	0.050	200	0.050	200	0.08	150	0.20	80
TR6T100A6(*)		1	0.004	300	0.004	300	0.01	150	0.02	50
TR6T200A1(*)	4 3 2 6 1	2	0.070	200	0.070	200	0.10	100	0.50	50
TR6T200A2(*)		2	0.250	500	0.250	500	0.30	200	0.50	50
TR6T300A1(*)		3	0.050	250	0.050	250	0.10	200	0.50	70
TR6T400A1(*)		4	0.200	350	0.200	350	0.35	300	0.20	100
TR6T16RA6(*)		16	0.030	75	0.030	75	0.06	30	0.10	20
TR6T400A6(*)		4	0.020	250	0.020	250	0.05	150	0.10	100
TR6T100B6(*)	4 3 5 2 6 1	1	0.001	500	0.004	500	0.02	200	0.10	50
TR6T400B1(*)		4	0.050	200	0.050	200	0.20	50	1.00	30
TR6T400B2(*)		4	0.100	300	0.100	300	0.20	250	0.30	180
TR6T100C1(*)	4 3 6 1	1	0.150	400	0.150	400	0.35	200	2.00	50
TR6T16RC1(*)		16	0.300	120	0.300	120	0.70	80	5.00	20
TR6T100C6(*)		1	0.010	150	0.010	150	0.02	100	0.05	50
TR6T400C6(*)		4	0.020	200	0.020	200	0.05	150	0.10	100
TR6H100C1(*)		1	8.000	300	8.000	300	10.00	200	25.00	100
TR6H16RC1(*)		16	7.000	85	7.000	85	10.00	65	15.00	40

Notes

[1] "(*)" = substitute Package Code as applicable: "**D**"=Small Outline SMD, "**G**"=Standard SMD, "**P**"=DIP, "**S**"=SIP, "**W**"=Wide-body DIL. Consult individual data sheets, in conjunction with the Package Outlines section of catalog, for availability and details.

[2] Level One's LXT901 and LXT907 are compatible with a number of network interface controllers including National's DP8390; Intel's 82586 and 82596 (for STP application [AUI port is not used]); Intel's 82586 Coprocessor in combination with National's DP8392C Coax Transceiver Interface (for 10Base2 operation); Texas Instruments' TMS380C26 CommProcessor with TMS380C54 transceiver (for dual 10BaseT and Token Ring operation [AUI port not used]); Texas Instruments' TMS380C24 (for full duplex application [AUI port not used]); Fujitsu's MB86950 or MB86960; Seeq's 8005; and AMD's Am7990 (AUI Encoder/Decoder application only [AUI port not used]).

[3] Applies to 1-port parts only. Refer to Series TP100TX2 and TP100TX4 data sheets for details.

[4] All Receive channels have a transformer and common mode filter choke.

[5] 4-port magnetics do not contain an input CMC or CMT coil.

Kappa Technologies Inc. • 1443 Pinewood St., Rahway, N.J. 07065 • (732) 396-9400 • Facsimile: (732) 388-4786

CUSTOM TRANSFORMERS

CUSTOM MADE TRANSFORMERS FROM LENCO

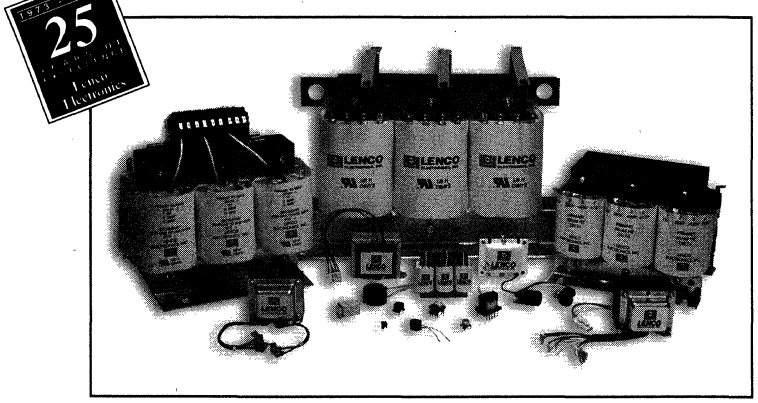
Complete engineering, design and manufacturing assistance from prototype thru production from 1 to 100,000+.

Custom transformers of all types
Single Phase 10mW to 15KVA / 3 Phase to 45 KVA

- Hi-Freq Switcher
- Audio
- Current
- Isolation
- Constant Voltage
- Medical UL 544/IEC 601
- Inductor
- PC
- Filament
- Low Profile
- Hi-Temperature Class H per 1446
- Touchless Terminals
- Plate
- Converter
- R-Core
- Control
- 400 HZ
- Three Phase from 9 VA to 45 KVA

YOUR SPECIAL APPLICATION . . . OUR SPECIALTY

Fax or E-Mail your custom specifications for a no obligation quotation



- Prompt engineering support
- Quick turnaround
- Highest quality control standards
- Low cost samples
- Custom designed to your special application
- Manufactured to conform to your specifications:

UL, CSA, VDE, BSI, IEC

We are as close as the phone!

815-344-2900

We Answer Your Call - In Person

View our Electronic Brochure and Latest Up-Dates At:
http://www.lenco-elect.com

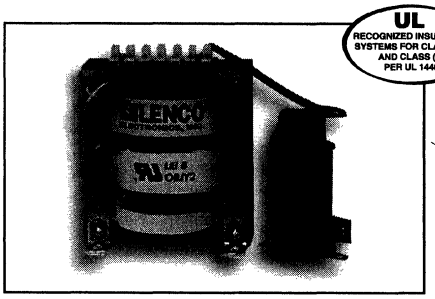
LENCO ELECTRONICS, INC.

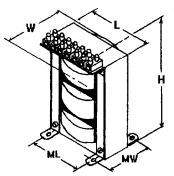
E-mail: sales@lenco-elect.com
1330 Belden St., McHenry, Il 60050

Use our 24-hour FAX 815-344-2730 for on-the-spot quotes!

In Stock Transformers for Immediate Delivery

Special Voltage Available In Two Weeks or Less





MOUNTING	L	W	H	ML	MW
A	3.70	3.70	5.00	3.06	2.25
B	4.5	3.8	6	3.75	2.35
C	5.35	4.35	6.51	4.48	2.62
D	5.35	5.15	6.51	4.38	3.62
E	5.85	6.42	7.01	4.81	4.75
F	7.20	6.42	8.70	5.94	4.75
G	7.20	7.0	8.70	5.94	4.68
H	8.69	7.0	10.50	7.22	3.92

Constant Voltage / Regulating Transformers

Lenco has In-stock Constant Voltage / Regulating Transformers (Sine Wave output) for immediate delivery. These transformers are designed to provide a relatively constant output voltage (+/-3%), with less than 3% distortion under full load and under 5% no-load Guaranteed, while specified input voltages may vary by as much as +15 to -25%. Providing high isolation and fast response time (typically 1-2 cycles), these transformers are excellent at controlling voltage sags, surges, brownouts, noise and distortion. All Lenco Constant Voltage/ Regulating transformers are built to a UL recognized insulation system and are vacuum impregnated to insure quite operation. They feature Compact Terminal Strips that provide the ultimate in safety due to all metal parts being either fully enclosed or deeply recessed. These transformers are available from 50 VA to 1500 VA and in 120, 240 and 480 volt 60 Hertz configurations.

All Lenco Constant Voltage/Regulating Transformers include appropriate Capacitor.

Special voltages and /or frequencies are available upon request.

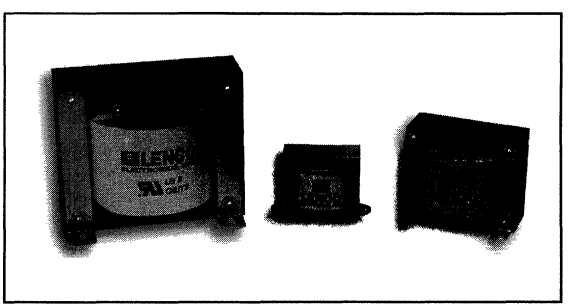
Frequency 60Hz/Output 120V
Special Voltages in 2 Weeks or Less

MODEL NO.	POWER	INPUT	MOUNTING
CVS-50-120-60	50VA	120V	A
CVS-100-120-60	100VA	120V	B
CVS-150-120-60	150VA	120V	C
CVS-250-120-60	250VA	120V	D
CVS-500-120-60	500VA	120V	E
CVS-750-120-60	750VA	120V	F
CVS-1000-120-60	1000VA	120V	G
CVS-1500-120/240-60	1500VA	120/240V	H

Also available in 240V/480V, 60 Hz Inputs

Autotransformers

Lenco has in stock Auto Transformers (also known as Step-Up/Step-Down) for immediate delivery. These transformers are available in power ranges from 100 VA to 5000 VA in both 115/230 and 240/480 volt configurations. They are also ***Bi-Directional*** and designed to accommodate 50/60 Hertz applications for greater versatility. Built to Lenco's exacting standards, these transformers are highly efficient, small in size, and very competitively priced. NOTE: Auto Transformers DO NOT PROVIDE ISOLATION.



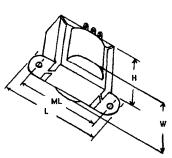


Figure 1

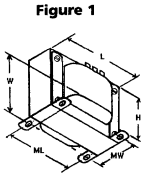


Figure 2

Frequency 50/60Hz

LUG STYLE	MODEL NO.	POWER	INPUT/OUTPUT BI-DIRECTIONAL	FIGURE	MOUNTING	L	W	H	ML	MW
Solder	ATF-100-230-115	100VA	115/230V	1	A	4.06	2.2	2.64	3.56	--
Solder	ATF-150-230-115	150VA	115/230V	1	B	4.06	2.4	2.64	3.56	--
Solder	ATF-250-230-115	250VA	115/230V	2	C	3.78	2.9	3.15	3.13	2.38
Solder	ATF-500-230-115	500VA	115/230V	2	D	4.53	3.5	3.78	3.75	2.75
10-32 Tapped	ATF-1000-230-115	1000VA	115/230V	2	E	5.28	4.1	4.4	4.38	3.13
10-32 Tapped	ATF-1500-230-115	1500VA	115/230V	2	F	6.4	4.3	5.33	5.31	2.88
10-32 Tapped	ATF-2000-230-115	2000VA	115/230V	2	G	6.4	5.25	5.33	5.31	3.75
10-32 Tapped	ATF-2500-230-115A	2500VA	115/230V	2	H	6.4	5.6	5.33	5.3	4.13
10-32 Tapped	ATF-3000-230-115A	3000VA	115/230V	2	I	6.4	6.3	5.33	5.31	4.88
10-32 Tapped	ATF-5000-230-115A	5000VA	115/230V	2	J	7.53	6.13	6.28	6.75	4.6

Also available in 240/480V

MEMBER PCPCI POWER CONVERSION PRODUCTS COUNCIL INTERNATIONAL

Your Special Application . . . OUR SPECIALTY

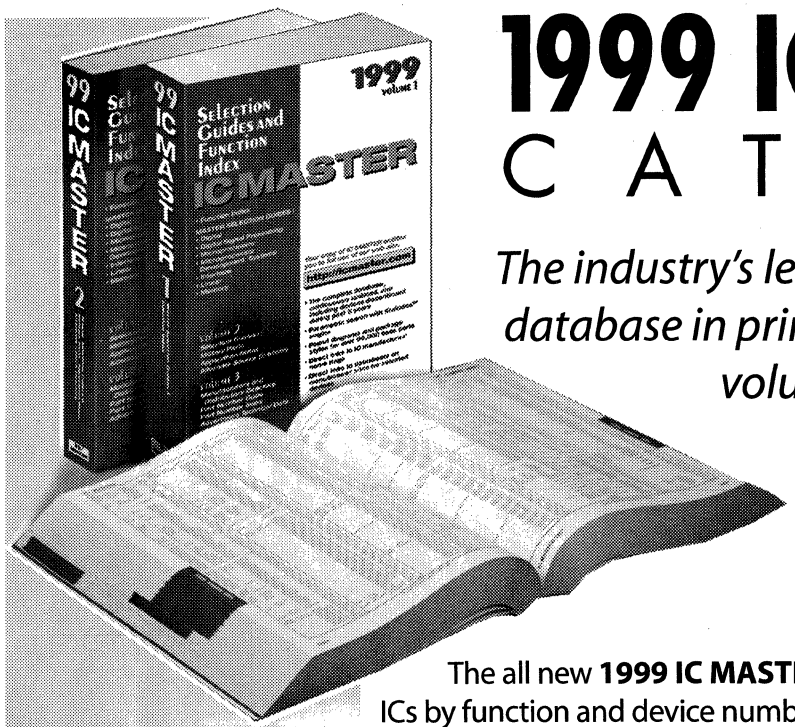
PHONE 815-344-2900 FAX 815-344-2730

E-MAIL: sales@lenco-elect.com

We Accept Visa and MasterCard

LENCO ELECTRONICS, INC.

1330 Belden St.,McHenry, Illinois 60050



1999 IC MASTER CATALOG

The industry's leading integrated circuit database in print. In three easy-to-use volumes you can:

* **Review current IC product information.**
* **Identify second-sources.**
* **Locate manufacturers with sales offices and distributors.**

The all new **1999 IC MASTER** catalog lists over 100,000 current ICs by function and device number. To make your search for information fast and easy, device data is organized in ten Master Selection Guides:

* **Digital**
* **Digital Signal Processing**
* **Microprocessor**
* **Interface**
* **Microprocessor Development Systems**
* **Linear**
* **Programmable Logic Devices**
* **ASIC/Custom**
* **Memory**
* **Chip Sets & Multifunction Devices**

The comprehensive, industry-wide Alternate Source Directory lists over 120,000 functional equivalents for current and discontinued ICs. It includes NTE and Philips ECG parts.

There's more. Other valuable sections include the Part Number Index, the Military Parts Directory, the Application Notes Directory, and the Manufacturers & Distributors Directory. You have access to pinout and package data for over 90,000 devices on the Internet at http://icmaster.com.

When you want a comprehensive overview of the IC industry, turn to the **1999 IC MASTER** catalog. An industry standard since 1974.

To order your 1999 IC MASTER

contact your local IC MASTER distributor or Marie Botta at:

Hearst Business Communications, Inc.
645 Stewart Avenue, Garden City, NY 11530
(516) 227-1314 FAX (516) 227-1453
Credit Card Hotline: 1-800-833-7138

Tell Marie you saw IC MASTER in the 1999 EEM, and she'll take $10.00 off the subscription price!

The IC MASTER catalog is published annually in February.

See us on the World Wide Web at http://icmaster.com

MAGNECOMP

A Full Line of High Quality Magnetic Components

CALL 864-878-4700 FAX 864-878-0507

For Standard & Fast Turnaround Custom Applications

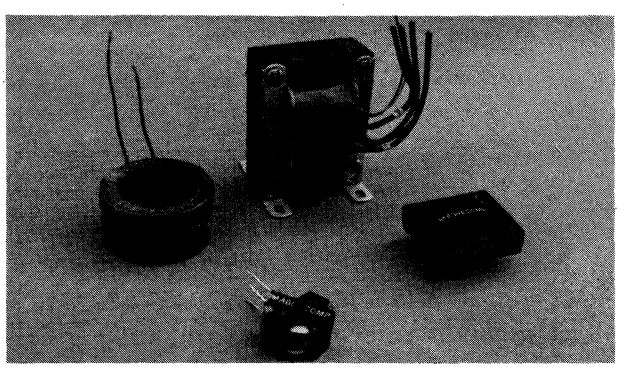
MILITARY • AEROSPACE • INDUSTRIAL

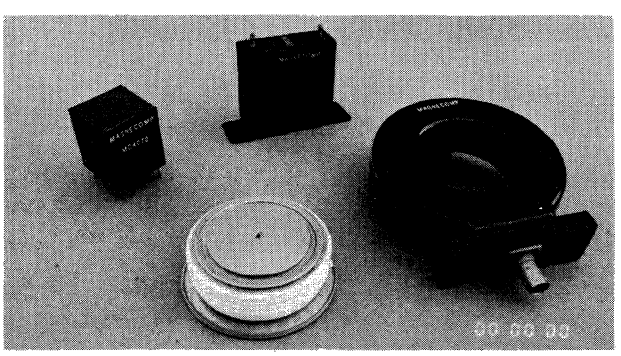
Thirty years of experience designing and building magnetic components to military and industrial specifications allows MagneComp to deliver prompt accurate solutions to your most difficult requests. Powers up to 1 kVA and frequencies to 500 mHZ.

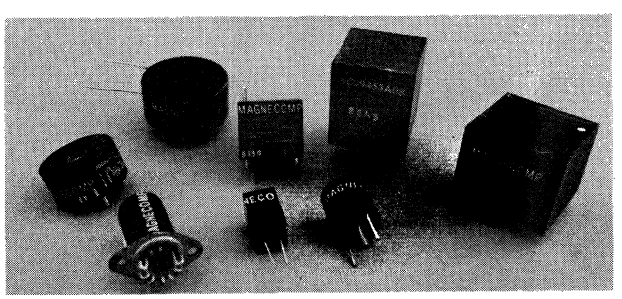
From one special transformer to thousands we'll deliver what you need when you need it. Call us. Our experienced engineers are ready to help you.

The photos show only a small fraction of the types and styles of magnetic components available. All can be designed and manufactured to meet military specifications MIL-T-27 and others. Our quality control system is designed to meet MIL-I-45208. Instrument calibration is per MIL-STD-45662.

• POWER TRANSFORMERS •
50 Hz to 5 KHz up to 1 KVA • Laminated
• toroidal • cut core •
• SWITCHING POWER TRANSFORMERS •
Up to 1 MHz and 500 Watts
• SWITCHING INDUCTORS •
Up to 1 MHz and 30 Amps
• PRECISION RATIO TRANSFORMERS •
Decade and digitally tapped
accuracies to 10 parts per million.
• SCOTT-T TRANSFORMERS •
Synchro to resolver. Resolver to synchro. Synchro and resolver isolation. Both miniature and power up to 30VA.
• PULSE TRANSFORMERS •
All types
• CURRENT MONITORING AND TRIGGER •
For high power industrial SCR circuits,
for commutation at any frequency.
• OPEN • ENCAPSULATED • HERMETIC •
• SINGLE PHASE • THREE PHASE •
• MULTI PHASE •







MagneComp, Inc. • P.O. Box 625,
Pickens, South Carolina 29671-0625

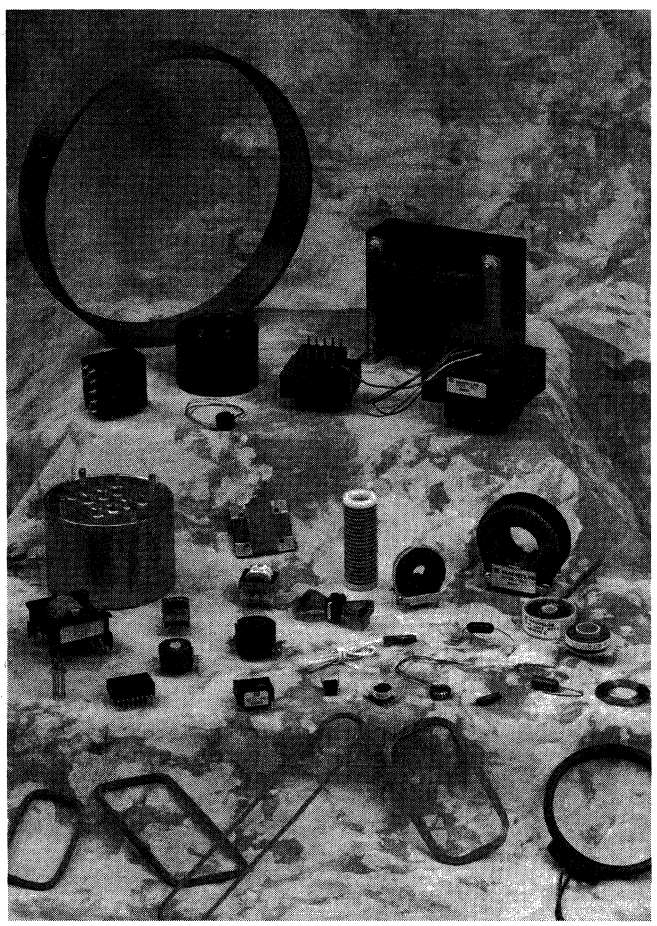
MAGNECOMP

MAGNELAB
DIVISION OF
SOLOMON CORPORATION

CUSTOM MAGNETICS

"The Performance Transformer Company"

- **Power Transformers**
- **Toroid Transformers**
- **Surface Mounts**
- **Power Inductors**
- **Filter Inductors**
- **Antenna Coils**
- **Converter Coils**
- **Pulse Transformers**
- **DIP Transformers**
- **Toroid Inductors**
- **Tuning Inductors**
- **EMI Filters**
- **Free-Form Coils**
- **Signal Transformers**
- **High Isolation Transformers**
- **Electro-Medical**
- **Audio Transformers**

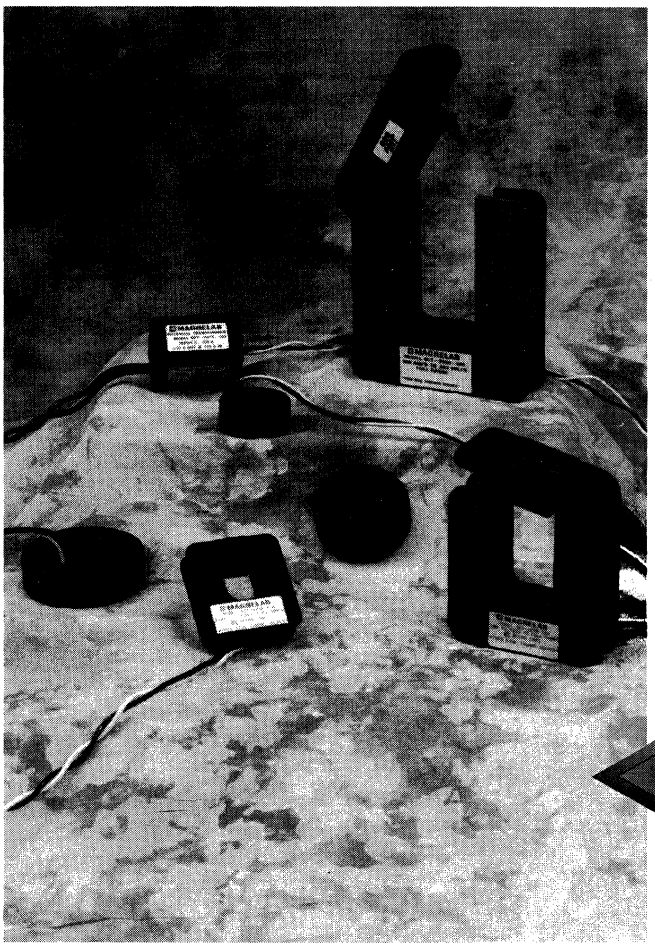


MAGNELAB has been a leader in the design and manufacture of custom magnetics for nearly 30 years. With a total commitment to quality and service, Magnelab continues to play an important role in many industries. Call us, or visit our website today!

• Commercial • Medical • Instruments • Aerospace
• Military • Computer • Audio • Energy Monitoring

MAGNELAB - DIVISION OF SOLOMON CORPORATION
4104 Weld County Road 22 • Longmont, CO 80504
Phone: (303) 772-9100 • FAX: (303) 772-9400 • Toll Free: (888) 442-6700
Internet: http://www.solomoncorp.com/magnelab
E-mail: magnelab@solomoncorp.com

CURRENT TRANSFORMERS



ENERGY MONITORING COMPONENTS

- **Split-Core, Opening Style Current Transformers UL Recognized**
- **Toroidal, Non-Opening Style Current Transformers UL Recognized**
- **Potential Transformers**

MAGNELAB
DIVISION OF
SOLOMON CORPORATION

MAGNELAB is a leader in the design and manufacture of precision current transformers and potential transformers. Our line of CT's are used in the energy monitoring field where accuracy and safety are desired. Available from stock, give us a call with your requirements.

"The Performance Transformer Company"

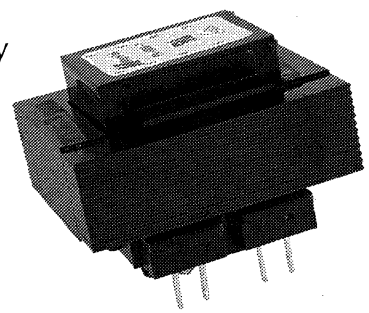
MAGNELAB - DIVISION OF SOLOMON CORPORATION
4104 Weld County Road 22 • Longmont, CO 80504
Phone: (303) 772-9100 • FAX: (303) 772-9400 • Toll Free: (888) 442-6700
Internet: http://www.solomoncorp.com/magnelab
E-mail: magnelab@solomoncorp.com

SPECIFY EXACTLY THE TRANSFORMER YOU WANT.

YOU'LL FIND IT AT MAGNETEK.

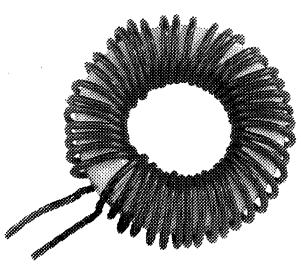
Standard or Custom.

Triad® transformers from MagneTek are available in over 1000 standard part numbers. An extensive inventory is ready to ship and satisfy short lead times. And MagneTek also excels at custom transformer design. An experienced engineering staff can meet all of your parameters cost-efficiently.



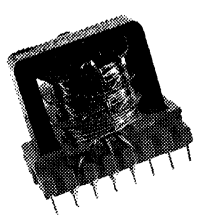
Low or High Volume.

MagneTek gives you the same commitment to service whether your order quantity is small or large.



Low or High Frequency.

Triad® transformers result from over 50 years of experience. So it's no wonder MagneTek offers expertise in all types of transformers ... from low to high frequency, and everywhere in between.

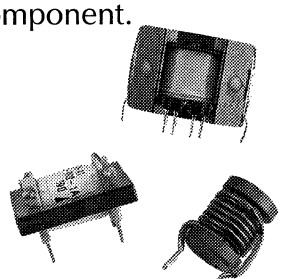


Your Design or Ours. With Quick Sample Turnaround.

While we emphasize our design engineering, we'll also work from your design. We'll produce it efficiently, and offer you suggestions for improving the component.

Worldwide Resources At Work.

With international engineering resources and both domestic and offshore production, MagneTek brings world class capabilities to your transformer procurement.



Find Out How MagneTek Has The Power to Meet Your Needs. Call Toll Free Today.

MagneTek

Triad® Transformers

90 East Union Street • Goodland, IN 47948
Phone 800-541-9997
FAX 219-297-3554
www.magnetekpeg.com

MAGNETIC CIRCUIT ELEMENTS ®

1540 MOFFETT STREET, SALINAS, CALIFORNIA 93905

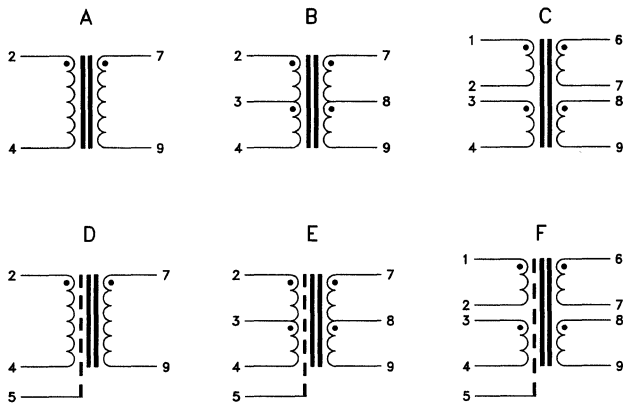
PHONE: (831) 757-8752 FAX: (831) 757-5478 E-MAIL: M_C_E@COMPUSERVE.COM

NEW! TELEPHONE COUPLING TRANSFORMERS *NEW!*

ELECTRICAL SPECIFICATIONS

PART NUMBER	PRIMARY L = 700 mH MIN	PRIMARY DCR = 35 Ω ±15%	SECONDARY DCR = 45 Ω ±15%	TURNS RATIO	IMPEDANCE RATIO (Ω)	SCHEMATIC DIAGRAM
OE13TT1	(2-4)	(2-4)	(7-9)	1:1	600:600	A
OE13TT2	(2-4)	(2-4)	(7-9)	1:1:1:1	150:150:150:150	B
OE13TT3	(1-4)	(1-4)	(6-9)	1:1:1:1	150:150:150:150	C
OE13TT4	(2-4)	(2-4)	(7-9)	1:1	600:600	D
OE13TT5	(2-4)	(2-4)	(7-9)	1:1:1:1	150:150:150:150	E
OE13TT6	(1-4)	(1-4)	(6-9)	1:1:1:1	150:150:150:150	F

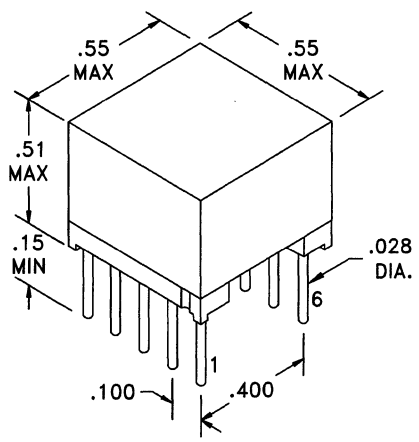
SCHEMATIC DIAGRAMS



NOTES

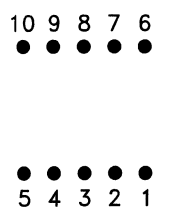
1. Initial Inductance (L) is measured at 1 KHz with no DC.
2. Frequency Response is ± 1db from 200 Hz-to-100 KHz.
3. Insertion Loss is < 1db at 1 KHz.
4. Power Level is 6 mW MAX.
5. Maximum operating temperature is 130°C.
6. Dielectric Withstanding Voltage (primaries and shield-to-secondaries) is 1800 VDC, 10 µA MAX leakage per UL1950.
7. All electrical data at 20° ± 5°C.
8. All mechanical dimensions are in inches with a tolerance of .XXX = ± .010.
9. Clear acrylic resin impregnated.
10. Pins are hot solder dipped.

MECHANICAL SPECIFICATIONS



SMD:

Also available in SURFACE MOUNT configurations.



PC Board Footprint
(Top View)

Contact us for information on other standard or custom chokes and transformers.

See MAGNETIC CIRCUIT ELEMENTS in EEM section 1800 for standard inductors.

CUSTOM TRANSFORMERS & Magnetic Components

Since 1927

Made in U.S.A.

Audio • Hi-Voltage • Toroids • Power Supplies • Hi-Current • Three Phase • Ferroresonant

0.1 VA to 10,000 VA (10kVA) - Single Phase, 30 kVA - 3 Phase

Experienced Engineering

- Let us be your design team
- Cost-effective solutions
- CAD-generated production files
- We can assist you from quick prototypes to volume production

High Quality & Reliability

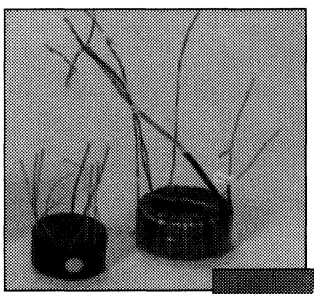
- ISO 9001 Cert. Pending
- Integrated SPC
- Compliance with MIL-I-45208 and MIL-Q-9858

World Class Manufacturing

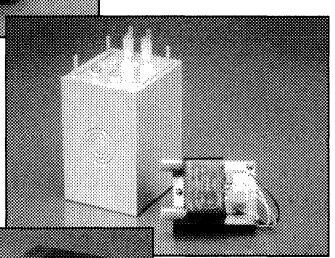
- Vacuum Impregnation
- NASA 981, (NHB5300.4) and MIL-STD-2000 Soldering Certification
- Agency Approvals - UL, CSA, VDE, TUV, IEC and CE
- JIT, KanBan, Bar Coding and EDI

Applications

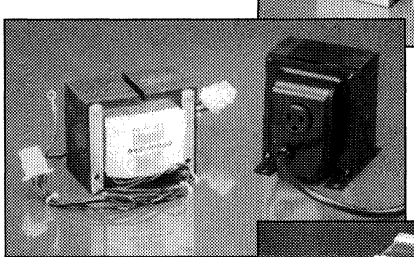
- Military and Commercial
- Audio Equipment
- Medical Systems
- Telecommunications Equipment



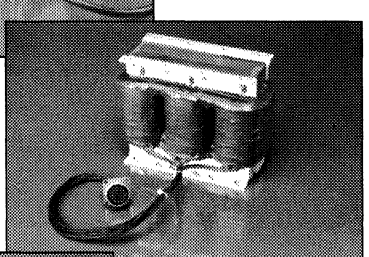
Toroids



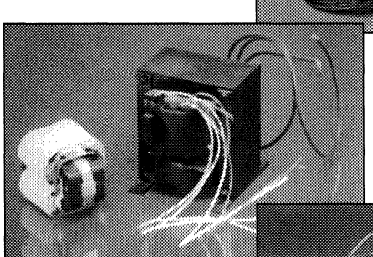
High Voltage



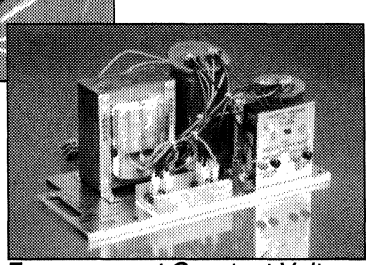
Electronic Assemblies



Three Phase



High Reactance Choke



Ferroresonant Constant Voltage

magnetic windings hi-tek

2711 Freemansburg Avenue
Easton, Pennsylvania 18045-6099

Ph: (800) 355-8574 or (610) 253-2751
Fax: (610) 258-0216
E-Mail: info@magwindings.com
Internet: www.magwindings.com

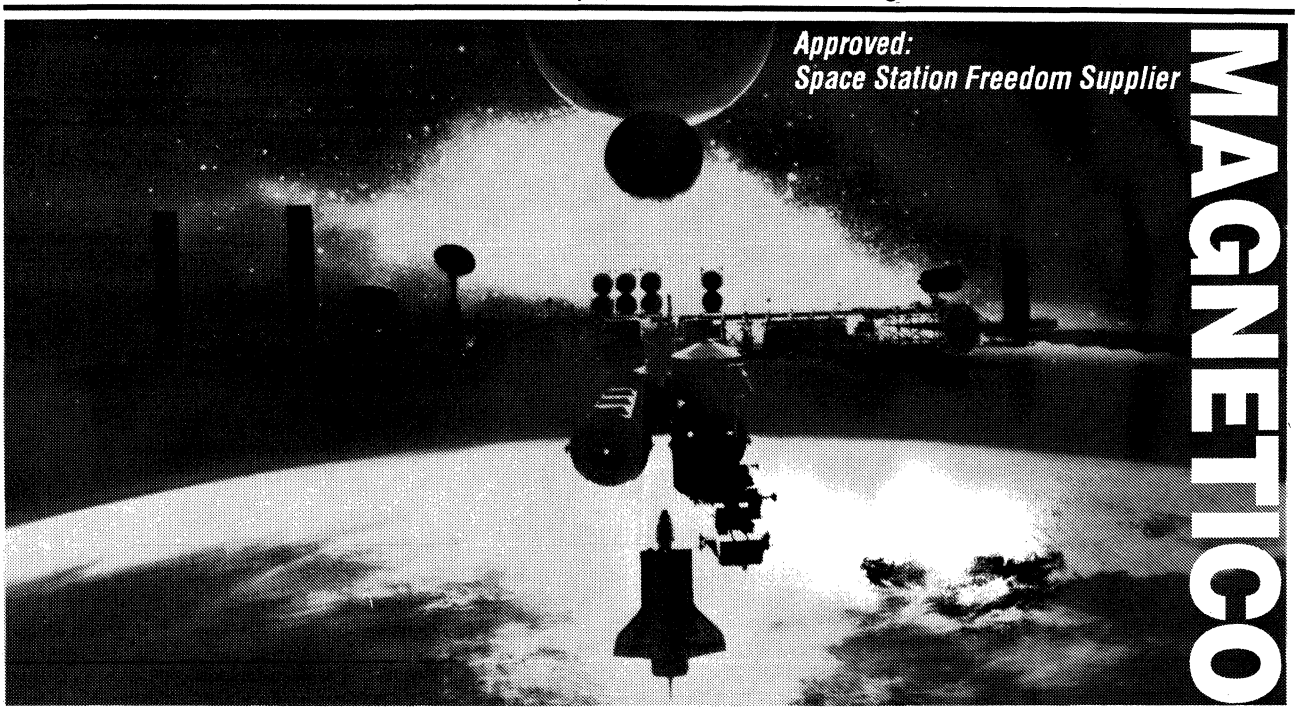
WHEN QUALITY COUNTS...

MAGNETICO

• SPACE STATION FREEDOM APPROVED •

THE BEST IN CUSTOM HIGH QUALITY MAGNETICS

MIL-STD-981 - Electromagnetic Devices For Space Applications
NHB 5300.4(3A-2) / WS6536/MIL-STD-2000 - Approved Certified Program for High Reliability Soldering
QUALIFICATION INSPECTION MIL-T-27 - Complete Environmental Testing



Power Conversion Magnetics

Planar Magnetics
PWM & Resonant Power Conversion
Integrated Magnetics
Gate Drive
Current Sense
High Voltage
TWT Power

400 Hz Power

3Ø Power Transformers
Designed to meet the requirements of:
M27/344/345/346/347/348/349[1]

1Ø Power Transformers
Designed to meet the requirements of:
M27/37 thru 47[1]
308 standard types 1.5 - 25 VA-- wide variety of output voltages offers maximum design flexibility

Inductors

Filter: Input / Output
Common Mode
Switching Regulator Inductors
Designed to meet the requirements of:
M27/287/288/289 (24 standard types)[1]

Mil / Aerospace DC-DC Converters

Standard 1-200 W / -55°C to +125°C
Analysis & Design of Power Conversion Circuits and Systems

Amplifiers, Hi-Rel

Audio & LF to 10 KW

Scott T Transformers

Synchro: Resolver / Resolver: Synchro

1 "All units designed to meet the dimensional and performance requirements of Mil-T-27 XXX; however, not all part numbers are listed on the Qualified Products List (QPL). The current status should be verified with the factory."

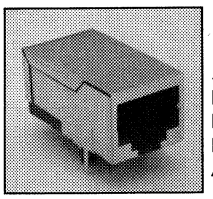
MAGNETICO INC. *182 MORRIS AVENUE • HOLTSVILLE, NY 11742 • TEL: 516-654-1166*
***ENGINEERING "HOT LINE"** 516-654-1167 • FAX: 516-758-7408*

MODULAR JACKS-FILTERED TRANSFORMER

Maxconn INCORPORATED

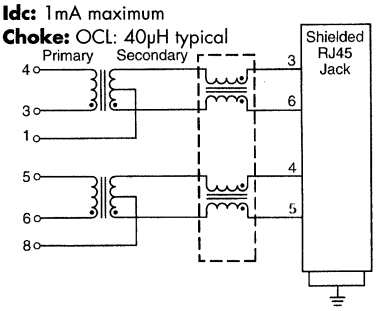
MJFS SERIES

Filtered Transformer, Shielded, Standard PCB Footprint



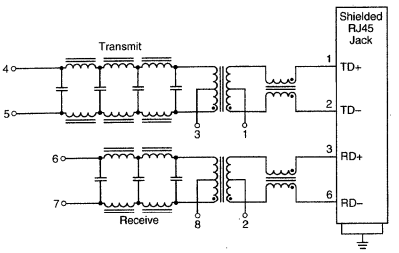
ISDN TRANSFORMER SPECIFICATIONS

Electrical Specifications
Isolation Voltage: 1000 Vrm:
Turns Ratio: 1:2CT±2% (Pri:Sec)
OCL: TX:22mH minimum @ 10kHz, 0.1V
CD: 180pF maximum (Pri)
Cw/w: 100 pF maximum (Pri/Sec) @ 100kHz 0.1V
LL: (Sec): 11µH maximum @ 100kHz 0.1V (Pri Shorted)
DCR: 2.4±25% ohms (Pri)
DCR: 4.4±25% ohms (Sec)
Idc: 1mA maximum
Choke: OCL: 40µH typical



10 BASE-T FILTERED TRANSFORMER SPECIFICATIONS

Electrical Specifications
Isolation Voltage: 1500 Vrms
Insertion Loss: (1-10MHz): -1dB maximum
Attenuation at 30 MHz:
Transmit: 30dB minimum
Receive: 18dB minimum
Return Loss: (1-10MHz): 15dB minimum
Cutoff Frequency: 17MHz typical
Cross Talk: (1-10MHz): -30dB minimum
I/O Impedance: 100 ohms



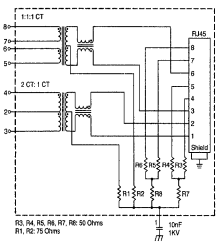
100 BASE COMBO FILTERED TRANSFORMER SPECIFICATIONS

Electrical Specifications
Isolation Voltage: 1500 Vrms (Input to Output)
Turns Ratio: TX: 2:1 (±2%), RX: 1:1:1 (±2%)
OCL: TX: 140µH minimum, RX: 350µH minimum @ 100kHz, 100mV
Rise Time: (10-90%): 3.0ns typical
Insertion Loss: (1M - 125 MHz): -1.0dB maximum
Return Loss:

100kHz-60 MHz	-15dB minimum (Tx)/ -17 dB minimum Rx
60 MHz - 100MHz	-11 dB minimum (Tx)/ -15dB minimum (Rx)

Common Mode to Differential Mode Attenuation:

100 kHz - 60 MHz	-45dB minimum (Tx)/ -40 dB minimum Rx
60 MHz - 100 MHz	-40dB minimum (Tx)/ -35dB minimum Rx



ATM 100 BASE FILTERED TRANSFORMER SPECIFICATIONS

Electrical Specifications
Isolation Voltage: 1500 Vrms
Rise Time: 2.5ns typical @ 10 – 90%
Insertion Loss: (0.1 - 125 MHz): -1.1dB maximum
Return Loss:

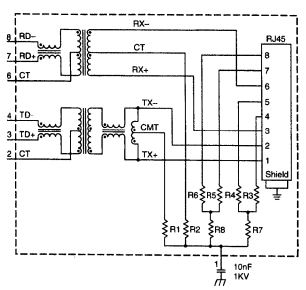
(0.1 - 60 MHz)	-15dB (Tx)/ -17 dB Rx typical
(60 - 125MHz)	-11 dB (Tx)/ -15dB (Rx) typical

Cross Talk:

(0.1 - 60 MHz)	-40dB minimum
(60 - 125MHz)	-38dB minimum

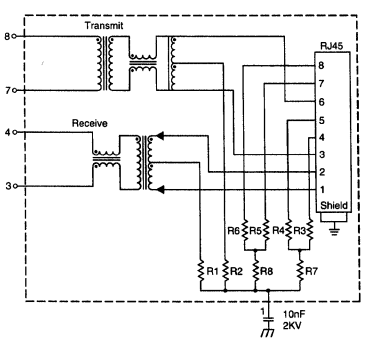
Common Mode to Differential Mode Rejection:

(0.1 - 60 MHz)	-45dB (Tx)/ -40 dB Rx minimum
(60 - 125 MHz)	-40dB (Tx)/ -35dB Rx minimum



10/100 BASE TX FILTERED TRANSFORMER SPECIFICATIONS

Electrical Specifications
Isolation Voltage: 2000 Vrms
Turns Ratio: 1:1CT
Pri/Sec DCR: 0.90 ohms maximum
Rise Time/Fall Time: 4ns maximum
Cw/w (Pri/Sec): 15pF maximum
Leakage Inductance: (pri): 0.4µH maximum
Insertion Loss: (0.1-125MHz) -1.1dB maximum
Return Loss: (0.1-60MHz) -18dB maximum
(60-125MHz) -12dB minimum
Cross Talk: (0.1-125MHz) -38dB minimum



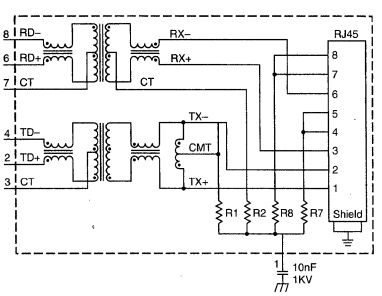
ATM 100 BASE FILTERED TRANSFORMER SPECIFICATIONS

Electrical Specifications
Isolation Voltage: 1500 Vrms
Rise Time: 2ns typical @ 10 – 90%
Insertion Loss: (0.1 - 125 MHz): -1.1dB maximum
Return Loss:

0.1 - 60 MHz	-15dB (Tx)/ -17 dB Rx typical
60 - 125MHz	-11 dB (Tx)/ -15dB (Rx) typical

Common Mode to Differential Mode Rejection:

100 kHz - 60 MHz	-45dB minimum (Tx)/ -40 dB minimum Rx
60 MHz - 100 MHz	-40dB minimum (Tx)/ -35dB minimum Rx



CALL TODAY FOR PRICE AND DELIVERY

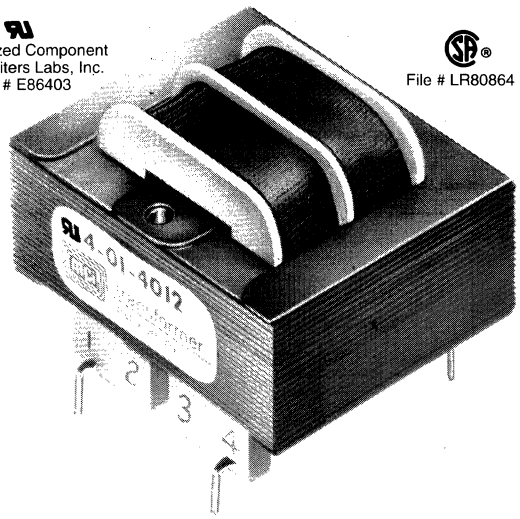
Maxconn INCORPORATED
CALL "MAX" for Spec/Samples
1-888-50-MAXCN
2151 Del Franco Street • San Jose • California • 95131-1570
Tel 408-435-5050 • FAX: 408-435-8377

HORIZONTAL PC TRANSFORMERS

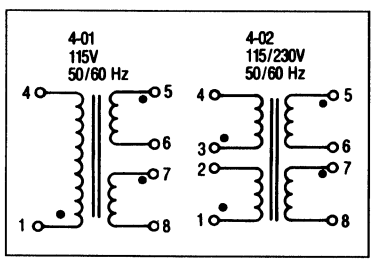
SERIES 4-01 & 4-02

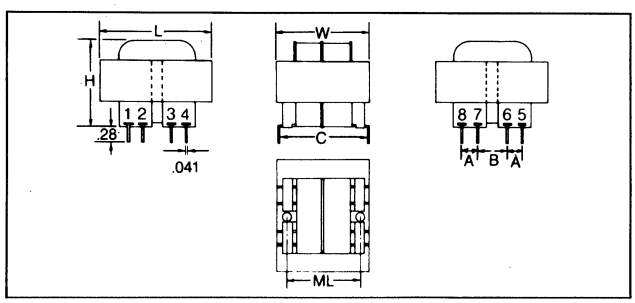
Recognized Component
Underwriters Labs, Inc.
File # E86403

File # LR80864



2,500-volt RMS Hipot, available in a variety of sizes. Maximum operating temperature 130°C. Available with either single 115V, or dual 115/230V primary. MCI's pin configuration is designed for ease of connection in printed circuit boards. Heavier transformers are provided with mounting holes for additional mounting security. Adaptations of standard transformers are also available. Dots on schematics shown below indicate like polarity.





To determine part number for specific transformer to be ordered:

1. **Locate the column, in the table, for the required voltage.**
2. **In the voltage column, locate the required current rating.**
3. **Moving left from the current rating, find the number indicating required primary—single 115V primary or dual 115/230V.**
4. **Derive part number by combining digits identifying required primary and digits at top of column giving required voltage.**

DIMENSIONS

Size	VA	L	W	H	ML	A	B	C	Optional Mtg. Screw & Nut	Lbs.
2	1.1	1-3/8	1-1/8	15/16	—	.250	.250	1.200	None	0.17
3	2.4	1-3/8	1-1/8	1-3/16	—	.250	.250	1.200	None	0.25
4	6.0	1-5/8	1-5/16	1-5/16	1-1/16	.250	.350	1.280	4-40x1-3/8 Nylon	0.44
5	12.0	1-7/8	1-9/16	1-7/16	1-1/4	.300	.400	1.410	4-40x1-3/8 Nylon	0.70
6	20.0	2-1/4	1-7/8	1-7/16	1-1/2	.300	.400	1.600	4-40x1-3/8 Nylon	0.80
7	36.0	2-5/8	2-3/16	1-9/16	†	.400	.400	1.850	†	1.1

† 4 mounting holes $2\frac{3}{16}$ x $1\frac{3}{4}$ for #6 screw

CURRENT RATINGS (AMPS RMS)

Last 3 Digits of Part Number:			-010	-012	-016	-020	-024	-028	-036	-048	-056	-120
First 4 Digits: Single 115V Primary	Dual 115/230V Primary		SERIES CONNECTION SECONDARY VOLTAGE 10V C.T.	12.6V C.T.	16V C.T.	20V. C.T.	24V C.T.	28V C.T.	36V C.T.	48V C.T.	56V C.T.	120V C.T.
4-01-2___	4-02-2___		.110	.090	.070	.055	.045	.040	.030	.023	.020	.010
4-01-3___	4-02-3___		.250	.200	.150	.120	.100	.085	.065	.050	.045	.020
4-01-4___	4-02-4___		.600	.500	.400	.300	.250	.200	.170	.125	.110	.050
4-01-5___	4-02-5___		1.200	1.000	.800	.600	.500	.420	.350	.250	.220	.100
4-01-6___	4-02-6___		2.000	1.600	1.250	1.000	.800	.700	.550	.400	.350	.160
4-01-7___	4-02-7___		3.600	2.850	2.250	1.800	1.500	1.300	1.000	.750	.650	.300
			PARALLEL CONNECTION SECONDARY VOLTAGE 5V	6.3V	8V	10V	12V	14V	18V	24V	28V	60V
4-01-2___	4-02-2___		.220	.180	.140	.110	.090	.080	.060	.046	.040	.020
4-01-3___	4-02-3___		.500	.400	.300	.240	.200	.170	.130	.100	.090	.040
4-01-4___	4-02-4___		1.200	1.000	.800	.600	.500	.400	.340	.250	.220	.100
4-01-5___	4-02-5___		2.400	2.000	1.600	1.200	1.000	.840	.700	.500	.440	.200
4-01-6___	4-02-6___		4.000	3.200	2.500	2.000	1.600	1.400	1.100	.800	.700	.320
4-01-7___	4-02-7___		7.200	5.700	4.500	3.600	3.000	2.600	2.000	1.500	1.300	.600

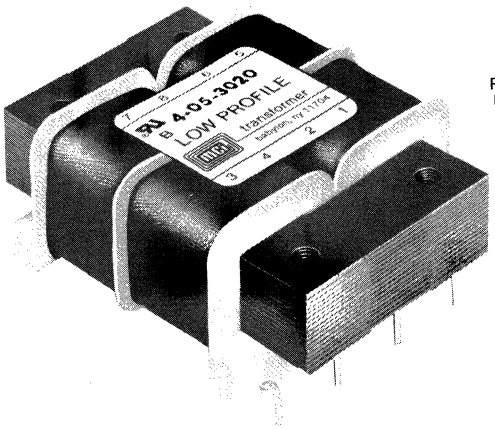
MCI TRANSFORMER CORPORATION

TOLL FREE: 1-800-MCI-TRAN

MAIN PLANT: 411 MANHATTAN AVENUE, BABYLON, NY 11704 • 516-587-0510 • FAX: 516-587-0624
NEW ENGLAND: BLODGETT STREET, ORANGE, MA 01364 • 508-544-8272 • FAX: 508-544-8356
WEST COAST: 150 SANHEDRIN CIRCLE, WILLITS, CA 95490 • 707-459-5994 • FAX: 707-459-5998

SERIES 4-05

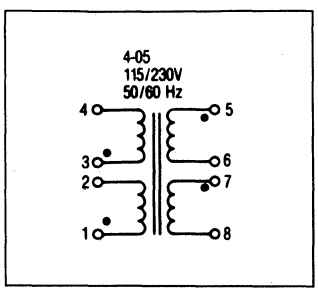
LOW PROFILE PC TRANSFORMERS

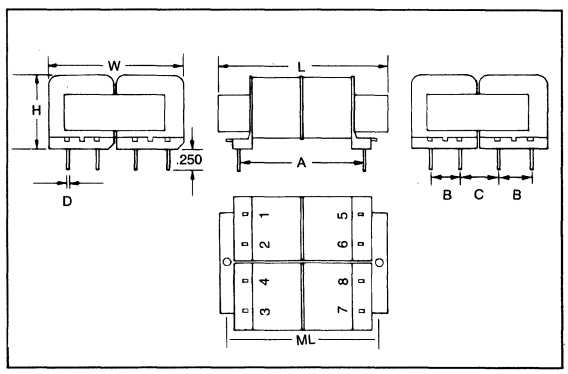


Recognized Component
Underwriters Labs, Inc.
File # E86403

File # LR80864

1,500-volt RMS Hipot, available in a variety of sizes. Maximum operating temperature 130°C. Available with dual 115/230V primary. MCI's pin configuration is designed for ease of connection in printed circuit boards. Adaptations of standard transformers are also available. Dots on schematics shown below indicate like polarity.





DIMENSIONS										
Part No.:	VA	L	W	H	A	B	C	D	ML	OZ
4-05-1___	2.5	1-7/8	1-9/16	.650	1.600	.375	.375	.041 x .020		5
4-05-2___	6	1-7/8	1-9/16	.850	1.600	.375	.375	.041 x .020		7
4-05-3___	12	2-1/2	2	1.065	2.000	.500	.500	.041 x .020		11
4-05-4___	24	2-7/8	2-1/4	1-1/4	1.900	.600	.530	.040 SQ	2-13/32 (with 2 holes for #4 screws)	15
4-05-5___	48	3-1/8	2-1/2	1-3/8	2.180	.600	.660	.040 SQ	2-5/8 (with 2 holes for #6 screws)	21

CURRENT RATINGS (AMPS RMS)												
Last 3 Digits of Part Number:	-010	-012	-016	-020	-024	-030	-034	-040	-056	-088	-120	-230
First 4 Digits: Dual 115/230V Primary	SERIES CONNECTION SECONDARY VOLTAGE											
	10VCT	12.6VCT	16VCT	20VCT	24VCT	30VCT	34VCT	40VCT	56VCT	88VCT	120VCT	230VCT
4-05-1___	.250	.200	.156	.125	.104	.085	.073	.062	.044	.028	.020	.010
4-05-2___	.600	.450	.350	.300	.250	.200	.170	.150	.100	.065	.050	.025
4-05-3___	1.200	.900	.700	.600	.500	.400	.340	.300	.200	.130	.100	.050
4-05-4___	2.400	1.900	1.500	1.200	1.000	.800	.700	.600	.425	.275	.200	.100
4-05-5___	4.800	3.800	3.000	2.400	2.000	1.600	1.400	1.200	.850	.550	.400	.200
	PARALLEL CONNECTION SECONDARY VOLTAGE											
	5V	6.3V	8V	10V	12V	15V	17V	20V	28V	44V	60V	115V
4-05-1___	.500	.400	.312	.250	.208	.170	.146	.124	.088	.056	.040	.020
4-05-2___	1.200	.900	.700	.600	.500	.400	.340	.300	.200	.130	.100	.050
4-05-3___	2.400	1.800	1.400	1.200	1.000	.800	.680	.600	.400	.260	.200	.100
4-05-4___	4.800	3.800	3.000	2.400	2.000	1.600	1.400	1.200	.850	.550	.400	.200
4-05-5___	9.600	7.600	6.000	4.800	4.000	3.200	2.800	2.400	1.700	1.100	.800	.400

MCI TRANSFORMER CORPORATION

TOLL FREE: 1-800-MCI-TRAN

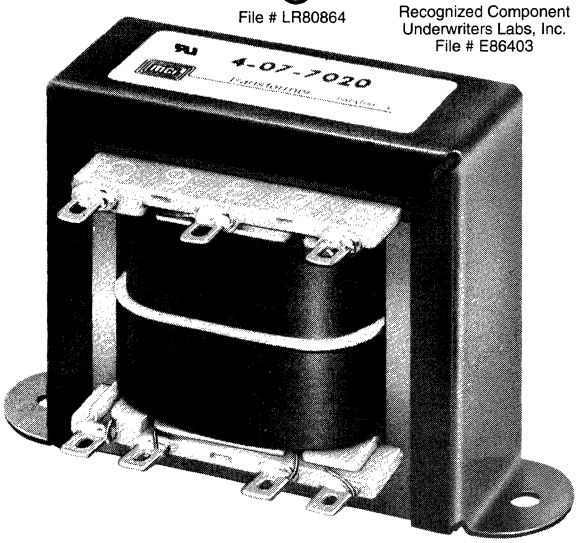
MAIN PLANT: 411 MANHATTAN AVENUE, BABYLON, NY 11704 • 516-587-0510 • FAX: 516-587-0624
NEW ENGLAND: BLODGETT STREET, ORANGE, MA 01364 • 508-544-8272 • FAX: 508-544-8356
WEST COAST: 150 SANHEDRIN CIRCLE, WILLITS, CA 95490 • 707-459-5994 • FAX: 707-459-5998

QUICK CONNECT POWER TRANSFORMERS

SERIES 4-06 & 4-07

File # LR80864

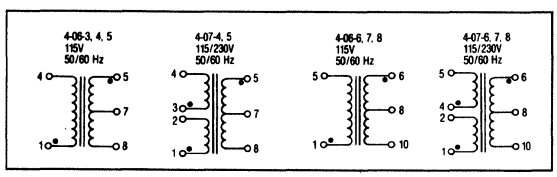
Recognized Component
Underwriters Labs, Inc.
File # E86403

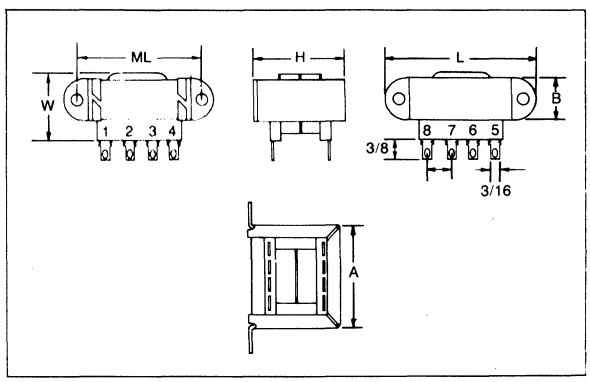


2,500 Volt RMS Hipot in a variety of practical sizes. Maximum operating temperature 130°C available with either single 115 or dual 115/230V primary (for all but 2.4 VA size).

MCI's split bobbin and non-concentric winding provide better insulation and high signal isolation, thus eliminating the need for electrostatic shielding.

Adaptations of standard transformers are also available. Dots on schematics shown below indicate like polarity.





To determine part number for specific transformer to be ordered:

1. **Locate the column, in the table, for the required voltage.**
2. **In the voltage column, locate the required current rating.**
3. **Moving left from the current rating, find the number indicating required primary—single 115V primary or dual 115/230V.**
4. **Derive part number by combining digits identifying required primary and digits at top of column giving required voltage.**

DIMENSIONS								
Size	**VA**	**L**	**W**	**H**	**A**	**B**	**ML**	**Lbs.**
3	2.4	2-1/16	1-1/16	1-3/16	1-7/16	9/16	1-3/4	0.25
4	6	2-3/8	1-1/4	1-3/8	1-11/16	11/16	2	0.44
5	12	2-13/16	1-3/8	1-5/8	1-15/16	13/16	2-3/8	0.7
6	30	3-1/4	1-11/16	1-15/16	2-5/16	1-1/16	2-13/16	1.1
7	56	3-11/16	1-13/16	2-1/4	2-11/16	1-1/16	3-1/8	1.7
8	100	4-1/32	2-1/4	2-9/16	3-1/16	1-5/16	3-9/16	2.75

CURRENT RATINGS (AMPS RMS)											
Last 3 Digits of Part Number:		**-010**	**-012**	**-016**	**-020**	**-024**	**-028**	**-036**	**-048**	**-056**	**-120**
First 4 Digits: Single 115V Primary	**Dual 115/230V Primary**	**SECONDARY VOLTAGE**									
		10V C.T.	**12.6V C.T.**	**16V C.T.**	**20V C.T.**	**24V C.T.**	**28V C.T.**	**36V C.T.**	**48V C.T.**	**56V C.T.**	**120V C.T.**
4-06-3___		.250	.200	.150	.120	.100	.085	.065	.050	.045	.020
4-06-4___	4-07-4___	.600	.500	.400	.300	.250	.200	.170	.125	.110	.050
4-06-5___	4-07-5___	1.200	1.000	.800	.600	.500	.420	.350	.250	.220	.100
4-06-6___	4-07-6___	3.000	2.500	2.000	1.500	1.250	1.100	.850	.630	.540	.250
4-06-7___	4-07-7___	5.000	4.000	3.500	2.800	2.400	2.000	1.500	1.200	1.000	.500
4-06-8___	4-07-8___	10.000	8.000	6.250	5.000	4.000	3.600	2.800	2.000	1.800	.850

MCI TRANSFORMER CORPORATION

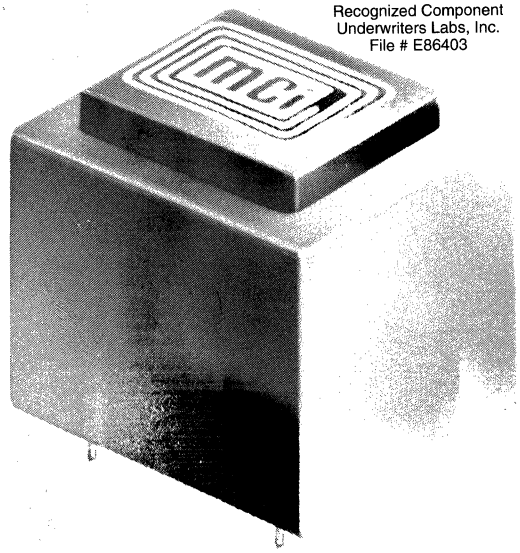
TOLL FREE: 1-800-MCI-TRAN

MAIN PLANT: 411 MANHATTAN AVENUE, BABYLON, NY 11704 • 516-587-0510 • FAX: 516-587-0624
NEW ENGLAND: BLODGETT STREET, ORANGE, MA 01364 • 508-544-8272 • FAX: 508-544-8356
WEST COAST: 150 SANHEDRIN CIRCLE, WILLITS, CA 95490 • 707-459-5994 • FAX: 707-459-5998

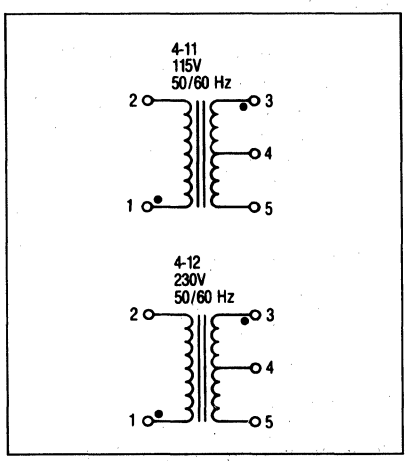
SERIES 4-11 & 4-12

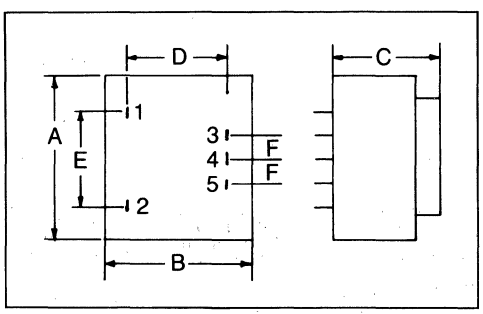
HORIZONTAL PC ENCAPSULATED TRANSFORMERS

Recognized Component
Underwriters Labs, Inc.
File # E86403



Our encapsulated design offers high reliability because of its mechanical strength, electrical insulation and moisture resistance. The internal construction consists of a split bobbin which isolates the primary and secondary thereby eliminating any need for an electrostatic shield. The construction will pass requirements of U.L., C.S.A. and V.D.E.





To determine part number for specific transformer to be ordered:

1. **Locate the column, in the table, for the required voltage.**
2. **In the voltage column, locate the required current rating.**
3. **Moving left from the current rating, find the number indicating required primary—single 115V primary or 230V.**
4. **Derive part number by combining digits identifying required primary and digits at top of column giving required voltage.**

DIMENSIONS

Size	VA	A	B	C	D	Primary E	Secondary F	Wt. (Lb.)
2	1.0	1.280	1.080	.890	.800	.800	.200	.16
3	1.2	1.280	1.080	.970	.800	.800	.200	.19
4	1.8	1.280	1.080	1.085	.800	.800	.200	.21
5	2.2	1.280	1.080	1.185	.800	.800	.200	.25
6	3.2	1.660	1.415	1.125	1.000	.800	.200	.33
7	4.5	1.780	1.500	1.300	1.000	1.000	.300	.44

CURRENT RATING (AMPS RMS)

Last 3 Digits of Part Number:		-010	-012	-016	-020	-024	-028	-036	-048	-056	-120
First 4 Digits: Single 115V Primary	Single 230V Primary	SECONDARY VOLTAGE 10V C.T.	12.6V C.T.	16V C.T.	20V C.T.	24V C.T.	28V C.T.	36V C.T.	48V C.T.	56V C.T.	120V C.T.
4-11-2___	4-12-2___	.100	.080	.065	.050	.045	.035	.030	.020	.018	.008
4-11-3___	4-12-3___	.120	.095	.075	.060	.050	.045	.035	.025	.021	.010
4-11-4___	4-12-4___	.180	.145	.115	.090	.075	.065	.050	.038	.032	.015
4-11-5___	4-12-5___	.220	.175	.140	.110	.095	.080	.060	.045	.040	.018
4-11-6___	4-12-6___	.320	.255	.200	.160	.135	.115	.090	.067	.057	.027
4-11-7___	4-12-7___	.450	.360	.280	.225	.190	.160	.125	.095	.080	.038

MCI TRANSFORMER CORPORATION

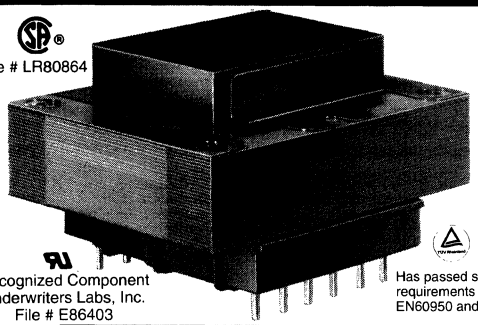
TOLL FREE: 1-800-MCI-TRAN

MAIN PLANT: 411 MANHATTAN AVENUE, BABYLON, NY 11704 • 516-587-0510 • FAX: 516-587-0624
NEW ENGLAND: BLODGETT STREET, ORANGE, MA 01364 • 508-544-8272 • FAX: 508-544-8356
WEST COAST: 150 SANHEDRIN CIRCLE, WILLITS, CA 95490 • 707-459-5994 • FAX: 707-459-5998

VDE P.C. MOUNT TRANSFORMERS

SERIES 4-44

File # LR80864



Recognized Component Underwriters Labs, Inc. File # E86403

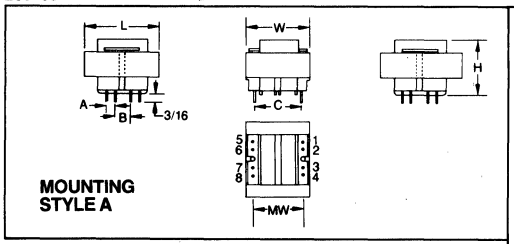
Has passed strict requirements of EN60950 and EN60742. VDE0551

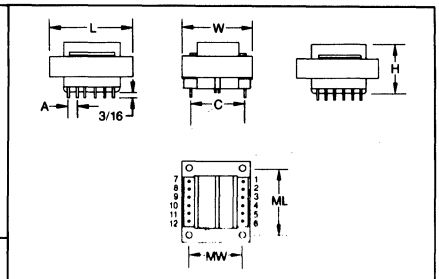
4,000 Volt RMS Hipot. In a variety of sizes. Maximum operating temperature 130°C. Available with either 115V or dual 115/230V primary.

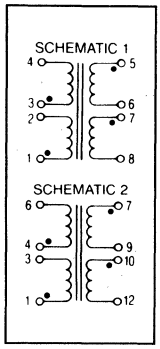
MCI's split bobbin and non-concentric winding provide better insulation and high signal isolation, thus eliminating the need for electrostatic shielding.

These transformers are designed to pass VDE's strict creepage distance requirements.

Adaptations of standard transformers are also available. Dots on schematics shown below indicate like polarity.







To determine part number for specific transformer to be ordered:

1. **Locate the column, in the table, for the required voltage.**
2. **In the voltage column, locate the required current rating.**
3. **Moving left from the current rating, find the number indicating required primary—dual 115/230V.**
4. **Derive part number by combining digits identifying required primary and digits at top of column giving required voltage.**

DIMENSIONS

Transformer	VA	Schematic	Mounting Style	L	W	H	A	B	C	Pin Dimensions	MW	ML	Screw Size	Maximum Number Terminals	Lbs.
4-44-3___	2.5	1	A	1-5/8	1-7/16	1-1/8	.200	.250	1.000	.025 sq.	1-1/16		4	8	.25
4-44-4___	5.0	1	A	1-5/8	1-7/16	1-3/8	.200	.400	1.000	.025 sq.	1-1/16		4	8	.37
4-44-5___	10.0	1	A	1-7/8	1-9/16	1-3/8	.200	.400	1.140	.036 sq.	1-1/4		4	8	.53
4-44-6___	20.0	2	A	2-1/4	1-7/8	1-5/8	.400	.400	1.436	.036 sq.	1-1/2		4	12	.90
4-44-7___	30.0	2	B	2-5/8	2-3/16	1-9/16	.275		1.650	.045 sq.	1-3/4	2-3/16	6	12	1.15
4-44-8___	56.0	2	B	3	2-1/2	1-13/16	.300		1.866	.045 sq.	2	2-1/2	6	12	1.70

CURRENT RATING (AMPS RMS)

Last 3 Digits of Part No.	-010	-012	-016	-20	-024	-028	-036
	SERIES CONNECTION			SECONDARY VOLTAGE			
First 4 Digits:	10V CT	12.6V CT	16V CT	20V CT	24V CT	28V CT	36V CT
4-44-3___	.25	.20	.15	.12	.10	.09	.07
4-44-4___	.50	.40	.31	.25	.21	.18	.14
4-44-5___	1.00	.80	.62	.50	.42	.36	.28
4-44-6___	2.00	1.60	1.25	1.00	.83	.72	.56
4-44-7___	3.00	2.40	1.90	1.50	1.25	1.06	.82
4-44-8___	5.60	4.40	3.50	2.80	2.33	2.00	1.56
	PARALLEL CONNECTION			SECONDARY VOLTAGE			
	5V	6.3V	8V	10V	12V	14V	18V
4-44-3___	.50	.40	.30	.24	.20	.18	.14
4-44-4___	1.00	.80	.62	.50	.42	.36	.28
4-44-5___	2.00	1.60	1.25	1.00	.84	.73	.56
4-44-6___	4.00	3.20	2.50	2.00	1.66	1.44	1.12
4-44-7___	6.00	4.80	3.80	3.00	2.50	2.12	1.64
4-44-8___	11.20	8.80	7.00	5.60	4.66	4.00	3.12

MCI TRANSFORMER CORPORATION

TOLL FREE: 1-800-MCI-TRAN

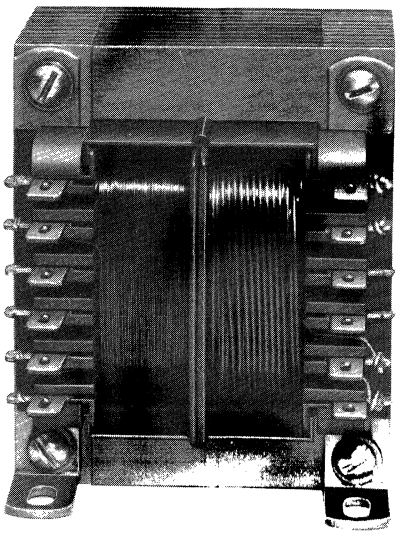
MAIN PLANT: 411 MANHATTAN AVENUE, BABYLON, NY 11704 • 516-587-0510 • FAX: 516-587-0624
NEW ENGLAND: BLODGETT STREET, ORANGE, MA 01364 • 508-544-8272 • FAX: 508-544-8356
WEST COAST: 150 SANHEDRIN CIRCLE, WILLITS, CA 95490 • 707-459-5994 • FAX: 707-459-5998

SERIES 4-49

VDE QUICK CONNECT TRANSFORMERS

Recognized Component Underwriters Labs, Inc. File # E86403

Has passed strict requirements of EN60950 and EN60742. VDE0551



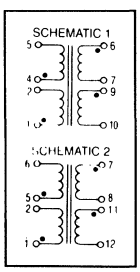
4,000 Volt RMS Hipot. In a variety of sizes. Maximum operating temperature 130°C. Available with either 115V or dual 115/230V primary.

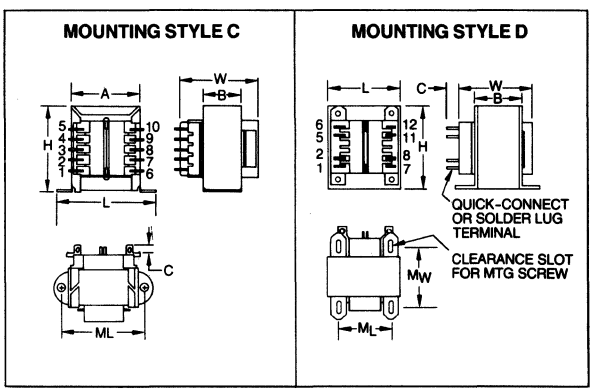
MCI's split bobbin and non-concentric winding provide better insulation and high signal isolation, thus eliminating the need for electrostatic shielding.

These transformers are designed to pass VDE's strict creepage distance requirements.

Adaptations of standard transformers are also available. Dots on schematics shown below indicate like polarity.

File # LR80864





To determine part number for specific transformer to be ordered:

1. **Locate the column, in the table, for the required voltage.**
2. **In the voltage column, locate the required current rating.**
3. **Moving left from the current rating, find the number indicating required primary—dual 115/230V.**
4. **Derive part number by combining digits identifying required primary and digits at top of column giving required voltage.**

DIMENSIONS

Transformer	VA	Schematic	Mounting Style	L	W	H	A	B	C	Terminals	ML	MW	Screw Size	Maximum Number Terminals	Lbs.
4-49-4___	25	1	C	2-13/16	1-7/8	2-5/16	2	1-1/8	5/16	3/16	2-3/8		6	10	1.25
4-49-5___	43	1	C	3-1/8	2-1/16	2-11/16	2-1/4	1-1/8	5/16	3/16	2-13/16		6	10	1.60
4-49-6___	80	2	D	2-1/2	2-3/8	3		1-3/8	5/16	3/16	2	2-3/16	6	12	2.80
4-49-7___	130	2	D	2-13/16	2-7/8	3-3/8		1-5/8	3/8	1/4	2-1/4	2-1/2	8	12	4.10
4-49-8___	175	2	D	3-1/8	2-7/8	3-3/4		1-5/8	3/8	1/4	2-1/2	2-1/2	8	12	5.5

CURRENT RATINGS (AMPS RMS)

Last 3 Digits of Part No.:	-010	-012	-016	-020	-024	-028	-036	-230
	SERIES CONNECTION			SECONDARY VOLTAGE				
First 4 Digits:	10V CT	12.6V CT	16V CT	20V CT	24V CT	28V CT	36V CT	230V CT
4-49-4___	2.50	2.00	1.60	1.25	1.00	.90	.70	.11
4-49-5___	4.30	3.40	2.70	2.20	1.80	1.50	1.20	.19
4-49-6___	8.00	6.30	5.00	4.00	3.30	2.80	2.20	.35
4-49-7___	13.00	10.30	8.10	6.50	5.40	4.60	3.60	.57
4-49-8___	17.50	14.00	11.00	8.80	7.30	6.25	4.80	.76
	PARALLEL CONNECTION			SECONDARY VOLTAGE				
	5V	6.3V	8V	10V	12V	14V	18V	115V
4-49-4___	5.00	4.00	3.20	2.50	2.00	1.86	1.40	.22
4-49-5___	8.60	6.80	5.40	4.40	3.60	3.00	2.40	.38
4-49-6___	16.00	12.60	10.00	8.00	6.60	5.60	4.40	.70
4-49-7___	26.00	20.60	16.20	13.00	10.80	9.20	7.20	1.14
4-49-8___	35.00	28.00	22.00	17.60	14.60	12.50	9.60	1.52

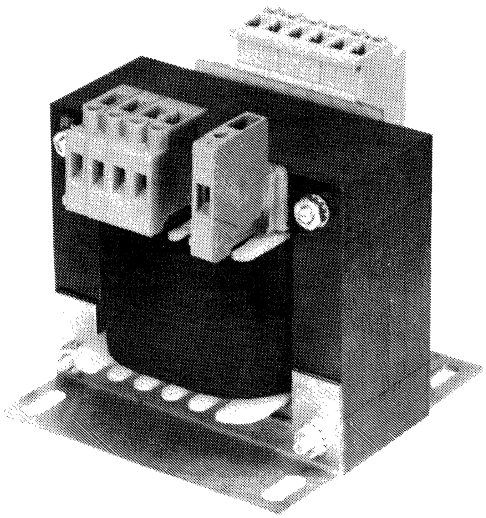
MCI TRANSFORMER CORPORATION

TOLL FREE: 1-800-MCI-TRAN

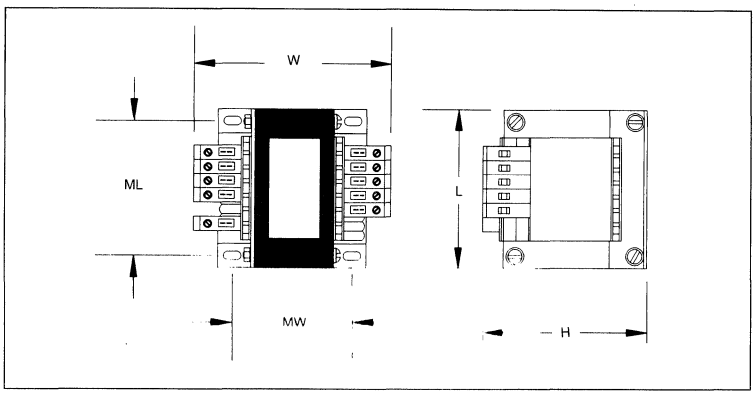
MAIN PLANT: 411 MANHATTAN AVENUE, BABYLON, NY 11704 • 516-587-0510 • FAX: 516-587-0624
NEW ENGLAND: BLODGETT STREET, ORANGE, MA 01364 • 508-544-8272 • FAX: 508-544-8356
WEST COAST: 150 SANHEDRIN CIRCLE, WILLITS, CA 95490 • 707-459-5994 • FAX: 707-459-5998

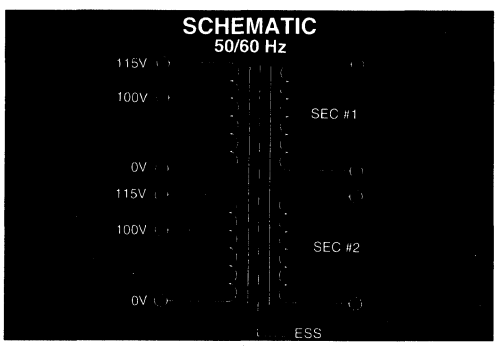
SERIES 4-50

INTERNATIONAL STYLE TRANSFORMERS



MCI's new American manufactured 4-50 Series transformers meet the requirements of UL506, CSA22.2 #6, VDE 0551, and IEC 742. These transformers are 100% tested, including a 4000 VRMS Hipot. Rugged or fast on screw type shock proof terminals handle high current and provide insulated field connections. MCI's 4-50 series is designed with better than 7.5% regulation and low leakage current for medical applications.





MECHANICAL DIMENSIONS

Size	L	W	H	ML	MW	WGT
200VA	3.750"	4.203"	3.720"	3.250"	2.800"	6.22 lbs
250VA	4.125"	3.898"	4.000"	3.625"	2.601"	6.76 lbs
300VA	4.125"	4.223"	4.000"	3.625"	2.915"	7.80 lbs
400VA	4.125"	4.805"	4.000"	3.625"	3.505"	9.82 lbs
650VA	5.250"	4.430"	4.800"	4.500"	3.415"	14.83 lbs
900VA	5.250"	5.197"	4.800"	4.500"	4.205"	19.84 lbs

CURRENT RATINGS (AMPS RMS)

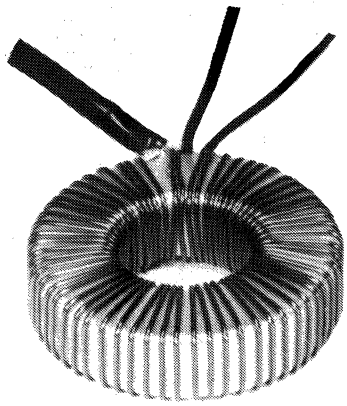
Last 3 Digits of Part Number:	-010	-012	-016	-020	-024	-028	-036	-040	-048	-230
First 4 Digits:	SERIES CONNECTION SECONDARY VOLTAGE									
	10V C.T.	12.0V C.T.	16V C.T.	20V C.T.	24V C.T.	28V C.T.	36V C.T.	40V C.T.	48V C.T.	230V C.T.
4-50-1___	20.0	16.7	12.5	10.0	8.3	7.1	5.6	5.0	4.2	.87
4-50-2___	25.0	20.8	15.6	12.5	10.4	8.9	6.9	6.3	5.2	1.1
4-50-3___	30.0	25.0	18.8	15.0	12.5	10.7	8.3	7.5	6.3	1.3
4-50-4___	40.0	33.3	25.0	20.0	16.7	14.3	11.1	10.0	8.3	1.7
4-50-5___	65.0	54.2	40.6	32.5	27.1	23.2	18.1	16.3	13.5	2.8
4-50-6___	90.0	75.0	56.3	45.0	37.5	32.1	25.0	22.5	18.8	3.9
	PARALLEL CONNECTION SECONDARY VOLTAGE									
	5V	6.0V	8V	10V	12V	14V	18V	20V	24V	115V
4-50-1___	40.0	33.3	25.0	20.0	16.7	14.2	11.2	10.0	8.3	1.7
4-50-2___	50.0	41.7	31.2	25.0	20.8	17.9	13.8	12.6	10.4	2.2
4-50-3___	60.0	50.0	37.6	30.0	25.0	21.4	16.7	15.0	12.6	2.6
4-50-4___	80.0	66.6	50.0	40.0	33.3	28.6	22.2	20.0	16.7	3.4
4-50-5___	130.0	108.4	81.2	65.0	54.2	46.4	36.2	32.6	27.1	5.6
4-50-6___	180.0	150.0	112.5	90.0	75.0	64.2	50.0	45.0	37.5	7.8

MCI TRANSFORMER CORPORATION

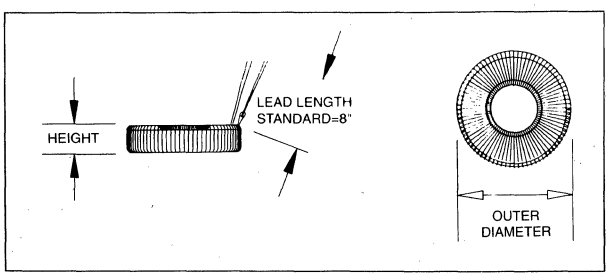
TOLL FREE: 1-800-MCI-TRAN

MAIN PLANT: 411 MANHATTAN AVENUE, BABYLON, NY 11704 • 516-587-0510 • FAX: 516-587-0624
NEW ENGLAND: BLODGETT STREET, ORANGE, MA 01364 • 508-544-8272 • FAX: 508-544-8356
WEST COAST: 150 SANHEDRIN CIRCLE, WILLITS, CA 95490 • 707-459-5994 • FAX: 707-459-5998

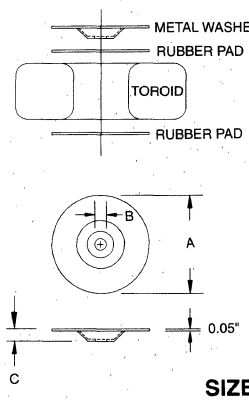
TOROIDS



Toroidal Transformers can be manufactured to pass UL, CSA, and TUV requirements for medical, audio, instrument, industrial, video, and compact power supplies. Toroids have substantially lower levels of stray field radiation, audible noise, and a lower height than conventional laminated transformers. Toroids also offer lower weight, easier mounting configuration and improved efficiency.
MCI has standard toroidal sizes but can manufacture a transformer with many different dimensions.



MAX. POWER (VA)	NO LOAD LOSS (WATTS)	DIMENSIONS		
		O.D. (INCHES)	HEIGHT (INCHES)	WEIGHT (LBS)
150	0.88	4.2	1.5	3.5
165	0.92	4.3	1.6	3.8
190	1.32	4.4	1.8	4.5
225	1.33	4.5	1.9	4.5
300	1.51	5.1	1.9	5.7
360	1.91	5.1	2.0	6.2
500	2.25	5.2	2.4	8.5
600	2.81	5.3	2.8	10.0
800	3.81	6.4	2.3	12.5
1000	4.76	6.5	2.7	15.5
1200	5.71	6.5	3.2	18.0
1400	5.50	7.9	2.5	20.4
1700	6.62	7.9	3.0	24.2
2100	7.94	8.6	3.4	28.5
2500	9.05	8.7	3.0	33.0
3000	10.8	8.7	3.3	39.0
3600	14.1	10.2	3.1	45.0
4500	15.3	10.2	3.6	55.0
5400	19.0	10.5	3.9	62.0
6000	22.3	11.5	4.5	68.0
6600	25.8	12.0	4.7	76.0
7600	23.4	12.7	4.7	83.0
8500	26.2	13.0	4.9	93.0
10000	33.5	13.0	5.4	115.0



MOUNTING WASHER WITH RUBBER PADS
The most economical method of mounting the TOROID horizontally is using a metal washer with rubber pads. Mounting is done with one screw through the center.

SIZE	"A"	"B"	"C"
1	2.0	0.31	0.31
2	2.8	0.31	0.31
3	3.5	0.31	0.31
4	4.3	0.31	0.31
5	5.3	0.31	0.31

*CAUTION: Be sure not to form a closed loop with the screw and the chassis when mounting the transformer. This will form a shorted turn on the transformer.

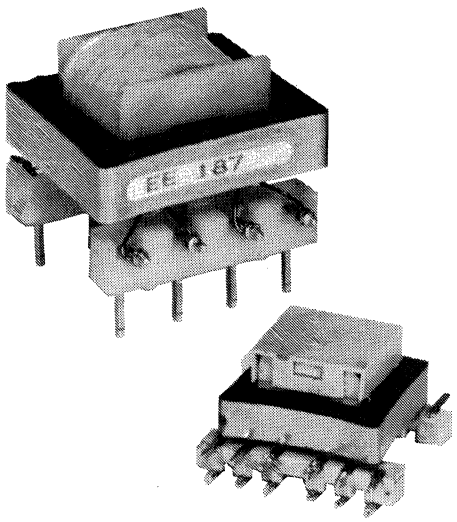
ADDITIONAL OPTIONS

- THERMAL PROTECTION:
  A thermal fuse or breaker can be added to protect circuitry.
- ELECTROSTATIC SHIELDING:
  To reduce electrostatic coupling, a 0.002 in. copper tape will be added between windings.
- MEDICAL INSULATION:
  For those who need low leakage current, due to patient hook-up, additional insulation can be added to meet safety standards.
- MAGNETIC SHIELDING:
  To further reduce stray magnetic fields, a metal belly band can be added to the toroid.

MCI TRANSFORMER CORPORATION
TOLL FREE: 1-800-MCI-TRAN
MAIN PLANT: 411 MANHATTAN AVENUE, BABYLON, NY 11704 • 516-587-0510 • FAX: 516-587-0624
NEW ENGLAND: BLODGETT STREET, ORANGE, MA 01364 • 508-544-8272 • FAX: 508-544-8356
WEST COAST: 150 SANHEDRIN CIRCLE, WILLITS, CA 95490 • 707-459-5994 • FAX: 707-459-5998

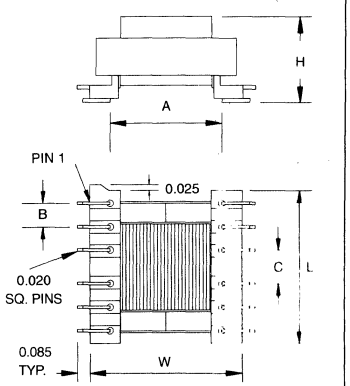
SERIES 4-81

HORIZONTAL P.C. MOUNT SWITCHMODE TRANSFORMERS

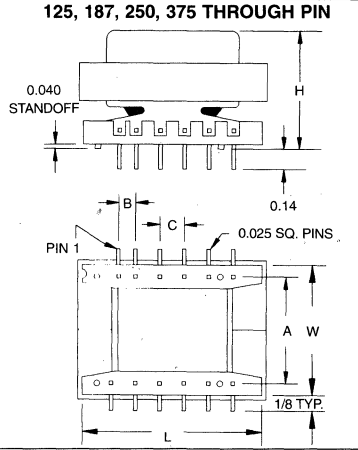


Standard EE Style switchmode transformers for customers who need cost effective solutions to switching magnetics requirements. Applications for these transformers are DC-DC and rectified offline switchers using flyback, forward, pushpull, halfbridge, or full bridge topologies. These transformers are designed to meet UL and CSA requirements and are Hipot tested at 1000VRMS standard with higher voltages available . MCI's 4-81 Series utilizes standard materials for quick turnaround of custom variations. MCI's "State of the art" manufacturing facilities provide automatic assembly and 100% final testing to guarantee a high quality part. Our design engineers are knowledgeable regarding switchmode magnetics and can provide many solutions for your switching application.

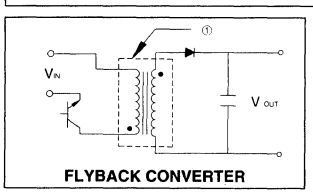
125 SMT



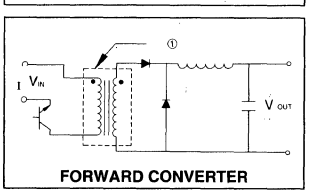
125, 187, 250, 375 THROUGH PIN



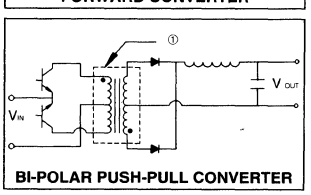
Maximum Output Power @ 100KHZ Max											
SIZE CODE	FLYBACK, FORWARD	PUSHPULL BRIDGE	CORE SIZE	L	W	H	A	B	C	# OF PINS	WT. (GRAM)
4-81-1___	5	6	125SMT	.68	.55	.43	.40	.10TYP	.150	12	3.6
4-81-2___	5	6	125	.68	.55	.43	.40	.10TYP	.150	12	3.6
4-81-3___	10	12	187	.75	.71	.68	.51	.15	.20TYP	8	14.0
4-81-4___	24	29	250	1.03	.82	.85	.62	.15	.20TYP	10	20.0
4-81-5___	110	132	375	1.47	1.08	1.04	.87	.15	.20TYP	12	55.0



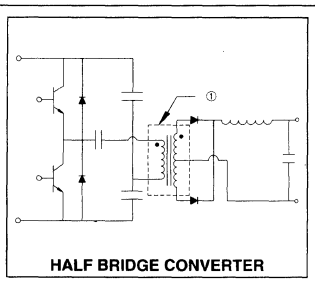
FLYBACK CONVERTER



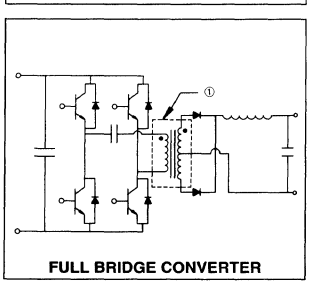
FORWARD CONVERTER



BI-POLAR PUSH-PULL CONVERTER



HALF BRIDGE CONVERTER



FULL BRIDGE CONVERTER

The above transformers can be used in four topologies, flyback, forward, pushpull, and bridge converters. For supplies in the 5-110 watt range the flyback is recommended. It has the least parts count, only one input switching devices, and no output inductor or freewheeling diode. It also exhibits excellent tracking between multiple outputs.

Information required to order a 4-81-Series Transformer:

- **Input voltage and range**
- **Operating frequency**
- **Maximum duty cycle**
- **Topology Desired**
- **Application of transformer**
- **Output voltages**
- **Operating current and range for each output**
- **Switching regulator chip (if known)**
- **Safety agency approval transformer needs to meet**

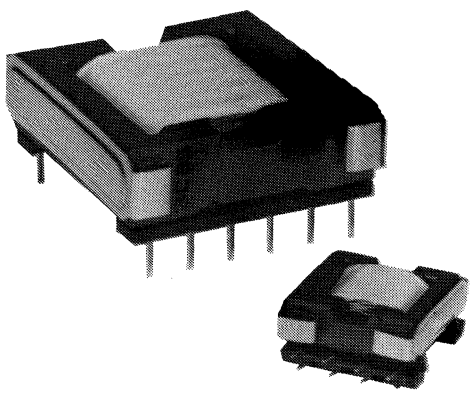
①: SWITCHMODE TRANSFORMER

MCI TRANSFORMER CORPORATION **TOLL FREE: 1-800-MCI-TRAN**

MAIN PLANT: 411 MANHATTAN AVENUE, BABYLON, NY 11704 • 516-587-0510 • FAX: 516-587-0624
NEW ENGLAND: BLODGETT STREET, ORANGE, MA 01364 • 508-544-8272 • FAX: 508-544-8356
WEST COAST: 150 SANHEDRIN CIRCLE, WILLITS, CA 95490 • 707-459-5994 • FAX: 707-459-5998

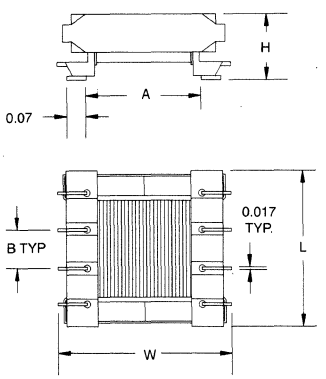
LOW PROFILE SWITCHMODE TRANSFORMERS

SERIES 4-82

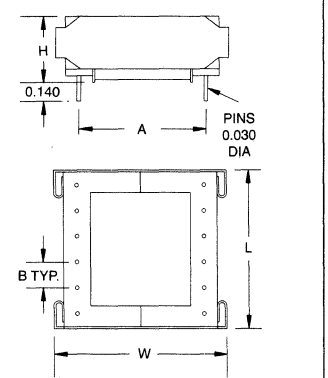


Standard EFD Core sizes for low profile surface mount and BC Board mount transformers that are economically manufactured on our automatic winding and assembly equipment. For customers who need low profile switching transformers. MCI's 4-82 Series packs up to 110 watts into a transformer only one half an inch high. By using superior grades of core material, MCI's 4-82 series transformers are suited to operate at switching frequencies up to 1MHz. These transformers are designed to meet UL and CSA requirements and are Hipot tested at 1000VRMS standard with higher voltages available. MCI's 4-81 Series utilizes standard materials for quick turnaround of custom variations. MCI's "State of the art" manufacturing facilities provide automatic assembly and 100% final testing to guarantee a high quality part. Our design engineers are knowledgeable regarding switchmode magnetics and can provide many solutions for your overall switching power application.

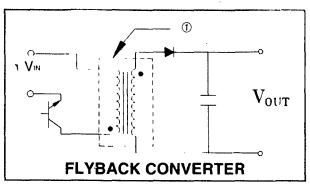
EFD 15 SURFACE MOUNT



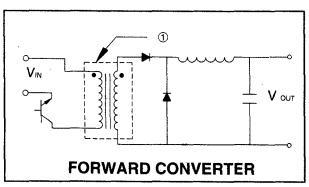
EFD 15, 20, 25, 30 THROUGH PIN



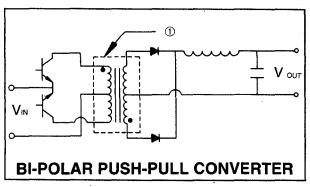
Maximum Output Power @ 100KHZ MAX										
SIZE CODE	FLYBACK, FORWARD	PUSHPULL, BRIDGE	CORE SIZE	W	L	H	A	B	# OF PINS	WT. (GRAMS)
4-82-1___	10	12	EFD15SMT	.81	.65	.32	.53	.150	8	6.0
4-82-2___	10	12	EFD15	.75	.65	.32	.54	.150	8	6.0
4-82-3___	50	60	EFD20	.95	.85	.38	.69	.200	8	15.0
4-82-4___	70	84	EFD25	1.15	1.05	.50	.89	.200	10	24.0
4-82-5 __	110	132	EFD30	1.35	1.26	.50	1.08	.200	12	39.0



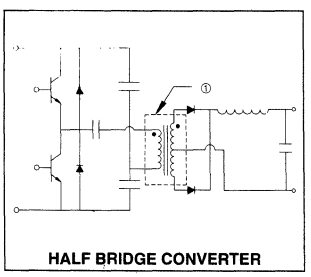
FLYBACK CONVERTER



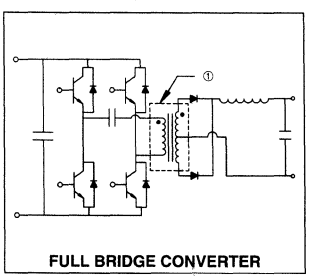
FORWARD CONVERTER



BI-POLAR PUSH-PULL CONVERTER



HALF BRIDGE CONVERTER



FULL BRIDGE CONVERTER

The above transformers can be used in four topologies, flyback, forward, pushpull, and bridge converters. For supplies in the 5-110 watt range the flyback is recommended. It has the least parts count, only one input switching devices, and no output inductor or freewheeling diode. It also exhibits excellent tracking between multiple outputs.

Information required to order a 4-82-Series Transformer:

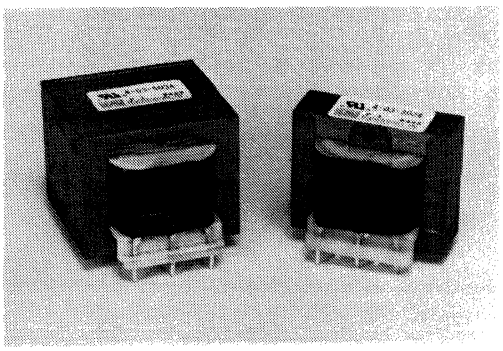
- **Input voltage and range**
- **Operating frequency**
- **Maximum duty cycle**
- **Topology Desired**
- **Application of transformer**
- **Output voltages**
- **Operating current and range for each output**
- **Switching regulator chip (if known)**
- **Safety agency approval transformer needs to meet**

①: SWITCHMODE TRANSFORMER

MCI TRANSFORMER CORPORATION **TOLL FREE: 1-800-MCI-TRAN**

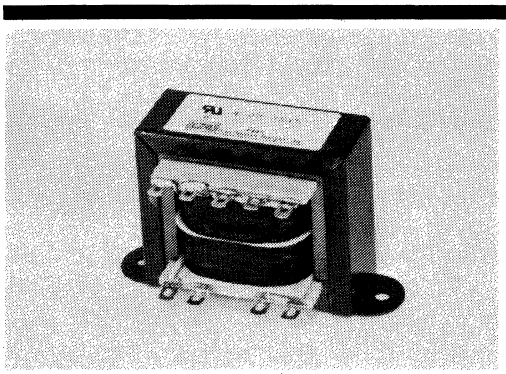
MAIN PLANT: 411 MANHATTAN AVENUE, BABYLON, NY 11704 • 516-587-0510 • FAX: 516-587-0624
NEW ENGLAND: BLODGETT STREET, ORANGE, MA 01364 • 508-544-8272 • FAX: 508-544-8356
WEST COAST: 150 SANHEDRIN CIRCLE, WILLITS, CA 95490 • 707-459-5994 • FAX: 707-459-5998

OTHER MCI TRANSFORMER PRODUCTS



VERTICAL P.C. TRANSFORMER

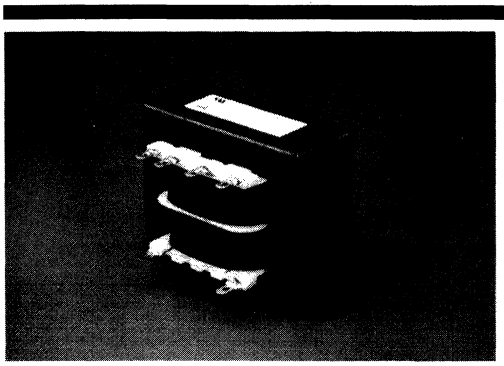
MCI has 126 transformers in our complete line of U/L recognized and CSA certified vertical PC transformers. The transformers' range is from 1.0 VA to 24 VA with either a 115 volt or 115/230 volt primary with 13 different secondary voltages. These transformers are carried in stock in our 3 domestic manufacturing plants for your convenience.



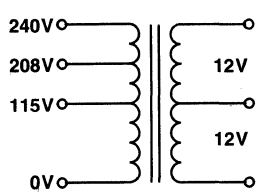
QUICK CONNECT TRIPLE OUTPUT TRANSFORMER

MCI has added 12 transformers to our product line for our customers with a need for one transformer to supply either 5VDC and ±12VDC or 5VDC and ±15VDC, in 3 power ratings of 35, 22.4, and 13.8 watts DC regulated.

There are 2 primary voltages available. Our 4-06 series which is for 100-130 volts, and our 4-07 series which is for either 100-130 volts or 200-260 volts.

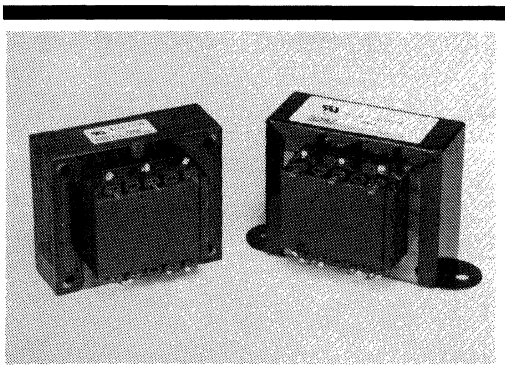


CLASS 2 UNIVERSAL INPUT VOLTAGE UL & CSA



Recognized Component
Underwriters Labs, Inc.

P/N 2-51-4024 IS 24V C/T AT 40VA
2-51-7024 IS 24V AT 80VA



VDE HORIZONTAL PC AND QUICK CONNECT TRANSFORMER

MCI has 124 transformers in our complete line of U/L recognized VDE horizontal and quick connect power transformers. These transformers are constructed and designed to meet all international standards. MCI split bobbin and non-concentric windings provide better insulation, thus eliminating the need for electrostatic shielding. All transformers pass a 4000 volt RMS Hipot.

MCI TRANSFORMER CORPORATION

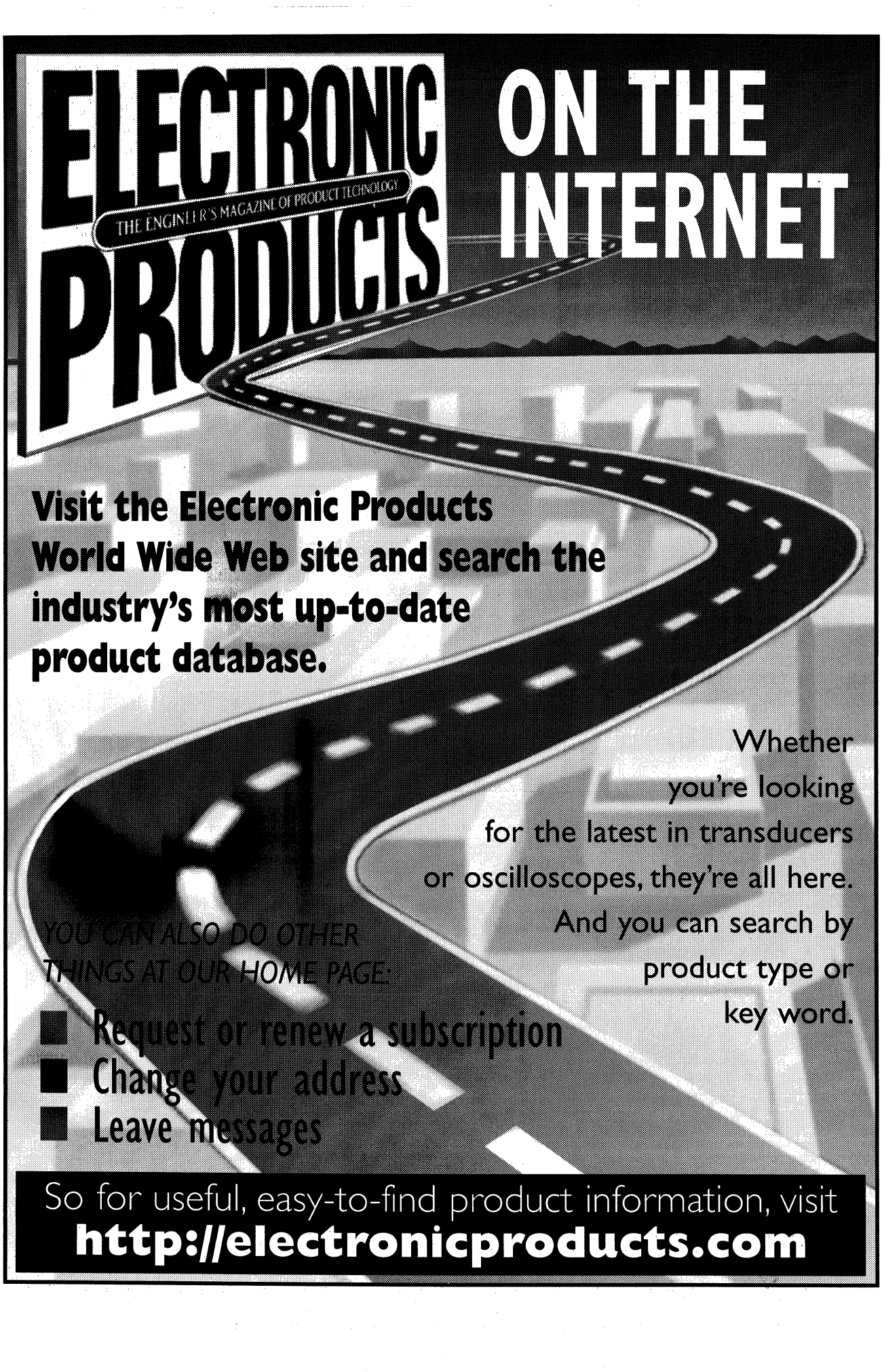
TOLL FREE: 1-800-MCI-TRAN

MAIN PLANT: 411 MANHATTAN AVENUE, BABYLON, NY 11704 • 516-587-0510 • FAX: 516-587-0624
NEW ENGLAND: BLODGETT STREET, ORANGE, MA 01364 • 508-544-8272 • FAX: 508-544-8356
WEST COAST: 150 SANHEDRIN CIRCLE, WILLITS, CA 95490 • 707-459-5994 • FAX: 707-459-5998

ELECTRONIC PRODUCTS

THE ENGINEER'S MAGAZINE OF PRODUCT TECHNOLOGY

ON THE INTERNET



Visit the Electronic Products World Wide Web site and search the industry's most up-to-date product database.

Whether you're looking for the latest in transducers or oscilloscopes, they're all here. And you can search by product type or key word.

YOU CAN ALSO DO OTHER THINGS AT OUR HOME PAGE:

- Request or renew a subscription
- Change your address
- Leave messages

So for useful, easy-to-find product information, visit

http://electronicproducts.com

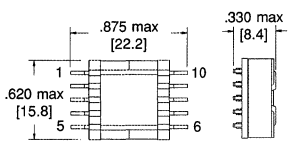
Midcom
The next five pages
are just the tip of
the iceberg...
Get more info at
www.midcom-inc.com
At Midcom, our mission is
to delight our customer through
innovative design, exceptional support,
quality manufacturing
and on-time delivery.

Power Products

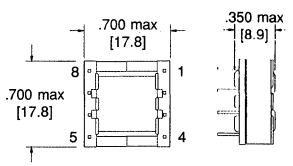
Midcom

Flyback Transformer Offerings

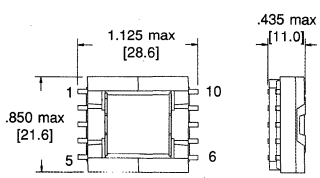
- Surface Mount and Through hole
- Low Profile Packages
- Power Requirements: up to 30 W
- Input Voltage range: 4 - 85 V
- Output Voltages: 5, 12, 15, 24, 48
- Reference Designs Available
- Switching Frequency: 40 - 250 kHz



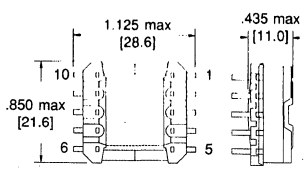
EFD15 Surface Mount



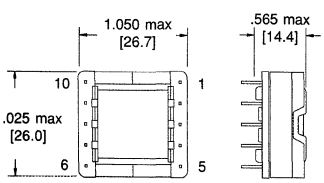
EFD15 Through Hole



EFD20 Surface Mount



EFD20 Through Hole



EFD25 Through Hole

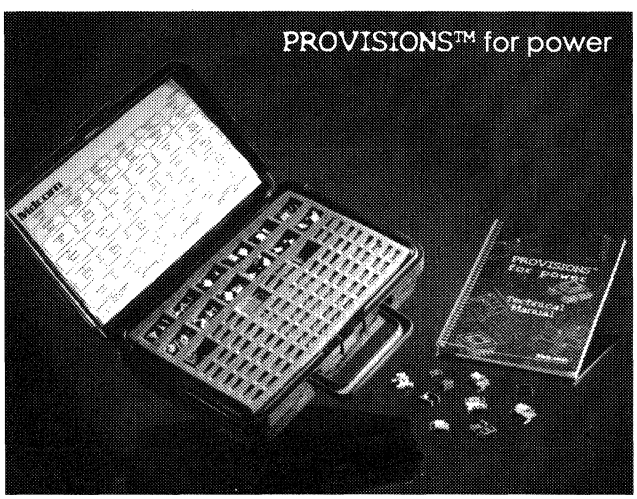
Supporting All Your Switching Application Needs

- Standard Product Offerings
- Custom Capabilities
- Technical Support
- Innovative Design Tools
- Flexibility Built In Our Designs
- Power Supply Reference Designs Available

PROVISIONS™ for power

Design Kit

- Switchmode Magnetics for £ 10 Watts
- Popular Output Voltages Optimized for Diode Drop
- Power Level Customization
- Prototypes When You Want Them — **NOW!**
- Easy to Use Part Numbering System
- Software Complements the Kit



Through Hole Toroidal Inductors

- Vertical Style Reduces Boardspace Required
- 9 Core Sizes
- 3 Current Ratings, Peak Currents to 5A
- Inductance Ranges 10 µH - 230 µH
- Multiple Applications:

Buck	Boost
Inverters	Output Chokes
DC-DC Converters	

Midcom, Inc.
121 Airport Drive
PO Box 1330
Watertown, SD 57201-6330 USA

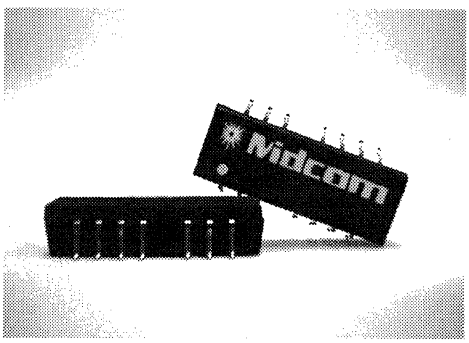
www.midcom-inc.com
e-mail: sales@midcom-inc.com
Toll Free (US & Canada) 800.643.2661
Phone 1.605.886.4385 Fax 1.605.886.4486

LAN 10/100 Mbps and 100Base-TX

Midcom

Midcom Offers:

- Fast-Match to Industry-Standard Components
- Timely Samples
- On-Time Delivery



Features:

- Meets IEEE 802.3u Standard
- Low-Profile, Surface Mount Transfer-Molded Package Design
- Withstands Aggressive Reflow Soldering Process
- Unique Lead Design Improves Solder Connection Reliability
- Qualified to operate with ICs from Major Manufacturers
- Supports UTP & STP Cable
- SIP & DIP Packages also Available
- Samples Immediately Available on Request
- Reliability & High-Volume Capabilities

In April 1998, Midcom purchased the assets of Nano Pulse Industries.

We are committed to continuing their level of exemplary quality and customer service.

Quad Channel 10/100 Mbps Modules

Chip Manufacturer(s)	Part Number
Broadcom BCM5203 / 5205 / 5208 Integrated Circuit Systems ICS1890 Intel 82555 / 82558 Level One LXT970 Lucent LUC3X54 National Semiconductor DP83223 Twister™ Micro Linear ML6671 / 6673 PMC Sierra PM3304 TDK TSC 78Q2120 / 78Q2121	6886-30 6887-30 6931-30 6945-30 6949-30
Micro Linear ML6692 / 6694 SEEQ 80220 / 80221 Level One LXT974 / LXT98X	6888-30 6889-30 6932-30 6965-30 6966-30

Dual Channel 10/100 Mbps Modules

Chip Manufacturer	Part Number
Level One LXT974 / LXT980 Micro Linear ML6692 / ML6694 SEEQ 80220 / 80221	6872-30
Intel 82555 / 82558 NSC DP83223 Twister™	6809-30

Single Channel 10/100 Mbps Modules

Chip Manufacturer(s)	Part Number
Integrated Circuit Systems ICS 1891	6120-37
Level One LXT970	6265-37
Quality Semiconductor QS6612	6812-37 6817-37
SEEQ 80220	6254-37 6930-37
TDK Semiconductors TSC 78Q2120	6120-37 6181-37

Single Channel 100 Base-TX Modules

Chip Manufacturer(s)	Part Number
NSC DP83223 Twister™, DP83840	6181-37 6241-37
Integrated Circuit Systems ICS 1891	6265-37
Micro Linear ML6673	6265-37 6120-37
Quality Semiconductor QS6611	6789-37 6682-37
TDK Semiconductors TSC 78Q2121	6120-37

Trademark of National Semiconductor

Midcom, Inc.
121 Airport Drive
PO Box 1330
Watertown, SD 57201-6330 USA

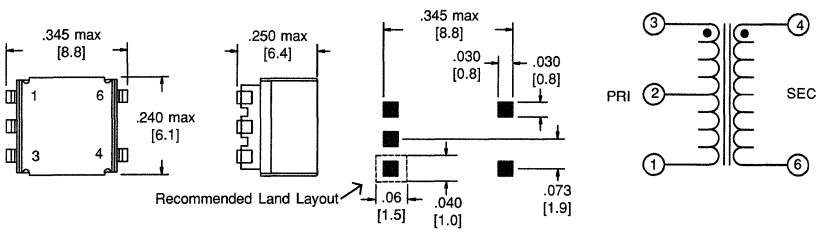
www.midcom-inc.com
e-mail: sales@midcom-inc.com
Toll Free (US & Canada) 800.643.2661
Phone 1.605.886.4385 Fax 1.605.886.4486

Telecom Transformers

Midcom

T1/E1/ISDN-PRI

- Meets ITU G.703 ISDN - Primary Rate Recommendations
- Meets BABT Requirements for TNV1 to SELV Isolation
- Meets UL1459 Requirements
- Compatible with IC Manufacturer's Transceivers
- Excellent Crosstalk Characteristics

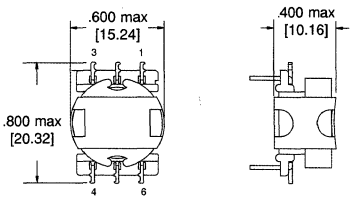


EE5

Part Number	Turns Ratio (Pri:Sec +/-1%)	L_{PRI} @ 20°C (mH Min)	L_{PRI} @ -40°C (mH Min)	Capacitance (w/w pF Typ)	Leakage L (uH Max.)	DCR Pri (ohms Max.)	DCR Sec (ohms Max.)	Dielectric (VAC Min.)
50480	1CT:1	1.2	0.7	45	1.2	2.7	2.7	1500
50479	1.14CT:1	1.2	0.7	45	1.2	2.9	2.5	1500
50478	1.26CT:1	1.2	0.7	45	1.2	2.7	2.2	1500
50398	1.35CT:1	1.2	0.7	45	1.2	2.7	2.0	1500
50477	1.41CT:1	1.2	0.7	45	1.2	2.2	1.6	1500
50511	1.66CT:1	1.2	0.7	45	1.2	2.3	1.4	1500
50476	2CT:1	1.2	0.7	45	1.2	2.3	1.2	1500
50475	2.32CT:1	1.2	0.7	45	1.2	2.3	1.0	1500

ISDN - U

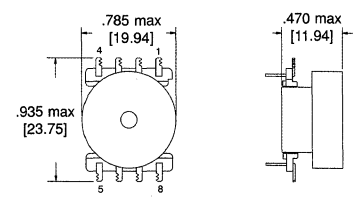
IC Manufacturer	IC Number	Thru-Hole	Package	SMD	Package
Level One	LXT520	50083	1811TT	-	-
Lucent	T7256, T7264	671-7934	1811TT	-	-
Motorola	MC145572	671-7308 671-7857	2311TT 1811TT	671-7829	1811TT
National	TP3410	671-7894	EP13	671-7910	EP13
Siemens	PEB2091	671-7456	1811TT	671-7778	1811TT



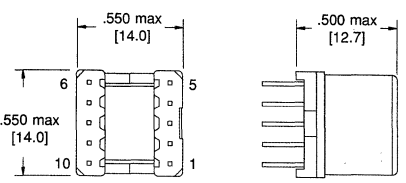
1408TT

DDS

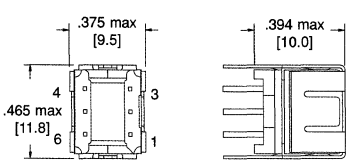
IC Manufacturer	IC Number	Thru-Hole	Package	SMD	Package	Notes
Level One	LXT400, LXT 456	671-6390	1408TT	671-8281	EP13	UL1459 Version
		671-7936	EP13	671-7937	EP13	UL1950 Version
	LXT441	671-7789	EP7	671-7876	EP7	UL1459 Version
		671-7941	EP13	671-7940	EP13	UL1950 Version



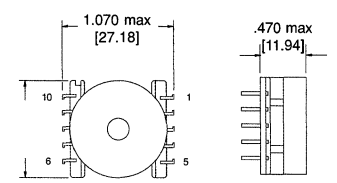
1811TT



EP13



EP7



2311TT

Midcom, Inc.
121 Airport Drive
PO Box 1330
Watertown, SD 57201-6330 USA

www.midcom-inc.com
e-mail: sales@midcom-inc.com
Toll Free (US & Canada) 800.643.2661
Phone 1.605.886.4385 Fax 1.605.886.4486

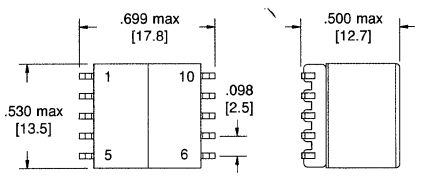
xDSL Transformers

Midcom

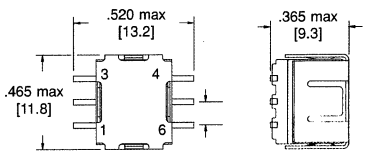
IC Mfr	IC Number	Application	UL1459 TH	UL1459 SMD	UL1459 Pkg	IEC950 TH	IEC950 SMD	IEC950 Pkg
HDSL								
Globespan	-	-	-	-	-	-	50302	EFD20
Level One	SK70704/70707	1168Kbps	50245	50351	EP13	50504	50493	EP13
Level One	SK70704/70706	784Kbps	50229	50350	EP13	50503	50492	EP13
Level One	SK70720/70721	528Kbps	50229	50350	EP13	50503	50492	EP13
Level One	SK70720/70721	400Kbps	50229	50350	EP13	50503	50492	EP13
Metalink	MT"XX"40B Series	All Rates	50329	50284	EP13	50145	50327	EP13
Rockwell	BT8970	2320Kbps	-	-	EP13	50422	50439	EP13
Rockwell	BT8970	1168Kbps	671-7928	50275	EP13	50050	50430	EP13
Rockwell	BT8970	784Kbps	671-7929	50150	EP13	50051	50449	EP13
Rockwell	BT8970 Multi-rate	Below 1168Kbps	671-7928	50275	EP13	50050	50430	EP13
Rockwell	BT8970 Multi-rate	Below 784Kbps	671-7929	50150	EP13	50051	50449	EP13
ADSL and Other xDSL								
ADI	AD20MSP910		-	-	-	50366	50521	EP13
Globespan	EL-1501	CPE	-	50293	EP7	50012	50522	EP13
Globespan	EL-1501	CO	-	50378	EP7	50039	50524	EP13
Globespan	RADSL Lite	CPE	-	50349	EFD15	50525	50527	EP13
Globespan	RADSL Lite	CO	-	50269	EFD15	50529	50530	EP13
Motorola	MC03AX1456RT	CPE	50281	50408	EP13	50531	50532	EP13
Motorola	MC03AX1456CO	CO	50280	50409	EP13	50533	50534	EP13
Rockwell	CDSL	-	50397	-	EP7	50413	50537	EP13
General	600Hz-2.5MHz	-	50397	-	EP7	50413	50537	EP13
ADSL POTS Splitter Inductors								
Globespan	EL-1501	-	-	-	-	-	671-4717	EFD20
Globespan	EL-1501	-	-	-	-	-	671-4716	EFD20

Features:

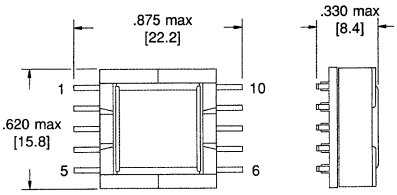
- Surface Mount and Through Hole
- Good Longitudinal Balance
- Low Total Harmonic Distortion
- Flat Frequency Response
- Broad Frequency Bandwidth
- UL1459, UL1950 and BABT Versions Available



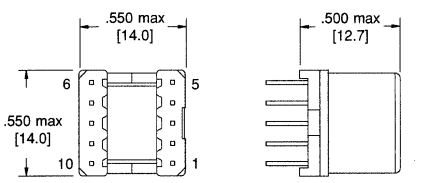
(EP13 SMD)



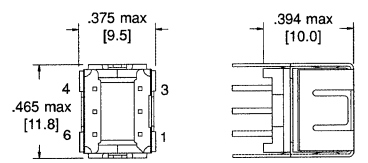
(EP7 SMD)



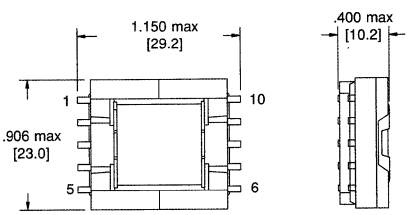
(EFD15 SMD)



(EP13 TH)



(EP7 TH)



(EFD20 SMD)

Midcom, Inc.
121 Airport Drive
PO Box 1330
Watertown, SD 57201-6330 USA

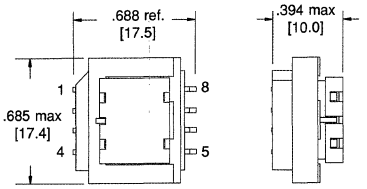
www.midcom-inc.com
e-mail: sales@midcom-inc.com
Toll Free (US & Canada) 800.643.2661
Phone 1.605.886.4385 Fax 1.605.886.4486

V.90 Transformers

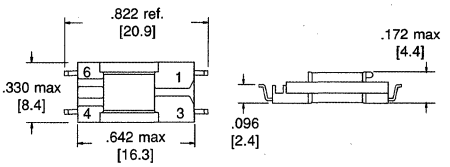
Midcom

UL1950 / BABT Products

- Meet or Exceed UL1950 and BABT Requirements for Supplementary Isolation
- Working Voltage of 250 V
- Low Distortion
- Compatible with V.90
- Flat Frequency Response

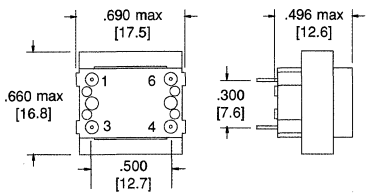


82081, 671-8496, and 82074

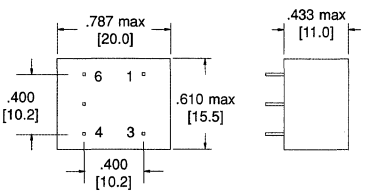


671-8481

Part Number	I.L. Approx. (dB)	THD 600Hz (-dB typ)	THD 150Hz (-dB typ)	Package Style
671-8248	1	83	59	TH
671-8236-M	2	90	72	TH
671-9690	3	94	86	TH
82081	1	76	55	SMD
671-8496	2	84	67	SMD
82074	3	90	73	SMD
671-8481	3	85	45	PC-Card



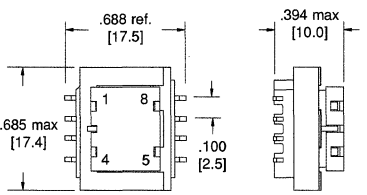
671-8236-M and 671-9690



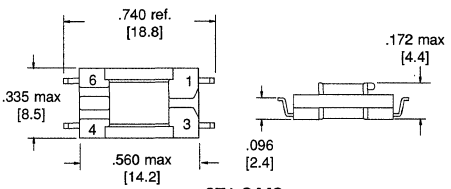
671-8248

UL1459 Products

- Meets UL1459 Requirements
- 1250 VAC Dielectric Minimum
- Low Distortion
- Compatible with V.90
- Flat Frequency Response

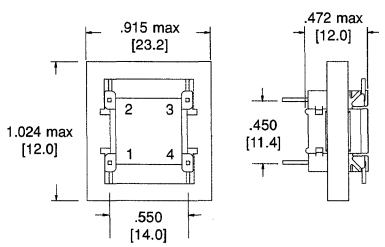


671-8422, 671-8482 and 82020



671-8443

Part Number	I.L. Approx. (dB)	THD 600Hz (-dB typ)	THD 150Hz (-dB typ)	Package Style
671-9372	1	81	65	TH
671-8056	2	91	76	TH
671-8079	3	91	80	TH
671-8482	1	79	56	SMD
671-8422	2	86	68	SMD
82020	3	90	71	SMD
671-8443	3	86	72	PC-Card

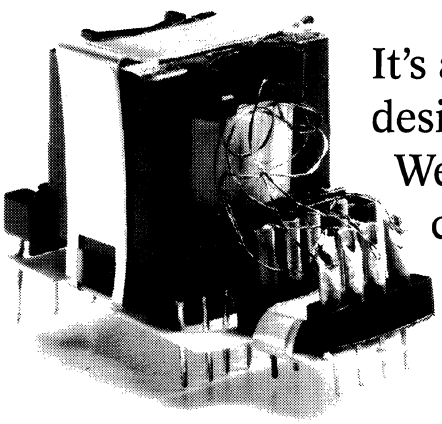


671-8056, 671-8079 and 671-9372

Midcom, Inc.
121 Airport Drive
PO Box 1330
Watertown, SD 57201-6330 USA

www.midcom-inc.com
e-mail: sales@midcom-inc.com
Toll Free (US & Canada) 800.643.2661
Phone 1.605.886.4385 Fax 1.605.886.4486

THE ONLY ONE OF ITS KIND IN THE WORLD.



It's a prototype transformer, designed to our customer's specs. We were happy to make just one. When he changed his specs, we made another. After several more modifications, his system was operating the way he wanted it to, and we were ready to go into full production for him, up to 50,000 units.

This is what Mitchell Electronics is all about.

Because we're small and flexible, we can respond to your needs quickly, with dedicated attention to quality and detail. And because we're small, you'll work closely with one of our three generations of active, hands-on family management.

And while we're small, many of our customers are among the largest in the world. We've designed, engineered and manufactured transformers, reactors, filters and coils (up to 1.5 KVA)— iron core, ferrite and toroidal — for such electronic giants as IBM, GE, Westinghouse and Honeywell.

For more information on our custom design service, call Jonathan Lerner. We'll treat you like family.

MITCHELL ELECTRONICS CORPORATION
85 West Grand Street / Mount Vernon NY 10552
914 699 3800
Manufacturing only in the USA for over 50 years.

http://eemonline.com

your search engine for electronic products!

- Faster search times and less time online
- Easy search of multiple products & companies
- Round-the-clock solutions to your design needs
- You can retrieve more detailed information, if necessary.
- As fast as a fax, faster than mail & overnight delivery.

Be sure to check out
our other websites devoted
to helping those in the design
and purchasing of
electronic products—

eemupdate.com
eemlocalsources.com
icmaster.com
electronicproducts.com

EEM Online—your search engine for electronic products.

Hearst Business Communications, Inc./UTP Division
645 Stewart Avenue, Garden City, NY 11530 • Tel: 516.227.1300 • FAX: 516.227.1901

RF TRANSFORMERS

Over 80 off-the-shelf models...

3KHz- 2000MHz from **$1.95**

Having difficulty locating RF or pulse transformers with low droop, fast risetime or a particular impedance ratio over a specified frequency range?....Mini-Circuits offers a solution.

Choose impedance ratios from 1:1 to 36:1, in connector, TO-, flatpack, surface-mount, or pin versions (plastic or metal case built to meet MIL-T-21038 and MIL-T-55631 requirements*). Coaxial connector models are offered with 50 and 75 ohm impedance; BNC standard, other types on request.

Ultra-wideband response achieves low droop and fast risetime for pulse applications. Ratings up to 1000M ohms insulation resistance and up to 1000V dielectric voltage. For wide dynamic range applications involving up to 100mA primary current, use the T-H series. Fully detailed data appear in our 740-pg RF/IF Designer's Handbook.

Need units in a hurry?...all models are covered by our exclusive one-week shipment guarantee. Only from Mini-Circuits.

*units are not QPL listed.

Please refer to our complete catalog in Volume A, Section 3450

Mini-Circuits®

P.O Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718)332-4661 ***INTERNET*** http://www.minicircuits.com

CIRCLE READER SERVICE CARD

For detailed specs on all Mini-Circuits products refer to • 760- pg. HANDBOOK • INTERNET • THOMAS REGISTER • MICROWAVE PRODUCT DATA DIRECTORY • EEM

ISO 9001 CERTIFIED

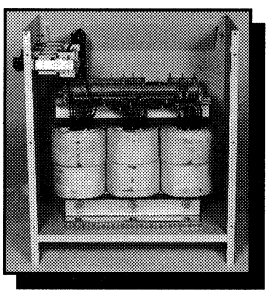
NESHAMINY TRANSFORMER CORPORATION

MANUFACTURER OF CUSTOM LAMINATED AND TOROIDAL POWER TRANSFORMERS, CONSTANT VOLTAGE TRANSFORMERS, SWITCHING POWER SUPPLY MAGNETICS, CHOKES, AND 3-PHASE POWER TRANSFORMERS

TOROIDS

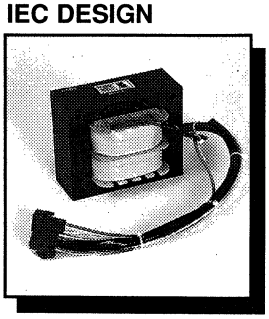
For over 40 years, Neshaminy Transformer has manufactured the versatile EI lamination style transformer as well as the lower profile, highly efficient toroidal transformers. If you have a size, stray field or efficiency problem, toroids may be right for you. Send us your spec and we will quote both ways and explain the tradeoffs. Call or write today.

3-PHASE POWER



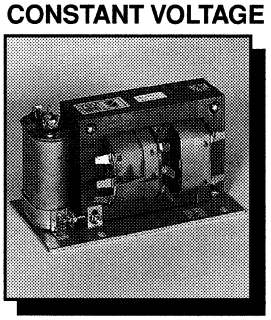
Neshaminy Transformer manufactures a wide range of custom transformers from switching power supply transformers (up to 100 kHz) to 30 KVA 3 phase, 50/60 Hz, multi-tapped, enclosed transformers for international use. For over 40 years, Neshaminy Transformer has been the top choice among customers that demand the highest level of innovation, quality and competitiveness. Call today for assistance.

IEC DESIGN



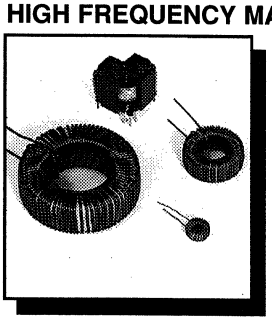
Neshaminy Transformer has many years of experience designing and manufacturing laminated, toroidal and ferrite type transformers for international use per IEC specs. We can help you on all of your split bobbins, creepages and clearances, and thermal cutout questions. Call today.

CONSTANT VOLTAGE



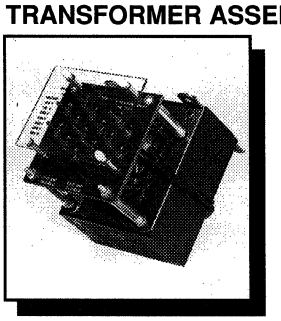
Neshaminy Transformer Corporation is a leader in supplying custom constant voltage transformers for all applications. If your equipment needs to handle +/-15% line voltage fluctuations, our CVT can regulate the output voltage to within 2% AC (1% DC) of the desired level. Constant voltage transformers remove most sags, surges, noise and brownouts and have inherent short circuit protection. Call today with your requirement.

HIGH FREQUENCY MAGNETICS



Neshaminy Transformer manufacturers a wide range of custom designed AC and DC toroidal and laminated inductors and transformers for applications up to 1 MHz. Available in mounting configurations to meet your PC requirements, including surface mount packages. Call today.

TRANSFORMER ASSEMBLIES



Neshaminy Transformer can take your transformer requirement one step further by supplying a complete assembly. We will add the terminal boards, connectors, fuses, breakers, or other attachments to reduce your installed cost. Reduce your inventory, inspection time and purchasing costs. Call today.

NESHAMINY TRANSFORMER CORPORATION
40 INDIAN DRIVE, IVYLAND,PA 18974
TEL # 215-322-2727 FAX # 215-322-1318

NESHAMINY TRANSFORMER CORPORATION

MANUFACTURER OF CUSTOM LAMINATED AND TOROIDAL POWER TRANSFORMERS, CONSTANT VOLTAGE TRANSFORMERS, SWITCHING POWER SUPPLY MAGNETICS, CHOKES, AND 3-PHASE POWER TRANSFORMERS

SINCE 1949 NESHAMINY TRANSFORMER CORPORATION... has been supplying Custom Transformers to companies seeking solutions to difficult problems. Our experience and manufacturing expertise guarantee that your needs will receive our utmost attention. You will receive a written response to your request for quotation within 5 days—usually within 2 to 3 days—and most prototypes are shipped within 2 weeks after your OK.

NESHAMINY TRANSFORMER IS SUPPLYING CUSTOM TRANSFORMERS TO MANUFACTURERS OF: Medical Equipment, Electronic Measurement Devices, Chromatography Equipment, PC Board Assembly Machines, Telecommunications Equipment, Uninterruptible Power Supplies, Oil Drilling Equipment, Process Control, Military Devices, Information Displays, Bar Code Scanning Devices, Soldering Equipment, Dental Equipment, Office Equipment, and others.

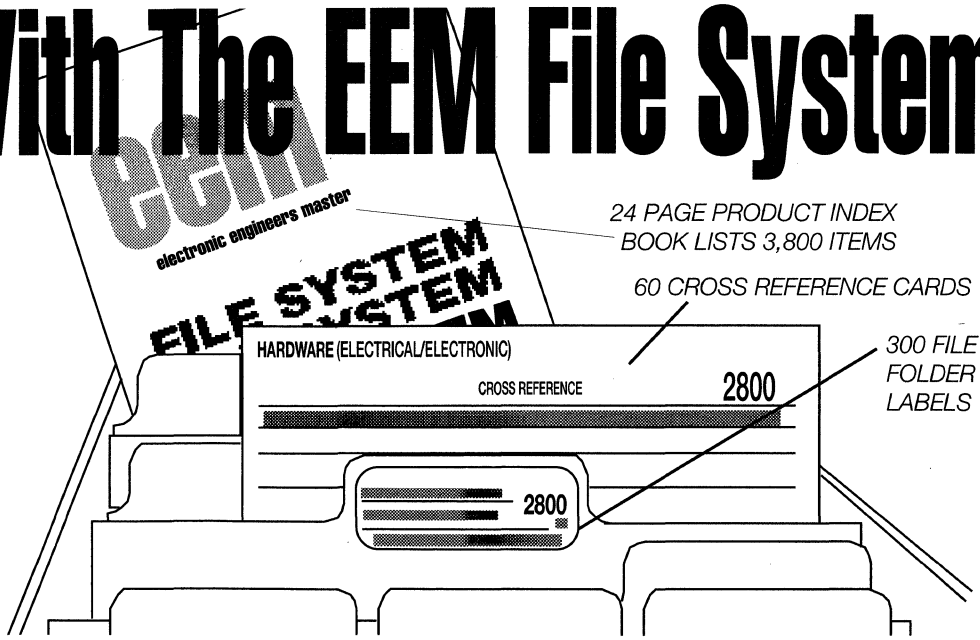
NESHAMINY TRANSFORMER SCOPE OF PRODUCTION Laminated Transformers up to 25 KVA, Printed Circuit Board Mounted Magnetics, Toroidal Transformers up to 18" in diameter, High Frequency Switching Power Supply Magnetics, Constant Voltage Transformers, 3-Phase Enclosed Power Transformers up to 20 KVA.

Neshaminy Transformer is a UL recognized manufacturer using UL recognized insulated systems for Classes 130(B), 155(F), and 180(H). Our UL file number is E51532.

We build transformers in accordance with the following standards: (partial listing) Underwriters Laboratories: UL478, UL544, UL873, UL1012, UL1950. Canadian Standards: CSA-C22-2, IEC (VDE, TUV): IEC204, IEC240, IEC348, IEC380, IEC435, IEC601, IEC742, IEC950, IEC1010; and MIL-T-27.

NESHAMINY TRANSFORMER CORPORATION
40 INDIAN DRIVE, IVYLAND,PA 18974
TEL # 215-322-2727 FAX # 215-322-1318

Organize Your Files... With The EEM File System!



The EEM File System was developed 36 years ago to help you organize your catalog files the EEM way. The EEM File System follows the EEM cataloging system that organizes all electronic product information by the four-digit EEM Product Section Number. It puts an end to catalog clutter and filing frustration.

The EEM File System comes in one neat package:

Product Index Book - Tells you where to file information on each and every type of electronic product by generic product name and EEM Product Section Number.

300 File Folder Labels - Pressure sensitive labels are pre-printed with product names and EEM Product Section Number. You apply the labels to as many, or as few, file folders as you choose.

60 Cross Reference Cards - You'll never lose track of where you filed a catalog from a multi-product manufacturer.

With the EEM File System you can get organized and stay organized. You'll save countless hours of searching for elusive catalogs and data sheets. You'll be able to quickly find the catalog you need when you need it. The EEM File System is in everyday use in thousands of engineering and purchasing departments around the world. This proven, time-saving system belongs in your department!

The EEM File System is very affordable and easy to order...

- **Charge it to your VISA, AMEX or MasterCard by calling toll-free 1-800-833-7138.**
- **Or, mail your purchase order and check for US $30.00 plus local sales tax* to:**

EEM/Hearst Business Communications, Inc.
645 Stewart Avenue
Garden City, NY 11530
Att: Marie Botta
(516) 227-1314 • FAX (516) 227-1453

*Add sales tax in CA,FL,IL,MA,NJ,NY,PA,VA and GST tax in Canada.

Pre-payment in U.S. dollars required for orders shipped outside the USA. Add $10 per set for foreign delivery.

North Hills™ Signal Processing

A Porta Systems Company

High Reliability, High Performance Products For The Electronics and Telecommunications Industry

The leading supplier of :

- **Audio, Video & RF Transformers**
- **Baluns, and**
- **MIL-STD-1553 Products**

  Couplers

  Harnesses & Testers

Registered to ISO 9001 (Certificate Number A6353)

Video Isolation Transformers

Eliminate HUM in video signals

Video Over Twisted Pair

For NTSC / PAL and,

High Resolution Video

Baluns

Impedance Matching

Coax to Twisted Pair Transmission

Media Adapters and Filters

Test Equipment Interface

MIL-STD-1553 Products

Data Bus Couplers

Harnesses

Terminators

Testers

High Quality and Reliability from World Class Manufacturing

ISO9001 Certified, Integrated SPC, MIL-Q-9858 Approved

NHB5300.4 Soldering Certification

CAD and Environmental Testing Facilities

Wide selection of Standard Products

Custom Engineering and Technical Support

Specification Control Drawings and Application Notes

Cost Effective Solutions, Quick Turn-Around on Custom Design and Manufacturing

Visit our website @

www.northhills-sp.com

Please visit us on the web at www.northhills-sp.com or e-mail at info@northhills-sp.com for the latest product info and catalogs. Count us in to be part of your design team.

North Hills™ Signal Processing 575 Underhill Blvd., Syosset, NY 11791 • (516)682-7740 • FAX (516)682-7704

North Hills™ Signal Processing

INDUSTRIAL MILITARY AEROSPACE

A Porta Systems Company

DC Isolated Signal Transformers • Baluns • Data Bus Couplers
RF Power Dividers • Sum & Difference Hybrids • LAN Coupling Baluns
RF Signal Combiners • Impedance Matching Adapters • Wideband Transformers

WIDEBAND TRANSFORMERS

UNBALANCED TO BALANCED TRANSFORMERS

Balanced secondaries center-tapped and dc-isolated from primaries. Mid-band insertion loss approx. 0.5 dB.

LOW POWER SERIES (1W)

Series		Extended Video		Video Frequency		Medium Frequency		Radio Frequency	
Cases		PB		LA,LB		BA,BB		BA,BB,HB	
LCO		20 Hz		1 kHz		10 kHz		100 kHz	
Impedance Unb.	Bal.	Type No.	HCO MHz	Type No.	HCO MHz	Type No.	HCO MHz	Type No.	HCO MHz
50	50	0014	6	0009	25	0010	80	0001	125
	75	0113	6	0104	25	0111	80	0101	125
	90			0203	20	0202	60	0200	125
	100	0315	6	0311	20	0301	60	0300	100
	124	0316		0306	20	0302	60	0307	100
	135			0303	18	0312	60	0310	100
	150			0415	15	0401	60	0400	100
	200	0522	4	0511	15	0520	60	0500	100
	300			0517	12	0521	50	0501	100
	450			0603	10	0602	40	0600	65
	600			0706	8	0703	32	0700	65
	800			0802	7	0801	25	0800	60
	1200			0904	6	0902	15	0900	30
75	50	1003	6	1002	25	1001	60	1000	100
	75	1111	6	1102	25	1112	60	1100	100
	90			1202	20	1201	60	1200	100
	100			1314	20	1310	60	1300	100
	110	1307	6	1318	20	1319	60	1320	100
	124	1309	10	1301	20	1311	60	1302	100
	135			1312	20	1315	60	1317	100
	150	1408	6	1404	16	1405	60	1400	100
	200			1516	15	1513	60	1500	100
	300	1520	4	1502	15	1514	60	1501	100
	450			1602	12	1601	40	1600	60
	600			1704	10	1707	32	1700	60
	800			1802	10	1801	20	1800	30
	1200			1902	9	1905	15	1900	30
	1850			1903	6	1901	8	1906	15

WIDEBAND POWER DIVIDERS/COMBINERS

North Hills also manufactures a full line of Power Dividers and Combiners, 2-way to 8-way, for 50 and 75 Ohm coaxial applications. Frequency ranges up to 225 MHz are available. Custom designs can be manufactured for balanced circuits, other impedance values. BNC and triax connectors available. Contact factory for your specific requirements.

HIGH POWER SERIES

Power Level	10 W	25 W	100 W
Cases	HB	BA,BB	BA,BB
MHz Range	.1-30	.1-30	.5-30
Unb/Bal	Type No.	Type No.	Type No.
50:50	0008	0011	0012
50:75	0108	0109	0105
50:100	0309	0308	0304
50:150	0406	0402	0404
50:200	0519	0512	0516
50:300	0514	0518	0506
50:450	0604	0605	0606
50:600	0705	0701	0704
75:75	1105	1110	1118
75:100	1306	1304	1305
75:150	1406	1401	1403
75:200	1517	1519	1512
75:300	1515	1510	1505
75:450	1603	1604	1605
75:600	1709	1703	1708

VIDEO ISOLATION TRANSFORMERS UNBALANCED TO UNBALANCED

Ground Isolation in 50 and 75 Ohm Coaxial Systems

- Flat frequency, linear phase response
- Insulated BNC Connectors
- 120 dB isolation at power frequencies

Type No.	Impedance Unb/Unb (Ω)	Bandwidth	Case Styles
0005	50:50	1kHz - 25MHz	CC,MA
1103	75:75	1kHz - 25MHz	CC,MA
0112	50:75	1kHz - 25MHz	CC,MA
0017	50:50	10Hz - 5MHz	CC,MA
1117	75:75	10Hz - 5MHz	CC,MA,UA
0016	50:50	20Hz - 20MHz	PA
1116	75:75	20Hz - 20MHz	PA,UA
1121	75:75	3.5Hz - 8MHz	TC
0018	50:50	20kHz - 300MHz	VA
1122	75:75	20kHz - 300MHz	VA
1204	75:93	15Hz - 4MHz	PA
0115	50:75	15Hz-5MHz	PA

HUMBUCKING TRANSFORMERS

Insulated BNC Connectors

Type	Impedance	Bandwidth	Isolation at 60Hz
0019PA	50:50	DC - 20MHz	50dB min
0020CC	50:50	DC - 25MHz	40dB min
1119PA	75:75	DC - 20MHz	50dB min
1120CC	75:75	DC - 25MHz	40dB min

MILITARY TRANSFORMERS (MIL-T-21038, MIL-T-55631, MIL-STD-981)

North Hills designs and manufactures custom and standard transformers at its MIL-I-45208 and MIL-Q-9858 certified facilities. 100% acceptance testing and in-house environmental test capabilities have enabled North Hills to be a qualified parts supplier to all major military and aerospace customers. Contact factory for your custom requirements and information on qualification tests performed. Soldering to MIL-STD-2000 or NHB5300.4.

TRANSFORMERS FOR TEST/MEASUREMENT AND INSTRUMENTATION

North Hills also manufactures a full line of baluns to interface 50 or 75 ohm coaxial interface test equipment to 100/120/150 and 600 ohm balanced systems. Covering a frequency range of up to 600 MHz, these test baluns are in compliance with national and international standards for test and measurement. Contact factory for full line catalog and your custom requirements.

North Hills™ Signal Processing 575 Underhill Blvd., Syosset, NY 11791 • (516)682-7740 • FAX (516)682-7704

North Hills™ Signal Processing

A Porta Systems Company

WIDEBAND COAXIAL IMPEDANCE ADAPTERS

For interconnection of unbalanced circuits of different characteristic impedances with low insertion loss.

Line of standard models with combinations of type BNC male and female connectors match 50:75, 50:90, and 75:90 ohm circuits. Adapters transfer power bidirectionally and are matched in both directions.

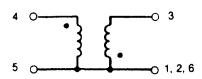
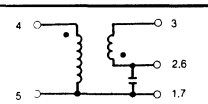
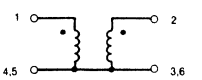
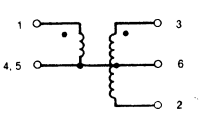
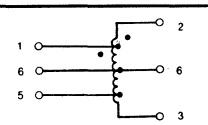
Bandwidths shown correspond to low-end — 3 dB maximum cut-off frequency, and high end frequency at which VSWR does not exceed 1.25.

Model No.	50 Ohms		75 Ohms		90 Ohms		Bandwidth (MHz)
	M	F	M	F	M	F	
0120-JA		•		•			.05-300
0102-JB	•			•			.05-300
0102-JC	•		•				.05-300
0102-JD		•	•				.05-300
0114-JA		•		•			5-1000
0114-JB	•			•			5-1000
0114-JC	•		•				5-1000
0114-JD		•	•				5-1000
0201-JA		•				•	.05-300
0201-JB	•					•	.05-300
0201-JC	•				•		.05-300
0201-JD		•			•		.05-300
1203-JA				•		•	.2-300
1203-JB			•			•	.2-300
1203-JC			•		•		.2-300
1203-JD				•	•		.2-300

APPLICATIONS

- *Video Systems (Ground Isolation/Hum Eliminators)*
- *Antenna Couplers*
- *Data/Pulse Transmission - Process Control*
- *Medical Electronics - Radar Systems*
- *Industrial, Military and Aerospace*
- *High Frequency Test*
- *Local Area Network Testing*

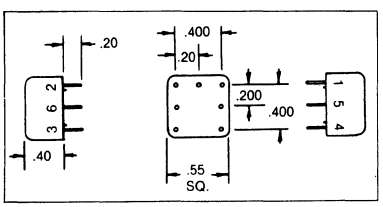
MINIATURE WIDEBAND TRANSFORMERS: NA Series — .10 to 300 MHz

Configuration	Part No.	Impedance Ration • Ohms	Simplified Schematic Diagram
Unbal. to Unbal. Phase Reversing	0003 NA 1106 NA 2200 NA	50:50 75:75 90:90	
Unbal. to Unbal. Phase Reversing DC isolated	0007 NA 1107 NA 2201 NA	50:50 75:75 90:90	
Unbal. to Unbal. Non-inverting	0002 NA 0508 NA 1506 NA	50:12.5 50:200 75:300	
Unbal. to Bal.	0004 NA 0117 NA 0319 NA 0325 NA 0408 NA 0509 NA 1004 NA 1101 NA 1710 NA 1409 NA 1507 NA	50:50 50:75 50:100 50:120 50:150 50:200 75:50 75:75 75:100 75:150 75:300	
Bal. to Bal.	0510 NA 1508 NA	50:200 75:300	

These transformers are also available in shielded cases with BNC connectors on the unbalanced port for direct attachment to Network Analyzers and other test equipment.

Contact factory for details.

DIMENSIONS (in inches)



Wt — 4 gms (.14 oz.)

Temp. — 20°C to +80°C

SPECIAL TRANSFORMERS FOR LONGITUDINAL BALANCE MEASUREMENTS - BF & BFA Series

To comply with CCITT, ISO/IEC, BELLCORE, IEEE and TIA/EIA standards. Available in 50/100, 50/120, 50/135, 50/150, 75/100, 75/120, 75/135 and 75/150 Ohms for frequencies up to 300 MHz. Full line catalog available.

CUSTOM TRANSFORMER DESIGNS

With over 40 years experience in the business, (est'd. 1953) North Hills is uniquely qualified to help you develop your next transformer specification. Consult with our applications/tech support department for immediate response.

Visit our website at http://www.northhills-sp.com
or e-mail us at info@northhills-sp.com

™ Trademark of North Hills Electronics, Inc.

North Hills™ Signal Processing 575 Underhill Blvd., Syosset, NY 11791 • (516)682-7740 • FAX (516)682-7704

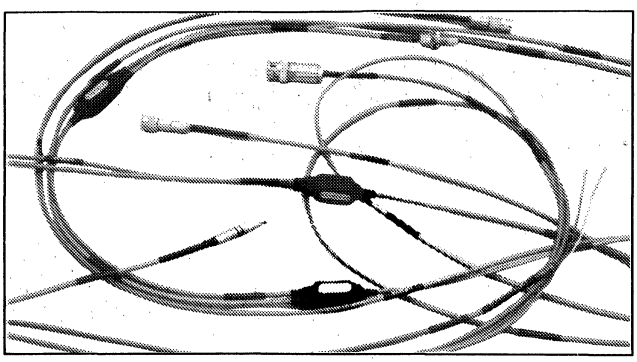
North Hills™ Signal Processing

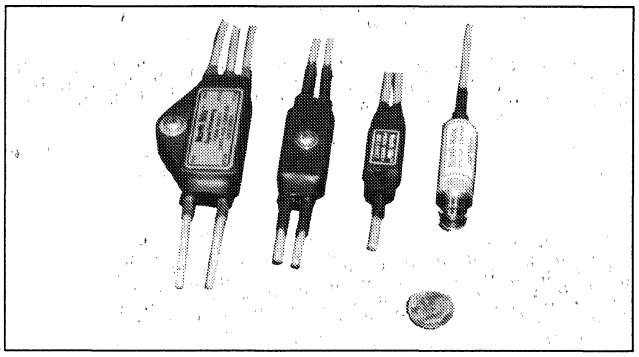
A Porta Systems Company

North Hills Signal Processing is a full service provider of MIL-STD-1553 connectivity products - couplers, harnesses, terminators, transformers, connectors and splice kits.

Airborne and Space Applications; one through eight stub designs in multiple configurations
Qualified to NASA & MIL specs: Extended temperature ranges -90°C to +150°C
Full Qualification Test Reports and Documentation available
Standard and Quick turn-around custom designs
In-house capabilities for burn-in, test and screening
MIL-STD 2000 or NHB5300.4 workmanship, 100% test, certificate of conformance

BOX TYPES OR IN-LINE UNITS WITH TAB OR THROUGH HOLE! "QUIK-CLIK" (CONNECTORIZED)!
COMPLETE HARNESSES (ELIMINATE SPLICES AND MINIMIZE CONNECTORS)



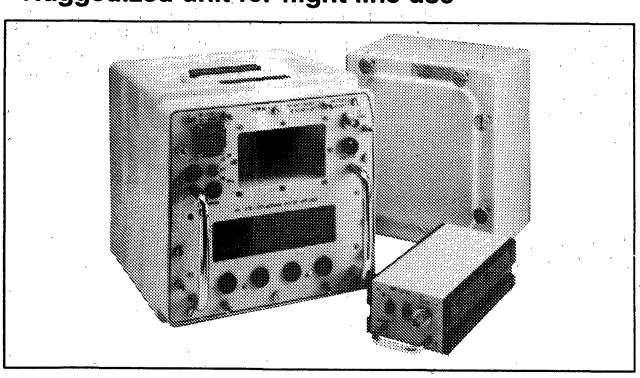


TYPICAL QUALIFICATION ENVIRONMENTS

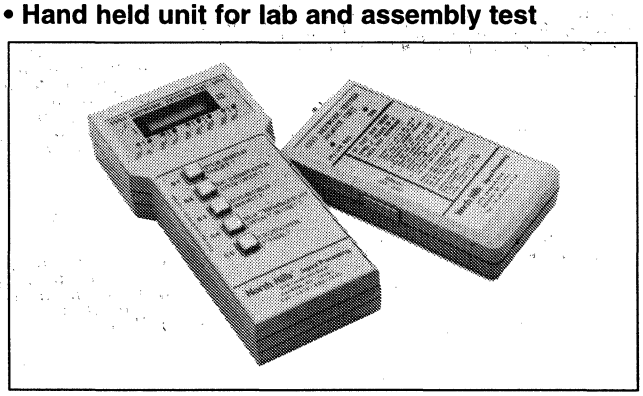
Operating Temperature: -90°C to +150°C; Humidity - 0 to 99% RH
Vibration - Random and Gunfire - up to 56 Grms (10 to 2000 Hz)
Shock (10-2000 Hz) - 1920 G pk
Temperature Altitude Humidity - 50,000 ft., -55°C to +90°C, 50% RH; Fluids - Jet Fuels, Cleaning and Hydraulic Fluids, Kerosene (168 hours)
1000 hour life test at 125°C 100% duty cycle
Contact our Applications Engineering for test reports and your optimum design solutions

DATA BUS NETWORK TESTERS

• Ruggedized unit for flight line use



• Hand held unit for lab and assembly test



Visit our website at http://www.northhills-sp.com. Contact factory for application notes, drawings and design assistance on custom parts or e-mail us at info@northhills-sp.com

™ Trademark of North Hills Electronics, Inc.

North Hills™ Signal Processing 575 Underhill Blvd., Syosset, NY 11791 • (516) 682-7740 • FAX (516) 682-7704

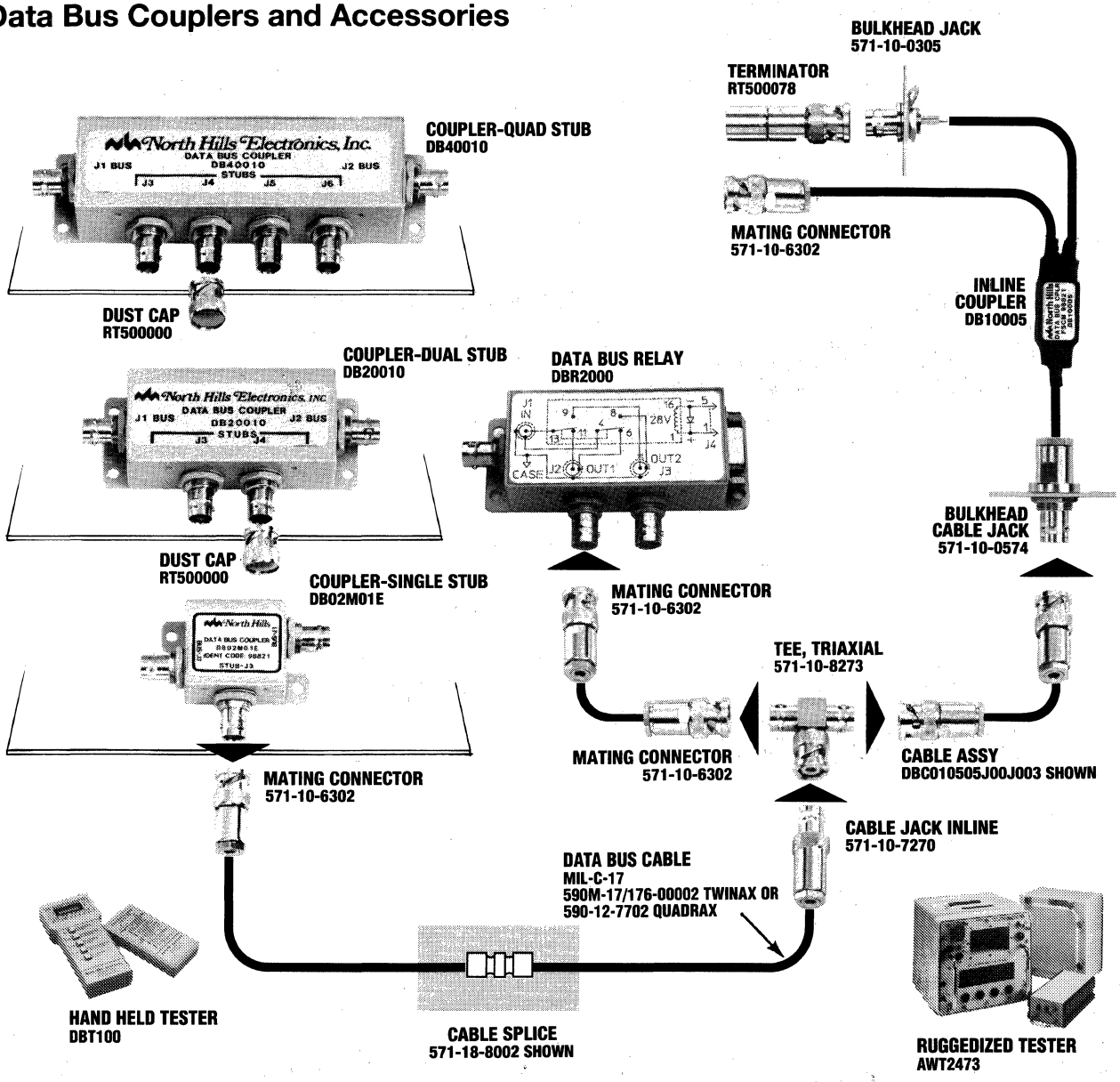
North Hills™ Signal Processing

A Porta Systems Company

Your One Stop Coupler Shop

- ***Complete assortment of Data Bus interconnect accessories, cable assemblies and Data Bus Couplers (Box or In-Line)***
- ***Readily Available from Stock***

MIL-STD-1553
Data Bus Couplers and Accessories



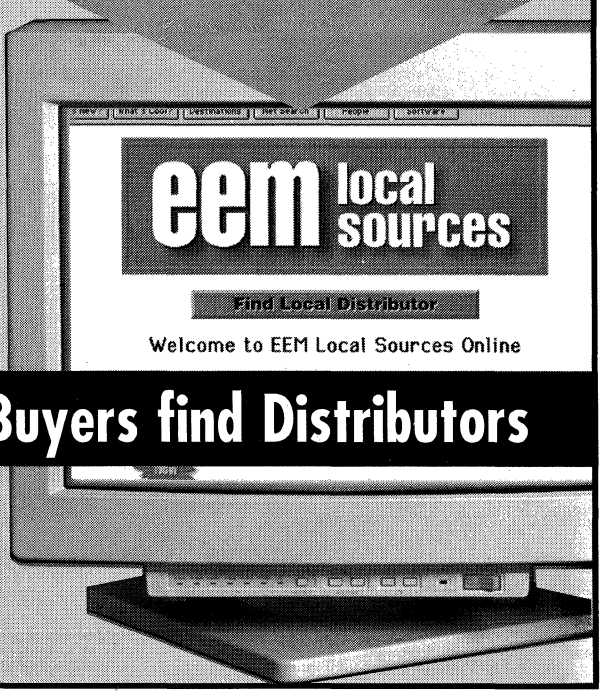
™ Trademark of North Hills Electronics, Inc.

When you need to buy electronic products NOW, access the source:

eemlocalsources.com

- "New, improved interface and faster database now available"
  means... **Faster search times and less time online**
- "Easy, well-organized index of distributors, manufacturers & their products"
  means... **Easy search of multiple distributors & manufacturers**
- "EEM Local Sources is available 24 hours a day, 7 days a week"
  means... **Round-the-clock solutions to your needs**
- Gives detailed company information & links including a distributors linecard, website & email
  means... **You can retrieve more detailed information, if necessary.**

Where BUYERS find DISTRIBUTORS!



EEM Local Sources—Where Buyers find Distributors

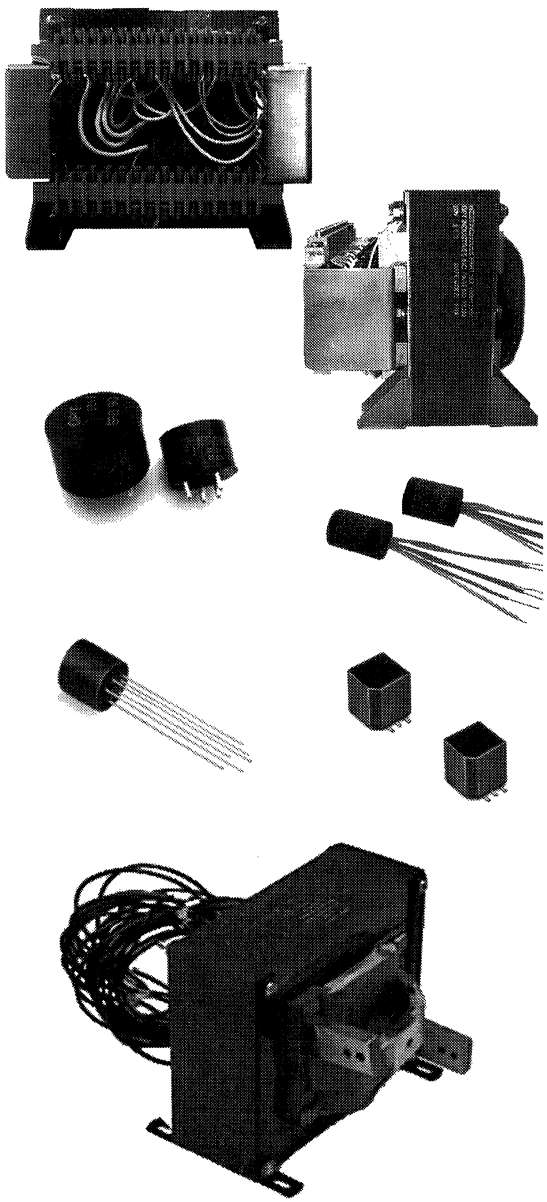
Be sure to check out our other websites devoted to helping those in the design and purchasing of electronic products—

eemonline.com • eemupdate.com • icmaster.com • electronicproducts.com

CUSTOM & STANDARD MAGNETICS

OPT INDUSTRIES, INC.

Cost Effective Design Solutions at Your Fingertips!



- ❑ **Linear Transformers**
  (Audio, R.F., Power Coupling, Isolation)
  - Milliwatt to 20KVA (1-3 Phase)
  - 50/60 to 50KHz
  - Bobbin Wound, Toroid, Layer Wound
  - Open Frame, Molded, Hermetic Seal
- ❑ **Pulse**
- ❑ **Ferroresonant**
- ❑ **High Reactance**
- ❑ **Switch Mode Magnetics**
  - Transformers
  - Output Chokes, Common Mode Chokes
  - Differential Mode Chokes
  - Flyback Transformers
- ❑ **Commercial Power Inductors**
- ❑ **UL, CSA, TUV Approval**
- ❑ **High Volume, Low Cost Offshore Capability**
- ❑ **Military & Commercial Designs**

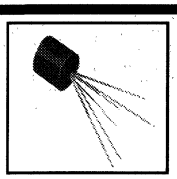
The above photos are not to scale.

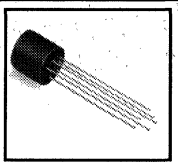
We Design & Build to Your Special Requirements

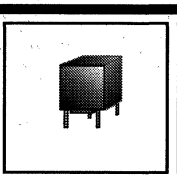
Application Assistance Available

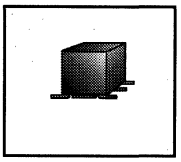
OPT Industries, Inc. 300 Red School Lane, Phillipsburg, NJ 08865 • Phone: (908) 454-2600 • FAX: (908) 454-3742
www.optind.com • E-mail: sales@optind.com • Faxback: 1-800-950-2892

ULTRA MINIATURE TRANSFORMERS


DIT

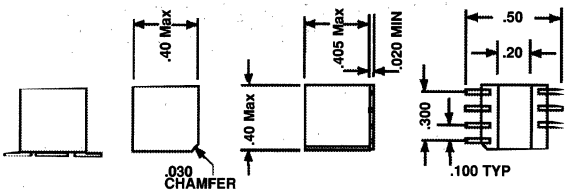

DIT200

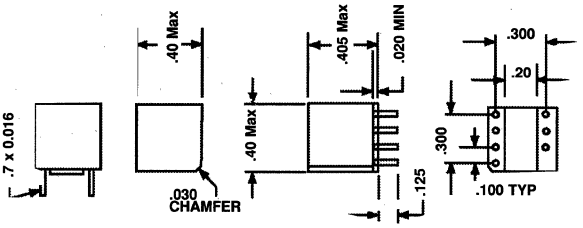

DIT300


DIT400

- **Unprecedented Power Handling Capacity in an Ultraminiature Package.**
- **DIT200 Series QPL-27 M27/103 TF5R21ZZ**
- **Operating Temperature -55°C to 105°C, Class S (130°C) Available**
- **Frequency Response ± 3dB 400HZ to100KHz**
- **Electrostatic and Magnetic Shield Available**
- **Variations of Stanard Designs Available**

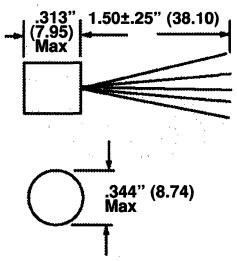
DIT300 & 400 Series



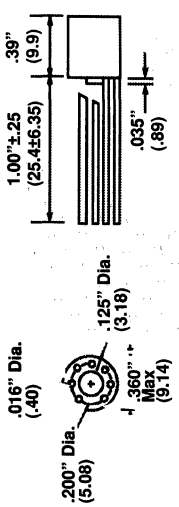


DIT Series

.016"(.40) Diameter Insulated Leads



DIT200 Series



Electrical Specifications

Leads xx	Plug-In 2xx	Plug-In 3xx	SMT 4xx	Primary Impedance	Secondary Impedance Split Wdg. SER/PAR		Power* Miliwatts 1KHz & Higher	Primary Unbal (ma)	Primary DCR	Secondary DCR SER/PAR Conn		Turns Ratio Pri/Sec SEC SER	SEC PAR
DIT44	DIT225	DIT301	DIT401	80 CT	32CT	8	500	12	11.5	4.0	1.0	1.58:1	3.16:1
DIT56	DIT227	DIT302	DIT402	150 CT	150CT	-	500	10	14	16	-	1:1	-
DIT19	DIT230	DIT303	DIT403	300 CT	600	-	500	7	20	89	-	1:1.4	-
DIT43	DIT235	DIT304	DIT404	400 CT	40CT	10	500	8	50	6.5	1.62	3.16:1	6.32:1
DIT41	DIT240	DIT305	DIT405	400 CT	400CT	100	500	8	50	89	22	1:1	2:1
DIT53	-	DIT306	DIT406	400 CT	4K CT	-	500	8	33	367	-	1:3.16	-
DIT2	-	DIT307	DIT407	500 CT	50	-	500	3	65	9.0	-	3.16:1	-
DIT20	-	DIT309	DIT409	500 CT	600	-	500	5.5	32	89	-	1:1.1	-
DIT55	DIT290	DIT312	DIT412	600 CT	600CT	-	500	4	47	47	-	1:1	-
DIT21	-	DIT313	DIT413	900 CT	600	-	500	4	53	90	-	1.22:1	-
DIT3	-	DIT314	DIT414	1K CT	50	-	500	3	110	8	-	4.47:1	-
DIT5	-	DIT316	DIT416	1.2K CT	3.2	-	500	2	110	.53	-	19.36:1	-
DIT22	-	DIT317	DIT417	1.5K CT	600	-	500	3	87	90	-	1.58:1	-
DIT51	-	DIT319	DIT419	2K CT	2K CT	500	100	3	180	110	27.5	1:1	2:1
DIT37	DIT265	DIT320	DIT420	2K CT	8K CT	2K	100	3	180	440	110	1:2	1:1
DIT52**	-	DIT321	DIT421	4K CT	8K CT	-	100	2	300	590	-	1:1.41	-
DIT9	-	DIT322	DIT422	10K CT	500CT	-	100	1	870	50	-	4.47:1	-
DIT10	-	DIT323	DIT423	10K CT	1.2KCT	-	100	1	870	130	-	2.89:1	-
DIT25	-	DIT327	DIT427	10K CT	1.5KCT	-	100	1	870	105	-	2.58:1	-
DIT38	DIT278	DIT239	DIT239	10KCT	2K CT	500	100	1	620	220	55	2.24:1	1.12:1
DIT11	-	DIT234	DIT234	10K CT	2K CT	-	100	1	870	180	-	2.24:1	-
DIT36	DIT283	DIT330	DIT430	10K CT	10K CT	-	100	1	970	1220	-	1:1	-
DIT1	-	DIT331	DIT431	20KCT	800	-	50	.5	815	140	-	5:1	-
DIT23	DIT288	DIT332	DIT432	20KCT	800	-	50	.5	815	140	-	5:1	-
DITSH	Drawn Hipermalloy shield and cover for DIT's provides 20 to 30db shielding .390" h x .359" dia.												

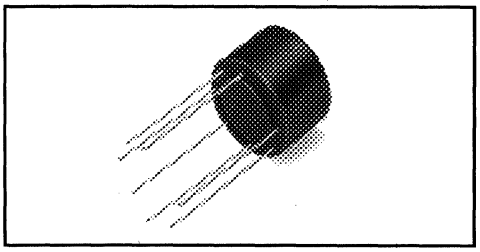
*For 5% Maximum Distortion. **Includes Electrostatic Shield.

OPT Industries, Inc. 300 Red School Lane, Phillipsburg, NJ 08865 • Phone: (908)454-2600 • FAX: (908)454-3742
Web: www.optind.com • E-mail: sales@optind.com • Faxback: 1-800-950-2892

OPT INDUSTRIES, INC.

ULTRA MINIATURE TRANSFORMERS

TOP SERIES



- High Power Handling Capacity
- Coupling, Matching and Isolation Capacity
- Manufactured to MIL-T-27 TF5R21ZZ (Not QPL-27 Listed)
- QPL Versions Available
- Operating Temperature -55°C to +105°C, Class S(130°C) Available
- Dielectric Withstanding Voltage 200VRMS
- Hipermalloy Electromagnetic Shields Available
- Variation of Standard Designs Available

TOP1000 Series, Frequency Response ± 3 DB 300 Hz-75 KHz

Part No.	Primary Imp Ω	Secondary Imp Ω Split Windings SER	PAR	Power Watts* 1KHz & higher	400 Hz & higher	300 Hz & higher	Primary Unbal DC Current ma	Primary DC Resist Ω	Secondary DC Resistance Ω SER CONN	PAR CONN	Turns Ratio Prim/SEC SEC SER CONN	SEC PAR CONN
TOP1109	100 CT	100 CT	25	.6	.3	.16	13.0	10.8	12	3	1:1	2:1
TOP1116	150CT	150 CT	37.5	.6	.3	.16	11.0	12	18.3	4.6	1:1	2:1
TOP1117	150 CT	600 CT	150	.6	.3	.16	11.0	13	75	19	1:2	1:1
TOP1121	300 CT	150 CT	37.5	.6	.3	.16	8.0	30	18	4.6	1.41:1	2.83:1
TOP1133	500 CT	16 CT	4	.6	.3	.16	6.0	48	1.9	.5	5.6:1	11.2:1
TOP1143	600 CT	600 CT	150	.6	.3	.16	5.5	57	79	20	1:1	2:1
TOP1144**	600 CT	600 CT	-	.6	.3	.16	5.5	53	75	-	1:1	-
TOP1145	600 CT	1200 CT	300	.6	.3	.16	5.5	53	105	26	1:1.41	1.41:1
TOP1154	1000 CT	1000 CT	250	.6	.3	.16	4.5	103	115	28	1:1	2:1
TOP1167**	2000 CT	2000 CT	-	.6	.3	.16	3.0	198	218	-	1:1	-
TOP1168	2000 CT	8000 CT	2000	.6	.3	.16	3.0	198	850	213	1:2	1:1
TOP1200	10,000 CT	10,000 CT	2500	.6	.3	.16	1.4	866	1215	304	1:1	2:1
TOP1201**	10,000 CT	10,000 CT	-	.6	.3	.16	1.4	1060	1215	-	1:1	-
TOP1204	15,000 CT	600 CT	150	.6	.3	.16	1.0	1305	72.5	18	5:1	10:1
TOP1212	20,000 CT	1000 CT	250	.5	.3	.16	1.0	1560	121	30.5	4.47:1	8.94:1

TOP2000 Series, Frequency Response ± 3 DB 150 Hz-75 KHz

Part No.	Primary Imp Ω	Secondary Imp Ω Split Windings SER	PAR	Power Watts* 1KHz & higher	400 Hz & higher	150 Hz & higher	Primary Unbal DC Current ma	Primary DC Resist Ω	Secondary DC Resistance Ω SER CONN	PAR CONN	Turns Ratio Prim/SEC SEC SER CONN	SEC PAR CONN
TOP2109	100 CT	100 CT	25	1.0	.75	.075	10.0	9.7	11	2.8	1:1	2:1
TOP2116	150 CT	150 CT	37.5	1.0	.75	.075	8.0	12	20	5	1:1	2:1
TOP2117	150 CT	600 CT	150	1.0	.75	.075	8.0	12	82	20.5	1:2	1:1
TOP2123	300 CT	600 CT	150	1.0	.75	.075	5.0	27	66	17	1.41:1	1.41:1
TOP2142	600 CT	200 CT	50	1.0	.75	.075	4.0	60	25	6.3	1:73:1	3.46:1
TOP2143	600 CT	600 CT	150	1.0	.75	.075	4.0	60	66	17	1:1	2:1
TOP2144**	600 CT	600 CT	-	1.0	.75	.075	4.0	60	68	-	1:1	-
TOP2146	600 CT	1200 CT	300	1.0	.75	.075	4.0	60	116	29	1:1.41	1.41:1
TOP2169**	2000 CT	2000 CT	-	1.0	.75	.075	2.0	175	240	-	1:1	-
TOP2170	2000 CT	8000 CT	2000	1.0	.75	.075	2.0	185	1015	254	1:2	1:1
TOP2202	10,000 CT	10,000 CT	2500	1.0	.75	.075	1.0	780	1075	269	1:1	2:1
TOP2203**	10,000 CT	10,000 CT	-	1.0	.75	.075	1.0	715	985	-	1:1	-
TOP2206	15,000 CT	600 CT	150	.66	.66	.075	0.8	1165	80	21	5:1	10:1
TOP2214	20,000 CT	1000 CT	250	.5	.5	.075	0.7	1750	135	34	4.47:1	8.94:1
TOP2246	100,000 CT	2000 CT	500	.1	.1	.075	0.3	10,000	248	62	7.07:1	14.14:1

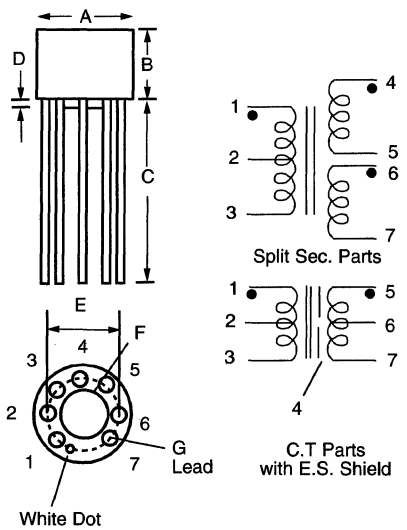
TOP5000 Series, Frequency Response ± 3 DB 75 Hz-30 KHz

Part No.	Primary Imp Ω	Secondary Imp Ω Split Windings SER	PAR	Power Watts* 1KHz & higher	300 Hz & higher	75 Hz & higher	Primary Unbal DC Current ma	Primary DC Resist Ω	Secondary DC Resistance Ω SER CONN	PAR CONN	Turns Ratio Prim/SEC SEC SER CONN	SEC PAR CONN
TOP5109	100 CT	100 CT	25	1.5	.9	.02	10	8	9.5	2.38	1:1	2:1
TOP5116	150 CT	150 CT	37.5	1.5	.9	.02	8	12	14.3	3.56	1:1	2:1
TOP5118	200 CT	200 CT	50	1.5	.9	.02	7	16	19	4.75	1:1	2:1
TOP5134	500 CT	50 CT	12.5	1.5	.9	.02	4.5	40	4.75	1.19	3.16:1	6.32:1
TOP5139	600 CT	12.8 CT	3.2	1.5	.9	.02	4	48	1.22	.3	6.85:1	13.7
TOP5143	600 CT	600 CT	150	1.5	.9	.02	4	48	57	14.25	1:1	2:1
TOP5144*	600 CT	600 CT	-	1.5	.9	.02	4	48	57	-	1:1	-
TOP5147	600 CT	1200 CT	300	1.5	.9	.02	4	48	114	28.5	1:1.41	1.41:1
TOP5171**	2000 CT	2000 CT	-	1.5	.9	.02	2.2	160	190	-	1:1	-
TOP5172	2000 CT	8000 CT	2000	1.5	.9	.02	2.2	160	760	190	1:2	1:1
TOP5207	10,000 CT	10,000 CT	2500	1.0	.9	.02	1	800	950	238	1:1	2:1
TOP5208**	10,000 CT	10,000 CT	-	1.0	.9	.02	1	800	950	-	1:1	-
TOP5211	15,000 CT	600 CT	150	.66	.66	.02	.8	1200	57	14.3	5:1	10:1
TOP5219	20,000 CT	1000 CT	250	.5	.5	.02	.7	1600	95	23.8	4.47:1	8.94:1
TOP5250	100,000 CT	2000 CT	500	.1	.1	.02	3	8000	190	47.5	7.07:1	14.14:1

TOP3000 Series, Frequency Response ± 3 DB 50 Hz-30 KHz

Part No.	Primary Imp Ω	Secondary Imp Ω Split Windings SER	PAR	Power Watts* 1KHz & higher	300 Hz & higher	50 Hz & higher	Primary Unbal DC Current ma	Primary DC Resist Ω	Secondary DC Resistance Ω SER CONN	PAR CONN	Turns Ratio Prim/SEC SEC SER CONN	SEC PAR CONN
TOP3109	100 CT	100 CT	25	2.0	1.5	.03	10	8	11	2.75	1:1	2:1
TOP3116	150 CT	150 CT	37.5	2.0	1.5	.03	8	12	16.5	4.13	1:1	2:1
TOP3117	150 CT	600 CT	150	2.0	1.5	.03	8	12	66	16.5	1:2	1:1
TOP3134	500CT	50 CT	2.5	2.0	1.5	.03	4.5	40	5.5	1.38	3.16:1	6.32:1
TOP3139	600CT	12.8 CT	3.2	2.0	1.5	.03	4	48	1.41	.35	6.85:1	13.7
TOP3143	600 CT	600CT	150	2.0	1.5	.03	4	48	66	16.5	1:1	2:1
TOP3144**	600 CT	600 CT	-	2.0	1.5	.03	4	48	66	-	1:1	-
TOP3146	600CT	1200 CT	300	2.0	1.5	.03	4	48	132	33	1:1.41	1.41:1
TOP3170**	2000 CT	2000 CT	-	2.0	1.5	.03	2.2	160	220	-	1:1	-
TOP3171	2000 CT	8000 CT	2000	2.0	1.5	.03	2.2	160	880	220	1:2	1:1
TOP3206	10,000 CT	10,000 CT	2500	1.0	1.0	.03	1	800	1100	275	1:1	2:1
TOP3207**	10,000 CT	10,000 CT	-	1.0	1.0	.03	1	800	1100	-	1:1	-
TOP3210	15,000 CT	600 CT	150	.65	.65	.03	.8	1200	66	16.5	5:1	10:1
TOP3219	20,000 CT	1000 CT	250	.5	.5	.03	.7	1600	110	27.5	4.47:1	8.94:1
TOP3250	100,000 CT	2000 CT	500	.1	.1	.03	.3	8000	220	55	7.07:1	14.14:1

*For 5% Maximum Distortion, **Includes Electrostatic Shield



	Dimensions						
	A Max.	B Max.	C ±.25	D ±.010	E ±.010	F ±.010	G ±.002
TOP1000	.5	.35	1.0	.020	.35	.218	.016D
TOP2000	.5	.50	1.0	.020	.35	.218	.016D
TOP5000	.75	.38	1.0	.020	.60	.475	.016D
TOP3000	.75	.52	1.0	.020	.60	.475	.016D

OPT Industries, Inc. 300 Red School Lane, Phillipsburg, NJ 08865 • Phone: (908)454-2600 • FAX: (908)454-3742
www.optind.com • E-mail: sales@optind.com • Faxback: 1-800-950-2892

UL/CSA Isolation Transformers (Low Leakage)

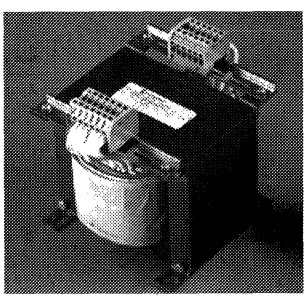
Designing for Export? We make it easy!

- *Available from stock.*
- *MasterCard/Visa accepted.*
- *Assembly services available.*
- *Special rates available for express shipments.*
- *Technical support available.*
- *Call and FAX toll free.*
- *No minimum order required.*
- *Low leakage transformers for medical applications available.*

Designing for international markets?

Panel Components Corporation imports and manufactures power components such as international cords, cordage, plugs and sockets, which are used by North American manufacturers who wish to market their products both domestically and overseas. These products are sourced or manufactured to comply with the standards and requirements of international safety testing agencies such as UL, CSA, VDE, SEMKO, etc. Panel Components' products are indicated by the **Interpower™** trademark.

Interpower™ UL/CSA/VDE Isolation Transformers



Interpower™ Transformers, Model #82520010, 82520020, 82520030, and 82520040

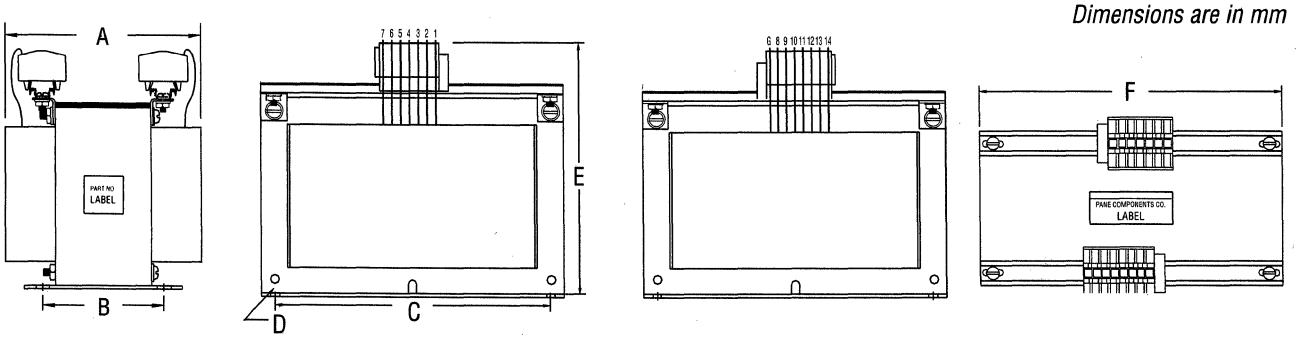
Interpower™ transformers are designed to make it easy for equipment manufacturers to adapt their products to work on power mains voltages common in foreign markets. The Interpower™ transformer family can be used in one of two ways: with North American equipment designed for shipment to 230 VAC markets or with equipment produced abroad for 230 VAC power mains and imported into North American markets.

It is important, however, to verify that all power system components can operate successfully at both 50 and 60 Hertz because foreign power mains are normally 50 Hertz systems. This is particularly important with motors, other transformers and solenoids. Please note that transformers do not change frequencies.

The Interpower™ transformers are intended for use on equipment in which the transformer can be mounted inside a protective enclosure. Interpower™ transformers are listed, certified and approved by UL, CSA and VDE for use in both information technology and medical applications. All transformers are designed for full rated use at either 50 or 60 Hertz.

Part No.	Volt-amps	DIMENSIONS						
		A	B	C	D	E	F	Weight
82520010R2	100VA	119.2	88.9	79.3	5.1 x 8.7 slot (4 places)	115.6	99.2	3.5 kg
82520020R2	500VA	133.3	79.3	134.9	7.9 x 14.2 slot (4 places)	170.0	161.9	10.1 kg
82520030R2	1000 VA	176.0	133.4	158.7	5.1 x 8.7 slot (4 places)	198.0	190.5	16.0 kg
82520040R2	2000VA	242.0	158.8	158.8	1.5 x 19 slot (4 places)	198.0	190.5	1574.8kg

Dimensions are in mm



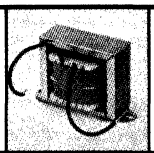
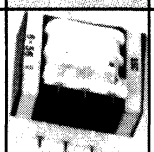
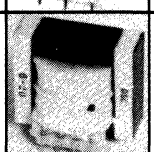
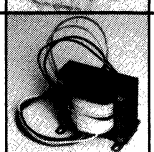
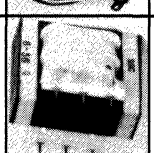
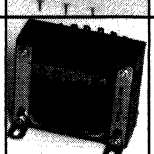
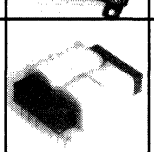
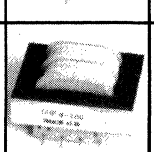
DESIGNING FOR EXPORT? WE MAKE IT EASY! See also EEM sections 2100 • 4050 • 4300 • 6000

PANEL COMPONENTS CORPORATION
featuring interpower products
P.O. Box 115, Oskaloosa, IA 52577
Phone: (515) 673-5000
FAX (515) 673-5100
E-mail: info@panelcomponents.com
TOLL-FREE (U.S., Can., V.I., P.R.):
Call toll-free (800) 409-0081
FAX toll-free (800) 409-0082
Internet: www.panelcomponents.com

PARA-LINE TRANSFORMER COMPANY, INC.

Over 3600 VARIOUS TYPES OF TRANSFORMERS

AVAILABLE FROM STOCK

SSA SERIES		Primary Voltages Available 115 & 230 VAC, 50/60 HZ. Single Center Tapped Secondaries. Lead Wires or Lugs-Secondary Voltages Ranging from 4 VCT to 230 VCT. Power Ranging from 2 VA to 60 VA.
SSC SERIES		Printed Circuit Types with Single Primary. Available 115 or 230 VAC, 50/60 HZ with Single Center Tapped Secondaries. Secondary Voltages from 4 to 230 VAC. Power Available from 0.5 to 20 VA.
CSC SERIES		Printed Circuit Types with Single Primary. Available 115 or 230 VAC, 50/60 HZ with Two Equal Secondaries. Secondary Voltages from 4 to 230 Total Series Volts. Power Available from 2 VA to 20 VA.
DSF SERIES		Lead Wires or Lugs with Dual 115 or 230 VAC Primaries, 50/60 HZ. Two Separate and Equal Secondaries. Total Secondary Volts in Series from 6.3 to 480 VAC. Power Available from 50 VA to 450 VA.
TTC SERIES		Telephone Couplers, Hybrids, and Holding Coils. Printed Circuit Types.
MSH SERIES		Dual Primaries for 115/230 VAC, 50/60 HZ Operation. Voltages from 6.3 to 480 VAC. Power from 50-450 VA. Multiple Secondary Types Including Designs for Microprocessor Supplies and Multiple-Tapped Control Types.
DLP SERIES		Low Profile Printed Circuit Types Dual Primaries for 115/230 VAC, 50/60 HZ Operation. Voltages from 6.3 to 230 VAC. Power from 5-50 VA.
MLP SERIES		Low Profile Printed Circuit Types with Multiple Dual 115 VAC Primaries and Secondary Outputs for Logic and OP AMP Supplies.
DHP SERIES		Printed Circuit Types-Compact Design. Single or Dual 115 VAC Primaries 50/60 HZ. Dual Identical Secondaries 5 to 230 VAC. Power from 5-80 VA.

FOR A FULL LINE CATALOGUE PLEASE CALL OR WRITE:

PARALINE
TRANSFORMER SPECIALISTS

511 South Palm Avenue
Alhambra, CA 91803
818-281-0222, FAX: 818-281-5867 or
online at www.paraline.com

PC TRANSFORMER CORP.

OUR SPECIALTY!
24 HOUR TURN AROUND TIME FOR CUSTOM PROTOTYPES

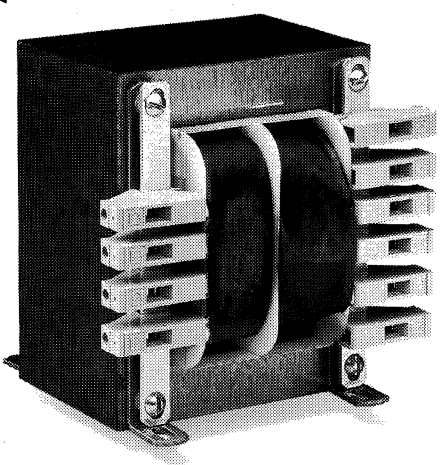
64D NANCY ST., WEST BABYLON, NY 11704 • TEL: (516) 491-3300 • FAX: (516) 491-3689 • E-MAIL: pcxfmr@juno.com

P.C. TRANSFORMER IS DEDICATED TO QUALITY PRODUCTS, COMPETITIVE PRICING AND ON-TIME DELIVERIES...

- *24 Hour Delivery For Custom Prototypes / Small Catalog Orders*
- *No Minimum Quantity / Billing Requirements*
- *Over 50 Years Of Transformer Design Expertise Available For Your Custom Requirements*
- *Design And Construction Standards Meet Or Exceed VDE, IEC, UL and CSA*
- *All Transfomers Are Tested 100% Prior To On-Time Delivery*
- *Our Transformers Are Manufactured In The USA*

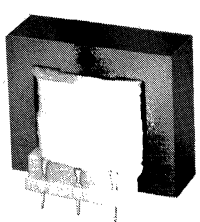
NEW

INTERNATIONAL POWER TRANSFORMER SERIES



Power Ratings:
250/500/1000/1500 VA

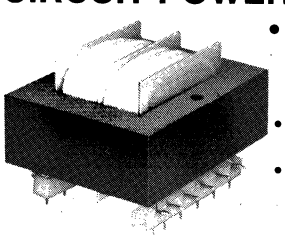
PLUG-IN PRINTED CIRCUIT AUDIO TRANSFORMERS



- **Designed and constructed to meet UL and CSA safety standards.**

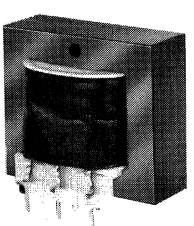
Designed for Input, Interstage, Output and Isolation Circuits. ±2db 200 Hz-15,000 Hz Frequency Response and 20dbm Power Rating for Entire Series.

LOW PROFILE SPLIT BOBBIN MICROPROCESSOR PRINTED CIRCUIT POWER TRANSFORMERS



- **Designed and constructed to meet UL and CSA safety standards.**
- Low profile – allows closer printed circuit board stacking
- Split bobbin construction – center flange insulation barrier provides 2500 VRMs Hipot – non concentric coil winding results in low inter-winding capacitance, eliminates need for electo-static shielding
- Class S (130°C) insulation system
- Single 115V and dual 115V/230V primaries are standard
- DC output combinations – ±12 and 5V or ±15 and 5V rated at the regulator output with allowance for line variations up to ±13%
- Packaging Flexibility

PLUG-IN PRINTED CIRCUIT TELEPHONE COUPLING TRANSFORMERS



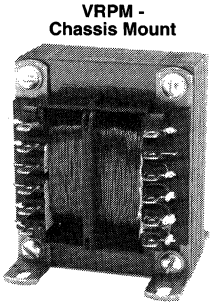
- **Designed and constructed to meet UL and CSA safety standards.**

Designed for Interconnection of Voice/Data Modem Terminals to Telephone Lines.

- Frequency response ±0.5dB 300Hz-3500Hz
- Power level -45dbm to +7dbm
- Longitudinal balance – per FCC Part 68
- Distortion – 0.5% max.
- Impedance matching ±10% over frequency range
- 1500 VRMS Dielectric strength

INTERNATIONAL SERIES DUAL BOBBIN MICROPROCESSOR TRANSFORMERS

VRPM - Chassis Mount



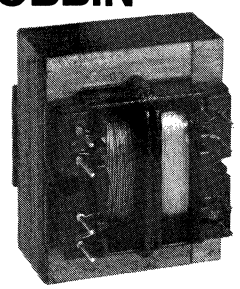
- **Designed to meet UL, VDE, IEC and CSA**
- Dual bobbin construction for low inter-winding capacitance. Eliminates need for electro-static shielding and provides 4000V Hipot.
- 130°C insulation system. Exceeds UL flammability requirement.
- Dual 115V/230V primaries are standard.
- DC output combinations ±12V and 5V and ±15V and 5V. Rated at regulator output.

PCT TRANSFORMER CORP.

64D NANCY ST., WEST BABYLON, NY 11704 • TEL: (516) 491-3300 • FAX: (516) 491-3689 • E-MAIL: pcxfmr@juno.com

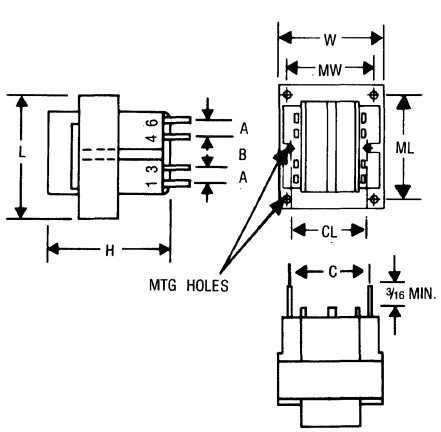
OUR SPECIALTY!
24 HOUR TURN AROUND TIME FOR CUSTOM PROTOTYPES

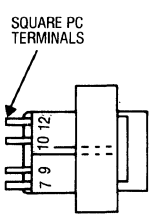
INTERNATIONAL SERIES LOW PROFILE DUAL BOBBIN PRINTED CIRCUIT POWER TRANSFORMERS

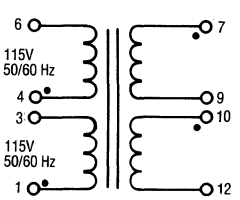


- **Designed to meet UL, VDE, IEC, CSA.**
- Dual bobbin construction with insulating shrouds—provides 4000V hipot and results in low interwinding capacitance, eliminating the need for electro-static shielding.
- 130°C insulating system—materials meet UL flammability requirements.
- Dual 115V/230V 50/60 HZ primaries.
- Dual secondaries for variety of utilization.
- Low cost.

Part No.	R.M.S. SECONDARY RATINGS			
	Series	Parallel	Size	VA
VPC3-10	10 VCT @ 0.25A	5 V @ 0.5 A	3	2.5
VPC3-12	12.6VCT @ 0.2 A	6.3V @ 0.4 A	3	2.5
VPC3-16	16 VCT @ 0.15A	8 V @ 0.3 A	3	2.5
VPC3-20	20 VCT @ 0.12A	10 V @ 0.24A	3	2.5
VPC3-24	24 VCT @ 0.1 A	12 V @ 0.2 A	3	2.5
VPC3-28	28 VCT @ 0.09A	14 V @ 0.18A	3	2.5
VPC3-36	36 VCT @ 0.07A	18 V @ 0.14A	3	2.5
VPC4-10	10 VCT @ 0.5 A	5 V @ 1.0 A	4	5.0
VPC4-12	12.6VCT @ 0.4 A	6.3V @ 0.8 A	4	5.0
VPC4-16	16 VCT @ 0.31A	8 V @ 0.62A	4	5.0
VPC4-20	20 VCT @ 0.25A	10 V @ 0.5 A	4	5.0
VPC4-24	24 VCT @ 0.21A	12 V @ 0.42A	4	5.0
VPC4-28	28 VCT @ 0.18A	14 V @ 0.36A	4	5.0
VPC4-36	36 VCT @ 0.14A	18 V @ 0.28A	4	5.0
VPC5-10	10 VCT @ 1.0 A	5 V @ 2.0 A	5	10.0
VPC5-12	12.6VCT @ 0.8 A	6.3V @ 1.6 A	5	10.0
VPC5-16	16 VCT @ 0.62A	8 V @ 1.25A	5	10.0
VPC5-20	20 VCT @ 0.5 A	10 V @ 1.0 A	5	10.0
VPC5-24	24 VCT @ 0.42A	12 V @ 0.84A	5	10.0
VPC5-28	28 VCT @ 0.36A	14 V @ 0.72A	5	10.0
VPC5-36	36 VCT @ 0.28A	18 V @ 0.56A	5	10.0
VPC6-10	10 VCT @ 2.0 A	5 V @ 4.0 A	6	20.0
VPC6-12	12.6VCT @ 1.6 A	6.3V @ 3.2 A	6	20.0
VPC6-16	16 VCT @ 1.25A	8 V @ 2.5 A	6	20.0
VPC6-20	20 VCT @ 1.0 A	10 V @ 2.0 A	6	20.0
VPC6-24	24 VCT @ .83A	12 V @ 1.66A	6	20.0
VPC6-28	28 VCT @ .72A	14 V @ 1.44A	6	20.0
VPC6-36	36 VCT @ .56A	18 V @ 1.12A	6	20.0
VPC7-10	10 VCT @ 3.0 A	5 V @ 6.0 A	7	30.0
VPC7-12	12.6VCT @ 2.4 A	6.3V @ 4.8 A	7	30.0
VPC7-16	16 VCT @ 1.9 A	8 V @ 3.8 A	7	30.0
VPC7-20	20 VCT @ 1.5 A	10 V @ 3.0 A	7	30.0
VPC7-24	24 VCT @ 1.25A	12 V @ 2.5 A	7	30.0
VPC7-28	28 VCT @ 1.06A	14 V @ 2.12A	7	30.0
VPC7-36	36 VCT @ .82A	18 V @ 1.64A	7	30.0
VPC8-10	10 VCT @ 5.6 A	5 V @ 11.2 A	8	56.0
VPC8-12	12.6VCT @ 4.4 A	6.3V @ 8.8 A	8	56.0
VPC8-16	16 VCT @ 3.5 A	8 V @ 7.0 A	8	56.0
VPC8-20	20 VCT @ 2.8 A	10 V @ 5.6 A	8	56.0
VPC8-24	24 VCT @ 2.33A	12 V @ 4.66A	8	56.0
VPC8-28	28 VCT @ 2.0 A	14 V @ 4.0 A	8	56.0
VPC8-36	36 VCT @ 1.56A	18 V @ 3.12A	8	56.0





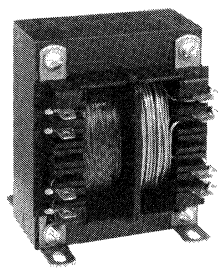


SIZE	VA	L	W	H	A	B	C	PIN	MTG CL	MTG MW	MTG ML	MTG Screw	WT. lbs.
3	2.5	1 5/8	1 5/16	1 1/8	.200	.250	1.000	.025SQ	1 1/16	—	—	#4	0.25
4	5.0	1 5/8	1 5/16	1 3/8	.200	.400	1.000	.025SQ	1 1/16	—	—	#4	0.37
5	10.0	1 7/8	1 9/16	1 3/8	.200	.400	1.140	.038SQ	1 1/4	—	—	#4	0.53
6	20.0	2 1/4	1 7/8	1 5/8	.400	.400	1.460	.038SQ	1 1/2	—	—	#4	0.90
7	30.0	2 5/8	2 3/16	1 9/16	.550	.275	1.680	.045SQ	—	1 3/4	2 3/16	#6	1.15
8	56.0	3	2 1/2	1 13/16	.600	.300	1.900	.045SQ	—	2	2 1/2	#6	1.70

PCT TRANSFORMER CORP.
64D NANCY ST., WEST BABYLON, NY 11704 • TEL: (516) 491-3300 • FAX: (516) 491-3689 • E-MAIL: pcxfmr@juno.com

OUR SPECIALTY!
24 HOUR TURN AROUND TIME FOR CUSTOM PROTOTYPES

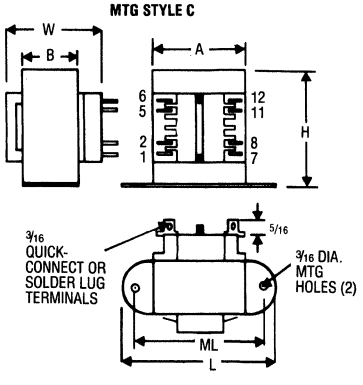
INTERNATIONAL SERIES CHASSIS MOUNT TYPE DUAL BOBBIN POWER TRANSFORMERS



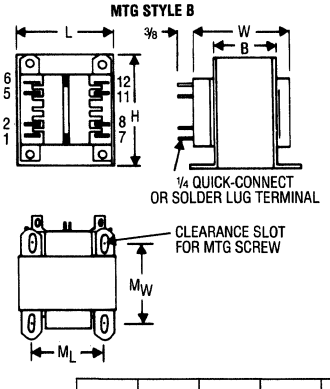
- **Designed to meet UL, VDE, IEC, CSA.**
- Dual bobbin construction with insulating shrouds—provides 4000V hipot and results in low interwinding capacitance eliminating the need for electro-static shielding.
- 130°C insulating system—materials meet UL flammability requirements.
- Dual 115V/230V 50/60 HZ primaries.
- Dual secondaries for variety of utilization.
- Low cost.

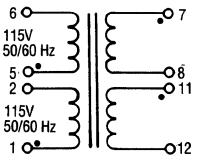
Part No.	R.M.S. SECONDARY RATINGS			
	Series	Parallel	Size	VA
VRP6-10	10 VCT @ 2.5 A	5 V @ 5.0 A	6	25
VRP6-12	12.6VCT @ 2.0 A	6.3V @ 4.0 A	6	25
VRP6-16	16 VCT @ 1.6 A	8 V @ 3.2 A	6	25
VRP6-20	20 VCT @ 1.25A	10 V @ 2.5 A	6	25
VRP6-24	24 VCT @ 1.0 A	12 V @ 2.0 A	6	25
VRP6-28	28 VCT @ 0.9 A	14 V @ 1.8 A	6	25
VRP6-36	36 VCT @ 0.7 A	18 V @ 1.4 A	6	25
VRP6-230	230 VCT @ 0.11A	115 V @ 0.22A	6	25
VRP7-10	10 VCT @ 4.3 A	5 V @ 8.6 A	7	43
VRP7-12	12.6VCT @ 3.4 A	6.3V @ 6.8 A	7	43
VRP7-16	16 VCT @ 2.7 A	8 V @ 5.4 A	7	43
VRP7-20	20 VCT @ 2.2 A	10 V @ 4.4 A	7	43
VRP7-24	24 VCT @ 1.8 A	12 V @ 3.6 A	7	43
VRP7-28	28 VCT @ 1.5 A	14 V @ 3.0 A	7	43
VRP7-36	36 VCT @ 1.2 A	18 V @ 2.4 A	7	43
VRP7-230	230 VCT @ 0.19A	115 V @ 0.38A	7	43
VRP8-10	10 VCT @ 8.0 A	5 V @ 16.0 A	8	80
VRP8-12	12.6VCT @ 6.3 A	6.3V @ 12.6 A	8	80
VRP8-16	16 VCT @ 5.0 A	8 V @ 10.0 A	8	80
VRP8-20	20 VCT @ 4.0 A	10 V @ 8.0 A	8	80
VRP8-24	24 VCT @ 3.3 A	12 V @ 6.6 A	8	80
VRP8-28	28 VCT @ 2.8 A	14 V @ 5.6 A	8	80
VRP8-36	36 VCT @ 2.2 A	18 V @ 4.4 A	8	80
VRP8-230	230 VCT @ 0.35A	115 V @ 0.7 A	8	80
VRP9-10	10 VCT @ 13.0 A	5 V @ 26.0 A	9	130
VRP9-12	12.6VCT @ 10.3 A	6.3V @ 20.6 A	9	130
VRP9-16	16 VCT @ 8.1 A	8 V @ 16.2 A	9	130
VRP9-20	20 VCT @ 6.5 A	10 V @ 13.0 A	9	130
VRP9-24	24 VCT @ 5.4 A	12 V @ 10.8 A	9	130
VRP9-28	28 VCT @ 4.6 A	14 V @ 9.2 A	9	130
VRP9-36	36 VCT @ 3.6 A	18 V @ 7.2 A	9	130
VRP9-230	230 VCT @ 0.57A	115 V @ 1.14A	9	130
VRP10-16	16 VCT @ 11.0 A	8 V @ 22.0 A	10	175
VRP10-20	20 VCT @ 8.8 A	10 V @ 17.6 A	10	175
VRP10-24	24 VCT @ 7.3 A	12 V @ 14.6 A	10	175
VRP10-28	28 VCT @ 6.25A	14 V @ 12.5 A	10	175
VRP10-36	36 VCT @ 4.8 A	18 V @ 9.6 A	10	175
VRP10-230	230 VCT @ 0.76A	115 V @ 1.52A	10	175

MTG STYLE C



MTG STYLE B





SIZE	VA	L	W	H	A	B	MTG Style	MTG ML	MTG MW	MTG Screw	WT. lbs.
6	25	2 13/16	1 7/8	2 5/16	2	1 1/8	C	2 3/8	—	#6	1.25
7	43	3 1/8	2 1/16	2 11/16	2 1/4	1 1/8	C	2 13/16	—	#6	1.60
8	80	3 9/16	2 3/8	3 1/16	2 5/8	1 5/16	B	2	2 1/4	#6	2.60
9	130	2 13/16	2 7/8	3 3/8	—	1 5/8	B	2 1/4	2 1/2	#8	4.10
10	175	3 1/8	2 7/8	3 3/4	—	1 5/8	B	2 1/2	2 1/2	#8	6.50

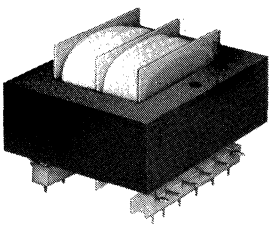
PCT TRANSFORMER CORP.

OUR SPECIALTY!
24 HOUR TURN AROUND TIME
FOR CUSTOM PROTOTYPES

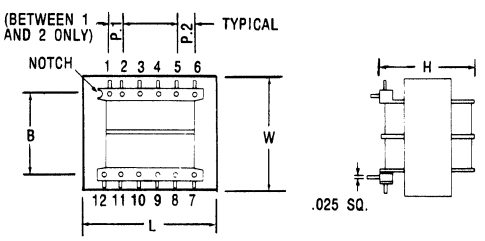
64D NANCY ST., WEST BABYLON, NY 11704 • TEL: (516) 491-3300 • FAX: (516) 491-3689 • E-MAIL: pcxfmr@juno.com

LOW PROFILE SPLIT BOBBIN PRINTED CIRCUIT POWER TRANSFORMERS

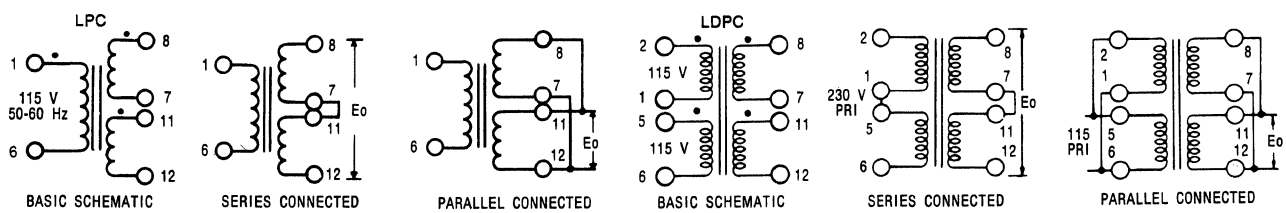
- **Designed and constructed to meet UL and CSA safety standards.**
- Low profile – allows closer printed circuit board stacking
- Split bobbin construction – center flange insulation barrier provides 2500 VRMs Hipot – non concentric coil winding results in low interwinding capacitance, eliminates need for electo-static shielding.
- Class S (130°C) insulation system
- Single 115V and dual 115V/230V primaries are standard.
- Dual secondaries for variety of utilization
- 12 pin bobbin design increases available options for multi-winding special orders
- Low regulation



PRIMARY 50/60HZ		R.M.S. SECONDARY RATINGS			
Single 115V	Dual 115V/230V	Series	Parallel	SIZE	VA
LPC3- 12	LDPC3- 12	12.6VCT @ 105MA	6.3V @ 210MA	3	1.25
LPC3- 16	LDPC3- 16	16 VCT @ 80MA	8 V @ 160MA	3	1.25
LPC3- 20	LDPC3- 20	20 VCT @ 65MA	10 V @ 130MA	3	1.25
LPC3- 24	LDPC3- 24	24 VCT @ 55MA	12 V @ 110MA	3	1.25
LPC3- 34	LDPC3- 34	34 VCT @ 35MA	17 V @ 70MA	3	1.25
LPC3- 40	LDPC3- 40	40 VCT @ 30MA	20 V @ 60MA	3	1.25
LPC3- 56	LDPC3- 56	56 VCT @ 20MA	28 V @ 40MA	3	1.25
LPC3-120	LDPC3-120	120 VCT @ 10MA	60 V @ 20MA	3	1.25
LPC4- 12	LDPC4- 12	12.6VCT @ 360MA	6.3V @ 720MA	4	4.50
LPC4- 16	LDPC4- 16	16 VCT @ 280MA	8 V @ 560MA	4	4.50
LPC4- 20	LDPC4- 20	20 VCT @ 225MA	10 V @ 450MA	4	4.50
LPC4- 24	LDPC4- 24	24 VCT @ 185MA	12 V @ 370MA	4	4.50
LPC4- 34	LDPC4- 34	34 VCT @ 130MA	17 V @ 260MA	4	4.50
LPC4- 40	LDPC4- 40	40 VCT @ 110MA	20 V @ 220MA	4	4.50
LPC4- 56	LDPC4- 56	56 VCT @ 80MA	28 V @ 160MA	4	4.50
LPC4-120	LDPC4-120	120 VCT @ 40MA	60 V @ 80MA	4	4.50
LPC5- 12	LDPC5- 12	12.6VCT @ 795MA	6.3V @ 1.59A	5	10.0
LPC5- 16	LDPC5- 16	16 VCT @ 625MA	8 V @ 1.25A	5	10.0
LPC5- 20	LDPC5- 20	20 VCT @ 500MA	10 V @ 1.00A	5	10.0
LPC5- 24	LDPC5- 24	24 VCT @ 415MA	12 V @ 930MA	5	10.0
LPC5- 34	LDPC5- 34	34 VCT @ 295MA	17 V @ 590MA	5	10.0
LPC5- 40	LDPC5- 40	40 VCT @ 250MA	20 V @ 500MA	5	10.0
LPC5- 56	LDPC5- 56	56 VCT @ 180MA	28 V @ 360MA	5	10.0
LPC5-120	LDPC5-120	120 VCT @ 85MA	60 V @ 170MA	5	10.0
LPC6- 12	LDPC6- 12	12.6VCT @ 1.9A	6.3V @ 3.8A	6	24.0
LPC6- 16	LDPC6- 16	16 VCT @ 1.5A	8 V @ 3.0A	6	24.0
LPC6- 20	LDPC6- 20	20 VCT @ 1.2A	10 V @ 2.4A	6	24.0
LPC6- 24	LDPC6- 24	24 VCT @ 1.0A	12 V @ 2.0A	6	24.0
LPC6- 34	LDPC6- 34	34 VCT @ 705MA	17 V @ 1.4A	6	24.0
LPC6- 40	LDPC6- 40	40 VCT @ 600MA	20 V @ 1.2A	6	24.0
LPC6- 56	LDPC6- 56	56 VCT @ 430MA	28 V @ 860MA	6	24.0
LPC6-120	LDPC6-120	120 VCT @ 200MA	60 V @ 400MA	6	24.0



LPC, LDPC SIZE	VA	L″	W″	H″	P-1	P-2	B	WT. (oz.)
3	1.25	1⅜	1⅝	1¼	.150	.200	.862	3
4	4.50	1⅝	1⅜	1¾	.200	.250	.950	5
5	10.0	1⅞	1⅝	1¾	.200	.300	1.100	9
6	24.0	2¼		1⅝	.200	.300	1.300	14

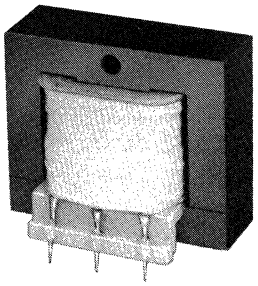


PCT TRANSFORMER CORP.

OUR SPECIALTY!
24 HOUR TURN AROUND TIME
FOR CUSTOM PROTOTYPES

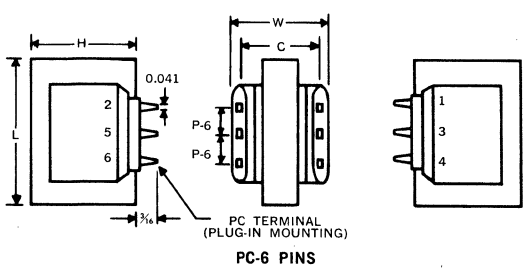
64D NANCY ST., WEST BABYLON, NY 11704 • TEL: (516) 491-3300 • FAX: (516) 491-3689 • E-MAIL: pcxfmr@juno.com

PLUG-IN PRINTED CIRCUIT POWER TRANSFORMERS

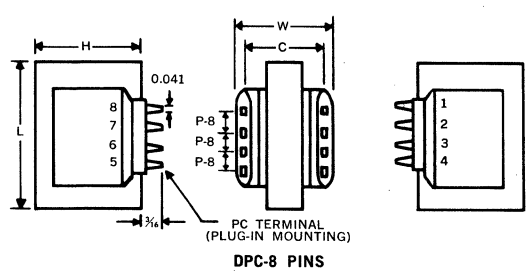


- **Designed and constructed to meet UL and CSA safety standards.**
- Packaging flexibility
- Miniaturized construction
- Precision spaced molded-in terminals
- 105°C insulation system
- 1500V Hipot
- Low regulation
- Single 115V and dual 115V/230V primaries are standard
- Dual secondaries for variety of utilization

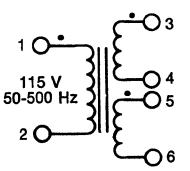
PRIMARY 50/400HZ		R.M.S. SECONDARY RATINGS			
Single 115V	Dual 115V/230V	Series	Parallel	SIZE	VA
PC2- 12	DPC2- 12	12.6VCT @ 70MA	6.3V @ 140MA	2	1.0
PC2- 16	DPC2- 16	16 VCT @ 55MA	8 V @ 110MA	2	1.0
PC2- 20	DPC2- 20	20 VCT @ 45MA	10 V @ 90MA	2	1.0
PC2- 24	DPC2- 24	24 VCT @ 35MA	12 V @ 70MA	2	1.0
PC2- 34	DPC2- 34	34 VCT @ 25MA	17 V @ 50MA	2	1.0
PC2- 40	DPC2- 40	40 VCT @ 20MA	20 V @ 40 MA	2	1.0
PC2- 56	DPC2- 56	56 VCT @ 15MA	28 V @ 30MA	2	1.0
PC3- 12	DPC3- 12	12.6VCT @ 105MA	6.3V @ 210MA	3	1.25
PC3- 16	DPC3- 16	16 VCT @ 80MA	8 V @ 160MA	3	1.25
PC3- 20	DPC3- 20	20 VCT @ 65MA	10 V @ 130MA	3	1.25
PC3- 24	DPC3- 24	24 VCT @ 55MA	12 V @ 110MA	3	1.25
PC3- 34	DPC3- 34	34 VCT @ 35MA	17 V @ 70MA	3	1.25
PC3- 40	DPC3- 40	40 VCT @ 30MA	20 V @ 60MA	3	1.25
PC3- 56	DPC3- 56	56 VCT @ 20MA	28 V @ 40MA	3	1.25
PC3-120	DPC3-120	120 VCT @ 10MA	60 V @ 20MA	3	1.25
PC4- 12	DPC4- 12	12.6VCT @ 360MA	6.3V @ 720MA	4	4.50
PC4- 16	DPC4- 16	16 VCT @ 280MA	8 V @ 560MA	4	4.50
PC4- 20	DPC4- 20	20 VCT @ 225MA	10 V @ 450MA	4	4.50
PC4- 24	DPC4- 24	24 VCT @ 185MA	12 V @ 370MA	4	4.50
PC4- 34	DPC4- 34	34 VCT @ 130MA	17 V @ 260MA	4	4.50
PC4- 40	DPC4- 40	40 VCT @ 110MA	20 V @ 220MA	4	4.50
PC4- 56	DPC4- 56	56 VCT @ 80MA	28 V @ 160MA	4	4.50
PC4-120	DPC4-120	120 VCT @ 40MA	60 V @ 80MA	4	4.50
PC5- 12	DPC5- 12	12.6VCT @ 795MA	6.3V @ 1.59A	5	10.0
PC5- 16	DPC5- 16	16 VCT @ 625MA	8 V @ 1.25A	5	10.0
PC5- 20	DPC5- 20	20 VCT @ 500MA	10 V @ 1.00A	5	10.0
PC5- 24	DPC5- 24	24 VCT @ 415MA	12 V @ 930MA	5	10.0
PC5- 34	DPC5- 34	34 VCT @ 295MA	17 V @ 590MA	5	10.0
PC5- 40	DPC5- 40	40 VCT @ 250MA	20 V @ 500MA	5	10.0
PC5- 56	DPC5- 56	56 VCT @ 180MA	28 V @ 360MA	5	10.0
PC5-120	DPC5-120	120 VCT @ 85MA	60 V @ 170MA	5	10.0
PC6- 12	DPC6- 12	12.6VCT @ 1.9A	6.3V @ 3.8A	6	24.0
PC6- 16	DPC6- 16	16 VCT @ 1.5A	8 V @ 3.0A	6	24.0
PC6- 20	DPC6- 20	20 VCT @ 1.2A	10 V @ 2.4A	6	24.0
PC6- 24	DPC6- 24	24 VCT @ 1.0A	12 V @ 2.0A	6	24.0
PC6- 34	DPC6- 34	34 VCT @ 705MA	17 V @ 1.4A	6	24.0
PC6- 40	DPC6- 40	40 VCT @ 600MA	20 V @ 1.2A	6	24.0
PC6- 56	DPC6- 56	56 VCT @ 430MA	28 V @ 860MA	6	24.0
PC6-120	DPC6-120	120 VCT @ 200MA	60 V @ 400MA	6	24.0



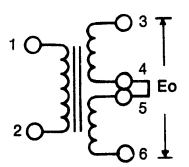
PC-6 PINS



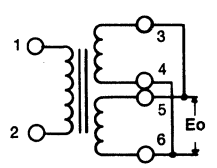
DPC-8 PINS



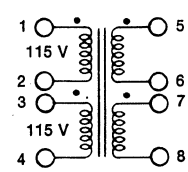
BASIC SCHEMATIC



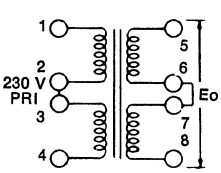
SERIES CONNECTED



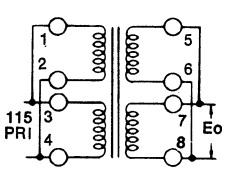
PARALLEL CONNECTED



BASIC SCHEMATIC



SERIES CONNECTED



PARALLEL CONNECTED

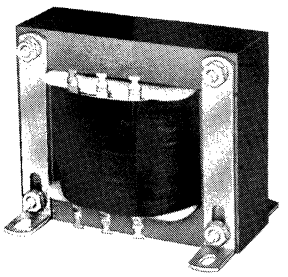
SIZE	VA	L	W	H	P-5 PIN	P-8 PIN	C	WT. (oz.)
2	1.0	1	1⅜	0.83	.250	.200	1.200	2.5
3	1.25	1⅜	1⅛	1⅜₁₆	.312	.200	1.000	3
4	4.50	1⅝	1¼	1⅜	.400	.250	1.100	5
5	10.0	1⅞	1⅞₁₆	1⅝	.400	.250	1.300	9
6	24.0	1⅝	2¼	1⅜	.400	.250	2.100	12

PCT TRANSFORMER CORP.

OUR SPECIALTY!
24 HOUR TURN AROUND TIME
FOR CUSTOM PROTOTYPES

64D NANCY ST., WEST BABYLON, NY 11704 • TEL: (516) 491-3300 • FAX: (516) 491-3689 • E-MAIL: pcxfmr@juno.com

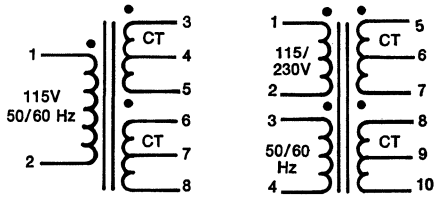
RECTIFIER POWER TRANSFORMERS



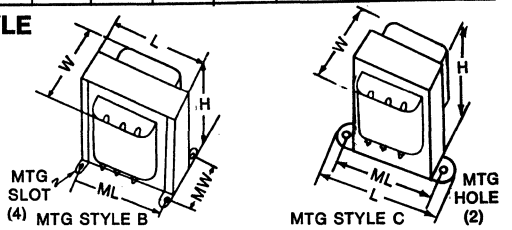
- **Designed and constructed to meet UL and CSA safety standards.**
- Single 115V or dual 115V/230V – 50/60 Hz primaries.
- (2) center tapped secondaries provide variety of utilization.
- 1500 VRMS hipot.
- Class 130°C insulation system.
- Rugged construction – only prime raw materials are used.
- Secondary voltage and currents are R.M.S. and are designed for a wide range of rectifier power circuit applications. Our Engineering/Applications staff can assist you with selecting the unit that best suits your rectifier circuit requirements. Custom design and construction is available for your special requirements.

PRIMARY 50/60 Hz		R.M.S. SECONDARY RATINGS		Mtg.							Approx.
Single 115V	Dual 115V/230V	Series	Parallel	Style	L	W	H	ML	MW	Mtg. Screw	Wt.
RP10- 1	DRP10- 1	10 VCT @ 1A	5 VCT @ 2A	C	2 13/16	1 1/2	1 5/8	2 3/8	—	# 8	.6
RP10- 2	DRP10- 2	10 VCT @ 2A	5 VCT @ 4A	C	3 1/4	1 3/4	1 15/16	2 13/16	—	# 8	1.0
RP10- 4	DRP10- 4	10 VCT @ 4A	5 VCT @ 8A	C	3 11/16	2	2 1/4	3 1/8	—	# 8	1.5
RP10- 6	DRP10- 6	10 VCT @ 6A	5 VCT @ 12A	C	3 11/16	2 1/8	2 1/4	3 1/8	—	# 8	1.7
RP10- 8	DRP10- 8	10 VCT @ 8A	5 VCT @ 16A	C	4 1/32	2 1/4	2 5/16	3 5/16	—	# 8	2.3
RP10-10	DRP10-10	10 VCT @ 10A	5 VCT @ 20A	C	4 1/32	2 1/2	2 5/16	3 5/16	—	# 8	2.8
RP10-12	DRP10-12	10 VCT @ 12A	5 VCT @ 24A	C	4 1/2	2 1/2	2 7/8	4	—	# 8	3.0
RP12.8- 1	DRP12.8- 1	12.8 VCT @ 1A	6.4 VCT @ 2A	C	2 13/16	1 5/8	1 5/8	2 3/8	—	# 8	.7
RP12.8- 2	DRP12.8- 2	12.8 VCT @ 2A	6.4 VCT @ 4A	C	3 1/4	2	1 15/16	2 13/16	—	# 8	1.1
RP12.8- 4	DRP12.8- 4	12.8 VCT @ 4A	6.4 VCT @ 8A	C	3 11/16	2 1/8	2 1/4	3 1/8	—	# 8	1.7
RP12.8- 6	DRP12.8- 6	12.8 VCT @ 6A	6.4 VCT @ 12A	C	4 1/32	2 1/4	2 5/16	3 5/16	—	# 8	2.3
RP12.8- 8	DRP12.8- 8	12.8 VCT @ 8A	6.4 VCT @ 16A	C	4 1/32	2 1/2	2 5/16	3 5/16	—	# 8	2.8
RP12.8-10	DRP12.8-10	12.8 VCT @ 10A	6.4 VCT @ 20A	C	4 1/2	2 1/2	2 7/8	4	—	# 8	3.0
RP12.8-12	DRP12.8-12	12.8 VCT @ 12A	6.4 VCT @ 24A	B	3 3/4	2 3/4	3 1/8	3 1/8	2 1/4	# 8	4.5
RP16- 1	DRP16- 1	16 VCT @ 1A	8 VCT @ 2A	C	3 1/4	1 3/4	1 15/16	2 13/16	—	# 8	1.0
RP16- 2	DRP16- 2	16 VCT @ 2A	8 VCT @ 4A	C	3 11/16	2	2 1/4	3 1/8	—	# 8	1.5
RP16- 4	DRP16- 4	16 VCT @ 4A	8 VCT @ 8A	C	4 1/32	2 1/4	2 5/16	3 5/16	—	# 8	2.3
RP16- 6	DRP16- 6	16 VCT @ 6A	8 VCT @ 12A	C	4 1/32	2 1/2	2 5/16	3 5/16	—	# 8	2.8
RP16- 8	DRP16- 8	16 VCT @ 8A	8 VCT @ 16A	C	4 1/2	2 1/2	2 7/8	4	—	# 8	3.0
RP16-10	DRP16-10	16 VCT @ 10A	8 VCT @ 20A	B	3 3/4	2 3/4	3 1/8	3 1/8	2 1/4	# 8	4.5
RP16-12	DRP16-12	16 VCT @ 12A	8 VCT @ 24A	B	4 1/8	3	3 5/16	3 5/16	2 3/8	#10	5.5
RP24- 1	DRP24- 1	24 VCT @ 1A	12 VCT @ 2A	C	3 1/4	1 3/4	1 15/16	2 13/16	—	# 8	1.0
RP24- 2	DRP24- 2	24 VCT @ 2A	12 VCT @ 4A	C	3 11/16	2 1/8	2 1/4	3 1/8	—	# 8	1.7
RP24- 4	DRP24- 4	24 VCT @ 4A	12 VCT @ 8A	C	4 1/32	2 1/2	2 5/16	3 5/16	—	# 8	2.8
RP24- 6	DRP24- 6	24 VCT @ 6A	12 VCT @ 12A	B	3 3/4	2 3/4	3 1/8	3 1/8	2 1/4	# 8	4.5
RP24- 8	DRP24- 8	24 VCT @ 8A	12 VCT @ 16A	B	4 1/8	3	3 5/16	3 5/16	2 3/8	#10	5.5
RP24-10	DRP24-10	24 VCT @ 10A	12 VCT @ 20A	B	4 1/2	3 1/4	3 3/4	3 3/4	2 1/2	#10	7.0
RP24-12	DRP24-12	24 VCT @ 12A	12 VCT @ 24A	B	4 1/2	3 1/2	3 3/4	3 3/4	2 3/4	#10	8.7
RP36- 1	DRP36- 1	36 VCT @ 1A	18 VCT @ 2A	C	3 11/16	2	2 1/4	3 1/8	—	# 8	1.5
RP36- 2	DRP36- 2	36 VCT @ 2A	18 VCT @ 4A	C	4 1/32	2 1/4	2 5/16	3 5/16	—	# 8	2.3
RP36- 4	DRP36- 4	36 VCT @ 4A	18 VCT @ 8A	B	3 3/4	2 3/4	3 1/8	3 1/8	2 1/4	# 8	4.5
RP36- 6	DRP36- 6	36 VCT @ 6A	18 VCT @ 12A	B	4 1/8	3	3 5/16	3 5/16	2 3/8	#10	5.5
RP36- 8	DRP36- 8	36 VCT @ 8A	18 VCT @ 16A	B	4 1/2	3 1/2	3 3/4	3 3/4	2 3/4	#10	8.7
RP36-10	DRP36-10	36 VCT @ 10A	18 VCT @ 20A	B	4 1/2	3 3/4	3 3/4	3 3/4	3	#10	9.4
RP36-12	DRP36-12	36 VCT @ 12A	18 VCT @ 24A	B	5 1/4	4	4 3/8	4 3/8	2 7/8	1/4	12.3
RP56- 1	DRP56- 1	56 VCT @ 1A	28 VCT @ 2A	C	3 11/16	2 1/8	2 1/4	3 1/8	—	# 8	1.7
RP56- 2	DRP56- 2	56 VCT @ 2A	28 VCT @ 4A	C	4 1/2	2 1/2	2 7/8	4	—	# 8	3.0
RP56- 4	DRP56- 4	56 VCT @ 4A	28 VCT @ 8A	B	4 1/8	3	3 5/16	3 5/16	2 3/8	#10	5.5
RP56- 6	DRP56- 6	56 VCT @ 6A	28 VCT @ 12A	B	4 1/2	3 3/4	3 3/4	3 3/4	3	#10	9.4
RP56- 8	DRP56- 8	56 VCT @ 8A	28 VCT @ 16A	B	5 1/4	4	4 3/8	4 3/8	2 7/8	1/4	12.3
RP56-10	DRP56-10	56 VCT @ 10A	28 VCT @ 20A	B	5 1/4	4 1/4	4 3/8	4 3/8	3 1/8	1/4	13.4
RP56-12	DRP56-12	56 VCT @ 12A	28 VCT @ 24A	B	5 1/4	4 3/4	4 3/8	4 3/8	3 5/8	1/4	15.8
RP68- 1	DRP68- 1	68 VCT @ 1A	34 VCT @ 2A	C	4 1/32	2 1/4	2 5/16	3 5/16	—	# 8	2.3
RP68- 2	DRP68- 2	68 VCT @ 2A	34 VCT @ 4A	B	3 3/4	2 3/4	3 1/8	3 1/8	2 1/4	# 8	4.5
RP68- 4	DRP68- 4	68 VCT @ 4A	34 VCT @ 8A	B	4 1/2	3 1/2	3 3/4	3 3/4	2 3/4	#10	8.7
RP68- 6	DRP68- 6	68 VCT @ 6A	34 VCT @ 12A	B	5 1/4	4	4 3/8	4 3/8	2 7/8	1/4	12.3
RP68- 8	DRP68- 8	68 VCT @ 8A	34 VCT @ 16A	B	5 1/4	4 1/4	4 3/8	4 3/8	3 1/8	1/4	13.4
RP68-10	DRP68-10	68 VCT @ 10A	34 VCT @ 20A	B	5 1/4	4 3/4	4 3/8	4 3/8	3 5/8	1/4	15.8
RP68-12	DRP68-12	68 VCT @ 12A	34 VCT @ 24A	B	6 3/8	5 1/4	5 5/16	5 5/16	3 1/4	1/4	21.0
RP80- 1	DRP80- 1	80 VCT @ 1A	40 VCT @ 2A	C	4 1/32	2 1/4	2 5/16	3 5/16	—	# 8	2.3
RP80- 2	DRP80- 2	80 VCT @ 2A	40 VCT @ 4A	B	3 3/4	2 3/4	3 1/8	3 1/8	2 1/4	# 8	4.5
RP80- 4	DRP80- 4	80 VCT @ 4A	40 VCT @ 8A	B	4 1/2	3 3/4	3 3/4	3 3/4	3	#10	9.4
RP80- 6	DRP80- 6	80 VCT @ 6A	40 VCT @ 12A	B	5 1/4	4	4 3/8	4 3/8	2 7/8	1/4	12.3
RP80- 8	DRP80- 8	80 VCT @ 8A	40 VCT @ 16A	B	5 1/4	4 3/4	4 3/8	4 3/8	3 5/8	1/4	15.8
RP80-10	DRP80-10	80 VCT @ 10A	40 VCT @ 20A	B	6 3/8	5 1/4	5 5/16	5 5/16	3 1/4	1/4	21.0
RP80-12	DRP80-12	80 VCT @ 12A	40 VCT @ 24A	B	6 3/8	5 1/4	5 5/16	5 5/16	3 1/4	1/4	21.0

SCHEMATIC



MTG. STYLE



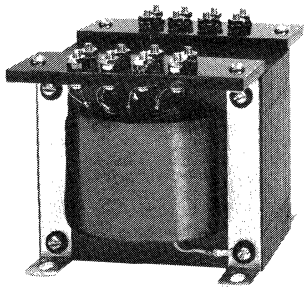
PCT TRANSFORMER CORP.

OUR SPECIALTY!
24 HOUR TURN AROUND TIME
FOR CUSTOM PROTOTYPES

64D NANCY ST., WEST BABYLON, NY 11704 • TEL: (516) 491-3300 • FAX: (516) 491-3689 • E-MAIL: pcxfmr@juno.com

ISOLATION POWER TRANSFORMERS STEP-UP/STEP-DOWN VARIABLE VOLTAGE RATINGS

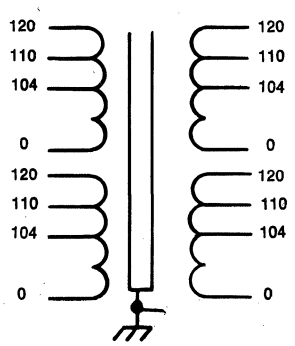
- **Designed and constructed to meet UL and CSA safety standards.**
- The IPS Series features (4) identical windings; (2) primaries and (2) secondaries; each rated at 0/104/110/120 volts allowing for rating combinations of 104V, 110V, 120V, 208V, 214V, 220V and 240V with primary and secondary isolated from each other. Step-down of 440V to 220V or step-up of 220V to 440V can be achieved by inter-connecting primaries and secondaries in an Auto-Transformer configuration. This eliminates isolation but a doubling of the power rating can be realized.
- The DIPS series is similar to the IPS series except the dual secondaries are each rated 0/208/220/240 volts.
- 50 Hz to 500 Hz operating frequency range.
- Electrostatically shielded with shield grounded to the core. This connection can be opened for floating shield.
- ¼ inch thick phenolic terminal boards with nickel plated brass hardware (#10-32 on 250 VA and 500 VA; ¼-20 on 1000 VA and 2000 VA). Voltage rating can be varied with easy to make interconnections.
- Completely varnish impregnated and ruggedly constructed with prime raw materials.
- Well insulated and designed to withstand 2500 VRMS hipot.
- 55°C temperature rise above ambient



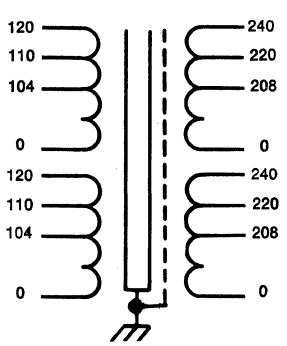
Part No.	Power Volt-Amps	Secondary Ratings				Mechanical Dimensions					Mtg. & Term. Screw	Approx. Wt. (lbs.)
		Series Volts	Max. Amps	Parallel Volts	Max. Amps	L	W	H	ML	MW		
IPS-250	250	0/208/220/240	1.1	0/104/110/120	2.2	5 5/16	4 1/4	5 1/4	4 3/8	2 1/2	#10	12
IPS-500	500	0/208/220/240	2.3	0/104/110/120	4.6	5 5/16	5 5/16	5 1/4	4 3/8	3 5/8	#10	18
IPS-1000	1000	0/208/220/240	4.5	0/104/110/120	9.0	7 7/16	7	7 3/8	6 3/4	3 1/8	1/4	33
IPS-2000	2000	0/208/220/240	9.0	0/104/110/120	18.0	7 7/16	9	7 3/8	6 3/4	5 1/8	1/4	56
DIPS-250	250	0/416/440/480	0.55	0/208/220/240	1.1	5 5/16	4 1/4	5 1/4	4 3/8	2 1/2	#10	12
DIPS-500	500	0/416/440/480	1.15	0/208/220/240	2.3	5 5/16	5 5/16	5 1/4	4 3/8	3 5/8	#10	18
DIPS-1000	1000	0/416/440/480	2.25	0/208/220/240	4.5	7 7/16	7	7 3/8	6 3/4	3 1/8	1/4	33
DIPS-2000	2000	0/416/440/480	4.50	0/208/220/240	9.0	7 7/16	9	7 3/8	6 3/4	5 1/8	1/4	56

SCHEMATIC DIAGRAMS

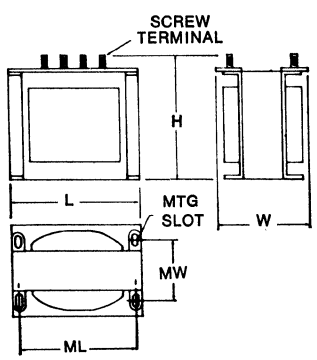
IPS SCHEMATIC



DIPS SCHEMATIC



MECHANICAL OUTLINE

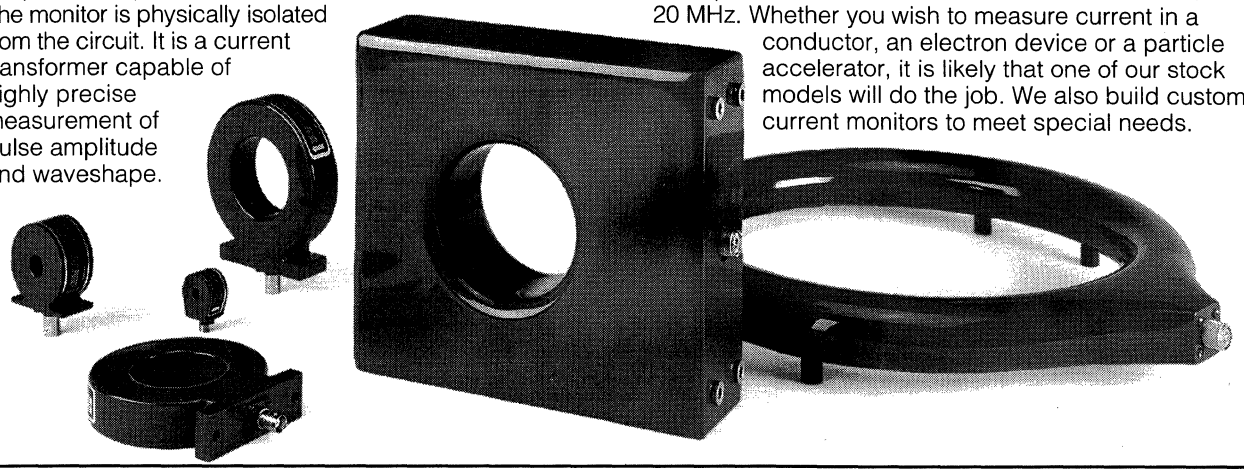


PEARSON ELECTRONICS, INC.

Wide Band, Precision Current Monitors

With a Pearson current monitor you can measure pulse or ac currents from milliamperes to kiloamperes, in any conductor or beam of charged particles, at frequencies up to 200 MHz or down to below 1 Hz. The monitor is physically isolated from the circuit. It is a current transformer capable of highly precise measurement of pulse amplitude and waveshape.

The Model 110, for example, offers pulse-amplitude accuracy of + 1%, -0% (typical of all Pearson current monitors), 20 nanosecond rise time, and droop of only 0.8% per millisecond. Three dB bandwidth is 1 Hz to 20 MHz. Whether you wish to measure current in a conductor, an electron device or a particle accelerator, it is likely that one of our stock models will do the job. We also build custom current monitors to meet special needs.

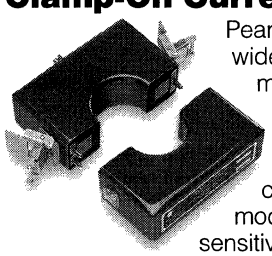


PEARSON CURRENT MONITORS (partial listing)

Model Number	Output† (volts/amp.)	Hole Dia. (inches)	Maximum Peak Curr. (amps)	Droop (%/microsec.)	Useable Rise Time (nanosec.)	IT Max. (amp-sec.)	Maximum RMS Curr. (amps)	Approx. 3 dB pt. Low (Hz)	High (MHz)	I/f (peak amps/Hz)
2877	1.0	0.25	100	0.2	2	0.0004**	2.5	300	200	0.0025
4100	1.0	0.5	500	0.09	10	0.002**	5	140	35	0.006
2100	1.0	2	500	0.08	20	0.005**	7.5	125	20	0.017
3100*	1.0	3.5	500	0.04	50	0.03**	12	60	7	0.1
2878	0.1	0.25	400	0.02	5	0.004**	10	30	70	0.025
410	0.1	0.5	5,000	0.06	20	0.25	50	120	20	1.7
411	0.1	0.5	5,000	0.0009	20	0.2**	50	1	20	0.6
110	0.1	2	5,000	0.0008	20	0.5**	65	1	20	1.5
110A	0.1	2	10,000	0.0008	20	0.5**	65	1	20	1.5
310*	0.1	3.5	5,000	0.02	40	0.6	140	30	10	3.6
1010*	0.1	10.75	5,000	0.25	50	0.7**	120	400	7	4.4
1025	0.025	2	20,000	0.1	100	0.5	100	160	4	3
3025*	0.025	3.5	20,000	0.004	100	3.0	325	7	4	20
2879	0.01	0.25	2,000	0.002	20	0.04**	25	3	20	0.25
101	0.01	2	50,000	0.0001	100	2.5**	200	0.25	4	12
301X*	0.01	3.5	50,000	0.003	200	22	400	5	2	140
1423*	0.001	3.5	500,000	0.0007	300	75	2500	1.0	1.2	450
2093*	0.001	4.75	500,000	0.0001	2000	1200	2500	0.15	0.2	7500
Clamp-On Current Monitors										
4688	1.0	2	500	0.4	12	0.005	15	600	30	0.03
3525	0.1	2	5,000	0.004	25	0.5	100	5	15	3.5
4160	0.01	2	50,000	0.001	200	2.5	300	1.5	2	15

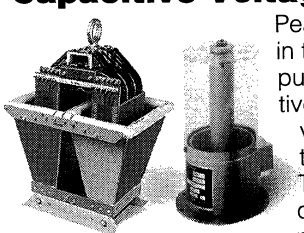
† Initial pulse response with one megohm in parallel with 20 pF load impedance. With the exception of the 2093, a 50 ohm termination will cut the output in half. *Double Shielded
**May need small bias current through secondary for maximum rating.

Clamp-On Current Monitors



Pearson Electronics has designed a wide variety of clamp-on current monitors. These units incorporate the wide-band response and accuracy for which Pearson is noted with the convenience of a clamp-on sensor. The off-the-shelf model 3525 shown at left has a sensitivity of 0.1 V/A, a frequency range of 5Hz to 15MHz and a 5,000 Amperes peak pulse capability. Custom clamp-on current monitors can be designed to meet hole diameter, sensitivity and other requirements.

High Voltage Pulse Transformers & Capacitive Voltage Dividers



Pearson Electronics specializes in the design of high voltage pulse transformers and capacitive voltage dividers. The output voltage range for the pulse transformer is 100kV to 500kV. Typical systems incorporating our pulse transformers include pulse modulators for klystron and traveling wave microwave tubes and voltage pulsers for particle accelerator injectors, x-ray tubes, and high power lasers. Pearson high voltage coaxial capacitive dividers permit measurement of pulse voltages up to 500 kV. The units are frequently used in observing the output wave shape of our high voltage pulse transformers.

Contact us and we will send you engineering data.
1860 Embarcadero Road, Palo Alto, CA 94303 U.S.A.
Phone (650) 494-6444 • (650) 494-6716
E-Mail: sales@pearsonelectronics.com

U.S.A. SALES OFFICE
PETER PARTS ELECTRONICS

CUSTOM TRANSFORMERS & COILS

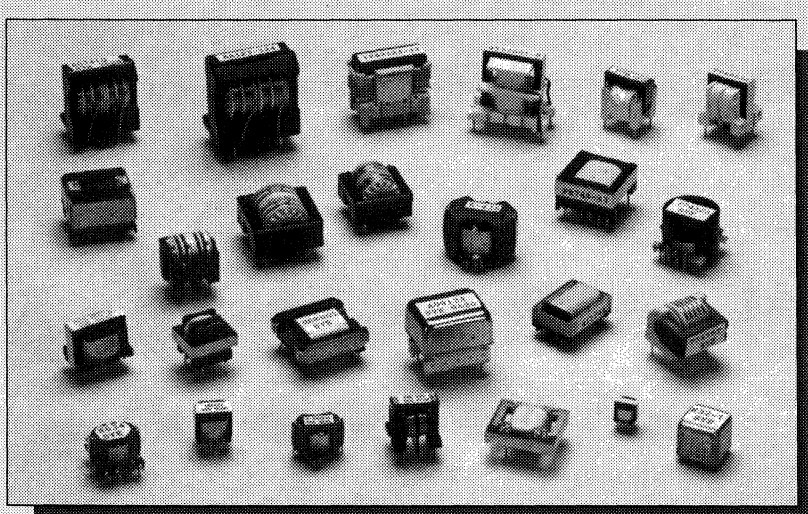
Need Transformers or Coils Made to YOUR Specifications? Try Us

SHINING YUAN

- Line Filter
- Driver Transformer
- Matching Transformer
- Audio Transformer
- Pulse Transformer
- RF Transformer
- Switching Power Transformer
- Coupling Transformer
- Low Power Transformer
- Low Frequency Power Transformer

- Choke Coil
- Linearity Coil
- Toroidial Coil
- Width Coil

- Focus Coil
- Power Choke
- Auto Linearity Coil
- Current Sensor



- ISO9002 Certified
- UL Class B Certified
- Taiwan Engineering Facility
- China Factory with 68 Production Lines

PETER PARTS ELECTRONICS

CALL NOW
716-265-2000

www.peterparts.com
Email: sales@peterparts.com
Call or Email to request our NEW Catalog

PICO Catalog Contents

SURFACE MOUNT TRANSFORMERS	
LOW PROFILE AUDIO TRANSFORMERS (.190" HT. X .50" X .45")	A•2252-2253
LOW PROFILE AUDIO TRANSFORMERS (.240" HT. X .55" X .55")	A•2254-2255
AUDIO TRANSFORMERS: 2 OHM TO 30K OHM; 400 Hz TO 250 KHz; 100 MILLIWATT AT 1KHz	A•2256-2257
AUDIO TRANSFORMERS: 2 OHM TO 40K OHM; 400 Hz TO 100 KHz; 400 MILLIWATT AT 1 KHz	A•2258-2259
AUDIO TRANSFORMERS: 20 OHM TO 100K OHM; 300 Hz TO 75 KHz; 600 MILLIWATT AT 1 KHz	A•2260-2261
AUDIO TRANSFORMERS: 20 OHM TO 250 K OHM; 150 Hz TO 75 KHz; 1 WATT AT 1 KHz	A•2262-2263
AUDIO TRANSFORMERS: 20 OHM TO 135K OHM; 75 Hz TO 30 KHz; 1.5 WATT AT 1 KHz	A•2264-2265
AUDIO TRANSFORMERS: 20 OHM TO 135K OHM; 50 Hz TO 30 KHz; 2 WATT AT 1 KHz	A•2266-2267
AUDIO TRANSFORMERS: 20 OHM TO 80K OHM; 20 Hz TO 25 KHz; 3 WATT AT 1 KHz	A•2268-2269
400 Hz POWER TRANSFORMERS. PRIMARY VOLTAGES OF 115V OR 26V. ULTRA-MINIATURE SIZE.	A•2270
PULSE TRANSFORMERS	A•2271
DC-DC CONVERTER TRANSFORMERS	A•2272-2273
MIL-STD-1553 INTERFACE TRANSFORMERS/MULTIPLEX DATA BUS PULSE TRANSFORMERS	A•2274
ELECTRICAL EQUIVALENTS OF QPL MIL-T-21038/27C	A•2275

PLUG-IN TRANSFORMERS	
1/4" × 1/4" TRANSFORMERS; 2 OHM TO 30K OHM; 400 Hz TO 250 KHz; 100 MILLIWATT AT 1 KHz	A•2276-2277
.35" × .32" TRANSFORMERS; 2 OHM TO 40K OHM; 400 Hz TO 100 KHz; 400 MILLIWATT AT 1 KHz	A•2278-2279
.35" × .46" TRANSFORMERS; 2 OHM TO 100K OHM; 300 Hz TO 100 KHz; 600 MILLIWATT AT 1 KHz	A•2280-2281
.5" × .35" TRANSFORMERS; 2 OHM TO 100K OHM; 300 Hz TO 75 KHz; 600 MILLIWATT AT 1 KHz	A•2282-2283
.5" × .5" TRANSFORMERS; 2 OHM TO 250K OHM; 150 Hz TO 75 KHz; 1 WATT AT 1 KHz	A•2284-2285
.75" × .375" TRANSFORMERS; 2 OHM TO 135K OHM; 75 Hz TO 30 KHz; 1.5 WATT AT 1 KHz	A•2286-2287
.75" × .52" TRANSFORMERS; 2 OHM TO 135K OHM; 50 Hz TO 30 KHz; 2 WATT AT 1 KHz	A•2288-2289
.75" × .82" TRANSFORMERS; 2 OHM TO 80K OHM; 20Hz TO 25 KHz; 3 WATT AT 1 KHz	A•2290-2291
MICROPHONE/TRANSDUCER AUDIO INPUT TRANSFORMERS	A•2292
400 Hz POWER TRANSFORMERS. PRIMARY VOLTAGES OF 115V OR 26V. PLUG-IN CONSTRUCTION. ULTRA-MINIATURE SIZE.	A•2293
PULSE TRANSFORMERS .05μSEC TO 100μSEC WITH MINIATURIZED PLUG-IN CONSTRUCTION	A•2294
PLUG-IN PULSE TRANSFORMERS	A•2295
MIL-STD-1553 INTERFACE TRANSFORMERS/MULTIPLEX DATA BUS PULSE TRANSFORMERS	A•2296
QPL STANDARDS (MIL-T-21038/27C)	A•2297
ULTRA MINIATURE DC-DC CONVERTER TRANSFORMERS	A•2298-2299
RECOMMENDED LAND PATTERN DIMENSIONS FOR SURFACE MOUNT TRANSFORMERS	A•2300-2301

See EEM Section 1800: Coils, Chokes & Inductors for PICO's latest line of:

• Mini High "Q" Inductors • Mini Power Inductors (Surface Mount, Plug-in & Axial Leads)
• EMI Common Mode Suppression Inductors

Pages A•1265 through A•1278

See EEM Section 4000: AC-DC Power Supplies

• New AC-DC Power Supplies 0.5" ht., up to 200 Watts

Pages D•1725 through D•1743

See EEM Section 4025: Over 850 High Reliability Ultra-Miniature DC-DC Converters

• Regulated 75, 100, 200 Watts, Wide Input Voltage Range, Isolated Single and Dual, up to 1000VDC Outputs

Pages D•2033 through D•2106

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747 • FAX 914-738-8225

Delivery: Stock to one week

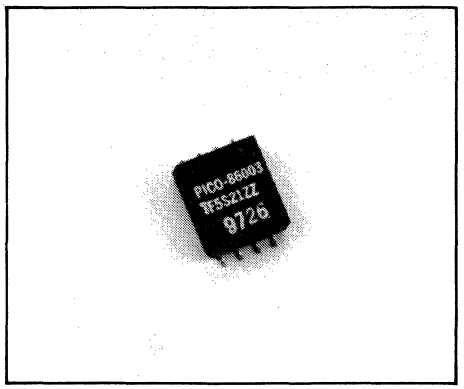
PICO Electronics, Inc.

143 Sparks Ave., Pelham, N.Y. 10803-1837 E-Mail: HLSC73A@prodigy.com

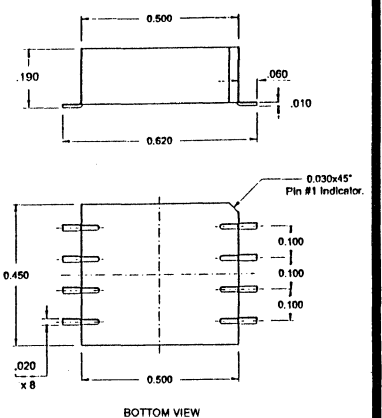
Internet:http://www.picoelectronics.com

New Surface Mount (.19″ Ht. x .50″ x .45″)

LOW PROFILE AUDIO TRANSFORMERS



SERIES 86000



BOTTOM VIEW

TERMINALS ARE CLOCKWISE FROM PIN # 1

All dimensions are in inches, ( ) = MM

For Land Pattern Dimensions See Pg. A•2300 Fig.1

PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	IMPEDANCE OHMS SPLIT WINDING SER	IMPEDANCE OHMS SPLIT WINDING PAR	POWER WATTS 1 KHz	POWER WATTS 400 Hz	POWER WATTS 300 Hz	PRIMARY UNBAL DC CURRENT mA	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	SECONDARY DC RESISTANCE OHMS PAR CONN	TURNS RATIO PRIME/SEC SEC SER CONN	TURNS RATIO PRIME/SEC SEC PAR CONN	PICO PRICES 1-9****
86003	20 ct	8 ct	2	.15	0.15	.008	9.68	1.76	7.25	.181	1.58:1	3.16:1	26.76
86005	20 ct	20 ct	5	.15	.015	.008	9.68	1.76	1.813	.453	1:1	2:1	26.76
86010	32 ct	32 ct	8	.15	.015	.008	7.65	2.816	2.9	7.25	1:1	2:1	26.76
86015	40 ct	40 ct	10	.15	.015	.008	6.85	3.52	3.63	.9075	1:1	2:1	26.76
86020	48 ct	16 ct	4	.15	.015	.008	6.25	4.22	1.45	.3625	1.73:1	3.46:1	26.76
86025	50 ct	50 ct	12.5	.15	.015	.008	6.12	4.4	4.53	1.1325	1:1	2:1	28.40
86030	75 ct	75 ct	18.75	.15	.015	.008	5	6.6	6.8	3.4	1:1	2:1	28.40
86035	80 ct	32 ct	8	.15	.015	.008	4.84	7.04	2.9	.725	1.58:1	3.16:1	33.71
86040	100 ct	40 ct	10	.15	.015	.008	4.33	8.8	3.63	.9075	1.58:1	3.16:1	28.40
86045	100 ct	100 ct	25	.15	.015	.008	4.33	8.8	9.07	2.2675	1:1	2:1	25.54
86050	120 ct	12.8 ct	3.2	.15	.015	.008	3.95	10.56	1.16	.29	3.06:1	6.12:1	25.54
86055	120 ct	60 ct	15	.15	.015	.008	3.95	10.56	5.44	1.36	1.41:1	2.83:1	33.71
86060	120 ct	120 ct	30	.15	.015	.008	3.95	10.56	10.88	2.72	1:1	2:1	33.71
86065	150 ct	12 ct	3	.15	.015	.008	3.54	13.2	1.088	.272	3.54:1	7.08:1	25.54
86070	150 ct	50 ct	12.5	.15	.015	.008	3.54	13.2	4.53	1.1325	1.73:1	3.46:1	28.40
86075	150 ct	100 ct	25	.15	.015	.008	3.54	13.2	9.07	2.2675	1.22:1	2.44:1	28.40
86080	150 ct	150 ct	37.5	.15	.015	.008	3.54	13.2	13.6	3.4	1:1	2:1	33.71
86085	150 ct	600 ct	150	.15	.015	.008	3.54	13.2	54.4	13.6	1:2	1:1	28.40
86090	200 ct	200 ct	50	.15	.015	.008	3.06	17.6	18.13	4.533	1:1	2:1	28.40
86095	300 ct	12 ct	3	.15	.015	.008	2.5	26.4	1.088	.272	5:1	10:1	25.54
86100	300 ct	50 ct	12.5	.15	.015	.008	2.5	26.4	4.53	1.1325	2.54:1	4.9:1	28.40
86105	300 ct	150 ct	37.5	.15	.015	.008	2.5	26.4	13.6	3.4	1.41:1	2.83:1	28.40
86110	300 ct	300 ct	75	.15	.015	.008	2.5	26.4	27.2	6.8	1:1	2:1	33.71
86115	300 ct	600 ct	150	.15	.015	.008	2.5	26.4	54.4	13.6	1:1.41	1.41:1	25.54
86120	320 ct	12.8 ct	3.2	.15	.015	.008	2.42	28.16	1.16	.29	5:1	10:1	25.54
86125	400 ct	40 ct	10	.15	.015	.008	2.17	35.2	3.63	.9075	3.16:1	6.32:1	33.71
86130	400 ct	120 ct	30	.15	.015	.008	2.17	35.2	10.88	2.72	1.83:1	3.65:1	33.71
86135	400 ct	200 ct	50	.15	.015	.008	2.17	35.2	18.13	4.533	1.41:1	2.83:1	28.40
86140	400 ct	400 ct	100	.15	.015	.008	2.17	35.2	36.27	9.08	1:1	2:1	33.71
86145	400 ct	1000 ct	250	.15	.015	.008	2.17	35.2	90.67	22.67	1:1.58	1.26:1	38.68
86150	400 ct	2000 ct	500	.15	.015	.008	2.17	35.2	181.33	45.33	1:2.24	1:1.12	38.68
86155	400 ct	4000 ct	1000	.15	.015	.008	2.17	35.2	362.67	90.67	1:3.16	1:1.58	34.93
86160	500 ct	12.8 ct	3.2	.15	.015	.008	1.94	44	1.16	.29	6.25:1	12.5:1	29.60
86165	500 ct	16 ct	4	.15	.015	.008	1.94	44	1.45	.3625	5.6:1	11.2:1	29.60
86170	500 ct	50 ct	12.5	.15	.015	.008	1.94	44	4.53	1.1325	3.16:1	6.32:1	29.60
86175	500 ct	150 ct	37.5	.15	.015	.008	1.94	44	13.6	3.4	1.83:1	3.65:1	29.60
86180	500 ct	500 ct	125	.15	.015	.008	1.94	44	45.33	11.33	1:1	2:1	29.60
86185	*500 ct	500 ct	—	.15	.015	.008	1.94	44	45.33	—	1:1	—	29.60
86190	500 ct	600 ct	150	.15	.015	.008	1.94	44	54.4	13.6	1:1.1	1.83:1	29.60
86195	600 ct	12.8 ct	3.2	.15	.015	.008	1.77	52.8	1.16	.29	6.85:1	13.7:1	25.54

SPECIFICATIONS:

- **MIL-T-27:** All units manufactured to MIL-T-27. Military Designation is TF5S21ZZ for transformers.
- **FREQUENCY RESPONSE:** ±3 dB, 300 Hz-500 KHz to 1 mW
- **MAXIMUM DISTORTION:** 5% with rated power level at 1 KHz, 400 Hz, and 300 Hz
- **DIELECTRIC STRENGTH:** All units tested at 200 VRMS
- **INSULATION RESISTANCE:** Greater than 10,000 Megohms at 300 VDC
- **OPERATING TEMPERATURE:** –55°C / +130°C
- **TERMINALS:** Solderability per MIL-STD-202 Method 208
- **THERMAL SHOCK:** 25 cycles, method 107, MIL-STD-202, test condition –55°C / +130°C
- **WEIGHT:** 3 grams

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

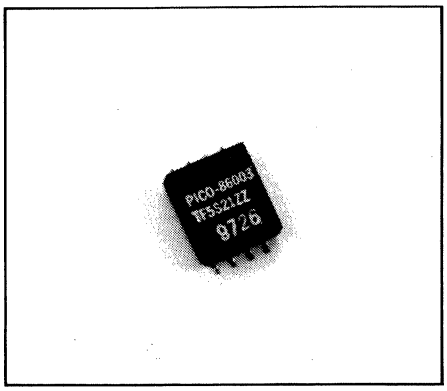
*For immediate engineering assistance or to place an order—**Call Toll Free 800-228-9747***

Delivery— stock to one week

PICO Electronics, Inc.
143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225
Internet: http://www.picoelectronics.com E-Mail: HLSC73A@prodigy.com

LOW PROFILE AUDIO TRANSFORMERS

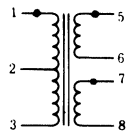
SURFACE MOUNT
PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.



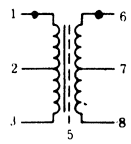
PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	IMPEDANCE OHMS SPLIT WINDING SER	IMPEDANCE OHMS SPLIT WINDING PAR	POWER WATTS 1 KHz	POWER WATTS 400 Hz	POWER WATTS 300 Hz	PRIMARY UNBAL DC CURRENT mA	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	SECONDARY DC RESISTANCE OHMS PAR CONN	TURNS RATIO PRIME/SEC SEC SER CONN	TURNS RATIO PRIME/SEC SEC PAR CONN	PICO PRICES 1-9****
86200	600 ct	30 ct	7.5	.15	.015	.008	1.77	52.8	2.72	.68	4.47:1	8.94:1	26.76
86205	600 ct	48 ct	12	.15	.015	.008	1.77	52.8	4.352	1.088	3.54:1	7.07:1	26.76
86210	600 ct	200 ct	50	.15	.015	.008	1.77	52.8	18.13	4.533	1.73:1	3.46:1	26.76
86215	600 ct	600 ct	150	.15	.015	.008	1.77	52.8	54.4	13.6	1:1	2:1	26.76
86220	*600 ct	600 ct	—	.15	.015	.008	1.77	52.8	54.4	—	1:1	—	29.60
86225	*600 ct	900 ct	—	.15	.015	.008	1.77	52.8	81.6	—	1:1.22	—	26.76
86230	600 ct	1200 ct	300	.15	.015	.008	1.77	52.8	108.8	27.2	1:1.41	1.41:1	26.76
86235	640 ct	12.8 ct	3.2	.15	.015	.008	1.71	56.32	1.16	.29	7.07:1	14.14:1	26.76
86240	700 ct	100 ct	25	.15	.015	.008	1.64	61.6	9.07	2.2675	2.65:1	5.29:1	26.76
86245	800 ct	12.8 ct	3.2	.15	.015	.008	1.53	70.4	1.16	.29	7.91:1	15.8:1	39.94
86250	800 ct	48 ct	12	.15	.015	.008	1.53	70.4	4.352	1.088	4.08:1	8.16:1	26.76
86255	800 ct	800 ct	200	.15	.015	.008	1.53	70.4	72.53	18.13	1:1	2:1	26.76
86260	900 ct	600 ct	150	.15	.015	.008	1.44	79.2	54.4	13.6	1.23:1	2.45:1	26.76
86265	*900 ct	900 ct	—	.15	.015	.008	1.44	79.2	81.6	—	1:1	—	29.60
86270	1000 ct	12 ct	3	.15	.015	.008	1.37	88	1.088	.272	9.13:1	18.26:1	29.60
86275	1000 ct	50 ct	12.5	.15	.015	.008	1.37	88	4.53	1.1325	4.47:1	8.94:1	26.76
86280	1000 ct	1000 ct	250	.15	.015	.008	1.37	88	90.66	22.66	1:1	2:1	25.54
86285	1060 ct	12.8 ct	3.2	.15	.015	.008	1.33	93.28	1.16	.29	9.1:1	18.2:1	25.54
86290	1200 ct	12.8 ct	3.2	.15	.015	.008	1.25	105.6	1.16	.29	9.68:1	19.4:1	25.54
86295	1200 ct	500 ct	125	.15	.015	.008	1.25	105.6	45.33	11.33	1.55:1	3.1:1	33.71
86300	1200 ct	1200 ct	300	.15	.015	.008	1.25	105.6	108.8	27.2	1:1	2:1	26.76
86305	*1200 ct	1200 ct	—	.15	.015	.008	1.25	105.6	108.8	—	1:1	—	29.60
86310	1500 ct	12 ct	3	.15	.015	.008	1.12	132	1.088	.272	11.18:1	22.36:1	29.60
86315	1500 ct	500 ct	125	.15	.015	.008	1.12	132	45.33	11.33	1.73:1	3.46:1	29.60
86320	*1500 ct	600 ct	—	.15	.015	.008	1.12	132	54.4	—	1.58:1	—	26.76
86325	*1500 ct	1500 ct	—	.15	.015	.008	1.12	134	136	—	1:1	—	34.93
86330	1600 ct	12.8 ct	3.2	.15	.015	.008	1.08	140.8	1.16	.29	11.18:1	22.36:1	34.93
86335	2000 ct	8 ct	2	.15	.015	.008	.97	176	.725	.181	15.8:1	31.6:1	38.68
86340	2000 ct	2000 ct	500	.15	.015	.008	.97	176	181.33	45.33	1:1	2:1	34.93
86345	*2000 ct	2000 ct	—	.15	.015	.008	.97	176	181.33	—	1:1	—	34.93
86350	2000 ct	8000 ct	2000	.15	.015	.008	.97	176	725.33	181.33	1:2	1:1	28.40
86355	2500 ct	2500 ct	625	.15	.015	.008	.87	220	226.66	56.66	1:1	2:1	38.68
86360	3000 ct	3000 ct	750	.15	.015	.008	.79	264	272	68	1:1	2:1	28.40
86365	*3000 ct	3000 ct	—	.15	.015	.008	.79	264	272	—	1:1	—	34.93
86370	3600 ct	3600 ct	900	.15	.015	.008	.722	316.8	326.4	81.6	1:1	2:1	34.93
86375	4000 ct	16 ct	4	.15	.015	.008	.685	352	1.45	.3625	15.8:1	31.6:1	38.68
86380	4000 ct	600 ct	150	.15	.015	.008	.685	352	54.4	13.6	2.58:1	5.16:1	38.68
86385	4000 ct	1000 ct	250	.15	.015	.008	.685	352	90.66	22.66	2:1	4:1	29.60
86390	*4000 ct	8000 ct	—	.15	.015	.008	.685	352	725.33	—	1:1.41	—	29.60
86395	5000 ct	500 ct	125	.15	.015	.008	.612	440	45.33	11.33	3.16:1	6.32:1	29.60
86400	5000 ct	5000 ct	1250	.15	.015	.008	.612	440	453.33	113.33	1:1	2:1	29.60

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York
*INCLUDED ELECTROSTATIC SHIELD

SCHEMATICS FOR TRANSFORMERS WITH SPLIT SECONDARIES



SCHEMATICS FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELD DESIGN AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED.
- VARIATION OF STANDARD DESIGNS AVAILABLE
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

THIS PRODUCT IS PATENTED

New Surface Mount (.19"Ht. x .50"x .45")

*For immediate engineering assistance or to place an order—**Call Toll Free 800-228-9747***

Delivery— stock to one week

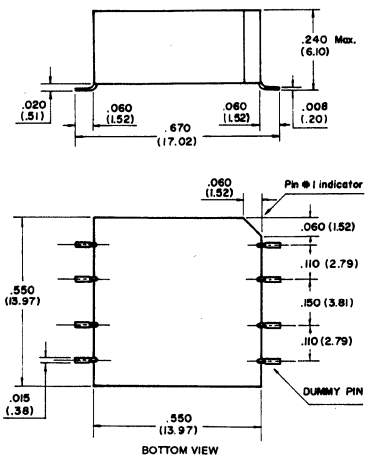
PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225
Internet: http://www.picoelectronics.com E-Mail: HLSC73A@prodigy.com

LOW PROFILE AUDIO TRANSFORMERS

New Surface Mount (.24"Ht.x.55"x.55")

SERIES 78000



TERMINALS ARE CLOCKWISE FROM PIN#1

All dimensions are in inches, ( ) = MM

For Land Pattern Dimensions See Pg. A•2300 Fig.2

PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER WATTS 1 KHz and higher	300 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS/RATIO PRIM/SEC SEC SER CONN	SEC PAR CONN	PICO PRICES 1-9 ***
78003	10 ct	10 ct	2.5	.4	.050	31.6	.83	1.16	.29	1:1	2:1	26.76
78005	20 ct	8 ct	2	.4	.050	22.3	1.66	.93	.23	1.58:1	3.16:1	26.76
78010	20 ct	20 ct	5	.4	.050	22.3	1.66	2.33	.58	1:1	2:1	26.76
78015	32 ct	32 ct	8	.4	.050	17.6	2.66	3.73	.93	1:1	2:1	26.76
78020	40 ct	40 ct	10	.4	.050	15.8	3.33	4.66	1.16	1:1	2:1	26.76
78025	48 ct	16 ct	4	.4	.050	14.4	4	1.86	.46	1.73:1	3.46:1	28.40
78030	50 ct	50 ct	12.5	.4	.050	14.1	4.16	5.8	1.45	1:1	2:1	28.40
78035	80 ct	32 ct	8	.4	.050	11.1	6.66	3.73	.93	1.58:1	3.16:1	33.71
78040	100 ct	40 ct	10	.4	.050	10	8.33	4.66	1.16	1.58:1	3.16:1	28.40
78045	100 ct	100 ct	25	.4	.050	10	8.33	11.6	2.91	1:1	2:1	25.54
78050	120 ct	12.8 ct	3.2	.4	.050	9.1	10	1.49	.37	3.06:1	6.12:1	25.54
78055	120 ct	60 ct	15	.4	.050	9.1	10	7	1.75	1.41:1	2.83:1	33.71
78060	120 ct	120 ct	30	.4	.050	9.1	10	14	3.5	1:1	2:1	33.71
78065	150 ct	12 ct	3	.4	.050	8.2	12.5	1.4	.35	3.54:1	7.08:1	25.54
78070	150 ct	50 ct	12.5	.4	.050	8.2	12.5	5.8	1.45	1.73:1	3.46:1	28.40
78075	150 ct	100 ct	25	.4	.050	8.2	12.5	11.6	2.91	1.22:1	2.45:1	28.40
78080	150 ct	150 ct	37.5	.4	.050	8.2	12.5	17.5	4.37	1:1	2:1	33.71
78085	150 ct	600 ct	150	.4	.050	8.2	12.5	70	17.5	1:2	1:1	28.40
78090	200 ct	200 ct	50	.4	.050	7	16.6	23.3	5.83	1:1	2:1	28.40
78095	300 ct	12 ct	3	.4	.050	5.8	25	1.4	.35	5:1	10:1	25.54
78100	300 ct	50 ct	12.5	.4	.050	5.8	25	5.8	1.45	2.45:1	4.9:1	28.40
78105	300 ct	150 ct	37.5	.4	.050	5.8	25	17.5	4.37	1.41:1	2.83:1	28.40
78110	300 ct	300 ct	75	.4	.050	5.8	25	35	8.75	1:1	2:1	33.71
78115	300 ct	600 ct	150	.4	.050	5.8	25	70	17.5	1:1.41	1.41:1	25.54
78120	320 ct	12.8 ct	3.2	.4	.050	5.6	26.6	1.49	.37	5:1	10:1	25.54
78125	400 ct	40 ct	10	.4	.050	5	33.3	4.66	1.16	3.16:1	6.32:1	33.71
78130	400 ct	120 ct	30	.4	.050	5	33.3	14	3.5	1.83:1	3.65:1	33.71
78135	400 ct	200 ct	50	.4	.050	5	33.3	23.3	5.83	1.41:1	2.83:1	28.40
78140	400 ct	400 ct	100	.4	.050	5	33.3	46.6	11.66	1:1	2:1	33.71
78145	400 ct	1000 ct	250	.4	.050	5	33.3	116.6	29.16	1:1.58	1.26:1	38.68
78150	400 ct	2000 ct	500	.4	.050	5	33.3	233.3	58.3	1:2.24	1:1.12	38.68
78155	400 ct	4000 ct	1000	.4	.050	5	33.3	466.6	116.6	1:3.16	1:1.58	34.93
78160	500 ct	12.8 ct	3.2	.4	.050	4.5	41.6	1.49	.37	6.25:1	12.5:1	29.60
78165	500 ct	16 ct	4	.4	.050	4.5	41.6	1.86	.46	5.6:1	11.2:1	29.60
78170	500 ct	50 ct	12.5	.4	.050	4.5	41.6	5.83	1.45	3.16:1	6.32:1	29.60
78175	500 ct	150 ct	37.5	.4	.050	4.5	41.6	17.5	4.37	1.83:1	3.65:1	29.60
78180	500 ct	500 ct	125	.4	.050	4.5	41.6	58.3	14.58	1:1	2:1	29.60
78185	*500 ct	500 ct	–	.4	.050	4.5	41.6	58.3	14.58–	1:1	–	29.60
78190	500 ct	600 ct	150	.4	.050	4.5	41.6	70	17.5	1:1.1	1.83:1	29.60
78195	600 ct	12.8 ct	3.2	.4	.050	4.1	50	1.49	.37	6.85:1	13.7:1	25.54
78200	600 ct	30 ct	7.5	.4	.050	4.1	50	3.5	.875	4.47:1	8.94:1	26.76
78205	600 ct	48 ct	12	.4	.050	4.1	50	5.6	1.4	3.54:1	7.07:1	26.76
78210	600 ct	200 ct	50	.4	.050	4.1	50	23.3	5.83	1.73:1	3.46:1	26.76
78215	600 ct	600 ct	150	.4	.050	4.1	50	70	17.5	1:1	2:1	26.76
78220	*600 ct	600 ct	–	.4	.050	4.1	50	70	17.5–	1:1	–	29.60
78225	600 ct	1200 ct	300	.4	.050	4.1	50	140	35	1:1.41	1.41:1	26.76
78230	640 ct	12.8 ct	3.2	.4	.050	3.9	53.3	1.49	.37	7.07:1	14.4:1	26.76
78235	700 ct	100 ct	25	.4	.050	3.8	58.3	11.6	2.91	2.65:1	5.29:1	26.76
78240	800 ct	12.8 ct	3.2	.4	.050	3.5	66.6	1.49	.37	7.9:1	15.8:1	26.76
78245	800 ct	48 ct	12	.4	.050	3.5	66.6	5.6	1.4	4.08:1	8.16:1	39.94
78250	800 ct	800 ct	200	.4	.050	3.5	66.6	93.3	23.3	1:1	2:1	26.76
78255	900 ct	600 ct	150	.4	.050	3.3	75	70	17.5	1.22:1	2.45:1	26.76
78260	1000 ct	12 ct	3	.4	.050	3.2	83.3	1.4	.35	9.13:1	18.3:1	26.76
78265	1000 ct	50 ct	12.5	.4	.050	3.2	83.3	5.83	1.45	4.47:1	8.94:1	29.60
78270	1000 ct	1000 ct	250	.4	.050	3.2	83.3	116.6	29.15	1:1	2:1	29.60

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York
*INCLUDED ELECTROSTATIC SHIELD

SPECIFICATIONS:

- **MIL-T-27:** All units manufactured to MIL-T-27. Military Designation is TF5S21ZZ for Transformers.
- **FREQUENCY RESPONSE:** ±2dB, 300 Hz-50 KHz at 1.0 Milliwatt.
- **MAXIMUM DISTORTION:** 5% With Rated Power Level at 1 KHz and 300 Hz.
- **DIELECTRIC STRENGTH:** All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:** Greater Than 10,000 Megohms at 300 V DC.
- **WEIGHT:** 3 Grams
- **OPERATING TEMPERATURE:** −55°C to +130°C
- **TERMINALS:** Solderability per MIL-STD-202 Method 208.
- **THERMAL SHOCK:** 25 Cycles, Method 107, MIL-STD-202, Test Condition −55°C to +130°C

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

Delivery— stock to one week

PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225

Internet: http://www.picoelectronics.com E-mail: HLSC73A@prodigy.com

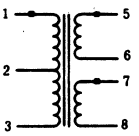
LOW PROFILE AUDIO TRANSFORMERS

SURFACE MOUNT
PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.

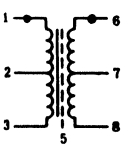
PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS PAR	POWER WATTS 1 KHz and higher	POWER WATTS 300 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	SECONDARY DC RESISTANCE OHMS PAR CONN	TURNS/RATIO PRIM/SEC SEC SER CONN	TURNS/RATIO PRIM/SEC SEC PAR CONN	PICO PRICES 1-9 ***
78275	1060 ct	12.8 ct	3.2	.4	.050	3.1	88.3	1.49	.37	9.1:1	18.2:1	26.76
78280	1200 ct	12.8 ct	3.2	.4	.050	2.9	100	1.49	.37	9.68:1	19.4:1	25.54
78285	1200 ct	500 ct	125	.4	.050	2.9	100	58.3	14.58	1.55:1	3.1:1	25.54
78290	1200 ct	1200 ct	300	.4	.050	2.9	100	140	35	1:1	2:1	25.54
78295	*1200 ct	1200 ct	–	.4	.050	2.9	100	140	35	1:1	–	33.71
78300	1500 ct	12 ct	3	.4	.050	2.6	125	1.4	.35	11.2:1	22.4:1	26.76
78305	1500 ct	500 ct	125	.4	.050	2.6	125	58.3	14.58	1.73:1	3.46:1	29.60
78310	*1500 ct	600 ct	–	.4	.050	2.6	125	70	17.5	1.58:1	–	29.60
78315	*1500 ct	1500 ct	–	.4	.050	2.6	125	175	43.75	1:1	–	29.60
78320	1600 ct	12.8 ct	3.2	.4	.050	2.5	133.3	1.49	.37	11.2:1	22.4:1	26.76
78325	2000 ct	8 ct	2	.4	.050	2.2	166.6	.93	.23	15.8:1	31.6:1	34.93
78330	2000 ct	2000 ct	500	.4	.050	2.2	166.6	233.3	58.33	1:1	2:1	34.93
78335	*2000 ct	2000 ct	–	.4	.050	2.2	166.6	233.3	58.33	1:1	–	38.68
78340	2000 ct	8000 ct	2000	.4	.050	2	166.6	933.3	233.3	1:2	1:1	34.93
78345	2000 ct	2500 ct	625	.4	.050	1.8	166.6	291.6	72.9	1:1	2:1	34.93
78350	3000 ct	3000 ct	725	.4	.050	1.8	250	350	87.5	1:1	2:1	28.40
78355	*3000 ct	3000 ct	–	.4	.050	1.7	250	350	87.5	1:1	–	38.68
78360	3600 ct	3600 ct	900	.4	.050	1.6	300	420	105	1:1	2:1	28.40
78365	4000 ct	16 ct	4	.4	.050	1.6	333.3	1.86	.46	15.8:1	31.6:1	34.93
78370	4000 ct	600 ct	150	.4	.050	1.6	333.3	70	17.5	2.58:1	5.16:1	34.93
78375	4000 ct	1000 ct	250	.4	.050	1.6	333.3	116.6	29.16	2:1	4:1	38.68
78380	*4000 ct	8000 ct	–	.4	.050	1.4	333.3	933.3	233.3	1:1.41	–	38.68
78385	5000 ct	500 ct	125	.4	.050	1.4	416.6	58.3	14.58	3.16:1	6.32:1	29.60
78390	5000 ct	5000 ct	1250	.4	.050	1.2	416.6	583.3	145.8	1:1	2:1	29.60
78395	7500 ct	50 ct	12.5	.4	.050	1.2	625	5.83	1.45	12.2:1	24.5:1	29.60
78400	7500 ct	100 ct	25	.4	.050	1.2	625	11.66	2.91	8.66:1	17.3:1	29.60
78405	7500 ct	600 ct	150	.4	.050	1.2	625	70	17.5	3.54:1	7.07:1	33.71
78410	7500 ct	2500 ct	625	.4	.050	1.2	625	291.6	72.9	1.73:1	3.46:1	33.71
78415	*7500 ct	7500 ct	–	.4	.050	1.1	625	875	218.75	1:1	–	38.68
78420	8000 ct	12.8 ct	3.2	.4	.050	1.1	666.6	1.49	.37	25:1	50:1	29.60
78425	8000 ct	1000 ct	250	.4	.050	1.1	666.6	116.6	29.16	2.83:1	5.66:1	33.71
78430	*8000 ct	1200 ct	–	.4	.050	1.1	666.6	140	35	2.58:1	–	38.68
78435	*9000 ct	9000 ct	–	.4	.050	1.0	750	1050	262.5	1:1	–	38.68
78440	10000 ct	12.8 ct	3.2	.4	.050	1.0	833	1.49	.37	28:1	56:1	26.76
78445	10000 ct	16 ct	4	.4	.050	1.0	833	1.86	.46	25:1	50:1	26.76
78450	10000 ct	100 ct	25	.4	.050	1.0	833	11.66	2.91	10:1	20:1	29.60
78455	10000 ct	200 ct	50	.4	.050	1.0	833	23.3	5.83	7.07:1	14.14:1	29.60
78460	10000 ct	500 ct	125	.4	.050	1.0	833	58.3	14.58	4.47:1	8.94:1	29.60
78465	10000 ct	600 ct	150	.4	.050	1.0	833	70	17.5	4.08:1	8.16:1	29.60
78470	10000 ct	1000 ct	250	.4	.050	1.0	833	116.6	29.16	3.16:1	6.32:1	29.60
78475	10000 ct	1200 ct	300	.4	.050	1.0	833	140	35	2.89:1	5.77:1	34.93
78480	10000 ct	1500 ct	375	.4	.050	1.0	833	175	43.75	2.58:1	5.16:1	34.93
78485	10000 ct	2000 ct	500	.4	.050	1.0	833	233.33	58.33	2.24:1	4.47:1	34.93
78490	10000 ct	5000 ct	1250	.4	.050	1.0	833	583.3	145.83	1.41:1	2.83:1	34.93
78495	10000 ct	7500 ct	1875	.4	.050	1.0	833	875	218.75	1.15:1	2.3:1	34.93
78500	10000 ct	10000 ct	2500	.4	.050	1.0	833	1166.6	291.6	1:1	2:1	33.71
78505	10000 ct	10000 ct	–	.4	.050	1.0	833	1166.6	291.6	1:1	–	38.68

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York
*INCLUDED ELECTROSTATIC SHIELD

SCHEMATICS FOR TRANSFORMERS WITH SPLIT SECONDARIES



SCHEMATICS FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELD DESIGN AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED.
- VARIATION OF STANDARD DESIGNS AVAILABLE
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

THIS PRODUCT IS PATENTED

New Surface Mount (.24"Ht.x.55"x.55")

For immediate engineering assistance or to place an order—

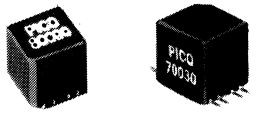
Call Toll Free 800-228-9747

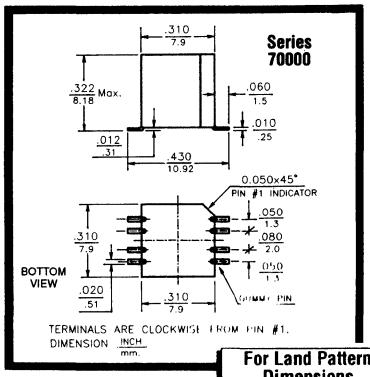
Delivery— stock to one week

PICO Electronics, Inc.
143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225
Internet: http://www.picoelectronics.com E-mail: HLSC73A@prodigy.com

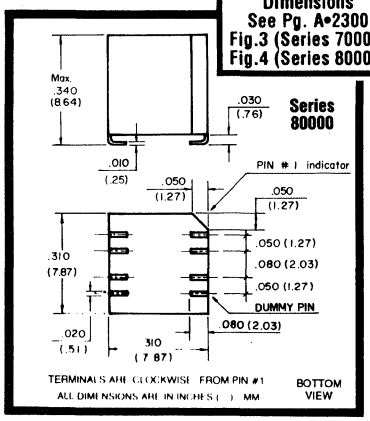
SURFACE MOUNT
PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.

PICO's ultra-miniature transformers





For Land Pattern Dimensions See Pg. A•2300 Fig.3 (Series 70000) Fig.4 (Series 80000)



SPECIFICATIONS

- **MIL-T-27:** . . . . . All units manufactured to MIL-T-27, Military Designation is TF5S21ZZ for Transformers, TF5S20ZZ for inductors.
- **FREQUENCY RESPONSE:** ±3db, 400 Hz-250 KHz at 1.0 Milliwatt.
- **MAXIMUM DISTORTION:** . . . 5% With Rated Power Level at 1 KHz and 400 Hz.
- **DIELECTRIC STRENGTH:** All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:** Greater Than 10,000 Megohms at 300 V DC.
- **OPERATING TEMPERATURE:** −55°C to +130°C
- **WEIGHT:** . . . . . 1.5 GRAMS
- **TERMINALS:** . . . . . Solderability per MIL-STD-202 Method 208.
- **THERMAL SHOCK:** . . . . . 25 Cycles, Method 107, MIL-STD-202, Test Condition −55°C to +130°C

Delivery— stock to one week

Gull Wing PICO PART NUMBER	J Lead PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER MILLIWATTS 1 KHz and higher	400 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS/RATIO PRIM/SEC SEC SER CONN	SEC PAR CONN	PICO PRICES 1-9 ***
70003	80003	10 ct	10 ct	2.5	125	20	11.5	1.1	1.35	.34	1:1	2:1	34.81
70005	80005	20 ct	8 ct	2	125	20	8	2.1	1.28	.32	1.58:1	3.16:1	34.81
70010	80010	20 ct	20 ct	5	125	20	8	2.1	2.56	.64	1:1	2:1	34.81
70015	80015	32 ct	32 ct	8	125	20	6.5	3.52	4.32	1.08	1:1	2:1	34.81
70020	80020	40 ct	40 ct	10	125	20	5.6	4	4.77	1.19	1:1	2:1	34.54
70025	80025	48 ct	16 ct	4	125	20	5.2	4.3	2.3	.58	1.73:1	3.46:1	31.64
70030	80030	50 ct	50 ct	12.5	125	20	5	5.5	6.6	1.65	1:1	2:1	31.64
70035	80035	80 ct	32 ct	8	125	20	4	8.5	4.25	1.06	1.58:1	3.16:1	34.54
70040	80040	100 ct	40 ct	10	125	20	3.6	12.1	4.85	1.21	1.58:1	3.16:1	34.54
70045	80045	100 ct	100 ct	25	125	20	3.6	12.1	12	3	1:1	2:1	31.64
70050	80050	120 ct	12.8 ct	3.2	125	20	3.3	13.2	1.6	.4	3.06:1	6.12:1	31.64
70055	80055	120 ct	60 ct	15	125	20	3.3	13.2	7.3	1.83	1.41:1	2.83:1	37.85
70060	80060	120 ct	120 ct	30	125	20	3.3	13.2	16	4	1:1	2:1	37.85
70065	80065	150 ct	12 ct	3	125	20	3	15	1.56	.39	3.54:1	7.07:1	36.64
70070	80070	150 ct	50 ct	12.5	125	20	3	15	6.6	1.65	1.73:1	3.46:1	37.85
70075	80075	150 ct	100 ct	25	125	20	3	15	14.5	3.63	1.22:1	2.45:1	37.85
70080	80080	150 ct	150 ct	37.5	125	20	3	15	18.3	4.58	1:1	2:1	37.85
70085	80085	150 ct	600 ct	150	125	20	3	15	72	18	1:2	1:1	37.85
70090	80090	200 ct	200 ct	50	125	20	2.5	22	25.8	6.7	1:1	2:1	37.85
70095	80095	300 ct	12 ct	3	125	20	2	33	1.56	.39	5:1	10:1	37.85
70100	80100	300 ct	50 ct	12.5	125	20	2	33	6.6	1.65	2.45:1	4.9:1	37.85
70105	80105	300 ct	150 ct	37.5	125	20	2	33	18.3	4.58	1:1.41	2.83:1	37.85
77110	80110	300 ct	300 ct	75	125	20	2	33	40.3	10.08	1:1	2:1	37.85
70115	80115	300 ct	600 ct	150	125	20	2	33	72	18	1:1.41	1.41:1	34.40
70120	80120	320 ct	12.8 ct	3.2	125	20	2	34	1.6	0.4	5:1	10:1	40.58
70125	80125	400 ct	40 ct	10	125	20	1.8	49	4.7	1.18	3.16:1	6.32:1	40.58
70130	80130	400 ct	120 ct	30	125	20	1.8	49	16.3	4.08	1.83:1	3.65:1	40.58
70135	80135	400 ct	200 ct	50	125	20	1.8	49	27.3	6.83	1.41:1	2.83:1	40.58
70140	80140	400 ct	400 ct	100	125	20	1.8	49	49	12.25	1:1	2:1	36.90
70145	80145	400 ct	1000 ct	250	125	20	1.8	48	120	30	1:1.58	1.26:1	40.58
70150	80150	400 ct	2000 ct	500	125	20	1.8	49	270	67.5	1:2.24	1:1.12	40.58
70155	80155	400 ct	4000 ct	1000	125	20	1.8	49	476	119	1:3.16	1:1.58	40.58
70160	80160	500 ct	12.8 ct	3.2	125	20	1.6	54	1.6	0.4	6.25:1	12.5:1	36.90
70165	80165	500 ct	16 ct	4	125	20	1.6	54	2.3	0.58	5.6:1	11.2:1	36.90
70170	80170	500 ct	50 ct	12.5	125	20	1.6	54	6.6	1.65	3.16:1	6.32:1	36.90
70175	80175	500 ct	150 ct	37.5	125	20	1.6	54	18.3	4.58	1.83:1	3.65:1	36.90
70180	80180	500 ct	500 ct	125	125	20	1.6	54	65	16.3	1:1	2:1	40.58
70185	80185	*500 ct	500 ct	–	125	20	1.6	54	65	–	1:1	–	40.58
70190	80190	500 ct	*600 ct	150	125	20	1.6	54	72	18	1:1.1	1.83:1	40.58
70195	80195	600 ct	12.8 ct	3.2	125	20	1.5	59	1.6	0.4	6.85:1	13.7:1	40.58
70200	80200	600 ct	30 ct	7.5	125	20	1.5	59	4.1	1.03	4.47:1	8.94:1	36.90
70205	80205	600 ct	48 ct	12	125	20	1.5	59	5.2	1.3	3.54:1	7.07:1	36.90
70210	80210	600 ct	200 ct	50	125	20	1.5	59	26.5	6.63	1.73:1	3.46:1	36.90
70215	80215	600 ct	600 ct	150	125	20	1.5	59	72	18	1:1	2:1	36.90
70220	80220	*600 ct	600 ct	–	125	20	1.5	59	72	–	1:1	–	40.58
70225	80225	600 ct	1200 ct	300	125	20	1.5	59	160	40	1:1.41	1.41:1	36.90
70230	80230	640 ct	12.8 ct	3.2	125	20	1.5	62	1.6	0.4	7.07:1	14.14:1	36.90
70235	80235	700 ct	100 ct	25	125	20	1.35	65	12	3	2.65:1	5.29:1	36.90
70240	80240	800 ct	12.8 ct	3.2	125	20	1.3	88	15	4	7.9:1	15.8:1	40.58
70245	80245	800 ct	48 ct	12	125	20	1.3	88	6.7	1.68	4.08:1	8.16:1	37.85
70250	80250	800 ct	800 ct	200	125	20	1.3	88	106	26.5	1:1	2:1	37.85
70255	80255	900 ct	600 ct	150	125	20	1.2	93	74	18.5	1.22:1	2.45:1	37.85
70260	80260	1000 ct	12 ct	3	125	20	1.2	120	1.55	0.39	9.13:1	18.3:1	41.65
70265	80265	1000 ct	50 ct	12.5	125	20	1.2	120	6.6	1.65	4.47:1	8.94:1	41.65
70270	80270	1000 ct	1000 ct	250	125	20	1.2	120	120	30	1:1	2:1	37.85
70275	80275	1060 ct	12.8 ct	3.2	125	20	1.2	125	1.6	0.4	9.1:1	18.2:1	41.65
70280	80280	1200 ct	12.8 ct	3.2	125	20	1	133	1.6	0.4	9.68:1	19.4:1	41.65
70285	80285	1200 ct	500 ct	125	125	20	1	133	65	16.25	1.55:1	3.1:1	41.65
70290	80290	1200 ct	1200 ct	300	125	20	1	133	160	40	1:1	2:1	41.65
70295	80295	*1200 ct	1200 ct	–	125	20	1	133	160	–	1:1	–	41.65
70300	80300	1500 ct	12 ct	3	125	20	1	180	1.55	0.39	11.2:1	22.4:1	41.65
70305	80305	1500 ct	500 ct	125	125	20	1	180	65	16.3	1.73:1	3.46:1	37.85
70310	80310	*1500 ct	600 ct	–	125	20	1	180	73	–	1.58:1	--	37.85
70315	80315	*1500 ct	1500 ct	–	125	20	1	180	215	–	1:1	–	41.65
70320	80320	1600 ct	12.8 ct	3.2	125	20	1	190	1.6	0.4	11.2:1	22.4:1	41.65
70325	80325	2000 ct	8 ct	2	125	20	0.8	218	1	.25	15.8:1	31.6:1	41.65
70330	80330	2000 ct	2000 ct	500	125	20	0.8	218	260	65	1:1	2:1	41.65
70335	80335	*2000 ct	2000 ct	–	125	20	0.8	218	260	–	1:1	–	41.65
70340	80340	2000 ct	8000 ct	2000	125	20	0.8	218	830	207.5	1:2	1:1	40.58

*INCLUDED ELECTROSTATIC SHIELD
***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225

Internet: http://www.picoelectronics.com E-mail: HLSC73A@prodigy.com

Gull Wing PICO PART NUMBER	J Lead PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER MILLIWATTS 1 KHz and higher	400 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS/RATIO PRIM/SEC SEC SER CONN	SEC PAR CONN	PICO PRICES 1-9 ***
70345	80345	2500 ct	2500 ct	625	125	20	0.75	280	280	70	1:1	2:1	40.58
70350	80350	3000 ct	3000 ct	725	125	20	0.65	330	330	82.5	1:1	2:1	40.58
70355	80355	*3000 ct	3000 ct	–	125	20	0.65	330	330	–	1:1	–	40.58
70360	80360	3600 ct	3600 ct	900	125	20	0.6	370	450	112.5	1:1	2:1	40.58
70365	80365	4000 ct	16 ct	4	125	20	0.57	400	2.3	0.58	15.8:1	31.6:1	40.58
70370	80370	4000 ct	600 ct	150	125	20	0.57	400	73	18.25	2.58:1	5.16:1	40.58
70375	80375	4000 ct	1000 ct	250	125	20	0.57	400	120	30	2:1	4:1	40.58
70380	80380	*4000 ct	8000 ct	–	125	20	0.57	400	1070	–	1:1.41	–	44.62
70385	80385	5000 ct	500 ct	125	125	20	0.5	540	65	16.25	3.16:1	6.32:1	40.58
70390	80390	5000 ct	5000 ct	1250	125	20	0.5	540	650	162.5	1:1	2:1	40.58
70395	80395	7500 ct	50 ct	12.5	125	20	0.5	835	6.6	1.65	12.2:1	24.5:1	44.62
70400	80400	7500 ct	100 ct	25	125	20	0.4	835	12	3	8.66:1	17.3:1	40.99
70405	80405	7500 ct	600 ct	150	125	20	0.4	835	72	18	3.54:1	7.07:1	40.99
70410	80410	7500 ct	2500 ct	625	125	20	0.4	835	280	70	1.73:1	3.46:1	40.99
70415	80415	*7500 ct	7500 ct	–	125	20	0.4	835	1020	–	1:1	–	40.99
70420	80420	8000 ct	12.8 ct	3.2	125	20	0.4	865	1.6	0.4	25:1	50:1	44.62
70425	80425	8000 ct	1000 ct	250	125	20	0.4	865	120	30	2.83:1	5.66:1	44.62
70430	80430	*8000 ct	1200 ct	–	125	20	0.4	865	160	–	2.58:1	–	44.62
70435	80435	*9000 ct	9000 ct	–	125	20	0.4	1160	1160	–	1:1	–	44.62
70440	80440	10,000 ct	12.8 ct	3.2	125	20	0.36	1200	1.6	0.4	28:1	56:1	44.62
70445	80445	10,000 ct	16 ct	4	125	20	0.36	1200	1.77	0.44	25:1	50:1	40.99
70450	80450	10,000 ct	100 ct	25	125	20	0.36	1200	12	3	10:1	20:1	40.99
70455	80455	10,000 ct	200 ct	50	125	20	0.36	1200	27	6.75	7.07:1	14.14:1	40.99
70460	80460	10,000 ct	500 ct	125	125	20	0.36	1200	65	16.25	4.47:1	8.94:1	40.99
70465	80465	10,000 ct	600 ct	150	125	20	0.36	1200	72	18	4.08:1	8.16:1	40.99
70470	80470	10,000 ct	1000 ct	250	125	20	0.36	1200	120	30	3.16:1	6.32:1	40.99
70475	80475	10,000 ct	1200 ct	300	125	20	0.36	1200	160	40	2.88:1	5.77:1	40.99
70480	80480	10,000 ct	1500 ct	375	125	20	0.36	1200	215	53.8	2.58:1	5.16:1	41.65
70485	80485	10,000 ct	2000 ct	500	125	20	0.36	1200	260	65	2.24:1	4.47:1	41.65
70490	80490	10,000 ct	5000 ct	1250	125	20	0.36	1200	650	162.5	1.41:1	2.83:1	41.65
70495	80495	10,000 ct	7500 ct	1875	125	20	0.36	1200	1020	255	1.15:1	2.3:1	41.65
70500	80500	10,000 ct	10,000 ct	2500	125	20	0.36	1200	1200	300	1:1	2:1	37.85
70505	80505	*10,000 ct	10,000 ct	–	125	20	0.36	1200	1440	–	1:1	–	44.62
70510	80510	15,000 ct	400 ct	100	100	15	0.35	1420	43	10.75	6.12:1	12.24:1	40.99
70515	80515	15,000 ct	500 ct	125	100	15	0.35	1420	49	12.25	5.48:1	10.95:1	40.99
70520	80520	15,000 ct	600 ct	150	100	15	0.35	1420	68	17	5:1	10:1	40.99
70525	80525	15,000 ct	10,000 ct	2500	100	15	0.35	1420	1100	275	1.22:1	2.45:1	40.99
70530	80530	*15,000 ct	15,000 ct	–	100	15	0.35	1420	1730	–	1:1	–	44.62
70535	80535	15,000 ct	15,000 ct	3750	100	15	0.35	1420	1730	433	1:1	2:1	41.65
70540	80540	16,000 ct	1000 ct	250	100	15	0.35	1500	115	28.75	4:1	8:1	41.65
70545	80545	20,000 ct	500 ct	125	100	15	0.3	1600	60	15	6.33:1	12.65:1	44.62
70550	80550	20,000 ct	600 ct	150	100	15	0.3	1600	66	16.5	5.77:1	11.55:1	44.62
70555	80555	20,000 ct	800 ct	200	100	15	0.3	1600	94	23.5	5:1	10:1	44.62
70560	80560	20,000 ct	1000 ct	250	100	15	0.3	1600	106	26.5	4.47:1	8.94:1	44.62
70565	80565	20,000 ct	5000 ct	1250	100	15	0.3	1600	600	150	2:1	4:1	44.62
70570	80570	20,000 ct	10,000 ct	2500	100	15	0.3	1600	1100	275	1.41:1	2.83:1	44.62

*INCLUDES ELECTROSTATIC SHIELD

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%

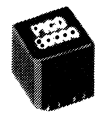
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

INDUCTORS

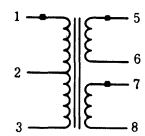
PART NUMBER	PART NUMBER	INDUCTANCE	DC CURRENT ma	DC RESISTANCE OHMS	PRICES 1-9***
70825	80825	SERIES { 10.0 / 2.75 }	0 / 2	2250	36.02
		PARALLEL { 2.5 / .65 }	0 / 4	560	
70830	80830	SERIES { 5.5 / 1.5 }	0 / 2	1000	36.02
		PARALLEL { 1.3 / .40 }	0 / 4	250	
70835	80835	SERIES { .85 / .25 }	1 / 6	240	36.02
		PARALLEL { .21 / .06 }	2 / 12	60	
70840	80840	SERIES { .6 / .15 }	0 / 5	144	36.02
		PARALLEL { .15 / .04 }	0 / 10	36	

SURFACE MOUNT

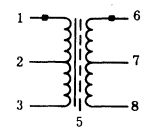
SERIES 70000 SERIES 80000



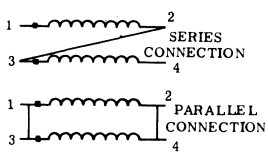
SCHEMATIC FOR TRANSFORMERS WITH SPLIT SECONDARIES



SCHEMATIC FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



SCHEMATIC FOR INDUCTORS



FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELD DESIGN AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED
- VARIATION OF STANDARD DESIGNS AVAILABLE
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

THIS PRODUCT IS PATENTED

INDUCTORS

ALL INDUCTORS HAVE SPLIT WINDINGS AND MEASUREMENTS ARE LISTED FOR BOTH SERIES AND PARALLEL CONNECTIONS. TWO VALUES OF INDUCTANCE, EACH AT A PARTICULAR VALUE OF D.C. CURRENT, ARE LISTED FOR EACH INDUCTOR.

Delivery— stock to one week

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

PICO Electronics, Inc.

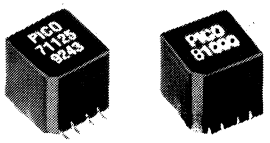
143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225

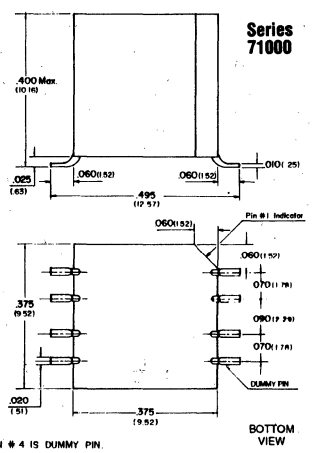
Internet: http://www.picoelectronics.com E-mail: HLSC73A@prodigy.com

SURFACE MOUNT

PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.

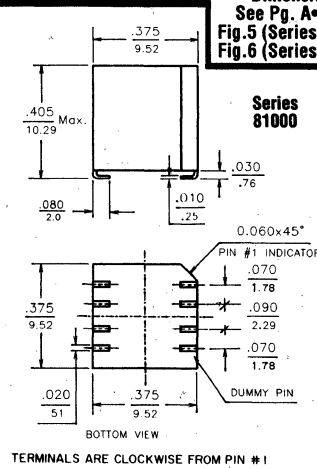
PICO's ultra-miniature transformers





*PIN # 4 IS DUMMY PIN.
- DIMENSIONS ARE IN INCHES ( ) = MM
- TERMINALS ARE CLOCKWISE FROM PIN # 1

For Land Pattern Dimensions See Pg. A•2300 Fig.5 (Series 71000) Fig.6 (Series 81000)



TERMINALS ARE CLOCKWISE FROM PIN # 1
DIMENSIONS INCH / mm.

Gull Wing PICO PART NUMBER	J Lead PICO PART NUMBER	PRIMARY IMPED OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER WATTS 1 KHz and higher	400 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIM DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS/RATIO PRIM/SEC SEC SER CONN	SEC PAR CONN	PICO PRICES 1-9 ***
71003	81003	10 ct	10 ct	2.5	.4	.075	31.6	1.1	1.3	.33	1:1	2:1	25.69
71005	81005	20 ct	8 ct	2	.4	.075	22.3	2.2	1	.25	1.58:1	3.16:1	25.69
71010	81010	20 ct	20 ct	5	.4	.075	22.3	2.2	2.6	.65	1:1	2:1	25.69
71015	81015	32 ct	32 ct	8	.4	.075	17.6	3.5	4.2	1.05	1:1	2:1	25.69
71020	81020	40 ct	40 ct	10	.4	.075	15.8	4	4.5	1.2	1:1	2:1	25.69
71025	81025	48 ct	16 ct	4	.4	.075	14.4	5.3	1.9	.48	1.73:1	3.46:1	27.26
71030	81030	50 ct	50 ct	12.5	.4	.075	14.1	5.6	6.5	1.6	1:1	2:1	27.26
71035	81035	80 ct	32 ct	8	.4	.075	11.1	8	4	1	1.58:1	3.16:1	32.36
71040	81040	100 ct	40 ct	10	.4	.075	10	10	4.5	1.2	1.58:1	3.16:1	27.26
71045	81045	100 ct	100 ct	25	.4	.075	10	10	12	3	1:1	2:1	24.52
71050	81050	120 ct	12.8 ct	3.2	.4	.075	9.1	12	1.5	.38	3.06:1	6.12:1	24.52
71055	81055	120 ct	60 ct	15	.4	.075	9.1	12	7.2	1.8	1.41:1	2.83:1	32.36
71060	81060	120 ct	120 ct	30	.4	.075	9.1	12	14.5	3.6	1:1	2:1	32.36
71065	81065	150 ct	12 ct	3	.4	.075	8.2	15	1.5	.38	3.54:1	7.08:1	24.52
71070	81070	150 ct	50 ct	12.5	.4	.075	8.2	15	6	1.5	1.73:1	3.46:1	27.26
71075	81075	150 ct	100 ct	25	.4	.075	8.2	15	12	3	1.22:1	2.45:1	27.26
71080	81080	150 ct	150 ct	37.5	.4	.075	8.2	15	16.8	4.2	1:1	2:1	32.36
71085	81085	150 ct	600 ct	150	.4	.075	8.2	15	70	17.5	1:2	1:1	27.26
71090	81090	200 ct	200 ct	50	.4	.075	7	20	24	6	1:1	2:1	27.26
71095	81095	300 ct	12 ct	3	.4	.075	5.8	30	1.5	.38	5:1	10:1	24.52
71100	81100	300 ct	50 ct	12.5	.4	.075	5.8	30	6	1.5	2.45:1	4.9:1	27.26
71105	81105	300 ct	150 ct	37.5	.4	.075	5.8	30	18	4.5	1.41:1	2.83:1	27.26
71110	81110	300 ct	300 ct	75	.4	.075	5.8	30	36	9	1:1	2:1	32.36
71115	81115	300 ct	600 ct	150	.4	.075	5.8	30	72	18	1:1.41	1.41:1	24.52
71120	81120	320 ct	12.8 ct	3.2	.4	.075	5.6	32	1.5	.38	5:1	10:1	24.52
71125	81125	400 ct	40 ct	10	.4	.075	5	40	4.5	1.1	3.16:1	6.32:1	32.36
71130	81130	400 ct	120 ct	30	.4	.075	5	40	14	3.5	1.83:1	3.65:1	32.36
71135	81135	400 ct	200 ct	50	.4	.075	5	40	24	6	1.41:1	2.83:1	27.26
71140	81140	400 ct	400 ct	100	.4	.075	5	40	48	12	1:1	2:1	32.36
71145	81145	400 ct	1000 ct	250	.4	.075	5	40	120	30	1:1.58	1.26:1	37.13
71150	81150	400 ct	2000 ct	500	.4	.075	5	40	240	60	1:2.24	1:1.12	37.13
71155	81155	400 ct	4000 ct	1000	.4	.075	5	40	480	120	1:3.16	1:1.58	33.53
71160	81160	500 ct	12.8 ct	3.2	.4	.075	4.5	50	1.5	.38	6.25:1	12.5:1	28.42
71165	81165	500 ct	16 ct	4	.4	.075	4.5	50	2	.5	5.6:1	11.2:1	28.42
71170	81170	500 ct	50 ct	12.5	.4	.075	4.5	50	6	1.5	3.16:1	6.32:1	28.42
71175	81175	500 ct	150 ct	37.5	.4	.075	4.5	50	16	4.5	1.83:1	3.65:1	28.42
71180	81180	500 ct	500 ct	125	.4	.075	4.5	50	60	15	1:1	2:1	28.42
71185	81185	*500 ct	500 ct	–	.4	.075	4.5	50	60	–	1:1	–	28.42
71190	81190	500 ct	600 ct	150	.4	.075	4.5	50	72	18	1:1.1	1.83:1	28.42
71195	81195	600 ct	12.8 ct	3.2	.4	.075	4.1	60	1.5	.38	6.85:1	13.7:1	24.52
71200	81200	600 ct	30 ct	7.5	.4	.075	4.1	60	3.6	.9	4.47:1	8.94:1	25.69
71205	81205	600 ct	48 ct	12	.4	.075	4.1	60	5.8	1.45	3.54:1	7.07:1	25.69
71210	81210	600 ct	200 ct	50	.4	.075	4.1	60	24	6	1.73:1	3.46:1	25.69
71215	81215	600 ct	600ct	150	.4	.075	4.1	60	72	18	1:1	2:1	25.69
71220	81220	*600 ct	600 ct	–	.4	.075	4.1	60	72	–	1:1	–	28.42
71225	81225	600 ct	1200 ct	300	.4	.075	4.1	60	144	36	1:1.41	1.41:1	25.69
71230	81230	640 ct	12.8 ct	3.2	.4	.075	3.9	64	1.5	.38	7.07:1	14.4:1	25.69
71235	81235	700 ct	100 ct	25	.4	.075	3.8	70	12	3	2.65:1	5.29:1	25.69
71240	81240	800 ct	12.8 ct	3.2	.4	.075	3.5	80	1.5	.38	7.9:1	15.8:1	25.69
71245	81245	800 ct	48 ct	12	.4	.075	3.5	80	5.8	1.45	4.08:1	8.16:1	38.34
71250	81250	800 ct	800 ct	200	.4	.075	3.5	80	96	24	1:1	2:1	25.69
71255	81255	900 ct	600 ct	150	.4	.075	3.3	90	72	18	1.22:1	2.45:1	25.69
71260	81260	1000 ct	12 ct	3	.4	.075	3.2	100	1.5	.38	9.13:1	18.3:1	25.69
71265	81265	1000 ct	50 ct	12.5	.4	.075	3.2	100	6	1.5	4.47:1	8.94:1	28.42
71270	81270	1000 ct	1000 ct	250	.4	.075	3.2	100	120	30	1:1	2:1	28.42
71275	81275	1060 ct	12.8 ct	3.2	.4	.075	3.1	106	1.5	.38	9.1:1	18.2:1	25.69
71280	81280	1200 ct	12.8 ct	3.2	.4	.075	2.9	120	1.5	.38	9.68:1	19.4:1	23.14
71285	81285	1200 ct	500 ct	125	.4	.075	2.9	120	60	15	1.55:1	3.1:1	23.14
71290	81290	1200 ct	1200 ct	300	.4	.075	2.9	120	140	35	1:1	2:1	23.14
71295	81295	*1200 ct	1200 ct	–	.4	.075	2.9	120	140	–	1:1	–	31.63
71300	81300	1500 ct	12 ct	3	.4	.075	2.6	150	1.5	.38	11.2:1	22.4:1	25.69
71305	81305	1500 ct	500 ct	125	.4	.075	2.6	150	60	15	1.73:1	3.46:1	28.42
71310	81310	*1500 ct	600 ct	–	.4	.075	2.6	150	72	–	1.58:1	–	28.42
71315	81315	*1500 ct	1500 ct	–	.4	.075	2.6	150	180	–	1:1	–	28.42
71320	81320	1600 ct	12.8 ct	3.2	.4	.075	2.5	160	1.5	.38	11.2:1	22.4:1	25.69
71325	81325	2000 ct	8 ct	2	.4	.075	2.2	200	1	.25	15.8:1	31.6:1	33.53
71330	81330	2000 ct	2000 ct	500	.4	.075	2.2	200	240	60	1:1	2:1	33.53
71335	81335	*2000 ct	2000 ct	–	.4	.075	2.2	200	240	–	1:1	–	37.13
71340	81340	2000 ct	8000 ct	2000	.4	.075	2.2	200	960	240	1:2	1:1	33.53
71345	81345	2500 ct	2500 ct	625	.4	.075	2	250	300	75	1:1	2:1	33.53

SPECIFICATIONS

- **MIL-T-27:** . . . . . All units manufactured to MIL-T-27, Military Designation is TF5S21ZZ for Transformers, TF5S20ZZ for Inductors.
- **FREQUENCY RESPONSE:** ±3db, 400 Hz-100 KHz at 1.0 Milliwatt.
- **MAXIMUM DISTORTION:** . . 5% With Rated Power Level at 1 KHz and 400 Hz.
- **DIELECTRIC STRENGTH:** All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:** Greater Than 10,000 Megohms at 300 V DC.
- **WEIGHT:** . . . . . 3 Grams
- **TERMINALS:** . . . . . Solderability per MIL-STD-202 Method 208.
- **THERMAL SHOCK:** . . . . . 25 Cycles, Method 107, MIL-STD-202, Test Condition –55°C to +130°C

*INCLUDES ELECTROSTATIC SHIELD

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%

Ordering Instructions: No minimum, Net 30 days F.O.B. Pelham, New York

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225

Internet: http://www.picoelectronics.com E-mail: HLSC73A@prodigy.com

Gull Wing PICO PART NUMBER	J Lead PICO PART NUMBER	PRIMARY IMPED OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER WATTS 1 KHz and higher	400 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIM DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS/RATIO PRIM/SEC SEC SER CONN	SEC PAR CONN	PICO PRICES 1-9 ***
71350	81350	3000 ct	3000 ct	725	.4	.075	1.8	300	360	90	1:1	2:1	27.28
71355	81355	*3000 ct	3000 ct	–	.4	.075	1.8	300	360	–	1:1	–	37.13
71360	81360	3600 ct	3600 ct	900	.4	.075	1.7	360	432	108	1:1	2:1	27.28
71365	81365	4000 ct	16 ct	4	.4	.075	1.6	400	1.9	.47	15.8:1	31.6:1	33.53
71370	81370	4000 ct	600 ct	150	.4	.075	1.6	400	72	18	2.58:1	5.16:1	33.53
71375	81375	4000 ct	1000 ct	250	.4	.075	1.6	400	120	30	2:1	4:1	37.13
71380	81380	*4000 ct	8000 ct	–	.4	.075	1.6	400	960	–	1:1.41	–	37.13
71385	81385	5000 ct	500 ct	125	.4	.075	1.4	500	60	15	3.16:1	6.32:1	28.42
71390	81390	5000 ct	5000 ct	1250	.4	.075	1.4	500	600	150	1:1	2:1	28.42
71395	81395	7500 ct	50 ct	12.5	.33	.075	1.2	750	6	1.5	12.2:1	24.5:1	28.42
71400	81400	7500 ct	100 ct	25	.33	.075	1.2	750	12	3	8.66:1	17.3:1	28.42
71405	81405	7500 ct	600 ct	150	.33	.075	1.2	750	72	18	3.54:1	7.07:1	31.63
71410	81410	7500 ct	2500 ct	625	.33	.075	1.2	750	300	75	1.73:1	3.46:1	31.63
71415	81415	*7500 ct	7500 ct	–	.33	.075	1.2	750	900	–	1:1	–	37.13
71420	81420	8000 ct	12.8 ct	3.2	.3	.075	1.1	800	1.5	.38	25:1	50:1	28.42
71425	81425	8000 ct	1000 ct	250	.3	.075	1.1	800	120	30	2.83:1	5.66:1	31.63
71430	81430	*8000 ct	1200 ct	–	.3	.075	1.1	800	144	–	2.58:1	–	37.13
71435	81435	*9000 ct	9000 ct	–	.27	.075	1.1	900	1080	–	1:1	–	37.13
71440	81440	10,000 ct	12.8 ct	3.2	.25	.075	1.0	1000	1.5	.38	28:1	56:1	25.69
71445	81445	10,000 ct	16 ct	4	.25	.075	1.0	1000	1.92	.48	25:1	50:1	25.69
71450	81450	10,000 ct	100 ct	25	.25	.075	1.0	1000	12	3	10:1	20:1	28.42
71455	81455	10,000 ct	200 ct	50	.25	.075	1.0	1000	24	6	7.07:1	14.14:1	28.42
71460	81460	10,000 ct	500 ct	125	.25	.075	1.0	1000	60	15	4.47:1	8.94:1	28.42
71465	81465	10,000 ct	600 ct	150	.25	.075	1.0	1000	72	18	4.08:1	8.16:1	28.42
71470	81470	10,000 ct	1000 ct	250	.25	.075	1.0	1000	120	30	3.16:1	6.32:1	28.42
71475	81475	10,000 ct	1200 ct	300	.25	.075	1.0	1000	144	36	2.89:1	5.77:1	33.53
71480	81480	10,000 ct	1500 ct	375	.25	.075	1.0	1000	180	45	2.58:1	5.16:1	33.53
71485	81485	10,000 ct	2000 ct	500	.25	.075	1.0	1000	240	60	2.24:1	4.47:1	32.86
71490	81490	10,000 ct	5000 ct	1250	.25	.075	1.0	1000	600	150	1.41:1	2.83:1	33.42
71495	81495	10,000 ct	7500 ct	1875	.25	.075	1.0	1000	900	225	1.15:1	2.3:1	33.53
71500	81500	10,000 ct	10,000 ct	2500	.25	.075	1.0	1000	1200	300	1:1	2:1	32.32
71505	81505	*10,000 ct	10,000 ct	–	.25	.075	1.0	1000	1200	–	1:1		37.13
71510	81510	15,000 ct	400 ct	100	.16	.075	.82	1500	48	12	6.12:1	12.24:1	32.32
71515	81515	15,000 ct	500 ct	125	.16	.075	.82	1500	60	15	5.48:1	10.95:1	32.32
71520	81520	15,000 ct	600 ct	150	.16	.075	.82	1500	72	18	5:1	10:1	32.32
71525	81525	15,000 ct	10,000 ct	2500	.16	.075	.82	1500	1200	300	1.22:1	2.45:1	32.32
71530	81530	*15,000 ct	15,000 ct	–	.16	.075	.82	1500	1800	–	1:1		37.13
71535	81535	15,000 ct	15,000 ct	3750	.16	.075	.82	1500	1800	450	1:1	2:1	33.53
71540	81540	16,000 ct	1,000 ct	250	.15	.075	.8	1600	120	30	4:1	8:1	33.53
71545	81545	20,000 ct	500 ct	125	.125	.075	.7	2000	60	15	6.33:1	12.65:1	30.95
71550	81550	20,000 ct	600 ct	150	.125	.075	.7	2000	72	18	5.77:1	11.55:1	30.95
71555	81555	20,000 ct	800 ct	200	.125	.075	.7	2000	96	24	5:1	10:1	29.58
71560	81560	20,000 ct	1000 ct	250	.125	.075	.7	2000	120	30	4.47:1	8.94:1	37.13
71565	81565	20,000 ct	5000 ct	1250	.125	.075	.7	2000	600	150	2:1	4:1	32.32
71570	81570	20,000 ct	10,000 ct	2500	.125	.075	.7	2000	1200	300	1.41:1	2.83:1	32.32
71575	81575	*20,000 ct	20,000 ct	–	.125	.075	.7	2000	2400	–	1:1	–	37.13
71580	81580	25,000 ct	500 ct	125	.1	.075	.63	2500	60	15	7.07:1	14.14:1	33.53
71585	81585	25,000 ct	1000 ct	250	.1	.075	.63	2500	120	30	5:1	10:1	33.53
71590	81590	30,000 ct	50 ct	12.5	.083	.075	.58	3000	6	1.5	24.5:1	49:1	33.53
71595	81595	30,000 ct	1200 ct	300	.083	.075	.58	3000	144	36	5:1	10:1	33.53
71600	81600	30,000 ct	500 ct	125	.083	.075	.58	3000	60	15	7.75:1	15.5:1	33.53
71605	81605	30,000 ct	200 ct	50	.083	.075	.58	3000	24	6	12.25:1	24.5:1	33.53
71610	81610	30,000 ct	5,000 ct	1250	.083	.075	.58	3000	600	150	2.45:1	4.9:1	33.53
71615	81615	30,000 ct	10,000 ct	2500	.083	.075	.58	3000	1200	300	1.73:1	3.46:1	33.53
71620	81620	*30,000 ct	30,000 ct	–	.083	.075	.58	3000	3600	–	1:1	–	36.49
71625	81625	40,000 ct	400 ct	100	.062	.062	.5	4000	48	12	10:1	20:1	36.49

*INCLUDES ELECTROSTATIC SHIELD

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%;50-99 less 23%; 100-499 less 30%

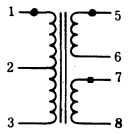
Ordering Instructions:
No minimum. Net 30 days
F.O.B. Pelham, New York

SURFACE MOUNT

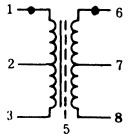
SERIES 71000

SERIES 81000

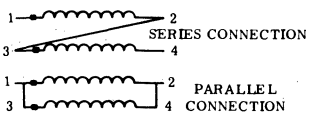
SCHEMATICS FOR TRANSFORMERS WITH SPLIT SECONDARIES



SCHEMATIC FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



SCHEMATIC FOR INDUCTORS



FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELD DESIGN AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED.
- VARIATION OF STANDARD DESIGNS AVAILABLE
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

THIS PRODUCT IS PATENTED

Delivery— stock to one week

INDUCTORS

ALL INDUCTORS HAVE SPLIT WINDINGS AND MEASUREMENTS ARE LISTED FOR BOTH SERIES AND PARALLEL CONNECTIONS. TWO VALUES OF INDUCTANCE, EACH AT A PARTICULAR VALUE OF D.C. CURRENT, ARE LISTED FOR EACH INDUCTOR.

PICO PART NUMBER	PICO PART NUMBER	INDUCTANCE SERIES		DC CURRENT	DC RESISTANCE	PRICES 1-9***
71705	81705	SERIES	0.1 .08	4 10	25	25.69
		PARALLEL	.025 .02	8 20	6.5	
71710	81710	SERIES	0.9 0.5	2 6	105	25.69
		PARALLEL	.23 .13	4 12	26	
71715	81715	SERIES	2.5 0.9	2 4	630	25.69
		PARALLEL	0.6 0.23	4 8	160	
71720	81720	SERIES	4.5 1.2	2 4	2300	27.28
		PARALLEL	1.1 0.3	4 8	575	

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

PICO Electronics, Inc.

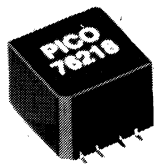
143 Sparks Ave.,
Pelham, N.Y. 10803-1837

FAX: 914-738-8225

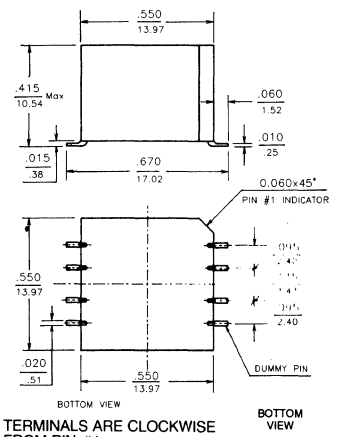
Internet:
http://www.picoelectronics.com
E-mail: HLSC73A@prodigy.com

SURFACE MOUNT
PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.

PICO's ultra-miniature transformers



76000 SERIES



TERMINALS ARE CLOCKWISE FROM PIN #1.
• DIMENSIONS INCH mm.

For Land Pattern Dimensions See Pg. A•2300 Fig.7

SPECIFICATIONS

- **MIL-T-27:** . . . . . All units manufactured to MIL-T-27, Military Designation is TF5S21ZZ for Transformers.
- **FREQUENCY RESPONSE:** ±3db, 300 Hz-75 KHz at 1.0 Milliwatt.
- **MAXIMUM DISTORTION:** . . . 5% With Rated Power Level at 1 KHz and 400 Hz.
- **DIELECTRIC STRENGTH:** All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:** Greater Than 10,000 Megohms at 300 V DC.
- **WEIGHT:** . . . . . 5 Grams
- **TERMINALS:** . . . . . Solderability per MIL-STD-202 Method 208.
- **THERMAL SHOCK:** . . . . . 25 Cycles, Method 107, MIL-STD-202, Test Condition –55°C to +130°C

PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER WATTS 1KHz and higher	400 Hz and higher	300 Hz and higher	PRIMARY UNBALANCED DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS RATIO PRIM/SEC SEC SER CONN	SEC PAR CONN	*** PRICE 1–9
76203	20 ct	8 ct	2	.6	.4	.3	30.0	2	1.2	.3	1.58:1	3.16:1	26.69
76205	20 ct	20 ct	5	.6	.4	.3	30.0	2	2.8	.7	1:1	2:1	26.69
76210	32 ct	32 ct	8	.6	.4	.3	23.0	3.3	4.5	1.13	1:1	2:1	26.69
76215	40 ct	40ct	10	.6	.4	.3	21.0	3.7	5	1.25	1:1	2:1	26.69
76218	48 ct	16 ct	4	.6	.4	.3	19.0	3.75	3	.75	1.73:1	3.46:1	26.69
76220	50 ct	50 ct	12.5	.6	.4	.3	19.0	5	7	1.75	1:1	2:1	26.69
76225	80 ct	32 ct	8	.6	.4	.3	15.0	7.5	4.3	1.13	1.58:1	3.16:1	26.69
76228	100 ct	40 ct	10	.6	.4	.3	13.0	10.8	5	1.25	1.58:1	3.16:1	26.69
76230	100 ct	100 ct	25	.6	.4	.3	13.0	10.8	12	3	1:1	2:1	26.69
76235	120 ct	12.8 ct	3.2	.6	.4	.3	12.0	9.3	2.2	.55	3.06:1	6.12:1	26.69
76240	120 ct	60 ct	15	.6	.4	.3	12.0	9	7.2	1.8	1.41:1	2.83:1	26.69
76245	120 ct	120 ct	30	.6	.4	.3	12.0	11.6	13	3.3	1:1	2:1	26.69
76250	150 ct	12 ct	3	.6	.4	.3	11.0	11.2	2.2	55	3.54:1	7.08:1	26.69
76255	150 ct	50 ct	12.5	.6	.4	.3	11.0	13	6.8	1.7	1.73:1	3.46:1	26.69
76260	150 ct	100 ct	25	.6	.4	.3	11.0	13	11.8	3	1.22:1	2.45:1	26.69
76265	150 ct	150 ct	37.5	.6	.4	.3	11.0	12	18.3	4.6	1:1	2:1	26.69
76270	150 ct	600 ct	150	.6	.4	.3	11.0	13	75	19	1:2	1:1	26.69
76275	200 ct	200 ct	50	.6	.4	.3	10.0	19	21.3	5.4	1:1	2:1	26.69
76280	300 ct	12 ct	3	.6	.4	.3	8.0	24	1.7	.43	5:1	10:1	26.69
76285	300 ct	50 ct	12.5	.6	.4	.3	8.0	30	6.8	1.7	2.45:1	4.9:1	26.69
76290	300 ct	150 ct	37.5	.6	.4	.3	8.0	30	18	4.6	1.41:1	2.83:1	26.69
76295	300 ct	300 ct	75	.6	.4	.3	8.0	30	34	8.5	1:1	2:1	26.69
76300	300 ct	600 ct	150	.6	.4	.3	8.0	30	60	15	1:1.41	1.41:1	26.69
76305	320 ct	12.8 ct	3.2	.6	.4	.3	7.5	31	1.7	.43	5:1	10:1	26.69
76310	400 ct	40 ct	10	.6	.4	.3	7.0	41	4.5	1.13	3.16:1	6.32:1	26.69
76315	400 ct	120 ct	30	.6	.4	.3	7.0	41	12	3	1.83:1	3.65:1	26.69
76320	400 ct	200 ct	50	.6	.4	.3	7.0	41	21.3	5.4	1.41:1	2.83:1	26.69
76325	400 ct	400 ct	100	.6	.4	.3	7.0	41	37.5	9.4	1:1	2:1	26.69
76330	400 ct	1000 ct	250	.6	.4	.3	7.0	41	96	24	1:1.58	1.26:1	26.69
76335	400 ct	2000 ct	500	.6	.4	.3	7.0	41	212	53	1:2.24	1:1.12	26.69
76340	400 ct	4000 ct	1000	.6	.4	.3	7.0	41	375	94	1:3.16	1:1.58	26.69
76342	500 ct	12.8 ct	3.2	.6	.4	.3	6.0	48	1.7	.43	6.25:1	12.5:1	26.69
76344	500 ct	16 ct	4	.6	.4	.3	6.0	48	1.9	.5	5.6:1	11.2:1	26.69
76345	500 ct	50 ct	12.5	.6	.4	.3	6.0	39	6.8	1.7	3.16:1	6.32:1	26.69
76347	500 ct	150 ct	37.5	.6	.4	.3	6.0	48	18	4.6	1.83:1	3.65:1	26.69
76350	500 ct	500 ct	125	.6	.4	.3	6.0	48	54	13.5	1:1	2:1	26.69
76355	*500 ct	500 ct	–	.6	.4	.3	6.0	48	68	–	1:1	–	26.69
76360	500 ct	600 ct	150	.6	.4	.3	6.0	48	59	15	1:1.1	1.83:1	26.69
76365	600 ct	12.8 ct	3.2	.6	.4	.3	5.5	53	1.7	.43	6.85:1	13.7:1	26.69
76367	600 ct	30 ct	7.5	.6	.4	.3	5.5	53	4.2	1.1	4.47:1	8.94:1	26.69
76370	600 ct	48 ct	12	.6	.4	.3	5.5	53	6.8	1.7	3.54:1	7.07:1	26.69
76375	600 ct	200 ct	50	.6	.4	.3	5.5	53	21.3	5.3	1.73:1	3.46:1	26.69
76380	600 ct	600 ct	150	.6	.4	.3	5.5	57	79	20	1:1	2:1	26.69
76385	*600 ct	600 ct	–	.6	.4	.3	5.5	53	75	–	1:1	–	26.69
76387	600 ct	1200 ct	300	.6	.4	.3	5.5	53	105	26	1:1.41	1.41:1	26.69
76390	640 ct	12.8 ct	3.2	.6	.4	.3	5.5	66	1.7	.43	7.07:1	14.14:1	26.69
76395	700 ct	100 ct	25	.6	.4	.3	5.0	69	12	3	2.65:1	5.29:1	26.69
76400	800 ct	12.8 ct	3.2	.6	.4	.3	5.0	75	1.7	.43	7.9:1	15.8:1	26.69
76405	800 ct	48 ct	12	.6	.4	.3	5.0	75	6.8	1.7	4.08:1	8.16:1	26.69
76410	800 ct	800 ct	200	.6	.4	.3	5.0	75	105	26	1:1	2:1	26.69
76415	900 ct	600 ct	150	.6	.4	.3	4.5	79	75	19	1.22:1	2.45:1	26.69
76420	1000 ct	12 ct	3	.6	.4	.3	4.5	103	1.6	.4	9.13:1	18.3:1	26.69
76425	1000 ct	50 ct	12.5	.6	.4	.3	4.5	103	6.4	1.6	4.47:1	8.94:1	26.69
76430	1000 ct	1000 ct	250	.6	.4	.3	4.5	103	115	28	1:1	2:1	26.69
76435	1060 ct	12.8 ct	3.2	.6	.4	.3	4.0	108	1.7	.43	9.1:1	18.2:1	26.69
76440	1200 ct	12.8 ct	3.2	.6	.4	.3	4.0	113	1.7	.43	9.68:1	19.4:1	26.69
76445	1200 ct	500 ct	125	.6	.4	.3	4.0	113	54	13.5	1.55:1	3.1:1	26.69
76450	1200 ct	1200 ct	300	.6	.4	.3	4.0	113	126	31.6	1:1	2:1	26.69
76455	*1200 ct	1200 ct	–	.6	.4	.3	4.0	111	125	–	1:1	–	26.69
76460	1500 ct	12 ct	3	.6	.4	.3	3.5	126	1.6	.4	11.2:1	22.4:1	26.69
76465	1500 ct	500 ct	125	.6	.4	.3	3.5	126	68	17	1.73:1	3.46:1	26.69
76470	*1500 ct	600 ct	–	.6	.4	.3	3.5	126	94	–	1.58:1	–	26.69
76475	*1500 ct	1500 ct	–	.6	.4	.3	3.5	126	176	–	1:1	–	26.69
76480	1600 ct	12.8 ct	3.2	.6	.4	.3	3.5	130	1.7	.43	11.2:1	22.4:1	26.69
76483	2000 ct	8 ct	2	.6	.4	.3	3.0	210	1.2	.3	15.8:1	31.6:1	26.69
76485	2000 ct	2000 ct	500	.6	.4	.3	3.0	198	218	55	1:1	2:1	26.69
76490	*2000 ct	2000 ct	–	.6	.4	.3	3.0	198	218	–	1:1	–	26.69
76495	2000 ct	8000 ct	2000	.6	.4	.3	3.0	198	850	213	1:2	1:1	26.69
76497	2500 ct	2500 ct	625	.6	.4	.3	2.5	220	305	76	1:1	2:1	26.69
76500	3000 ct	3000 ct	750	.6	.4	.3	2.5	243	335	84	1:1	2:1	26.69

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION

PICO Electronics, Inc.
143 Sparks Ave.,
Pelham, NY 10803-1837

FAX: 914-738-8225

Internet:
http://www.picoelectronics.com
E-Mail: ***HLSC73A@prodigy.com***

Delivery—stock to one week

*For immediate engineering assistance or to place an order—**Call Toll Free 800-228-9747***

SURFACE MOUNT

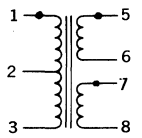
PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.

PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS PAR	POWER WATTS 1KHz and higher	POWER WATTS 400 Hz and higher	POWER WATTS 300 Hz and higher	PRIMARY UNBALANCED DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	SECONDARY DC RESISTANCE OHMS PAR CONN	TURNS RATIO PRIM/SEC SEC SER CONN	TURNS RATIO PRIM/SEC SEC PAR CONN	*** PRICE 1–9
76505	*3000 ct	3000 ct	–	.6	.4	.3	2.5	304	335	–	1:1	–	27.79
76510	.3600 ct	3600 ct	900	.6	.4	.3	2.5	330	366	92	1:1	2:1	26.69
76512	4000 ct	16 ct	4	.6	.4	.3	2.0	350	3	.75	15.8:1	31.6:1	26.69
76514	4000 ct	600 ct	150	.6	.4	.3	2.0	350	76	19	2.58:1	5.16:1	26.69
76515	4000 ct	1000 ct	250	.6	.4	.3	2.0	350	115	29	2:1	4:1	26.69
76520	*4000 ct	8000 ct	–	.6	.4	.3	2.0	350	1062	–	1:1.41	–	27.79
76525	5000 ct	500 ct	125	.6	.4	.3	2.0	350	67	17	3.16:1	6.32:1	26.69
76530	5000 ct	5000 ct	1250	.6	.4	.3	2.0	390	538	135	1:1	2:1	26.69
76535	7500 ct	50 ct	12.5	.6	.4	.3	1.5	600	7	1.75	12.2:1	24.5:1	29.61
76540	7500 ct	100 ct	25	.6	.4	.3	1.5	600	12	3	8.66:1	17.3:1	29.61
76545	7500 ct	600 ct	150	.6	.4	.3	1.5	600	78	19.5	3.54:1	7.07:1	29.61
76550	7500 ct	2500 ct	625	.6	.4	.3	1.5	600	305	77	1.73:1	3.46:1	29.61
76555	*7500 ct	7500 ct	–	.6	.4	.3	1.5	750	828	–	1:1	–	31.70
76560	8000 ct	12.8 ct	3.2	.6	.4	.3	1.5	750	1.7	.43	25:1	50:1	29.61
76565	8000 ct	1000 ct	250	.6	.4	.3	1.5	750	115	29	2.83:1	5.66:1	29.61
76570	*8000 ct	1200 ct	–	.6	.4	.3	1.5	750	158	–	2.58:1	–	31.70
76575	*9000 ct	9000 ct	–	.6	.4	.3	1.4	796	1100	–	1:1	–	31.70
76580	10,000 ct	12.8 ct	3.2	.6	.4	.3	1.4	1048	1.7	.43	28:1	56:1	29.61
76585	10,000 ct	16 ct	4	.6	.4	.3	1.4	1048	3	.75	25:1	50:1	29.61
76590	10,000 ct	100 ct	25	.6	.4	.3	1.4	839	12	3	10:1	20:1	29.61
76595	10,000 ct	200 ct	50	.6	.4	.3	1.4	839	27	6.7	7.07:1	14.14:1	29.61
76600	10,000 ct	500 ct	125	.6	.4	.3	1.4	850	67	17	4.47:1	8.94:1	29.61
76605	10,000 ct	600 ct	150	.6	.4	.3	1.4	850	74	18.5	4.08:1	8.16:1	29.61
76610	10,000 ct	1000 ct	250	.6	.4	.3	1.4	850	115	29	3.16:1	6.32:1	29.61
76615	10,000 ct	1200 ct	300	.6	.4	.3	1.4	850	158	39.5	2.89:1	5.77:1	29.61
76620	10,000 ct	1500 ct	375	.6	.4	.3	1.4	850	177	44	2.58:1	5.16:1	29.61
76625	10,000 ct	2000 ct	500	.6	.4	.3	1.4	850	255	64	2.24:1	4.47:1	29.61
76630	10,000 ct	5000 ct	1250	.6	.4	.3	1.4	850	630	158	1.41:1	2.83:1	29.61
76635	10,000 ct	7500 ct	1875	.6	.4	.3	1.4	850	772	193	1.15:1	2.3:1	29.61
76640	10,000 ct	10,000 ct	2500	.6	.4	.3	1.4	866	1215	304	1:1	2:1	29.61
76645	*10,000 ct	10,000 ct	–	.6	.4	.3	1.4	1060	1215	–	1:1		31.70
76650	15,000 ct	400 ct	100	.6	.4	.3	1.0	1305	47	12	6.12:1	12.24:1	29.61
76652	15,000 ct	500 ct	125	.6	.4	.3	1.0	1305	53	13	5.48:1	10.95:1	29.61
76655	15,000 ct	600 ct	150	.6	.4	.3	1.0	1305	72.5	18	5:1	10:1	29.61
76660	15,000 ct	10,000 ct	2500	.6	.4	.3	1.0	1305	1215	304	1.22:1	2.45:1	29.61
76665	*15,000 ct	15,000 ct	–	.6	.4	.3	1.0	1305	1800	–	1:1	–	31.70
76670	15,000 ct	15,000 ct	3750	.6	.4	.3	1.0	1305	1800	450	1:1	2:1	29.61
76675	16,000 ct	1000 ct	250	.6	.4	.3	1.0	1343	115	29	4:1	8:1	29.61
76680	20,000 ct	500 ct	125	.5	.4	.3	1.0	1560	68	17	6.33:1	12.65:1	31.70
76685	20,000 ct	600 ct	150	.5	.4	.3	1.0	1560	75	19	5.77:1	11.55:1	31.70
76690	20,000 ct	800 ct	200	.5	.4	.3	1.0	1560	108	27	5:1	10:1	31.70
76695	20,000 ct	1000 ct	250	.5	.4	.3	1.0	1560	121	30.5	4.47:1	8.94:1	31.70
76700	20,000 ct	5000 ct	1250	.5	.4	.3	1.0	1560	672	168	2:1	4:1	31.70
76705	20,000 ct	10,000 ct	2500	.5	.4	.3	1.0	1560	1520	380	1.41:1	2.83:1	31.70
76710	*20,000 ct	20,000 ct	–	.5	.4	.3	1.0	1560	2727	682	1:1	–	32.98
76715	25,000 ct	500 ct	125	.4	.4	.3	0.8	2170	68	17	7.07:1	14.14:1	31.70
76720	25,000 ct	1000 ct	250	.4	.4	.3	0.8	2170	120	30	5:1	10:1	31.70
76725	30,000 ct	50 ct	12.5	.33	.33	.3	0.8	2400	7	1.75	24.5:1	49:1	32.98
76730	30,000 ct	1200 ct	300	.33	.33	.3	0.8	2400	156	39	5:1	10:1	32.98
76732	30,000 ct	500 ct	125	.33	.33	.3	0.8	2400	68	17	7.75:1	15.5:1	32.98
76734	30,000 ct	200 ct	50	.33	.33	.3	0.8	2400	29	7.2	12.25:1	24.5:1	32.98
76735	30,000 ct	5000 ct	1250	.33	.33	.3	0.8	2400	673	169	2.45:1	4.9:1	32.98
76740	30,000 ct	10,000 ct	2500	.33	.33	.3	0.8	2400	1520	380	1.73:1	3.46:1	32.98
76745	*30,000 ct	30,000 ct	–	.33	.33	.3	0.8	3000	3310	–	1:1	–	35.41
76750	40,000 ct	400 ct	100	.25	.25	.25	0.7	3400	57	14.3	10:1	20:1	35.41
76755	40,000 ct	2000 ct	500	.25	.25	.25	0.7	3400	268	67	4.47:1	8.94:1	35.41
76760	40,000 ct	4000 ct	1000	.25	.25	.25	0.7	3400	476	119	3.16:1	6.32:1	35.41
76765	40,000 ct	20,000 ct	5000	.25	.25	.25	0.7	3400	2700	675	1.41:1	2.83:1	35.41
76770	*40,000 ct	40,000 ct	–	.25	.25	.25	0.7	3400	4750	–	1:1	–	39.49
76775	50,000 ct	200 ct	50	.2	.2	.2	0.6	4850	27	6.7	15.8:1	31.6:1	39.49
76777	50,000 ct	500 ct	125	.2	.2	.2	0.6	4850	68	17	10:1	20:1	39.49
76779	50,000 ct	600 ct	150	.2	.2	.2	0.6	4850	75	18.5	9.13:1	18.26:1	39.49
76780	60,000 ct	15,000 ct	3750	.16	.16	.16	0.5	5275	2250	563	2:1	4:1	42.58
76785	62,500 ct	50 ct	12.5	.16	.16	.16	0.5	5445	8.7	2.2	35.4:1	70.7:1	42.58
76787	80,000 ct	15,000 ct	3750	.12	.12	.12	0.4	6130	2250	563	2.3:1	4.6:1	42.58
76790	90,000 ct	10,000 ct	2500	.1	.1	.1	0.4	8140	1520	380	3:1	6:1	44.74
76795	95,000 ct	15,000 ct	3750	.1	.1	.1	0.4	8400	2250	563	2.52:1	5.03:1	44.74
76800	100,000 ct	60 ct	15	.1	.1	.1	0.4	8750	9.2	2.3	40.8:1	81.6:1	44.74
76805	100,000 ct	100 ct	25	.1	.1	.1	0.4	8750	15	3.8	31.6:1	63.2:1	44.74
76810	100,000 ct	500 ct	125	.1	.1	.1	0.4	8750	68	17	14.1:1	28.3:1	44.74
76815	100,000 ct	10,000 ct	2500	.1	.1	.1	0.4	8750	1535	385	3.16:1	6.32:1	44.74

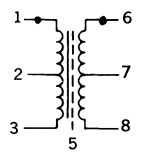
***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

*INCLUDES ELECTROSTATIC SHIELD

SCHEMATIC FOR TRANSFORMERS WITH SPLIT WINDING



SCHEMATIC FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED.
- VARIATION OF STANDARD DESIGNS AVAILABLE
- PRIMARY AND SECONDARY WINDINGS CAN BE USED EITHER AS INPUT OR OUTPUT.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

Delivery— stock to one week

PICO Electronics, Inc.

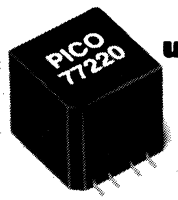
143 Sparks Ave.,
Pelham, NY 10803-1837

FAX: 914-738-8225

Internet:
http://www.picoelectronics.com
E-Mail: ***HLSC73A@prodigy.com***

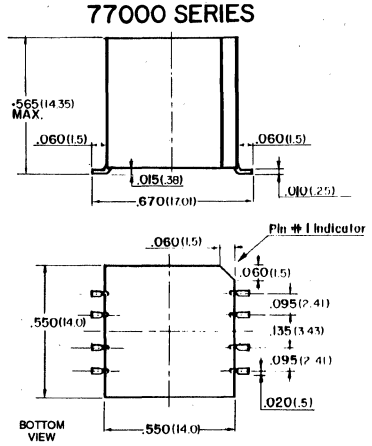
*For immediate engineering assistance or to place an order—**Call Toll Free 800-228-9747***

SURFACE MOUNT
PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.



PICO's ultra-miniature transformers

77000 SERIES



TERMINALS ARE CLOCKWISE FROM PIN #1.

- PIN #4 IS DUMMY PIN

DIMENSIONS ARE IN INCHES (MM)

SPECIFICATIONS

- **MIL-T-27:** . . . . . All units manufactured to MIL-T- 27, Audio Transformers are Type TF5S21ZZ
- **FREQUENCY RESPONSE:** ±3db, 150 Hz-75 KHz at 1.0 Milliwatt. (When Primary Impedance ≥ 50K Ohms, ±3 db 150 Hz to 20 KHz)
- **MAXIMUM DISTORTION:** . . . 5% With Rated Power Level at 1 KHz, 400 Hz and 150 Hz.
- **DIELECTRIC STRENGTH:** All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:** Greater Than 10,000 Megohms at 300 V DC.
- **WEIGHT:** . . . . . 7.5 Grams
- **TERMINALS:** . . . . . Solderability per MIL-STD-202 Method 208.
- **THERMAL SHOCK:** . . . . . 25 Cycles, Method 107, MIL-STD-202, Test Condition –55°C to +130°C

For Land Pattern Dimensions See Pg. A•2300 Fig.7

PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER WATTS 1KHz and higher	400 Hz and higher	150 Hz and higher	PRIMARY UNBALANCED DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS RATIO PRIM/SEC SEC SER CONN	SEC PAR CONN	*** PRICE 1–9
77203	20 ct	8 ct	2	1.0	.75	.11	22.0	1.75	1.0	.25	1.58:1	3.16:1	26.69
77205	20 ct	20 ct	5	1.0	.75	.11	22.0	1.75	2.5	.63	1:1	2:1	26.69
77210	32 ct	32 ct	8	1.0	.75	.11	18.0	2.7	3.7	.93	1:1	2:1	26.69
77215	40 ct	40 ct	10	1.0	.75	.11	16.0	3	5.2	1.3	1:1	2:1	26.69
77218	48 ct	16ct	4	1.0	.75	.11	13.0	4.5	2.4	.6	1.73:1	3.46:1	26.69
77220	50 ct	50 ct	12.5	1.0	.75	.11	13.0	4.5	6.2	1.6	1:1	2:1	26.69
77225	80 ct	32 ct	8	1.0	.75	.11	11.0	6.6	3.7	.93	1.58:1	3.16:1	26.69
77228	100 ct	40 ct	10	1.0	.75	.11	10.0	9.7	5.6	1.4	1.58:1	3.16:1	26.69
77230	100 ct	100 ct	25	1.0	.75	.11	10.0	9.7	11	2.8	1:1	2:1	26.69
77235	120 ct	12.8 ct	3.2	1.0	.75	.11	9.0	10.8	1.6	.4	3.06:1	6.12:1	26.69
77240	120 ct	60 ct	15	1.0	.75	.11	9.0	10.8	8.5	2.2	1.41:1	2.83:1	26.69
77245	120 ct	120 ct	30	1.0	.75	.11	9.0	10.8	15	3.8	1:1	2:1	26.69
77250	150 ct	12 ct	3	1.0	.75	.11	8.0	13.5	1.75	.44	3.54:1	7.08:1	26.69
77255	150 ct	50 ct	12.5	1.0	.75	.11	8.0	12	5.8	1.5	1.73:1	3.46:1	26.69
77260	150 ct	100 ct	25	1.0	.75	.11	8.0	12	13	3.3	1.22:1	2.44:1	26.69
77265	150 ct	150 ct	37.5	1.0	.75	.11	8.0	12	20	5	1:1	2:1	26.69
77270	150 ct	600 ct	150	1.0	.75	.11	8.0	12	82	20.5	1:2	1:1	26.69
77275	200 ct	200 ct	50	1.0	.75	.11	7.0	17	24	6.0	1:1	2:1	26.69
77280	300 ct	12 ct	3	1.0	.75	.11	5.0	30	1.75	.44	5:1	10:1	26.69
77285	300 ct	50 ct	12.5	1.0	.75	.11	5.0	27	6.2	1.6	2.45:1	4.9:1	26.69
77290	300 ct	150 ct	37.5	1.0	.75	.11	5.0	26	21	5.3	1.41:1	2.83:1	26.69
77295	300 ct	300 ct	75	1.0	.75	.11	5.0	27	38	9.5	1:1	2:1	26.69
77300	300 ct	600 ct	150	1.0	.75	.11	5.0	27	66	17	1.41:1	1.41:1	26.69
77305	320 ct	12.8 ct	3.2	1.0	.75	.11	5.0	30	1.75	.44	5:1	10:1	26.69
77310	400 ct	40 ct	10	1.0	.75	.11	5.0	39	4.3	1.1	3.16:1	6.32:1	26.69
77315	400 ct	120 ct	30	1.0	.75	.11	5.0	30	14	3.5	1.83:1	3.65:1	26.69
77320	400 ct	200 ct	50	1.0	.75	.11	5.0	39	24	6	1.41:1	2.83:1	26.69
77325	400 ct	400 ct	100	1.0	.75	.11	5.0	39	42	10.5	1:1	2:1	26.69
77330	400 ct	1000 ct	250	1.0	.75	.11	5.0	39	109	28	1:1.58	1.26:1	26.69
77335	400 ct	2000 ct	500	1.0	.75	.11	5.0	39	198	49	1:2.24	1:1.12	26.69
77340	400 ct	4000 ct	1000	1.0	.75	.11	5.0	39	436	109	1:3.16	1:1.58	26.69
77342	500 ct	12.8 ct	3.2	1.0	.75	.11	4.5	43	1.6	.4	6.25:1	12.5:1	26.69
77344	500 ct	16 ct	4	1.0	.75	.11	4.5	43	2.3	.56	5.6:1	11.2:1	26.69
77345	500 ct	50 ct	12.5	1.0	.75	.11	4.5	43	5.8	1.5	3.16:1	6.32:1	26.69
77347	500 ct	150 ct	37.5	1.0	.75	.11	4.5	43	19.8	5	1.83:1	3.65:1	26.69
77350	500 ct	500 ct	125	1.0	.75	.11	4.5	43	60	15	1:1	2:1	26.69
77355	*500 ct	500 ct	–	1.0	.75	.11	4.5	43	60	–	1:1	–	27.79
77360	500 ct	600 ct	150	1.0	.75	.11	4.5	43	66	17	1:1.1	1.83:1	26.69
77365	600 ct	12.8 ct	3.2	1.0	.75	.11	4.0	68	1.75	.44	6.85:1	13.7:1	26.69
77367	600 ct	30 ct	7.5	1.0	.75	.11	4.0	60	3.7	.93	4.47:1	8.94:1	26.69
77370	600 ct	48 ct	12	1.0	.75	.11	4.0	60	5.9	1.5	3.54:1	7.07:1	26.69
77375	*600 ct	200 ct	50	1.0	.75	.11	4.0	60	25	6.3	1.73:1	3.46:1	26.69
77380	600 ct	600 ct	150	1.0	.75	.11	4.0	60	66	17	1:1	2:1	26.69
77385	*600 ct	600 ct	–	1.0	.75	.11	4.0	60	68	–	1:1	–	27.79
77386	*600 ct	900 ct	–	1.0	.75	.11	4.0	60	104	–	1:1.22	–	27.79
77387	600 ct	1200 ct	300	1.0	.75	.11	4.0	60	116	29	1:1.41	1.41:1	26.69
77390	640 ct	12.8 ct	3.2	1.0	.75	.11	4.0	69	1.75	.44	7.07:1	14.14:1	26.69
77395	700 ct	100 ct	25	1.0	.75	.11	4.0	62	10.6	2.7	2.65:1	5.29:1	26.69
77400	800 ct	12.8 ct	3.2	1.0	.75	.11	3.5	78	1.75	.44	7.91:1	15.8:1	26.69
77405	800 ct	48 ct	12	1.0	.75	.11	3.5	74	6	1.5	4.08:1	8.16:1	26.69
77410	800 ct	800 ct	200	1.0	.75	.11	3.5	74	102	26	1:1	2:1	26.69
77415	900 ct	600 ct	150	1.0	.75	.11	3.0	90	66	17	1.23:1	2.45:1	26.69
77417	*900 ct	900 ct	–	1.0	.75	.11	3.0	90	102	–	1:1	–	27.79
77420	1000 ct	12 ct	3	1.0	.75	.11	3.0	115	1.75	.44	9.13:1	18.26:1	26.69
77425	1000 ct	50 ct	12.5	1.0	.75	.11	3.0	100	5.8	1.5	4.47:1	8.94:1	26.69
77430	1000 ct	1000 ct	250	1.0	.75	.11	3.0	75	103	26	1:1	2:1	26.69
77435	1060 ct	12.8 ct	3.2	1.0	.75	.11	3.0	115	1.75	.44	9.1:1	18.2:1	26.69
77440	1200 ct	12.8 ct	3.2	1.0	.75	.11	3.0	122	1.75	.44	9.68:1	19.4:1	26.69
77445	1200 ct	500 ct	125	1.0	.75	.11	3.0	113	63	16	1.55:1	3.1:1	26.69
77450	1200 ct	1200 ct	300	1.0	.75	.11	3.0	113	155	39	1:1	2:1	26.69
77455	*1200 ct	1200 ct	–	1.0	.75	.11	3.0	109	150	–	1:1	–	27.79
77460	1500 ct	12 ct	3	1.0	.75	.11	2.5	140	1.75	.44	11.18:1	22.36:1	26.69
77465	1500 ct	500 ct	125	1.0	.75	.11	2.5	150	60	15	1.73:1	3.46:1	26.69
77470	*1500 ct	600 ct	–	1.0	.75	.11	2.5	150	66	–	1.58:1	–	27.79
77475	*1500 ct	1500 ct	–	1.0	.75	.11	2.5	150	168	–	1:1	–	27.79
77480	1600 ct	12.8 ct	3.2	1.0	.75	.11	2.5	140	1.75	.44	11.18:1	22.36:1	26.69
77483	2000 ct	8 ct	2	1.0	.75	.11	2.0	250	1.0	.25	15.8:1	31.6:1	26.69
77485	2000 ct	2000 ct	500	1.0	.75	.11	2.0	185	255	64	1:1	2:1	26.69
77490	*2000 ct	2000 ct	–	1.0	.75	.11	2.0	175	240	–	1:1	–	27.79
77495	2000 ct	8000 ct	2000	1.0	.75	.11	2.0	185	1015	254	1:2	1:1	26.69
77497	2500 ct	2500 ct	625	1.0	.75	.11	2.0	245	268	68	1:1	2:1	26.69
77500	3000 ct	3000 ct	750	1.0	.75	.11	1.8	267	295	74	1:1	2:1	26.69
77505	*3000ct	3000 ct	–	1.0	.75	.11	1.8	267	368	–	1:1	–	27.79
77510	3600 ct	3600 ct	900	1.0	.75	.11	1.5	300	413	103	1:1	2:1	26.69
77512	4000 ct	16 ct	4	1.0	.75	.11	1.5	395	2.5	.65	15.8:1	31.6:1	26.69
77514	4000 ct	600 ct	150	1.0	.75	.11	1.5	395	66	17	2.58:1	5.16:1	26.69

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30% *INCLUDES ELECTROSTATIC SHIELD
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

PICO Electronics, Inc.
143 Sparks Ave.,
Pelham, NY 10803-1837
FAX: 914-738-8225
Internet:
http://www.picoelectronics.com
E-Mail: ***HLSC73A@prodigy.com***

Delivery— stock to one week

*For immediate engineering assistance or to place an order—**Call Toll Free 800-228-9747***

PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS PAR	POWER WATTS 1KHz and higher	POWER WATTS 400 Hz and higher	POWER WATTS 150 Hz and higher	PRIMARY UNBALANCED DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	SECONDARY DC RESISTANCE OHMS PAR CONN	TURNS RATIO PRIM/SEC SEC SER CONN	TURNS RATIO PRIM/SEC SEC PAR CONN	*** PRICE 1-9
77515	4000 ct	1000 ct	250	1.0	.75	.11	1.5	395	108	27	2:1	4:1	26.69
77520	*4000 ct	8000 ct	–	1.0	.75	.11	1.5	390	955	–	1:1.41	–	27.79
77525	5000 ct	500 ct	125	1.0	.75	.11	1.3	450	62	16	3.16:1	6.32:1	26.69
77530	5000 ct	5000 ct	1250	1.0	.75	.11	1.3	450	620	155	1:1	2:1	26.69
77535	7500 ct	50 ct	12.5	1.0	.75	.11	1.0	670	6	1.5	12.25:1	24.5:1	29.62
77540	7500 ct	100 ct	25	1.0	.75	.11	1.0	670	11	2.8	8.66:1	17.32:1	29.62
77545	7500 ct	600 ct	150	1.0	.75	.11	1.0	670	66	16.5	3.54:1	7.07:1	29.62
77550	7500 ct	2500 ct	625	1.0	.75	.11	1.0	670	268	67	1.73:1	3.46:1	29.62
77555	*7500 ct	7500 ct	–	1.0	.75	.11	1.0	670	925	–	1:1	–	32.66
77560	8000 ct	12.8 ct	3.2	1.0	.75	.11	1.0	765	1.75	.44	25:1	50:1	29.62
77565	8000 ct	1000 ct	250	1.0	.75	.11	1.0	695	106	26.5	2.83:1	5.66:1	29.62
77570	*8000 ct	1200 ct	–	1.0	.75	.11	1.0	715	153	–	2.58:1	–	32.66
77575	*9000 ct	9000 ct	–	1.0	.75	.11	1.0	925	1020	–	1:1	–	32.66
77580	10,000 ct	12.8 ct	3.2	1.0	.75	.11	1.0	768	1.6	.4	28:1	56:1	29.62
77585	10,000 ct	16 ct	4	1.0	.75	.11	1.0	756	1.7	.43	25:1	50:1	29.62
77590	10,000 ct	100 ct	25	1.0	.75	.11	1.0	780	10	2.5	10:1	20:1	29.62
77595	10,000 ct	200 ct	50	1.0	.75	.11	1.0	780	24	6	7.07:1	14.14:1	29.62
77600	10,000 ct	500 ct	125	1.0	.75	.11	1.0	780	60	15	4.47:1	8.94:1	29.62
77605	10,000 ct	600 ct	150	1.0	.75	.11	1.0	780	83	21	4.08:1	8.16:1	29.62
77610	10,000 ct	1000 ct	250	1.0	.75	.11	1.0	780	106	27	3.16:1	6.32:1	29.62
77615	10,000 ct	1200 ct	300	1.0	.75	.11	1.0	780	145	36	2.89:1	5.77:1	29.62
77620	10,000 ct	1500 ct	375	1.0	.75	.11	1.0	780	160	40	2.58:1	5.16:1	29.62
77625	10,000 ct	2000 ct	500	1.0	.75	.11	1.0	780	300	75	2.24:1	4.47:1	29.62
77630	10,000 ct	5000 ct	1250	1.0	.75	.11	1.0	780	610	153	1.41:1	2.83:1	29.62
77635	10,000 ct	7500 ct	1875	1.0	.75	.11	1.0	780	932	233	1.16:1	2.31:1	29.62
77640	10,000 ct	10,000 ct	2500	1.0	.75	.11	1.0	780	1075	269	1:1	2:1	29.62
77645	*10,000 ct	10,000 ct	–	1.0	.75	.11	1.0	715	985	–	1:1	–	32.66
77650	15,000 ct	400 ct	100	.66	.66	.11	0.8	1165	52	13	6.12:1	12.25:1	29.62
77652	15,000 ct	500 ct	125	.66	.66	.11	0.8	1165	60	15	5.48:1	10.95:1	29.62
77655	15,000 ct	600 ct	150	.66	.66	.11	0.8	1165	80	20	5:1	10:1	29.62
77660	15,000 ct	10,000 ct	2500	.66	.66	.11	0.8	1165	1050	263	1.22:1	2.45:1	29.62
77665	*15,000 ct	15,000 ct	–	.66	.66	.11	0.8	1165	1600		1:1		32.66
77670	15,000 ct	15,000 ct	3750	.66	.66	.11	0.8	1165	1600	400	1:1	2:1	29.62
77675	16,000 ct	1000 ct	250	.62	.62	.11	0.8	1560	108	27	4:1	8:1	29.62
77680	20,000 ct	500 ct	125	.5	.5	.11	0.7	1750	60	15	6.32:1	12.65:1	29.62
77685	20,000 ct	600 ct	150	.5	.5	.11	0.7	1750	82	20.5	5.77:1	11.55:1	32.66
77690	20,000 ct	800 ct	200	.5	.5	.11	0.7	1750	98	24.5	5:1	10:1	32.66
77695	20,000 ct	1000 ct	250	.5	.5	.11	0.7	1750	135	34	4.47:1	8.94:1	32.66
77700	20,000 ct	5000 ct	1250	.5	.5	.11	0.7	1750	610	153	2:1	4:1	32.66
77705	20,000 ct	10,000 ct	2500	.5	.5	.11	0.7	1750	1075	269	1.41:1	2.83:1	32.66
77710	*20,000 ct	20,000 ct	–	.5	.5	.11	0.7	1715	2370	–	1:1	–	32.66
77715	25,000 ct	500 ct	125	.4	.4	.11	0.6	2470	60	15	7.07:1	14.14:1	32.98
77720	25,000 ct	1000 ct	250	.4	.4	.11	0.6	2470	106	27	5:1	10:1	32.66
77725	30,000 ct	50 ct	12.5	.33	.33	.11	0.5	2730	6.2	1.6	24.5:1	49:1	32.66
77730	30,000 ct	1200 ct	300	.33	.33	.11	0.5	2815	156	39	5:1	10:1	32.98
77732	30,000 ct	500 ct	125	.33	.33	.11	0.5	2730	61	15.3	7.7:1	15.5:1	32.98
77734	30,000 ct	200 ct	50	.33	.33	.11	0.5	2730	24	6	12.2:1	24.5:1	32.98
77735	30,000 ct	5000 ct	1250	.33	.33	.11	0.5	2730	620	155	2.45:1	4.9:1	32.98
77740	30,000 ct	10,000 ct	2500	.33	.33	.11	0.5	2730	1090	272	1.73:1	3.46:1	32.98
77745	*30,000 ct	30,000 ct	–	.33	.33	.11	0.5	2730	3740	–	1:1	–	35.41
77750	40,000 ct	400 ct	100	.25	.25	.11	0.5	3150	53	13	10:1	20:1	35.41
77755	40,000 ct	2000 ct	500	.25	.25	.11	0.5	3150	300	75	4.47:1	8.94:1	35.41
77760	40,000 ct	4000 ct	1000	.25	.25	.11	0.5	3150	548	137	3.16:1	6.32:1	35.41
77765	40,000 ct	20,000 ct	5000	.25	.25	.11	0.5	3150	3075	769	1.41:1	2.83:1	35.41
77770	*40,000 ct	40,000 ct	–	.25	.25	.11	0.5	3940	4350	–	1:1	–	39.49
77775	50,000 ct	200 ct	50	.2	.2	.11	0.4	4275	24	6	15.8:1	31.6:1	39.49
77777	50,000 ct	500 ct	125	.2	.2	.11	0.4	4275	60	15	0:1	20:1	39.49
77778	50,000 ct	600 ct	150	.2	.2	.11	0.4	4275	82	21	9.13:1	18.26:1	39.49
77779	50,000 ct	50,000 ct	12,500	.2	.2	.11	0.4	4500	6270	1568	1:1	2:1	39.49
77780	60,000 ct	15,000 ct	3750	.16	.16	.11	0.4	5960	1650	412	2:1	4:1	42.76
77785	62,500 ct	50 ct	12.5	.16	.16	.11	0.4	5960	6	1.5	35.4:1	70.7:1	42.76
77787	80,000 ct	15,000 ct	3750	.12	.12	.11	0.3	7200	1690	423	2.3:1	4.6:1	42.76
77789	80,000 ct	80,000 ct	20,000	.12	.12	.11	0.3	7200	9920	2480	1:1	2:1	42.76
77790	90,000 ct	10,000 ct	2500	.11	.11	.11	0.3	7500	1350	338	3:1	6:1	44.70
77795	95,000 ct	15,000 ct	3750	.1	.1	.10	0.3	9550	1635	410	2.5:1	5:1	44.70
77800	100,000 ct	60 ct	15	.1	.1	.10	0.3	10,000	8.5	2.2	40.8:1	81.6:1	44.70
77805	100,000 ct	100 ct	25	.1	.1	.10	0.3	10,000	14	3.5	31.6:1	63.2:1	44.70
77810	100,000 ct	500 ct	125	.1	.1	.10	0.3	10,000	62	15.5	14.1:1	28.3:1	44.70
77813	100,000ct	1000 ct	250	.1	.1	.10	0.3	10,000	140	35	10:1	20:1	44.70
77814	100,000 ct	2000 ct	500	.1	.1	.10	0.3	10,000	248	62	7.07:1	14.14:1	44.70
77815	100,000 ct	10,000 ct	2500	.1	.1	.10	0.3	10,000	1075	270	3.16:1	6.32:1	44.70
77820	135,000 ct	82 ct	20.5	.074	.074	.074	0.25	13,700	9.5	2.4	40.6:1	81.2:1	46.76
77823	200,000 ct	500 ct	125	.05	.05	.05	0.2	17,340	75	19	20:1	40:1	46.76
77825	200,000 ct	1000 ct	250	.05	.05	.05	0.2	17,340	133	33	14.1:1	28.3:1	46.76
77830	200,000 ct	10,000 ct	2500	.05	.05	.05	0.2	17,340	1350	336	4.47:1	8.94:1	46.76
77835	200,000 ct	20,000 ct	5000	.05	.05	.05	0.2	17,340	3000	750	3.16:1	6.32:1	47.94
77837	250,000 ct	200 ct	50	.04	.04	.04	0.2	17,340	28	7	35.4:1	70.7:1	47.94
77840	250,000 ct	1000 ct	250	.04	.04	.04	0.2	17,340	118	30	15.8:1	31.6:1	47.94

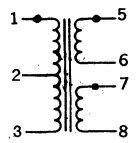
***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

*INCLUDES ELECTROSTATIC SHIELD

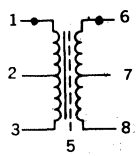
SURFACE MOUNT

PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.

SCHEMATIC FOR TRANSFORMERS WITH SPLIT WINDING



SCHEMATIC FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED.
- VARIATION OF STANDARD DESIGNS AVAILABLE
- PRIMARY AND SECONDARY WINDINGS CAN BE USED EITHER AS INPUT OR OUTPUT.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

Delivery— stock to one week

PICO Electronics, Inc.

143 Sparks Ave.,
Pelham, NY 10803-1837

FAX: 914-738-8225

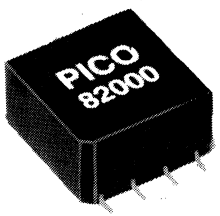
Internet:
http://www.picoelectronics.com
E-Mail: ***HLSC73A@prodigy.com***

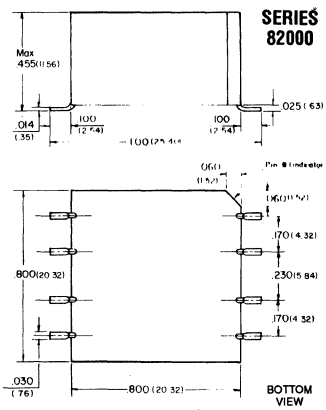
*For immediate engineering assistance or to place an order—**Call Toll Free 800-228-9747***

SURFACE MOUNT
PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.

PICO's ultra-miniature surface mount transformers

SERIES 82000





- TERMINALS ARE CLOCKWISE FROM PIN # 1.
- ALL DIMENSIONS ARE IN INCHES, ( ) = MM
- PIN # 4 IS DUMMY PIN.

For Land Pattern Dimensions See Pg. A•2300 Fig.8

PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	SPLIT WINDINGS PAR	POWER WATTS 1KHz and higher	300 Hz and higher	75 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS RATIO PRIME/SEC SEC SER CONN	SEC PAR CONN	PICO PRICES 1-9 ***
82003	20 ct	8 ct	2	1.5	.9	.03	22	1.6	.76	.19	1.58:1	3.16:1	32.63
82005	20 ct	20 ct	5	1.5	.9	.03	22	1.6	1.9	.48	1:1	2:1	32.63
82010	32 ct	32 ct	8	1.5	.9	.03	17.5	2.56	3	.75	1:1	2:1	32.63
82015	40 ct	40 ct	10	1.5	.9	.03	16	3.2	3.8	.95	1:1	2:1	32.63
82018	48 ct	16 ct	4	1.5	.9	.03	14.5	3.84	1.52	.38	1.73:1	3.46:1	32.63
82020	50 ct	50 ct	12.5	1.5	.9	.03	14	4	4.75	1.19	1:1	2:1	32.63
82025	80 ct	32 ct	8	1.5	.9	.03	11	6.4	3	.75	1.58:1	3.16:1	32.63
82028	100 ct	40 ct	10	1.5	.9	.03	10	8	3.8	.95	1.58:1	3.16:1	32.63
82030	100 ct	100 ct	25	1.5	.9	.03	10	8	9.5	2.38	1:1	2:1	32.63
82035	120 ct	12.8 ct	3.2	1.5	.9	.03	9	9.6	1.22	.3	3.06:1	6.12:1	32.63
82040	120 ct	60 ct	15	1.5	.9	.03	9	9.6	5.7	1.4	1.41:1	2.83:1	32.63
82045	120 ct	120 ct	30	1.5	.9	.03	9	9.6	11.4	2.85	1:1	2:1	32.63
82050	150 ct	12 ct	3	1.5	.9	.03	8	12	1.14	.29	3.54:1	7.08:1	32.63
82055	150 ct	50 ct	12.5	1.5	.9	.03	8	12	4.75	1.19	1.73:1	3.46:1	32.63
82060	150 ct	100 ct	25	1.5	.9	.03	8	12	9.5	2.38	1.22:1	2.44:1	32.63
82065	150 ct	150 ct	37.5	1.5	.9	.03	8	12	14.3	3.56	1:1	2:1	32.63
82070	150 ct	600 ct	150	1.5	.9	.03	8	12	57	14.3	1:2	1:1	32.63
82075	200 ct	200 ct	50	1.5	.9	.03	7	16	19	4.75	1:1	2:1	32.63
82080	300 ct	12 ct	3	1.5	.9	.03	5.5	24	1.14	.29	5:1	10:1	32.63
82085	300 ct	50 ct	12.5	1.5	.9	.03	5.5	24	4.75	1.19	2.45:1	4.9:1	32.63
82090	300 ct	150 ct	37.5	1.5	.9	.03	5.5	24	14.25	3.56	1.41:1	2.83:1	32.63
82095	300 ct	300 ct	75	1.5	.9	.03	5.5	24	28.5	7.13	1:1	2:1	32.63
82100	300 ct	600 ct	150	1.5	.9	.03	5.5	24	57	14.25	1:1.41	1.41:1	32.63
82105	320 ct	12.8 ct	3.2	1.5	.9	.03	5.5	25.6	1.22	.3	5:1	10:1	32.63
82110	400 ct	40 ct	10	1.5	.9	.03	5	32	3.8	.95	3.16:1	6.32:1	32.63
82115	400 ct	120 ct	30	1.5	.9	.03	5	32	11.4	2.85	1.83:1	3.65:1	32.63
82120	400 ct	200 ct	50	1.5	.9	.03	5	32	19	4.75	1.41:1	2.83:1	32.63
82125	400 ct	400 ct	100	1.5	.9	.03	5	32	38	9.5	1:1	2:1	32.63
82130	400 ct	1000 ct	250	1.5	.9	.03	5	32	95	23.8	1:1.58	1.26:1	32.63
82135	400 ct	2000 ct	500	1.5	.9	.03	5	32	190	47.5	1:2.24	1:1.12	32.63
82140	400 ct	4000 ct	1000	1.5	.9	.03	5	32	380	95	1:3.16	1:1.58	32.63
82142	500 ct	12.8 ct	3.2	1.5	.9	.03	4.5	40	1.22	.3	6.25:1	12.5:1	32.63
82144	500 ct	16 ct	4	1.5	.9	.03	4.5	40	1.52	.38	5.6:1	11.2:1	32.63
82145	500 ct	50 ct	12.5	1.5	.9	.03	4.5	40	4.75	1.19	3.16:1	6.32:1	32.63
82147	500 ct	150 ct	37.5	1.5	.9	.03	4.5	40	14.25	3.56	1.83:1	3.65:1	32.63
82150	500 ct	500 ct	125	1.5	.9	.03	4.5	40	47.5	11.88	1:1	2:1	32.63
82155	*500 ct	500 ct	–	1.5	.9	.03	4.5	40	47.5	–	1:1	–	33.98
82160	500 ct	600 ct	150	1.5	.9	.03	4.5	40	57	14.25	1:1.1	1.83:1	32.63
82165	600 ct	12.8 ct	3.2	1.5	.9	.03	4	48	1.22	.3	6.85:1	13.7	28.50
82167	600 ct	30 ct	7.5	1.5	.9	.03	4	48	2.85	.71	4.47:1	8.94:1	28.50
82170	600 ct	48 ct	12	1.5	.9	.03	4	48	4.56	1.14	3.54:1	7.07:1	28.50
82175	600 ct	200 ct	50	1.5	.9	.03	4	48	19	4.75	1.73:1	3.46:1	28.50
82180	600 ct	600 ct	150	1.5	.9	.03	4	48	57	14.25	1:1	2:1	32.63
82185	*600 ct	600 ct	–	1.5	.9	.03	4	48	57	–	1:1	–	29.68
82186	*600 ct	900 ct	–	1.5	.9	.03	4	48	85.5	–	1:1.22	–	29.68
82187	600 ct	1200 ct	300	1.5	.9	.03	4	48	114	28.5	1:1.41	1.41:1	28.50
82190	640 ct	12.8 ct	3.2	1.5	.9	.03	4	51.2	1.22	.3	7.07:1	14.14:1	28.50
82195	700 ct	100 ct	25	1.5	.9	.03	3.5	56	9.5	2.38	2.65:1	5.29:1	28.50
82200	800 ct	12.8 ct	3.2	1.5	.9	.03	3.5	64	1.22	.3	7.91:1	15.8:1	28.50
82205	800 ct	48 ct	12	1.5	.9	.03	3.5	64	4.56	1.14	4.08:1	8.16:1	28.50
82210	800 ct	800 ct	200	1.5	.9	.03	3.5	64	76	19	1:1	2:1	28.50
82215	900 ct	600 ct	150	1.5	.9	.03	3	72	57	14.3	1.23:1	2.45:1	28.50
82217	*900 ct	900 ct	–	1.5	.9	.03	3	72	85.5	–	1:1	–	29.68
82220	1000 ct	12 ct	3	1.5	.9	.03	3	80	1.14	.29	9.13:1	18.26:1	28.50
82225	1000 ct	50 ct	12.5	1.5	.9	.03	3	80	4.75	1.19	4.47:1	8.94:1	28.50
82230	1000 ct	1000 ct	250	1.5	.9	.03	3	80	95	23.8	1:1	2:1	28.50
82235	1060 ct	12.8 ct	3.2	1.5	.9	.03	3	85	1.22	.3	9.1:1	18.2:1	28.50
82240	1200 ct	12.8 ct	3.2	1.5	.9	.03	3	96	1.22	.3	9.68:1	19.4:1	28.50
82245	1200 ct	500 ct	125	1.5	.9	.03	3	96	47.5	11.88	1.55:1	3.1:1	28.50
82250	1200 ct	1200 ct	300	1.5	.9	.03	3	96	114	28.5	1:1	2:1	28.50
82255	*1200 ct	1200 ct	–	1.5	.9	.03	3	96	114	–	1:1	–	29.68
82260	1500 ct	12 ct	3	1.5	.9	.03	2.5	120	1.14	.29	11.18:1	22.36:1	28.50
82265	1500 ct	500 ct	125	1.5	.9	.03	2.5	120	47.5	11.88	1.73:1	3.46:1	28.50
82270	*1500 ct	600 ct	–	1.5	.9	.03	2.5	120	57	–	1.58:1	–	29.68
82275	*1500 ct	1500 ct	–	1.5	.9	.03	2.5	120	142	–	1:1	–	29.68
82280	1600 ct	12.8 ct	3.2	1.5	.9	.03	2.5	128	1.22	3	11.18:1	22.36:1	28.50
82283	2000 ct	8 ct	2	1.5	.9	.03	2.2	160	.76	.19	15.8:1	31.6:1	28.50
82285	2000 ct	2000 ct	500	1.5	.9	.03	2.2	160	190	47.5	1:1	2:1	28.50
82290	*2000 ct	2000 ct	–	1.5	.9	.03	2.2	160	190	–	1:1	–	29.68
82295	2000 ct	8000 ct	2000	1.5	.9	.03	2.2	160	760	190	1:2	1:1	28.50
82297	2500 ct	2500 ct	625	1.5	.9	.03	2	200	238	59.5	1:1	2:1	28.50
82300	3000 ct	3000 ct	750	1.5	.9	.03	1.8	240	285	71.3	1:1	2:1	28.50
82305	*3000 ct	3000 ct	–	1.5	.9	.03	1.8	240	285	–	1:1	–	29.68

*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION
***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

SPECIFICATIONS

- **MIL-T-27:** All units manufactured to MIL-T-27, Transformers are Type TF5S21ZZ
- **FREQUENCY RESPONSE:** ±3db, 75 Hz-30 KHz at 1.0 Milliwatt.
- **MAXIMUM DISTORTION:** 5% With Rated Power Level at 1 KHz, 300 Hz and 75 Hz.
- **DIELECTRIC STRENGTH:** All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:** Greater Than 10,000 Megohms at 300 V DC.
- **WEIGHT:** 12 Grams
- **OPERATING TEMPERATURE:** –55°C to +130°C
- **TERMINALS:** Solderability per MIL-STD-202 Method 208.
- **THERMAL SHOCK:** 25 Cycles, Method 107, MIL-STD-202, Test Condition –55°C to +130°C

THIS PRODUCT IS PATENTED

Delivery— stock to one week

Internet:http://www.picoelectronics.com • E-Mail:HLSC73A@prodigy.com • Call Toll free: 800-228-9747 • Fax: 914-738-8225

PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER WATTS 1KHz and higher	300 Hz and higher	75 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS RATIO PRIME/SEC SEC SER CONN	SEC PAR CONN	PICO PRICES 1-9 ***
82310	3600 ct	3600 ct	900	1.5	.9	.03	1.7	288	342	86	1:1	2:1	32.63
82312	4000 ct	16 ct	4	1.5	.9	.03	1.6	320	1.52	.38	15.8:1	31.6:1	32.63
82314	4000 ct	600 ct	150	1.5	.9	.03	1.6	320	57	14.3	2.58:1	5.16:1	32.63
82315	4000 ct	1000 ct	250	1.5	.9	.03	1.6	320	95	23.8	2:1	4:1	32.63
82320	*4000 ct	8000 ct	–	1.5	.9	.03	1.6	320	760	–	1:1.41	–	33.98
82325	5000 ct	500 ct	125	1.5	.9	.03	1.4	400	47.5	11.88	3.16:1	6.32:1	32.63
82330	5000 ct	5000 ct	1250	1.5	.9	.03	1.4	400	475	119	1:1	2:1	32.63
82335	7500 ct	50 ct	12.5	1.3	.9	.03	1.2	600	4.75	1.19	12.25:1	24.5:1	36.34
82340	7500 ct	100 ct	25	1.3	.9	.03	1.2	600	9.5	2.38	8.66:1	17.32:1	36.34
82345	7500 ct	600 ct	150	1.3	.9	.03	1.2	600	57	14.3	3.54:1	7.07:1	36.34
82350	7500 ct	2500 ct	625	1.3	.9	.03	1.2	600	238	59.5	1.73:1	3.46:1	36.34
82355	*7500 ct	7500 ct	–	1.3	.9	.03	1.2	600	713	–	1:1	–	38.75
82360	8000 ct	12.8 ct	3.2	1.2	.9	.03	1.1	640	1.22	.3	25:1	50:1	36.34
82365	8000 ct	1000 ct	250	1.2	.9	.03	1.1	640	95	23.8	2.83:1	5.66:1	36.34
82370	*8000 ct	1200 ct	–	1.2	.9	.03	1.1	640	114	–	2.58:1	–	38.75
82375	*9000 ct	9000 ct	–	1.1	.9	.03	1.1	720	855	–	1:1	–	38.75
82380	10,000 ct	12.8 ct	3.2	1.0	.9	.03	1	800	1.22	.3	28:1	56:1	36.34
82385	10,000 ct	16 ct	4	1.0	.9	.03	1	800	1.52	.38	25:1	50:1	36.34
82390	10,000 ct	100 ct	25	1.0	.9	.03	1	800	9.5	2.38	10:1	20:1	36.34
82395	10,000 ct	200 ct	50	1.0	.9	.03	1	800	19	4.75	7.07:1	14.14:1	36.34
82400	10,000 ct	500 ct	125	1.0	.9	.03	1	800	47.5	11.88	4.47:1	8.94:1	36.34
82405	10,000 ct	600 ct	150	1.0	.9	.03	1	800	57	14.25	4.08:1	8.16:1	36.34
82410	10,000 ct	1000 ct	250	1.0	.9	.03	1	800	95	23.8	3.16:1	6.32:1	36.34
82415	10,000 ct	1200 ct	300	1.0	.9	.03	1	800	114	28.5	2.89:1	5.77:1	36.34
82420	10,000 ct	1500 ct	375	1.0	.9	.03	1	800	143	35.8	2.58:1	5.16:1	36.34
82425	10,000 ct	2000 ct	500	1.0	.9	.03	1	800	190	47.5	2.24:1	4.47:1	36.34
82430	10,000 ct	5000 ct	1250	1.0	.9	.03	1	800	475	119	1.41:1	2.83:1	36.34
82435	10,000 ct	7500 ct	1875	1.0	.9	.03	1	800	713	178	1.16:1	2.31:1	36.34
82440	10,000 ct	10,000 ct	2500	1.0	.9	.03	1	800	950	238	1:1	2:1	36.34
82445	*10,000 ct	10,000 ct	–	1.0	.9	.03	1	800	950	–	1:1	–	38.75
82450	15,000 ct	400 ct	100	.66	.66	.03	.8	1200	38	9.5	6.12:1	12.25:1	36.34
82452	15,000 ct	500 ct	125	.66	.66	.03	.8	1200	48	12	5.48:1	10.95:1	36.34
82455	15,000 ct	600 ct	150	.66	.66	.03	.8	1200	57	14.3	5:1	10:1	36.34
82460	15,000 ct	10,000 ct	2500	.66	.66	.03	.8	1200	950	238	1.22:1	2.45:1	36.34
82465	*15,000 ct	15,000 ct	–	.66	.66	.03	.8	1200	1430	–	1:1		38.75
82470	15,000 ct	15,000 ct	3750	.66	.66	.03	.8	1200	1430	357	1:1	2:1	36.34
82475	16,000 ct	1000 ct	250	.62	.62	.03	.8	1280	95	23.8	4:1	8:1	36.34
82480	20,000 ct	500 ct	125	.5	.5	.03	.7	1600	47.5	11.88	6.32:1	12.65:1	38.75
82485	20,000 ct	600 ct	150	.5	.5	.03	.7	1600	57	14.25	5.77:1	11.55:1	38.75
82490	20,000 ct	800 ct	200	.5	.5	.03	.7	1600	76	19	5:1	10:1	38.75
82495	20,000 ct	1000 ct	250	.5	.5	.03	.7	1600	95	23.8	4.47:1	8.94:1	38.75
82500	20,000 ct	5000 ct	1250	.5	.5	.03	.7	1600	475	119	2:1	4:1	38.75
82505	20,000 ct	10,000 ct	2500	.5	.5	.03	.7	1600	950	238	1.41:1	2.83:1	38.75
82510	*20,000 ct	20,000 ct	–	.5	.5	.03	.7	1600	1900	–	1:1	–	40.29
82515	25,000 ct	500 ct	125	.4	.4	.03	.6	2000	47.5	11.88	7.07:1	14.14:1	38.75
82520	25,000 ct	1000 ct	250	.4	.4	.03	.6	2000	95	23.8	5:1	10:1	38.75
82525	30,000 ct	50 ct	12.5	.33	.33	.03	.6	2400	4.75	1.19	24.5:1	49:1	40.29
82530	30,000 ct	1200 ct	300	.33	.33	.03	.6	2400	114	28.5	5:1	10:1	40.28
82532	30,000 ct	500 ct	125	.33	.33	.03	.6	2400	47.5	11.88	7.7:1	15.5:1	40.28
82534	30,000 ct	200 ct	50	.33	.33	.03	.6	2400	19	4.75	12.2:1	24.5:1	40.28
82535	30,000 ct	5000 ct	1250	.33	.33	.03	.6	2400	475	119	2.45:1	4.9:1	40.28
82540	30,000 ct	10,000 ct	2500	.33	.33	.03	.6	2400	950	238	1.73:1	3.46:1	40.28
82545	*30,000 ct	30,000 ct	–	.33	.33	.03	.6	2400	2850	–	1:1	–	43.40
82550	40,000 ct	400 ct	100	.25	.25	.03	.5	3200	38	9.5	10:1	20:1	43.40
82555	40,000 ct	2000 ct	500	.25	.25	.03	.5	3200	190	47.5	4.47:1	8.94:1	43.40
82560	40,000 ct	4000 ct	1000	.25	.25	.03	.5	3200	380	95	3.16:1	6.32:1	43.40
82565	40,000 ct	20,000 ct	5000	.25	.25	.03	.5	3200	1900	475	1.41:1	2.83:1	43.40
82570	*40,000 ct	40,000 ct	–	.25	.25	.03	.5	3200	3800	–	1:1	–	48.18
82575	50,000 ct	200 ct	50	.2	.2	.03	.4	4000	19	4.75	15.8:1	31.6:1	48.18
82577	50,000 ct	500 ct	125	.2	.2	.03	.4	4000	47.5	11.88	10:1	20:1	48.18
82578	50,000 ct	600 ct	150	.2	.2	.03	.4	4000	57	14.3	9.13:1	18.26:1	48.18
82579	50,000 ct	50,000 ct	12,500	.2	.2	.03	.4	4000	4750	1190	1:1	2:1	48.18
82580	60,000 ct	15,000 ct	3750	.16	.16	.03	.4	4800	1430	358	2:1	4:1	52.05
82585	62,500 ct	50 ct	12.5	.16	.16	.03	.4	5000	4.75	1.19	35.4:1	70.7:1	52.05
82587	80,000 ct	15,000 ct	3750	.12	.12	.03	.3	6400	1430	358	2.3:1	4.6:1	52.05
82590	90,000 ct	10,000 ct	2500	.11	.11	.03	.3	7200	950	238	3:1	6:1	52.05
82595	95,000 ct	15,000 ct	3750	.1	.1	.03	.3	7600	1430	358	2.5:1	5:1	54.63
82600	100,000 ct	60 ct	15	.1	.1	.03	.3	8000	5.7	1.43	40.8:1	81.6:1	54.63
82605	100,000 ct	100 ct	25	.1	.1	.03	.3	8000	9.5	2.38	31.6:1	63.2:1	54.63
82610	100,000 ct	500 ct	125	.1	.1	.03	.3	8000	47.5	11.88	14.1:1	28.3:1	54.63
82613	100,000 ct	1000 ct	250	.1	.1	.03	.3	8000	95	23.8	10:1	20:1	54.63
82614	100,000 ct	2000 ct	500	.1	.1	.03	.3	8000	190	47.5	7.07:1	14.14:1	54.63
82615	100,000 ct	10,000 ct	2500	.1	.1	.03	.3	8000	950	238	3.16:1	6.32:1	54.63
82620	135,000 ct	82 ct	20.5	.07	.07	.03	.2	10,800	7.8	1.9	40.6:1	81.2:1	57.07

*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION
***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

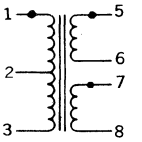
PICO's ultra-miniature surface mount transformers

SERIES 82000

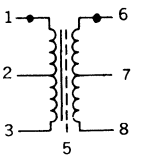
FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED.
- VARIATION OF STANDARD DESIGNS AVAILABLE
- PRIMARY AND SECONDARY WINDINGS CAN BE USED EITHER AS INPUT OR OUTPUT.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

SCHEMATIC FOR TRANSFORMERS WITH SPLIT WINDING



SCHEMATIC FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



PICO Electronics, Inc.
143 Sparks Ave.,
Pelham, NY 10803-1837
FAX: 914-738-8225
Internet:
http://www.picoelectronics.com
E-Mail: ***HLSC73A@prodigy.com***

For immediate engineering assistance or to place an order—

Delivery— stock to one week

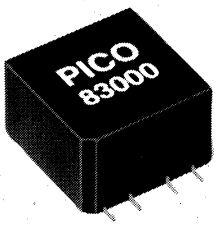
Call Toll Free 800-228-9747

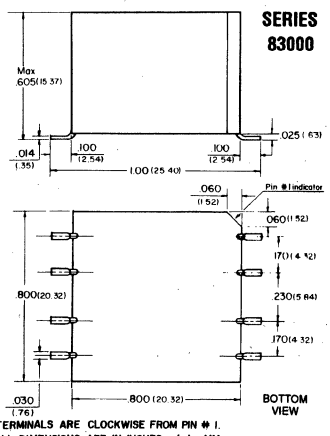
PICO's

SURFACE MOUNT

PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.

ultra-miniature transformers SERIES 83000





- TERMINALS ARE CLOCKWISE FROM PIN # 1.
- ALL DIMENSIONS ARE IN INCHES, ( ) = MM.
- PIN # 4 IS DUMMY PIN.

For Land Pattern Dimensions See Pg. A•2300 Fig.8

SPECIFICATIONS

- **MIL-T-27:** ..... All units manufactured to MIL-T-27, Transformers are Type TF5S21ZZ
- **FREQUENCY RESPONSE:** ..... ±3db, 50 Hz-30 KHz at 1.0 Milliwatt (±0.5 db, 300 Hz-5 KHz)
- **MAXIMUM DISTORTION:** ..... 5% With Rated Power Level at 1 KHz, 300 Hz and 50 Hz.
- **DIELECTRIC STRENGTH:** ..... All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:** ... Greater Than 10,000 Megohms at 300 V DC.
- **WEIGHT:** ..... 17 Grams
- **OPERATING TEMPERATURE:** -55°C to +130°C
- **TERMINALS:** ..... Solderability per MIL-STD-202 Method 208.
- **THERMAL SHOCK:** ..... 25 Cycles, Method 107, MIL-STD-202, Test Condition -55°C to +130°C

THIS PRODUCT IS PATENTED

For immediate engineering assistance or to place an order—
Call Toll Free 800-228-9747

PICO Electronics, Inc.

143 Sparks Ave., Pelham, N.Y. 10803-1837
FAX: 914-738-8225
Internet: http://www.picoelectronics.com
E-mail: HLSC73A@prodigy.com

These units can be manufactured and tested to MIL-T-27/359. Contact factory for price and delivery information and appropriate parts numbers (MIL-T-27/359-01 thru MIL-T-27/359-147).

PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS PAR	POWER WATTS 1KHz and higher	POWER WATTS 300 Hz and higher	POWER WATTS 50 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	SECONDARY DC RESISTANCE OHMS PAR CONN	TURNS RATIO PRIM/SEC SEC SER CONN	TURNS RATIO PRIM/SEC SEC PAR CONN	PICO PRICES 1-9 ***
83003	20 ct	8 ct	2	2.0	1.5	.05	22	1.6	.88	.22	1.58:1	3.16:1	26.62
83005	20 ct	20 ct	5	2.0	1.5	.05	22	1.6	2.2	.55	1:1	2:1	26.62
83010	32 ct	32 ct	8	2.0	1.5	.05	17.5	2.56	3.52	.88	1:1	2:1	26.62
83015	40 ct	40 ct	10	2.0	1.5	.05	16	3.2	4.4	1.1	1:1	2:1	26.62
83018	48 ct	16ct	4	2.0	1.5	.05	14.5	3.84	1.76	.44	1.73:1	3.46:1	26.62
83020	50 ct	50 ct	12.5	2.0	1.5	.05	14	4	5.5	1.38	1:1	2:1	26.62
83025	80 ct	32 ct	8	2.0	1.5	.05	11	6.4	3.52	.88	1.58:1	3.16:1	26.62
83028	100 ct	40 ct	10	2.0	1.5	.05	10	8	4.4	1.1	1.58:1	3.16:1	26.62
83030	100 ct	100 ct	25	2.0	1.5	.05	10	8	11	2.75	1:1	2:1	26.62
83035	120 ct	12.8 ct	3.2	2.0	1.5	.05	9	9.6	1.41	.35	3.06:2	6.12:1	26.62
83040	120 ct	60 ct	15	2.0	1.5	.05	9	9.6	6.6	1.65	1.41:1	2.83:1	26.62
83045	120 ct	120 ct	30	2.0	1.5	.05	9	9.6	13.2	3.3	1:1	2:1	26.62
83050	150 ct	12 ct	3	2.0	1.5	.05	8	12	1.32	.33	3.54:1	7.08:1	26.62
83055	150 ct	50 ct	12.5	2.0	1.5	.05	8	12	5.5	1.38	1.73:1	3.46:1	26.62
83060	150 ct	100 ct	25	2.0	1.5	.05	8	12	11	2.75	1.22:1	2.44:1	26.62
83065	150 ct	150 ct	37.5	2.0	1.5	.05	8	12	16.5	4.13	1:1	2:1	26.62
83070	150 ct	600 ct	150	2.0	1.5	.05	8	12	66	16.5	1:2	1:1	26.62
83075	200 ct	200 ct	50	2.0	1.5	.05	7	16	22	5.5	1:1	2:1	26.62
83080	300 ct	12 ct	3	2.0	1.5	.05	5.5	24	1.32	.33	5:1	10:1	26.62
83085	300 ct	50 ct	12.5	2.0	1.5	.05	5.5	24	5.5	1.38	2.45:1	4.9:1	26.62
83090	300 ct	150 ct	37.5	2.0	1.5	.05	5.5	24	16.5	4.13	1.41:1	2.83:1	26.62
83095	300 ct	300 ct	75	2.0	1.5	.05	5.5	24	33	8.25	1:1	2:1	26.62
83100	300 ct	600 ct	150	2.0	1.5	.05	5.5	24	66	16.5	1:1.41	1.41:1	26.62
83105	320 ct	12.8 ct	3.2	2.0	1.5	.05	5.5	25.6	1.41	.35	5:1	10:1	26.62
83110	400 ct	40 ct	10	2.0	1.5	.05	5	32	4.4	1.1	3.16:1	6.32:1	26.62
83115	400 ct	120 ct	30	2.0	1.5	.05	5	32	13.2	3.3	1.83:1	3.65:1	26.62
83120	400 ct	200 ct	50	2.0	1.5	.05	5	32	22	5.5	1.41:1	2.83:1	26.62
83125	400 ct	400 ct	100	2.0	1.5	.05	5	32	44	11	1:1	2:1	26.62
83130	400 ct	1000 ct	250	2.0	1.5	.05	5	32	110	27.5	1:1.58	1.26:1	26.62
83135	400 ct	2000 ct	500	2.0	1.5	.05	5	32	220	55	1:2.24	1:1.12	26.62
83140	400 ct	4000 ct	1000	2.0	1.5	.05	5	32	440	110	1:3.16	1:1.58	26.62
83142	500 ct	12.8 ct	3.2	2.0	1.5	.05	4.5	40	1.41	.35	6.25:1	12.5:1	26.62
83144	500 ct	16 ct	4	2.0	1.5	.05	4.5	40	1.76	.44	5.6:1	11.2:1	26.62
83145	500 ct	50 ct	12.5	2.0	1.5	.05	4.5	40	5.5	1.38	3.16:1	6.32:1	26.62
83147	500 ct	150 ct	37.5	2.0	1.5	.05	4.5	40	16.5	4.13	1.83:1	3.65:1	26.62
83150	500 ct	500 ct	125	2.0	1.5	.05	4.5	40	55	13.75	1:1	2:1	26.62
83155	*500 ct	500 ct	–	2.0	1.5	.05	4.5	40	55	–	1:1	–	27.68
83160	500 ct	600 ct	150	2.0	1.5	.05	4.5	40	66	16.5	1:1.1	1.83:1	26.62
83165	600 ct	12.8 ct	3.2	2.0	1.5	.05	4	48	1.41	.35	6.85:1	13.7	26.62
83167	600 ct	30 ct	7.5	2.0	1.5	.05	4	48	3.3	.83	4.47:1	8.94:1	26.62
83170	600 ct	48 ct	12	2.0	1.5	.05	4	48	5.28	1.37	3.54:1	7.07:1	26.62
83175	600 ct	200 ct	50	2.0	1.5	.05	4	48	22	5.5	1.73:1	3.46:1	26.62
83180**	600 ct	600 ct	150	2.0	1.5	.05	4	48	66	16.5	1:1	2:1	26.62
83185**	*600 ct	600 ct	–	2.0	1.5	.05	4	48	66	–	1:1	–	27.68
83186**	*600 ct	900 ct	–	2.0	1.5	.05	4	48	99	–	1:1.22	–	27.68
83187**	600 ct	1200 ct	300	2.0	1.5	.05	4	48	132	33	1:1.41	1.41:1	26.62
83190	640 ct	12.8 ct	3.2	2.0	1.5	.05	4	51	1.41	.35	7.07:1	14.14:1	26.62
83195	700 ct	100 ct	25	2.0	1.5	.05	3.5	56	11	2.75	2.65:1	5.29:1	26.62
83200	800 ct	12.8 ct	3.2	2.0	1.5	.05	3.5	64	1.41	.35	7.91:1	15.8:1	26.62
83205	800 ct	48 ct	12	2.0	1.5	.05	3.5	64	5.28	1.32	4.08:1	8.16:1	26.62
83210	800 ct	800 ct	200	2.0	1.5	.05	3.5	64	88	22	1:1	2:1	26.62
83215	900 ct	600 ct	150	2.0	1.5	.05	3	72	66	16.5	1.23:1	2.45:1	26.62
83217**	*900 ct	900 ct	–	2.0	1.5	.05	3	72	99	–	1:1	–	27.68
83220	1000 ct	12 ct	3	2.0	1.5	.05	3	80	1.32	.33	9.13:1	18.26:1	26.62
83225	1000 ct	50 ct	12.5	2.0	1.5	.05	3	80	5.5	1.38	4.47:1	8.94:1	26.62
83230	1000 ct	1000 ct	250	2.0	1.5	.05	3	80	110	27.5	1:1	2:1	26.62
83235	1060 ct	12.8 ct	3.2	2.0	1.5	.05	3	85	1.41	.35	9.1:1	18.2:1	26.62
83240	1200 ct	12.8 ct	3.2	2.0	1.5	.05	3	96	1.41	.35	9.68:1	19.4:1	26.62
83245	1200 ct	500 ct	125	2.0	1.5	.05	3	96	55	13.75	1.55:1	3.1:1	26.62
83250	1200 ct	1200 ct	300	2.0	1.5	.05	3	96	132	33	1:1	2:1	26.62
83255	*1200 ct	1200 ct	–	2.0	1.5	.05	3	96	132	–	1:1	–	27.68
83260	1500 ct	12 ct	3	2.0	1.5	.05	2.5	120	1.32	.33	11.18:1	22.36:1	26.62
83265	1500 ct	500 ct	125	2.0	1.5	.05	2.5	120	55	13.75	1.73:1	3.46:1	26.62
83270	*1500 ct	600 ct	–	2.0	1.5	.05	2.5	120	66	–	1.58:1	–	27.68
83275	*1500 ct	1500 ct	–	2.0	1.5	.05	2.5	120	165	–	1:1	–	27.68
83280	1600 ct	12.8 ct	3.2	2.0	1.5	.05	2.5	128	1.41	.35	11.18:1	22.36:1	26.62
38283	2000 ct	8 ct	2	2.0	1.5	.05	2.2	160	.88	.22	15.8:1	31.6:1	26.62
83285	2000 ct	2000 ct	500	2.0	1.5	.05	2.2	160	220	55	1:1	2:1	26.62
83290	*2000 ct	2000 ct	–	2.0	1.5	.05	2.2	160	220	–	1:1	–	27.68
83295	2000 ct	8000 ct	2000	2.0	1.5	.05	2.2	160	880	220	1:2	1:1	27.68
83297	2500 ct	2500 ct	625	2.0	1.5	.05	2	200	275	69	1:1	2:1	27.68
83300	3000 ct	3000 ct	750	2.0	1.5	.05	1.8	240	330	83	1:1	2:1	27.68
83305	*3000 ct	3000 ct	–	2.0	1.5	.05	1.8	240	330	–	1:1	–	27.68

*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION
***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER WATTS 1KHz and higher	300 Hz and higher	50 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS RATIO PRIM/SEC SEC SER CONN	SEC PAR CONN	PICO PRICES 1-9 ***
83310	3600 ct	3600 ct	900	2.0	1.5	.05	1.7	288	396	99	1:1	2:1	27.68
83312	4000 ct	16 ct	4	2.0	1.5	.05	1.6	320	1.76	.44	15.8:1	31.6:1	27.68
83314**	4000 ct	600 ct	150	2.0	1.5	.05	1.6	320	66	16.5	2.58:1	5.16:1	27.68
83315	4000 ct	1000 ct	250	2.0	1.5	.05	1.6	320	110	27.5	2:1	4:1	27.68
83320	*4000 ct	8000 ct	–	2.0	1.5	.05	1.6	320	880	–	1:1.41	–	27.68
83325	5000 ct	500 ct	125	2.0	1.5	.05	1.4	400	55	13.8	3.16:1	6.32:1	26.62
83330	5000 ct	5000 ct	1250	2.0	1.5	.05	1.4	400	550	138	1:1	2:1	26.62
83335	7500 ct	50 ct	12.5	1.3	1.3	.05	1.2	600	5.5	1.38	12.25:1	24.5:1	29.48
83340	7500 ct	100 ct	25	1.3	1.3	.05	1.2	600	11	2.75	8.66:1	17.32:1	29.48
83345	7500 ct	600 ct	150	1.3	1.3	.05	1.2	600	66	16.5	3.54:1	7.07:1	29.48
83350	7500 ct	2500 ct	625	1.3	1.3	.05	1.2	600	275	69	1.73:1	3.46:1	29.48
83355	*7500 ct	7500 ct	–	1.3	1.3	.05	1.2	600	825	–	1:1	–	31.87
83360	8000 ct	12.8 ct	3.2	1.2	1.2	.05	1.1	640	1.4	.35	25:1	50:1	29.48
83365	8000 ct	1000 ct	250	1.2	1.2	.05	1.1	640	110	27.5	2.83:1	5.66:1	29.48
83370	*8000 ct	1200 ct	–	1.2	1.2	.05	1.1	640	132	–	2.58:1	–	31.87
83375	*9000 ct	9000 ct	–	1.1	1.1	.05	1.1	720	990	–	1:1	–	31.87
83380	10,000 ct	12.8 ct	3.2	1.0	1.0	.05	1	800	1.4	.35	28:1	56:1	29.48
83385	10,000 ct	16 ct	4	1.0	1.0	.05	1	800	1.76	.44	25:1	50:1	29.48
83390	10,000 ct	100 ct	25	1.0	1.0	.05	1	800	11	2.75	10:1	20:1	29.48
83395	10,000 ct	200 ct	50	1.0	1.0	.05	1	800	22	5.5	7.07:1	14.14:1	29.48
83400	10,000 ct	500 ct	125	1.0	1.0	.05	1	800	55	13.75	4.47:1	8.94:1	29.48
83405	10,000 ct	600 ct	150	1.0	1.0	.05	1	800	66	16.5	4.08:1	8.16:1	29.48
83410	10,000 ct	1000 ct	250	1.0	1.0	.05	1	800	110	27.5	3.16:1	6.32:1	29.48
83415	10,000 ct	1200 ct	300	1.0	1.0	.05	1	800	132	33	2.89:1	5.77:1	29.48
83420	10,000 ct	1500 ct	375	1.0	1.0	.05	1	800	165	41.3	2.58:1	5.16:1	29.48
83425	10,000 ct	2000 ct	500	1.0	1.0	.05	1	800	220	55	2.24:1	4.47:1	29.48
83430	10,000 ct	5000 ct	1250	1.0	1.0	.05	1	800	550	138	1.41:1	1.83:1	29.48
83435	10,000 ct	7500 ct	1875	1.0	1.0	.05	1	800	825	206	1.16:1	2.31:1	29.48
83440	10,000 ct	10,000 ct	2500	1.0	1.0	.05	1	800	1100	275	1:1	2:1	29.48
83445	*10,000 ct	10,000 ct	–	1.0	1.0	.05	1	800	1100	–	1:1	–	31.87
83450	15,000 ct	400 ct	100	.65	.65	.05	.8	1200	44	11	6.12:1	12.25:1	29.48
83452	15,000 ct	500 ct	125	.65	.65	.05	.8	1200	55	13.8	5.48:1	10.95:1	29.48
83455	15,000 ct	600 ct	150	.65	.65	.05	.8	1200	66	16.5	5:1	10:1	29.48
83460	15,000 ct	10,000 ct	2500	.65	.65	.05	.8	1200	1100	275	1.22:1	2.45:1	29.48
83465	*15,000 ct	15,000 ct	–	.65	.65	.05	.8	1200	1650		1:1		31.87
83470	15,000 ct	15,000 ct	3750	.65	.65	.05	.8	1200	1650	413	1:1	2:1	29.48
83475	16,000 ct	1000 ct	250	.62	.62	.05	.8	1280	110	27.5	4:1	8:1	29.48
83480	20,000 ct	500 ct	125	.5	.5	.05	.7	1600	55	13.8	6.32:1	12.65:1	31.87
83485	20,000 ct	600 ct	150	.5	.5	.05	.7	1600	66	16.5	5.77:1	11.55:1	31.87
83490	20,000 ct	800 ct	200	.5	.5	.05	.7	1600	88	22	5:1	10:1	31.87
83495	20,000 ct	1000 ct	250	.5	.5	.05	.7	1600	110	27.5	4.47:1	8.94:1	31.87
83500	20,000 ct	5000 ct	1250	.5	.5	.05	.7	1600	550	138	2:1	4:1	31.87
83505	20,000 ct	10,000 ct	2500	.5	.5	.05	.7	1600	1100	275	1.41:1	2.83:1	31.87
83510	*20,000 ct	20,000 ct	–	.5	.5	.05	.7	1600	2200	–	1:1	–	32.82
83515	25,000 ct	500 ct	125	.4	.4	.05	.6	2000	55	13.8	7.07:1	14.14:1	31.87
83520	25,000 ct	1000 ct	250	.4	.4	.05	.6	2000	110	27.5	5:1	10:1	31.87
83525	30,000 ct	50 ct	12.5	.33	.33	.05	.6	2400	5.5	1.38	24.5:1	49:1	32.83
83530	30,000 ct	1200 ct	300	.33	.33	.05	.6	2400	132	33	5:1	10:1	32.83
83532	30,000 ct	500 ct	125	.33	.33	.05	.6	2400	55	13.8	7.7:1	15.5:1	32.83
83534	30,000 ct	200 ct	50	.33	.33	.05	.6	2400	22	5.5	12.2:1	24.5:1	32.83
83535	30,000 ct	5000 ct	1250	.33	.33	.05	.6	2400	550	137.5	2.45:1	4.9:1	32.83
83540	30,000 ct	10,000 ct	2500	.33	.33	.05	.6	2400	1100	275	1.73:1	3.46:1	32.83
83545	*30,000 ct	30,000 ct	–	.33	.33	.05	.6	2400	3300	–	1:1	–	35.29
83550	40,000 ct	400 ct	100	.25	.25	.05	.5	3200	44	11	10:1	20:1	35.29
83555	40,000 ct	2000 ct	500	.25	.25	.05	.5	3200	220	55	4.47:1	8.94:1	35.29
83560	40,000 ct	4000 ct	1000	.25	.25	.05	.5	3200	440	110	3.16:1	6.32:1	35.29
83565	40,000 ct	20,000 ct	5000	.25	.25	.05	.5	3200	2200	550	1.41:1	2.83:1	35.29
83570	*40,000 ct	40,000 ct	–	.25	.25	.05	.5	3200	4400	–	1:1	–	39.29
83575	50,000 ct	200 ct	50	.2	.2	.05	.4	4000	22	5.5	15.8:1	31.6:1	39.29
83577	50,000 ct	500 ct	125	.2	.2	.05	.4	4000	55	13.8	10:1	20:1	39.29
83578	50,000 ct	600 ct	150	.2	.2	.05	.4	4000	66	16.5	9.13:1	18.26:1	39.29
83579	50,000 ct	50,000 ct	12,500	.2	.2	.05	.4	4000	5500	1380	1:1	2:1	39.29
83580	60,000 ct	15,000 ct	3750	.16	.16	.05	.4	4800	1650	413	2:1	4:1	39.65
83585	62,500 ct	50 ct	12.5	.16	.16	.05	.4	5000	5.5	1.38	35.4:1	70.7:1	39.65
83587	80,000 ct	15,000 ct	3750	.12	.12	.05	.3	6400	1650	413	2.3:1	4.6:1	39.65
83590	90,000 ct	10,000 ct	2500	.11	.11	.05	.3	7200	1100	275	3:1	6:1	44.54
83595	95,000 ct	15,000 ct	3750	.1	.1	.05	.3	7600	1650	413	2.5:1	5:1	44.54
83600	100,000 ct	60 ct	15	.1	.1	.05	.3	8000	6.6	1.65	40.8:1	81.6:1	44.54
83605	100,000 ct	100 ct	25	.1	.1	.05	.3	8000	11	2.75	31.6:1	63.2:1	44.54
83610	100,000 ct	500 ct	125	.1	.1	.05	.3	8000	55	13.8	14.1:1	28.3:1	44.54
83613	100,000 ct	1000 ct	250	.1	.1	.05	.3	8000	110	27.5	10:1	20:1	44.54
83614	100,000 ct	2000 ct	500	.1	.1	.05	.3	8000	220	55	7.07:1	14.14:1	44.54
83615	100,000 ct	10,000 ct	2500	.1	.1	.05	.3	8000	1100	275	3.16:1	6.32:1	44.54
83620	135,000 ct	82 ct	20.5	.07	.07	.05	.2	10,800	9	2.25	40.6:1	81.2:1	46.54

*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

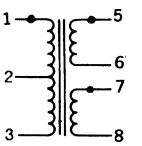
PICO's ultra-miniature surface mount transformers

SERIES 83000

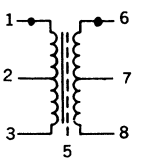
FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED.
- VARIATION OF STANDARD DESIGNS AVAILABLE
- PRIMARY AND SECONDARY WINDINGS CAN BE USED EITHER AS INPUT OR OUTPUT.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

SCHEMATIC FOR TRANSFORMERS WITH SPLIT WINDING



SCHEMATIC FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



PICO Electronics, Inc.

143 Sparks Ave.,
Pelham, NY 10803-1837

FAX: 914-738-8225

Internet:
http://www.picoelectronics.com
E-Mail: ***HLSC73A@prodigy.com***

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

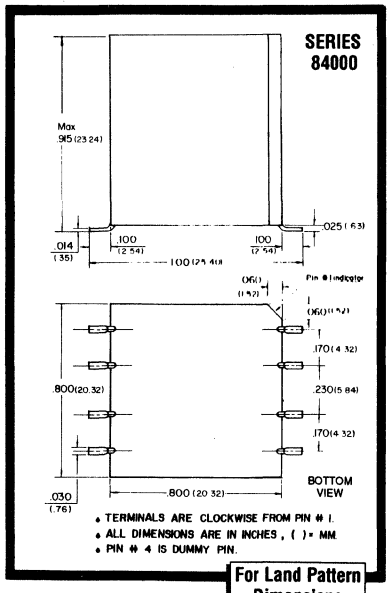
Delivery— stock to one week

SURFACE MOUNT

PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.

PICO's ultra-miniature surface mount transformers

SERIES 84000



- TERMINALS ARE CLOCKWISE FROM PIN # 1.
- ALL DIMENSIONS ARE IN INCHES, ( ) = MM.
- PIN # 4 IS DUMMY PIN.

For Land Pattern Dimensions See Pg. A•2300 Fig.8

SPECIFICATIONS

- **MIL-T-27:** ..... All units manufactured to MIL-T-27, Transformers are Type TF5S21ZZ
- **FREQUENCY RESPONSE:** ..... ±3db, 20 Hz-25 KHz at 1.0 Milliwatt.
- **MAXIMUM DISTORTION:** ..... 5% With Rated Power Level at 1 KHz and 300 Hz. 10% Distortion at 20 Hz.
- **DIELECTRIC STRENGTH:** ..... All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:** ... Greater Than 10,000 Megohms at 300 V DC.
- **WEIGHT:** ..... 28 Grams
- **OPERATING TEMPERATURE:** –55°C to +130°C
- **TERMINALS:** ..... Solderability per MIL-STD-202 Method 208.
- **THERMAL SHOCK:** ..... 25 Cycles, Method 107, MIL-STD-202, Test Condition –55°C to +130°C

THIS PRODUCT IS PATENTED

Delivery— stock to one week

PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	SPLIT WINDINGS PAR	POWER WATTS 1KHz and higher	300 Hz and higher	20 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	SECONDARY DC RESISTANCE OHMS PAR *CONN	TURNS RATIO PRIME/SEC SEC SER CONN	TURNS RATIO PRIME/SEC SEC PAR CONN	PICO PRICES 1-9 ***
84003	20 ct	8 ct	2	3.0	2.0	.006	22	1.6	.8	.2	1.58:1	3.16:1	29.23
84005	20 ct	20 ct	5	3.0	2.0	.006	22	1.6	2	.5	1:1	2:1	29.23
84010	32 ct	32 ct	8	3.0	2.0	.006	17.5	2.56	3.2	.8	1:1	2:1	29.23
84015	40 ct	40 ct	10	3.0	2.0	.006	16	3.2	4	1	1:1	2:1	29.23
84018	48 ct	16 ct	4	3.0	2.0	.006	14.5	3.84	1.6	.4	1.73:1	3.46:1	29.23
84020	50 ct	50 ct	12.5	3.0	2.0	.006	14	4	5	1.25	1:1	2:1	29.23
84025	80 ct	32 ct	8	3.0	2.0	.006	11	6.4	3.2	.8	1.58:1	3.16:1	29.23
84028	100 ct	40 ct	10	3.0	2.0	.006	10	8	4	1	1.58:1	3.16:1	29.23
84030	100 ct	100 ct	25	3.0	2.0	.006	10	8	10	2.5	1:1	2:1	29.23
84035	120 ct	12.8 ct	3.2	3.0	2.0	.006	9	9.6	1.3	.32	3.06:1	26.12:1	29.23
84040	120 ct	60 ct	15	3.0	2.0	.006	9	9.6	6	1.5	1.41:1	2.83:1	29.23
84045	120 ct	120 ct	30	3.0	2.0	.006	9	9.6	12	3	1:1	2:1	29.23
84050	150 ct	12 ct	3	3.0	2.0	.006	8	12	1.2	.3	3.54:1	7.08:1	29.23
84055	150 ct	50 ct	12.5	3.0	2.0	.006	8	12	5	1.25	1.73:1	3.46:1	29.23
84060	150 ct	100 ct	25	3.0	2.0	.006	8	12	10	2.5	1.22:1	2.44:1	29.23
84065	150 ct	150 ct	37.5	3.0	2.0	.006	8	12	15	3.75	1:1	2:1	29.23
84070	150 ct	600 ct	150	3.0	2.0	.006	8	12	60	15	1:2	1:1	29.23
84075	200 ct	200 ct	50	3.0	2.0	.006	7	16	20	5	1:1	2:1	29.23
84080	300 ct	12 ct	3	3.0	2.0	.006	5.5	24	1.2	.3	5:1	10:1	29.23
84085	300 ct	50 ct	12.5	3.0	2.0	.006	5.5	24	5	1.25	2.45:1	4.9:1	29.23
84090	300 ct	150 ct	37.5	3.0	2.0	.006	5.5	24	15	3.75	1.41:1	2.83:1	29.23
84095	300 ct	300 ct	75	3.0	2.0	.006	5.5	24	30	7.5	1:1	2:1	29.23
84100	300 ct	600 ct	150	3.0	2.0	.006	5.5	24	60	15	1:1.41	1.41:1	29.23
84105	320 ct	12.8 ct	3.2	3.0	2.0	.006	5.5	25.6	1.3	.32	5:1	10:1	29.23
84110	400 ct	40 ct	10	3.0	2.0	.006	5	32	4	1	3.16:1	16.32:1	29.23
84115	400 ct	120 ct	30	3.0	2.0	.006	5	32	12	3	1.83:1	3.65:1	29.23
84120	400 ct	200 ct	50	3.0	2.0	.006	5	32	20	5	1.41:1	2.83:1	29.23
84125	400 ct	400 ct	100	3.0	2.0	.006	5	32	40	10	1:1	2:1	29.23
84130	400 ct	1000 ct	250	3.0	2.0	.006	5	32	100	25	1:1.58	1.26:1	29.23
84135	400 ct	2000 ct	500	3.0	2.0	.006	5	32	200	50	1:2.24	1:1.12	29.23
84140	400 ct	4000 ct	1000	3.0	2.0	.006	5	32	400	100	1:3.16	1:1.58	29.23
84142	500 ct	12.8 ct	3.2	3.0	2.0	.006	4.5	40	1.3	.32	6.25:1	12.5:1	29.23
84144	500 ct	16 ct	4	3.0	2.0	.006	4.5	40	1.6	.4	5.6:1	11.2:1	29.23
84145	500 ct	50 ct	12.5	3.0	2.0	.006	4.5	40	5	1.25	3.16:1	6.32:1	29.23
84147	500 ct	150 ct	37.5	3.0	2.0	.006	4.5	40	15	3.75	1.83:1	3.65:1	29.23
84150	500 ct	500 ct	125	3.0	2.0	.006	4.5	40	50	12.5	1:1	2:1	29.23
84155	*500 ct	500 ct	–	3.0	2.0	.006	4.5	40	50	–	1:1	–	30.46
84160•	500 ct	600 ct	150	3.0	2.0	.006	4.5	40	60	15	1:1.1	1.83:1	29.23
84165	600 ct	12.8 ct	3.2	3.0	2.0	.006	4	48	1.3	.32	6.85:1	13.7:1	29.23
84167	600 ct	30 ct	7.5	3.0	2.0	.006	4	48	3	.75	4.47:1	8.94:1	29.23
84170	600 ct	48 ct	12	3.0	2.0	.006	4	48	4.8	1.2	3.54:1	7.07:1	29.23
84175	600 ct	200 ct	50	3.0	2.0	.006	4	48	20	5	1.73:1	3.46:1	29.23
84180**	600 ct	600 ct	150	3.0	2.0	.006	4	48	60	15	1:1	2:1	29.23
84185**	*600 ct	600 ct	–	3.0	2.0	.006	4	48	60	–	1:1	–	30.46
84186**	*600 ct	900 ct	–	3.0	2.0	.006	4	48	90	–	1:1.22	–	30.46
84187**	600 ct	1200 ct	300	3.0	2.0	.006	4	48	120	30	1:1.41	1.41:1	29.23
84190	640 ct	12.8 ct	3.2	3.0	2.0	.006	4	51	1.3	.32	7.07:1	14.14:1	29.23
84195	700 ct	100 ct	25	3.0	2.0	.006	3.5	56	10	2.5	2.65:1	5.29:1	29.23
84200	800 ct	12.8 ct	3.2	3.0	2.0	.006	3.5	64	1.3	.32	7.91:1	15.8:1	29.23
84205	800 ct	48 ct	12	3.0	2.0	.006	3.5	64	4.8	1.2	4.08:1	8.16:1	29.23
84210	800 ct	800 ct	200	3.0	2.0	.006	3.5	64	80	20	1:1	2:1	29.23
84215	900 ct	600 ct	150	3.0	2.0	.006	3	72	60	15	1.22:1	2.45:1	29.23
84217**	*900 ct	900 ct	–	3.0	2.0	.006	3	72	90	–	1:1	–	30.46
84220	1000 ct	12 ct	3	3.0	2.0	.006	3	80	1.2	.3	9.13:1	18.26:1	29.23
84225	1000 ct	50 ct	12.5	3.0	2.0	.006	3	80	5	1.25	4.47:1	8.94:1	29.23
84230	1000 ct	1000 ct	250	3.0	2.0	.006	3	80	100	25	1:1	2:1	29.23
84235	1060 ct	12.8 ct	3.2	3.0	2.0	.006	3	85	1.3	.32	9.1:1	18.2:1	29.23
84240	1200 ct	12.8 ct	3.2	3.0	2.0	.006	3	96	1.3	.32	9.68:1	19.4:1	29.23
84245	1200 ct	500 ct	125	3.0	2.0	.006	3	96	50	12.5	1.55:1	3.1:1	29.23
84250	1200 ct	1200 ct	300	3.0	2.0	.006	3	96	120	30	1:1	2:1	29.23
84255	*1200 ct	1200 ct	–	3.0	2.0	.006	3	96	120	–	1:1	–	30.46
84260	1500 ct	12 ct	3	3.0	2.0	.006	2.5	120	1.2	.3	11.18:1	22.36:1	29.23
84265	1500 ct	500 ct	125	3.0	2.0	.006	2.5	120	50	12.5	1.73:1	3.46:1	29.23
84270	*1500 ct	600 ct	–	3.0	2.0	.006	2.5	120	60	–	1.58:1	–	30.46
84275	*1500 ct	1500 ct	–	3.0	2.0	.006	2.5	120	150	–	1:1	–	30.46
84280	1600 ct	12.8 ct	3.2	3.0	2.0	.006	2.5	128	1.3	.32	11.18:1	22.36:1	29.23
84283	2000 ct	8 ct	2	3.0	2.0	.006	2.2	160	.8	.2	15.8:1	31.6:1	29.23
84285	2000 ct	2000 ct	500	3.0	2.0	.006	2.2	160	200	50	1:1	2:1	29.23
84290	*2000 ct	2000 ct	–	3.0	2.0	.006	2.2	160	200	–	1:1	–	30.46
84295	2000 ct	8000 ct	2000	3.0	2.0	.006	2.2	160	800	200	1:2	1:1	29.23
84297	2500 ct	2500 ct	625	3.0	2.0	.006	2	200	250	63	1:1	2:1	29.23
84300	3000 ct	3000 ct	750	3.0	2.0	.006	1.8	240	300	75	1:1	2:1	29.23
84305	*3000 ct	3000 ct	–	3.0	2.0	.006	1.8	240	300	–	1:1	–	29.23

*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION
***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

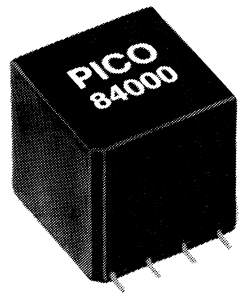
PICO PART NUMBER	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER WATTS 1KHz and higher	300 Hz and higher	20 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS RATIO PRIM/SEC SEC SER CONN	SEC PAR CONN	PICO PRICES 1-9 ***
84310	3600 ct	3600 ct	900	2.7	2.0	.006	1.7	288	360	90	1:1	2:1	29.23
84312	4000 ct	16 ct	4	2.5	2.0	.006	1.6	320	1.6	.4	15.8:1	31.6:1	29.23
84314**	4000 ct	600 ct	150	2.5	2.0	.006	1.6	320	60	15	2.58:1	5.16:1	29.23
84315	4000 ct	1000 ct	250	2.5	2.0	.006	1.6	320	100	25	2:1	4:1	29.23
84320	*4000 ct	8000 ct	–	2.5	2.0	.006	1.6	320	800	–	1:1.41	–	30.46
84325	5000 ct	500 ct	125	2.0	2.0	.006	1.4	400	50	12.5	3.16:1	6.32:1	29.32
84330	5000 ct	5000 ct	1250	2.0	2.0	.006	1.4	400	500	125	1:1	2:1	29.32
84335	7500 ct	50 ct	12.5	1.3	1.3	.006	1.2	600	5	1.25	12.25:1	24.5:1	32.42
84340	7500 ct	100 ct	25	1.3	1.3	.006	1.2	600	10	2.5	8.66:1	17.32:1	32.42
84345	7500 ct	600 ct	150	1.3	1.3	.006	1.2	600	60	15	3.54:1	7.07:1	32.42
84350	7500 ct	2500 ct	625	1.3	1.3	.006	1.2	600	250	63	1.73:1	3.46:1	32.42
84355	*7500 ct	7500 ct	–	1.3	1.3	.006	1.2	600	750	–	1:1	–	34.76
84360	8000 ct	12.8 ct	3.2	1.2	1.2	.006	1.1	640	1.3	.32	25:1	50:1	32.42
84365	8000 ct	1000 ct	250	1.2	1.2	.006	1.1	640	100	25	2.83:1	5.66:1	32.42
84370	*8000 ct	1200 ct	–	1.2	1.2	.006	1.1	640	120	–	2.58:1	–	34.76
84375	*9000 ct	9000 ct	–	1.1	1.1	.006	1.1	720	900	–	1:1	–	34.76
84380	10,000 ct	12.8 ct	3.2	1.0	1.0	.006	1	800	1.3	.32	28.1	56:1	32.42
84385	10,000 ct	16 ct	4	1.0	1.0	.006	1	800	1.6	.4	25:1	50:1	32.42
84390	10,000 ct	100 ct	25	1.0	1.0	.006	1	800	10	2.5	10:1	20:1	32.42
84395	10,000 ct	200 ct	50	1.0	1.0	.006	1	800	20	5	7.07:1	14.14:1	32.42
84400	10,000 ct	500 ct	125	1.0	1.0	.006	1	800	50	12.5	4.47:1	8.94:1	32.42
84405	10,000 ct	600 ct	150	1.0	1.0	.006	1	800	60	15	4.08:1	8.16:1	32.42
84410	10,000 ct	1000 ct	250	1.0	1.0	.006	1	800	100	25	3.16:1	6.32:1	32.42
84415	10,000 ct	1200 ct	300	1.0	1.0	.006	1	800	120	30	2.89:1	5.77:1	32.42
84420	10,000 ct	1500 ct	375	1.0	1.0	.006	1	800	150	38	2.58:1	5.16:1	32.42
84425	10,000 ct	2000 ct	500	1.0	1.0	.006	1	800	200	50	2.24:1	4.47:1	32.42
84430	10,000 ct	5000 ct	1250	1.0	1.0	.006	1	800	500	125	1.41:1	2.83:1	32.42
84435	10,000 ct	7500 ct	1875	1.0	1.0	.006	1	800	750	188	1.16:1	2.31:1	32.42
84440	10,000 ct	10,000 ct	2500	1.0	1.0	.006	1	800	1000	250	1:1	2:1	32.42
84445	*10,000 ct	10,000 ct	–	1.0	1.0	.006	1	800	1000	–	1:1	–	34.76
84450	15,000 ct	400 ct	100	.66	.66	.006	.8	1200	40	10	6.12:1	12.25:1	32.42
84452	15,000 ct	500 ct	125	.66	.66	.006	.8	1200	50	12.5	5.48:1	10.95:1	32.42
84455	15,000 ct	600 ct	150	.66	.66	.006	.8	1200	60	15	5:1	10:1	32.42
84460	15,000 ct	10,000 ct	2500	.66	.66	.006	.8	1200	1000	250	1.22:1	2.45:1	32.42
84465	*15,000 ct	15,000 ct	–	.66	.66	.006	.8	1200	1500		1:1		34.76
84470	15,000 ct	15,000 ct	3750	.66	.66	.006	.8	1200	1500	375	1:1	2:1	32.42
84475	16,000 ct	1000 ct	250	.62	.62	.006	.8	1280	100	25	4:1	8:1	32.42
84480	20,000 ct	500 ct	125	.5	.5	.006	.7	1600	50	12.5	6.32:1	12.6:1	34.76
84485	20,000 ct	600 ct	150	.5	.5	.006	.7	1600	60	15	5.77:1	11.55:1	34.76
84490	20,000 ct	800 ct	200	.5	.5	.006	.7	1600	80	20	5:1	10:1	34.76
84495	20,000 ct	1000 ct	250	.5	.5	.006	.7	1600	100	25	4.47:1	8.94:1	34.76
84500	20,000 ct	5000 ct	1250	.5	.5	.006	.7	1600	500	125	2:1	4:1	34.76
84505	20,000 ct	10,000 ct	2500	.5	.5	.006	.7	1600	1000	250	1.41:1	2.83:1	34.76
84510	*20,000 ct	20,000 ct	–	.5	.5	.006	.7	1600	2000	–	1:1	–	36.12
84515	25,000 ct	500 ct	125	.4	.4	.006	.6	2000	50	12.5	7.07:1	14.14:1	34.76
84520	25,000 ct	1000 ct	250	.4	.4	006	.6	2000	100	25	5:1	10:1	34.76
84525	30,000 ct	50 ct	12.5	.33	.33	.006	.6	2400	5	1.25	24.5:1	49:1	36.12
84530	30,000 ct	1200 ct	300	.33	.33	006	.6	2400	120	30	5:1	10:1	36.12
84532	30,000 ct	500 ct	125	.33	.33	.006	.6	2400	50	12.5	7.7:1	15.5:1	36.12
84534	30,000 ct	200 ct	50	.33	.33	.006	.6	2400	20	5	12.2:1	24.5:1	36.12
84535	30,000 ct	5000 ct	1250	.33	.33	006	.6	2400	500	125	2.45:1	4.9:1	36.12
84540	30,000 ct	10,000 ct	2500	.33	.33	.006	.6	2400	1000	250	1.73:1	3.46:1	36.12
84545	*30,000 ct	30,000 ct	–	.33	.33	006	.6	2400	3000	–	1:1	–	38.73
84550	40,000 ct	400 ct	100	.25	.25	.006	.5	3200	40	10	10:1	20:1	38.73
84555	40,000 ct	2000 ct	500	.25	.25	.006	.5	3200	200	50	4.47:1	8.94:1	38.73
84560	40,000 ct	4000 ct	1000	.25	.25	006	.5	3200	400	100	3.16:1	6.32:1	38.73
84565	40,000 ct	20,000 ct	5000	.25	.25	006	.5	3200	2000	500	1.41:1	2.83:1	38.73
84570	*40,000 ct	40,000 ct	–	.25	.25	006	.5	3200	4000	–	1:1	–	43.19
84575	50,000 ct	200 ct	50	.2	.2	.006	.4	4000	20	5	15.8:1	31.6:1	43.19
84577	50,000 ct	500 ct	125	.2	.2	006	.4	4000	50	12.5	10:1	20:1	43.19
84578	50,000 ct	600 ct	150	.2	.2	.006	.4	4000	60	15	9.13:1	18.26:1	43.19
84579	50,000 ct	50,000 ct	12,500	.2	.2	.006	.4	4000	5000	1250	1:1	2:1	43.19
84580	60,000 ct	15,000 ct	3750	.16	.16	.006	.4	4800	1500	375	2:1	4:1	46.64
84585	62,500 ct	50 ct	12.5	.16	.16	.006	.4	5000	5	1.25	35.4:1	70.7:1	46.64
84587	80,000 ct	15,000 ct	3750	.12	.12	.006	.3	6400	1500	375	2.3:1	4.6:1	46.64

*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

PICO's ultra-miniature surface mount transformers

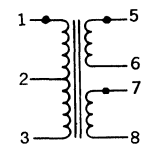
SERIES 84000



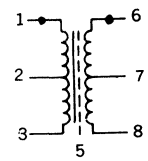
FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED.
- VARIATION OF STANDARD DESIGNS AVAILABLE
- PRIMARY AND SECONDARY WINDINGS CAN BE USED EITHER AS INPUT OR OUTPUT.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

SCHEMATIC FOR TRANSFORMERS WITH SPLIT WINDING



SCHEMATIC FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

Delivery— stock to one week

PICO Electronics, Inc.

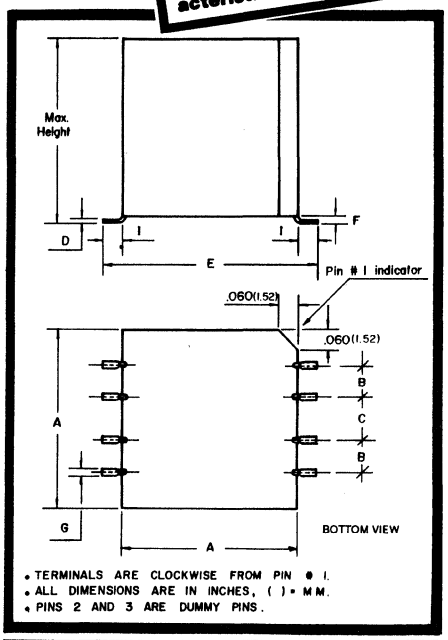
143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225
Internet: http://www.picoelectronics.com E-mail: HLSC73A@prodigy.com

PICO's miniature 400 Hz transformers

SURFACE MOUNT

PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.

115V/26V Primary



- TERMINALS ARE CLOCKWISE FROM PIN # 1.
- ALL DIMENSIONS ARE IN INCHES, ( ) = MM.
- PINS 2 AND 3 ARE DUMMY PINS.

Serial Number	Max Height	A	B	C	D	E	F	G	I
76000	.415 (10.54)	.550 (13.97)	.095 (2.41)	.135 (3.43)	.010 (.25)	.670 (17.02)	.015 (.38)	.020 (.51)	.060 (1.52)
77000	.565 (14.35)	.550 (13.97)	.095 (2.41)	.135 (3.43)	.010 (.25)	.670 (17.02)	.015 (.38)	.020 (.51)	.060 (1.52)
82000	.455 (11.56)	.800 (20.32)	.170 (4.32)	.230 (5.84)	.014 (.35)	1.000 (25.40)	.025 (.63)	.030 (.76)	.100 (2.54)
83000	.605 (15.37)	.800 (20.32)	.170 (4.32)	.230 (5.84)	.014 (.35)	1.000 (25.40)	.025 (.63)	.030 (.76)	.100 (2.54)
84000	.915 (23.24)	.800 (20.32)	.170 (4.32)	.230 (5.84)	.014 (.35)	1.000 (25.40)	.025 (.63)	.030 (.76)	.100 (2.54)

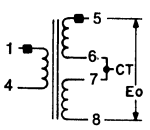
FEATURES

- **400 Hz Aerospace Application**
- **Smallest Possible Size**
- **Secondary Has Split Winding (Secondary can Be Used at Half Voltage Twice the Current).**

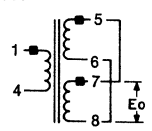
SPECIFICATIONS

- **Manufactured to MIL-T-27 (TF5S03ZZ)**
- **90°C Ambient**
- **Input Primary 115v-400 Hz ±20 Hz or 26V-400HZ-±20 Hz (Your Choice-Just Choose The Proper Part No.)**
- **Regulation is 24% (8400 Series Units Wave Regulation of 17%)**
- **Secondary Voltage Adjusted to Nominal Value at Half Load.**

For Land Pattern Dimensions See Pg. A•2300
Fig.7 (Series 76000)
Fig.7 (Series 77000)
Fig.8 (Series 82000)
Fig.8 (Series 83000)
Fig.8 (Series 84000)



SERIES CONNECTED SECONDARY



PARALLEL CONNECTED SECONDARY

THIS PRODUCT IS PATENTED

Delivery— stock to one week

SEC/ VOLT	SEC/ CURRENT ma	MODEL NUMBER 115V PRIMARY	MODEL NUMBER 26V PRIMARY	PICO PRICES 1-9*
5.0 CT	75	76900	76902	32.19
	150	77900	77902	32.19
	204	82650	82815	47.54
	338	83650	83815	42.28
	480	84650	84815	44.09
6.3 CT	59.5	76899	76903	32.19
	119	77899	77903	32.19
	162	82655	82820	47.54
	268	83655	83820	42.28
	381	84655	84820	44.09
8.0 CT	47	76898	76904	32.19
	94	77898	77904	32.19
	128	82660	82825	47.54
	211	83660	83825	42.28
	300	84660	84825	44.09
10 CT	37.5	76897	76905	32.19
	75	77897	77905	32.19
	102	82665	82830	47.54
	169	83665	83830	42.28
	240	84665	84830	44.09
12.8 CT	29	76892	76906	32.19
	58.6	77892	77906	32.19
	79.7	82670	82835	47.54
	132	83670	83835	42.28
	188	84670	84835	44.09
14 CT	26.8	76889	76907	32.19
	53.6	77889	77907	32.19
	72.9	82675	82840	47.54
	121	83675	83840	42.28
	171	84675	84840	44.09
16 CT	23	76887	76908	32.19
	47	77887	77908	32.19
	63.8	82680	82845	47.54
	106	83680	83845	42.28
	150	84680	84845	44.091
18 CT	20.8	76886	76909	32.19
	41.7	77886	77909	32.19
	56.7	82685	82850	47.54
	93.9	83685	83850	42.28
	133	84685	84850	44.09
20 CT	18.8	76885	76911	32.19
	37.5	77885	77911	32.19
	51	82690	82855	47.54
	84.5	83690	83855	42.28
	120	84690	84855	44.09
22 CT	17	76884	76912	32.19
	34	77884	77912	32.19
	46.4	82695	82860	47.54
	76.8	83695	83860	42.28
	109	84695	84860	44.09
24 CT	15.5	76882	76913	32.19
	31	77882	77913	32.19
	42.5	82700	82865	47.54
	70.4	83700	83865	42.28
	100	84700	84865	44.09
28 CT	13.4	76881	76914	32.19
	26.8	77881	77914	32.19
	36.4	82705	82870	47.54
	60.4	83705	83870	42.28
	85.7	84705	84870	44.09
31 CT	12	76879	76916	32.19
	24	77879	77916	32.19
	32.9	82710	82875	47.54
	54.5	83710	83875	42.28
	77.4	84710	84875	44.09
36 CT	10.4	76877	76917	32.19
	20.8	77877	77917	32.19
	28.3	82715	82880	47.54
	46.9	83715	83880	42.28
	66.7	84715	84880	44.09
39 CT	9.6	76876	76918	32.19
	19.2	77876	77918	32.19
	26.2	82720	82885	47.54
	43.3	83720	83885	42.28
	61.5	84720	84885	44.09

SEC/ VOLT	SEC/ CURRENT ma	MODEL NUMBER 115V PRIMARY	MODEL NUMBER 26V PRIMARY	PICO PRICES 1-9*
43 CT	8.7	76875	76919	32.19
	17.4	77875	77919	32.19
	23.7	82725	82890	47.54
	39.3	83725	83890	42.28
	55.8	84725	84890	44.09
48 CT	7.8	76874	76920	32.19
	15.6	77874	77920	32.19
	21.1	82730	82895	47.54
	35.2	83730	83895	42.28
	50	84730	84895	44.09
56 CT	6.6	76872	76921	32.19
	13.2	77872	77921	32.19
	18.2	82735	82900	47.54
	30.2	83735	83900	42.28
	42.9	84735	84900	44.09
63 CT	6	76869	76922	32.19
	11.9	77869	77922	32.19
	16.2	82740	82905	47.54
	26.9	83740	83905	42.28
	38.2	84740	84905	44.09
68 CT	5.5	76867	76923	32.19
	11	77867	77923	32.19
	15	82745	82910	47.54
	24.9	83745	83910	42.28
	35.3	84745	84910	44.09
80 CT	4.6	76862	76925	32.19
	9.4	77862	77925	32.19
	12.1	82750	82915	47.54
	21.1	83750	83915	42.28
	30	84750	84915	44.09
88 CT	4.2	76857	76926	32.19
	8.5	77857	77926	32.19
	11.6	82755	82920	47.54
	19.2	83755	83920	42.28
	27.3	84755	84920	44.09
100 CT	3.7	76854	76927	32.19
	8.5	77854	77927	32.19
	10.2	82760	82925	47.54
	16.9	83760	83925	42.28
	24	84760	84925	44.09
115 CT	3.2	76852	76928	32.19
	6.5	77852	77928	32.19
	8.9	82765	82930	47.54
	14.7	83765	83930	42.28
	20.9	84765	84930	44.09
123 CT	8.3	82770	82935	47.54
	13.7	83770	83935	42.28
	19.5	84770	84935	44.09
138 CT	7.4	82775	82940	47.54
	12.2	83775	83940	42.28
	17.4	84775	84940	44.09
157 CT	6.5	82780	82945	47.54
	10.8	83780	83945	42.28
	15.3	84780	84945	44.09
175 CT	5.8	82785	82950	47.54
	9.6	83785	83950	42.28
	13.7	84785	84950	44.09
200 CT	5.1	82790	82955	47.54
	8.4	83790	83955	42.28
	12	84790	84955	44.09
220 CT	7.7	83795	83960	44.43
	10.9	84795	84960	46.32
250 CT	6.8	83800	83965	46.54
	9.6	84800	84965	48.53
275 CT	6.1	83805	83970	48.85
	8.7	84805	84970	52.95
310 CT	5.4	83810	83975	50.79
	7.7	84810	84795	57.00

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

For immediate engineering assistance or to place an order—

Call Toll Free 800-288-9747 • FAX 800-228-9747

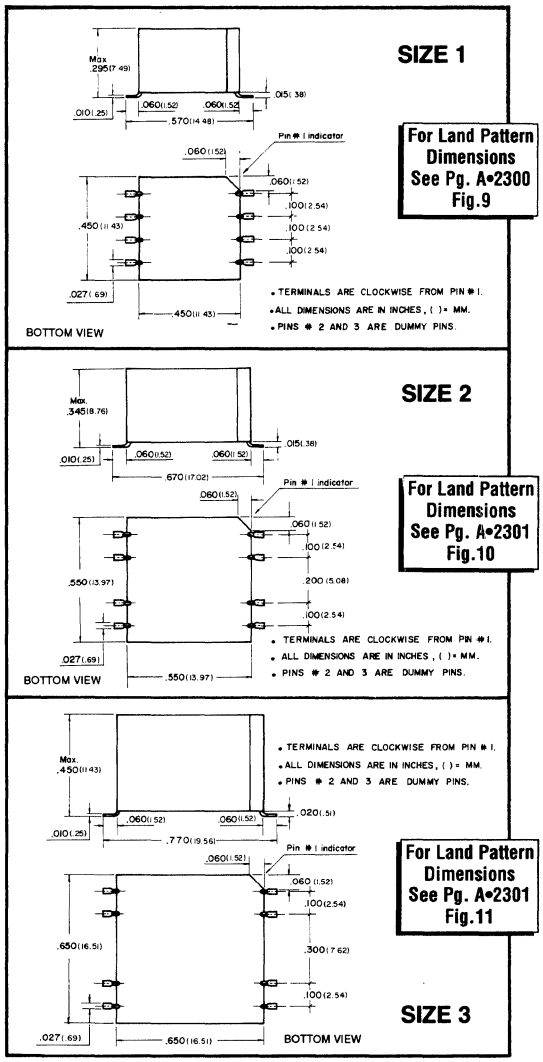
PICO Electronics, Inc.
143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225
Internet: http://www.picoelectronics.com E-mail: HLSC73A@prodigy.com

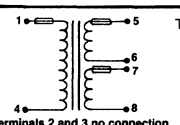
PICO's Pulse Transformers

SURFACE MOUNT
PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.

SPECIFICATIONS

- Units manufactured to MIL-T-21038 TP7SXNNNNK2
- **DIELECTRIC STRENGTH:** ..... All Units Tested at 500 V RMS.
- **INSULATION RESISTANCE:** ... Greater Than 10,000 Megohms at 700 V DC.
- **THERMAL SHOCK:** ..... 25 Cycles, Method 107, MIL-STD-202, Test Condition –55°C to +130°C
- **OPERATING TEMPERATURE:** –55°C to +130°C).
- **TERMINALS:** Meet solderability per MIL-STD-202 Method 208
- **WEIGHT SIZE:** 1-2.5 Grams, 2-4.5 Grams, 3-8.0 Grams





Terminals 2 and 3 no connection mechanical stability only

THIS PRODUCT IS PATENTED

Delivery— stock to one week

SIZE 1

PICO PART #	TURNS RATIO TOLER. ±5%	Lm TYPICAL µH	LEAKAGE IND. VALUE IN µH TYPICAL		WINDING RESISTANCE MAX VALUE IN OHMS			TYPICAL INTER-WINDING CAP VALUE IN pF		E.T. RATING VOLT - µsec MAX. PRIMARY	PRICE 1-9
			LL (N1-N2)	LL (N1-N3)	R(N1)	R(N2)	R(N3)	C1 (N1-N2)	C2 (N1-N3)		
75005	1:1:1	150	.100	.250	.070	.080	.085	25	12	10	21.96
75010	1:1:1	600	.400	1.1	.15	.18	.21	25	12	20	21.96
75015	1:1:1	1300	.900	2.5	.45	.51	.58	25	12	30	21.96
75020	1:1:1	2400	1.6	4.2	1.14	1.27	1.39	25	12	40	21.96
75025	1:1:1	3700	3.0	6.5	2.0	2.3	2.5	25	12	50	21.96
75030	2:1:1	150	.250	.450	.062	.014	.014	25	12	10	21.96
75035	2:1:1	600	1.0	1.5	.15	.074	.087	25	12	20	21.96
75040	2:1:1	1300	1.5	3.5	.45	.10	.13	25	12	30	21.96
75045	2:1:1	2400	2.2	6.0	1.14	.17	.20	25	12	40	21.96
75050	2:1:1	3700	3.4	9.0	2.07	.29	.32	25	12	50	21.96
75055	3:1:1	200	.617	1.0	.081	.018	.018	25	12	12	21.96
75060	3:1:1	800	1.2	1.5	.18	.035	.040	25	12	24	21.96
75065	3:1:1	1800	2.5	5.0	.37	.15	.16	25	12	36	21.96
75070	3:1:1	3200	4.5	10.0	.62	.25	.28	25	12	48	21.96
75075	3:1:1	5300	7.0	15.0	1.28	.25	.28	25	12	60	21.96
75080	3:3:1	200	200	1.0	.082	.096	.025	25	12	12	21.96
75085	3:3:1	800	1.0	1.5	.18	.22	.042	25	12	24	21.96
75090	3:3:1	1800	2.5	5.0	.58	.73	.28	25	12	36	21.96
75095	3:3:1	3200	4.,5	10.0	.95	1.18	.55	25	12	48	21.96
75100	3:3:1	5300	7.0	15.0	1.56	1.78	.69	25	12	60	21.96
75105	4:2:1	200	.506	2.0	.047	-024	.019	25	12	12	21.96
75110	4:2:1	800	1.5	3.0	.18	.071	.041	25	12	24	21.96
75115	4:2:1	1800	3.0	5.5	.46	.28	.16	25	12	36	21.96
75120	4:2:1	3200	5.5	10.0	.77	.46	.25	25	12	48	21.96
75125	4:2:1	5300	8.0	15.0	1.25	.72	.40	25	12	60	21.96

SIZE 2

PICO PART #	TURNS RATIO TOLER. ±5%	Lm TYPICAL µH	LEAKAGE IND. VALUE IN µH TYPICAL		WINDING RESISTANCE MAX VALUE IN OHMS			TYPICAL INTER-WINDING CAP VALUE IN pF		E.T. RATING VOLT - µsec MAX. PRIMARY	PRICE 1-9
			LL (N1-N2)	LL (N1-N3)	R(N1)	R(N2)	R(N3)	C1 (N1-N2)	C2 (N1-N3)		
75210	1:1:1	250	.350	.712	.038	.046	.048	35	18	16	21.96
75215	1:1:1	1000	.650	1.2	.12	.15	.17	35	18	32	21.96
75220	1:1:1	2250	1.5	3.0	.28	.32	.37	35	18	48	21.96
75225	1:1:1	4000	2.5	5.0	.59	.66	.74	35	18	65	21.96
75230	1:1:1	6200	4.0	8.0	1.27	1.48	1.56	35	18	80	21.96
75235	2:1:1	250	.400	.815	.038	.014	.015	35	18	16	21.96
75240	2:1:1	1000	.800	1.6	.12	.044	.049	35	18	32	21.96
75245	2:1:1	2250	1.8	3.6	.28	.11	.13	35	18	48	21.96
75250	2:1:1	4000	3.2	6.4	.59	.17	.20	35	18	65	21.96
75255	2:1:1	6200	5.0	10.0	1.26	.29	.31	35	18	80	21.96
75260	3:1:1	350	400	900	.036	.017	.023	35	18	19	21.96
75265	3:1:1	1400	1.1	2.2	.15	.035	.039	35	18	38	21.96
75270	3:1:1	3000	2.4	5.0	.42	.062	.068	35	18	57	21.96
75275	3:1:1	5500	4.2	8.0	.75	.23	.24	35	18	76	21.96
75280	3:1:1	9000	6.5	10.0	1.02	.39	.41	35	18	95	21.96
75285	3:3:1	350	.450	1.0	.063	.068	.049	35	18	19	21.96
75290	3:3:1	1400	1.2	2.6	.15	.17	.065	35	18	38	21.96
75295	3:3:1	3000	2.5	5.0	.42	.48	.089	35	18	57	21.96
75300	3:3:1	5500	4.5	9.0	.94	1.14	.43	35	18	76	21.96
75305	3:3:1	9000	7.0	14.0	1.54	1.74	.64	35	18	95	21.96
75310	4:2:1	350	.700	1.64	.040	.023	.014	35	18	19	21.96
75315	4:2:1	1400	1.3	2.7	.12	.067	.035	35	18	38	21.96
75320	4:2:1	3000	2.7	5.5	.42	.12	.070	35	18	57	21.96
75325	4:2:1	5500	4.8	9.0	.94	.27	.15	35	18	76	21.96
75330	4:2:1	9000	7.5	15.0	1.53	.35	.19	35	18	95	21.96

SIZE 3

PICO PART #	TURNS RATIO TOLER. ±5%	Lm TYPICAL µH	LEAKAGE IND. VALUE IN µH TYPICAL		WINDING RESISTANCE MAX VALUE IN OHMS			TYPICAL INTER-WINDING CAP VALUE IN pF		E.T. RATING VOLT - µsec MAX. PRIMARY	PRICE 1-9
			LL (N1-N2)	LL (N1-N3)	R(N1)	R(N2)	R(N3)	C1 (N1-N2)	C2 (N1-N3)		
75515	1:1:1	300	.300	.400	.044	.048	.054	45	25	25	21.96
75520	1:1:1	1200	1.25	1.9	.095	.11	.13	45	25	50	21.96
75525	1:1:1	2700	1.75	4.2	.22	.26	.29	45	25	75	21.96
75530	1:1:1	4800	3.0	7.3	.46	.52	.59	45	25	100	21.96
75535	1:1:1	7500	4.6	11.4	.81	.90	.99	45	25	125	21.96
75540	2:1:1	300	.514	.630	.044	.013	.017	45	25	25	21.96
75545	2:1:1	1200	.900	1.7	.095	.043	.047	45	25	50	21.96
75550	2:1:1	2700	2.0	3.7	.22	.10	.12	45	25	75	21.96
75555	2:1:1	4800	3.0	6.5	.46	.17	.19	45	25	100	21.96
75560	2:1:1	7500	4.88	10.0	.80	.28	.34	45	25	125	21.96
75565	3:1:1	400	.686	.800	.049	.011	.011	45	25	30	21.96
75570	3:1:1	1600	1.25	3.0	.12	.035	.038	45	25	60	21.96
75575	3:1:1	3600	2.75	6.5	.33	.062	.068	45	25	90	21.96
75580	3:1:1	6400	4.6	1.20	.58	.14	.15	45	25	120	21.96
75585	3:1:1	10000	7.2	18.0	1.25	.13	.15	45	25	150	21.96
75590	3:3:1	400	.400	1.02	.062	.072	.012	45	25	30	21.96
75595	3:3:1	1600	1.25	1.5	.12	.14	.040	45	25	60	21.96
75600	3:3:1	3600	3.0	2.9	.33	.38	.070	45	25	90	21.96
75605	3:3:1	6400	5.3	5.0	.58	.73	.18	45	25	120	21.96
75610	3:3:1	10000	8.2	7.8	1.35	1.40	.20	45	25	150	21.96
75615	4:2:1	400	.580	1.12	.054	.016	.009	45	25	30	21.96
75620	4:2:1	1600	1.2	3.0	.12	.052	.028	45	25	60	21.96
75625	4:2:1	3600	2.75	7.0	.33	.15	.084	45	25	90	21.96
75630	4:2:1	6400	4.6	12.0	.58	.14	.080	45	25	120	21.96
75635	4:2:1	10000	7.1	19.6	1.22	.27	.15	45	25	150	21.96

*For immediate engineering assistance or to place an order—**Call Toll Free 800-228-9747***

PICO Electronics, Inc.
143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225
Internet: http://www.picoelectronics.com E-Mail: HLSC73A@prodigy.com

SURFACE MOUNT

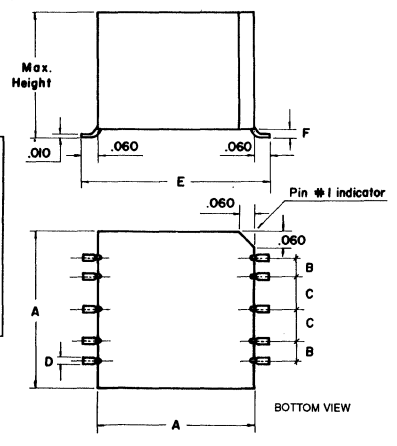
PICO surface mount units utilize materials and methods to withstand extreme temperature (220°C) of vapor phase, I.R., and other reflow procedures without degradation of electrical or mechanical characteristics.

Ultra-Miniature DC-DC Converter Transformers

- **These units can be used as self saturated or square wave driven**
- **Input voltages of: 5V, 12V, 24V and 48V**
- **Output voltages up to 300 Volts**
- **Power levels up to 40 Watts**

All units can be supplied with higher or lower output voltages. Delivery- stock to one week, special voltages 9 days.

Size	Max. Height	A	B	C	D	E	F
1	.310 (7.87)	.400 (10.16)	.050 (1.27)	.075 (1.91)	.020 (.51)	.520 (13.21)	.012 (.30)
2	.365 (9.27)	.495 (12.57)	.055 (1.40)	.095 (2.41)	.020 (.51)	.615 (15.62)	.012 (.30)
3	.460 (11.68)	.615 (15.62)	.075 (1.90)	.125 (3.18)	.027 (.69)	.735 (18.67)	.020 (.51)



For Land Pattern Dimensions See Pg. A•2301 Fig.12 (size #1) Fig.13 (size #2) Fig.14 (size #3)

• TERMINALS ARE CLOCKWISE FROM PIN # 1.

• ALL DIMENSIONS ARE IN INCHES, ( ) = MM.

INPUT 5 VOLTS

Part Number	D.C. OUT VOLTS Bridge	Full Wave	Dual Bridge	MAX. POWER OUT -55°C-+105°C	-55°C-+70°C	APPROX. SWITCH FREQ. Self-Saturated	Square-Wave Driven**	SIZE	*** PRICE 1-9
31420	10	5	±5	1.5W	3W	15K	30K TO 60K	1	41.54
31440	12	6	±6	1.5W	3W	15K	30K TO 60K	1	41.54
31460	28	14	±14	1.5W	3W	15K	30K TO 60K	1	41.54
31480	48	24	±24	1.5W	3W	20K	40K TO 60K	1	41.54
31500	100	50	±50	1.5W	3W	20K	40K TO 60K	1	41.54
32505	10	5	±5	3W	4.5W	15K	30K TO 60K	2	41.54
32525	12	6	±6	3W	4.5W	15K	30K TO 60K	2	41.54
32545	28	14	±14	3W	4.5W	15K	30K TO 60K	2	41.54
32565	48	24	±24	3W	4.5W	20K	40K TO 60K	2	41.54
32585	100	50	±50	3W	4.5W	20K	40K TO 60K	2	41.54
32588	150	75	±75	3W	-	10K	30K TO 60K	2	47.86
32591	200	100	±100	3W	-	10K	30K TO 60K	2	47.86
32594	300	150	±150	3W	-	10K	30K TO 60K	2	47.86
33503	10	5	±5	5W	7.5W	10K	20K TO 50K	3	41.54
33523	12	6	±6	5W	7.5W	10K	20K TO 50K	3	41.54
33543	28	14	±14	5W	7.5W	10K	20K TO 50K	3	41.54
33563	48	24	±24	5W	7.5W	10K	20K TO 50K	3	41.54
33583	100	50	±50	5W	7.5W	10K	20K TO 50K	3	41.54
33586	150	75	±75	5W	-	10K	30K TO 60K	3	47.86
33589	200	100	±100	5W	-	10K	30K TO 60K	3	47.86
33592	300	150	±150	5W	-	10K	30K TO 60K	3	47.86

** Lower switching frequency may be used at lower output power.

INPUT 12 VOLTS

Part Number	D.C. OUT VOLTS Bridge	Full Wave	Dual Bridge	MAX. POWER OUT -55°C-+105°C	-55°C-+70°C	APPROX. SWITCH FREQ. Self Saturated	Square-Wave Driven**	Size	*** Price 1-9
31520	12	6	±6	1.5W	3W	15K	30K TO 60K	1	41.54
31540	24	12	±12	1.5W	3W	15K	30K TO 60K	1	41.54
31560	28	14	±14	1.5W	3W	15K	30K TO 60K	1	41.54
31580	48	24	±24	1.5W	3W	20K	40K TO 60K	1	41.54
31600	100	50	±50	1.5W	3W	20K	40K TO 60K	1	41.54
32605	12	6	±6	3W	4.5W	15K	30K TO 60K	2	41.54
32625	24	12	±12	3W	4.5W	15K	30K TO 60K	2	41.54
32645	28	14	±14	3W	4.5W	15K	30K TO 60K	2	41.54
32665	48	24	±24	3W	4.5W	20K	40K TO 60K	2	41.54
32685	100	50	±50	3W	4.5W	20K	40K TO 60K	2	41.54
32688	150	75	±75	3W	-	10K	30K TO 60K	2	47.86
32691	200	100	±100	3W	-	10K	30K TO 60K	2	47.86
32694	300	150	±150	3W	-	10K	30K TO 60K	2	47.86
33603	12	6	±6	5W	7.5W	15K	30K TO 60K	3	41.25
33623	28	14	±14	5W	7.5W	15K	30K TO 60K	3	41.25
33643	48	24	±24	5W	7.5W	20K	40K TO 60K	3	41.25
33663	100	50	±50	5W	7.5W	20K	40K TO 60K	3	41.25
33666	150	75	±75	5W	-	10K	30K TO 60K	3	47.86
33669	200	100	±100	5W	-	10K	30K TO 60K	3	47.86
33672	300	150	±150	5W	-	10K	30K TO 60K	3	47.86

**Lower switching frequency may be used at lower output power.

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

FEATURES

1) Units can be used as self-saturating or for linear switching applications. Operation over ambient temperature range from –55° to +105°c. All units manufactured to the requirements of MIL-T-27 (TF5S40ZZ)
2) All units can be supplied with higher or lower secondary voltages at the same power levels.
3) Secondary can be connected for full-wave bridge or dual bridge.

Delivery— stock to one week

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225

Internet: http://www.picoelectronics.com E-mail: HLSC73A@prodigy.com

INPUT 24 VOLTS

Part Number	D.C. OUT VOLTS Bridge	Full Wave	Dual Bridge	MAX. POWER OUT -55°C-+105°C	-55°C-−70°C	APPROX. SWITCH FREQ. Self Saturated	Square-Wave Driven**	Size	*** Price 1-9
31620	10	5	±5	1.5W	3W	15K	30K TO 60K	1	41.54
31640	28	14	±14	1.5W	3W	15K	30K TO 60K	1	41.54
31660	48	24	±24	1.5W	3W	20K	40K TO 60K	1	41.54
31680	100	50	±50	1.5W	3W	20K	40K TO 60K	1	41.54
32705	10	5	±5	3W	4.5W	15K	30K TO 60K	2	41.54
32725	28	14	±14	3W	4.5W	15K	30K TO 60K	2	41.54
32745	48	24	±24	3W	4.5W	20K	40K TO 60K	2	41.54
32765	100	50	±50	3W	4.5W	20K	40K TO 60K	2	41.54
32768	150	75	±75	3W	-	10K	30K TO 60K	2	47.86
32771	200	100	±100	3W	-	10K	30K TO 60K	2	47.86
32774	300	150	±150	3W	-	10K	30K TO 60K	2	47.86
33683	10	5	±5	5W	7.5W	15K	30K TO 60K	3	41.54
33703	28	14	±14	5W	7.5W	15K	30K TO 60K	3	41.54
33723	48	24	±24	5W	7.5W	20K	40K TO 60K	3	41.54
33743	100	50	±50	5W	7.5W	20K	40K TO 60K	3	41.54
33746	150	75	±75	5W	-	10K	30K TO 60K	3	47.86
33749	200	100	±100	5W	-	10K	30K TO 60K	3	47.86
33752	300	150	±150	5W	-	10K	30K to 60K	3	47.86

**Lower switching frequency may be used at lower output power.

INPUT 48 VOLTS

Part Number	D.C. OUT VOLTS Bridge	Full Wave	Dual Bridge	MAX. POWER OUT -55°C-+105°C	-55°C-−70°C	APPROX. SWITCH FREQ. Self Saturated	Square-Wave Driven**	Size	*** Price 1-9
31700	24	12	±12	1.5W	3W	15K	30K TO 60K	1	41.54
31720	48	24	±24	1.5W	3W	20K	40K TO 60K	1	41.54
31740	100	50	±50	1.5W	3W	20K	40K TO 60K	1	41.54
31760	150	75	±75	1.5W	3W	20K	40K TO 60K	1	41.54
32785	24	12	±12	3W	4.5W	15K	30K TO 60K	2	41.54
32805	48	24	±24	3W	4.5W	20K	40K TO 60K	2	41.54
32825	100	50	±50	3W	4.5W	20K	40K TO 60K	2	41.54
32845	150	75	±75	3W	4.5W	20K	40K TO 60K	2	41.54
32848	200	100	±100	3W	4.5W	10K	30K TO 60K	2	47.86
32851	300	150	±150	3W	4.5W	10K	30K TO 60K	2	47.86
33763	24	12	±12	5W	7.5W	15K	30K TO 60K	3	47.86
33783	48	24	±24	5W	7.5W	20K	40K TO 60K	3	47.86
33803	100	50	±50	5W	7.5W	20K	40K TO 60K	3	47.86
33823	150	75	±75	5W	7.5W	20K	40K TO 60K	3	47.86
33826	200	100	±100	5W	-	10K	30K TO 60K	3	47.86
33829	300	150	±150	5W	-	10K	30K TO 60K	3	47.86

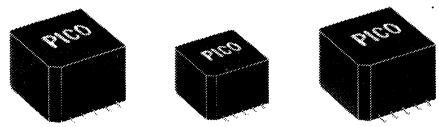
**Lower switching frequency may be used at lower output power.

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

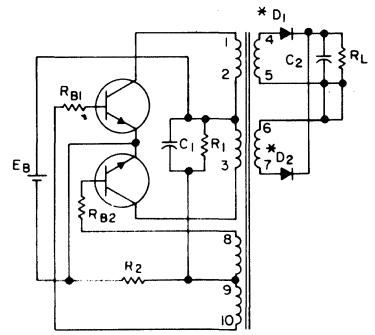
PICO

SURFACE MOUNT

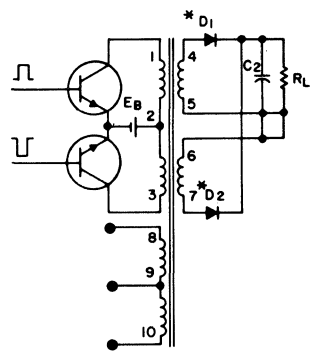
Ultra-Miniature DC-DC Converter Transformers



SCHEMATIC USING
TRANSFORMERS AS SELF-SATURATING



SCHEMATIC USING
TRANSFORMERS AS LINEAR SWITCHING



* D1 AND D2 USE SCHOTTKY OR FAST SWITCHING DIODES

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

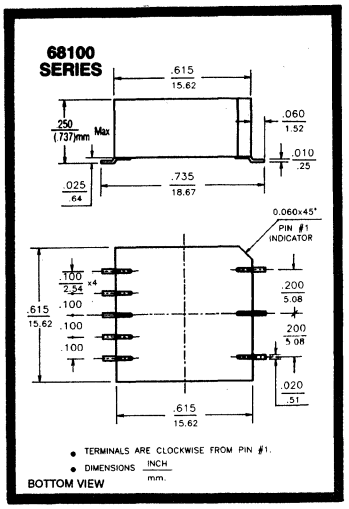
Delivery—stock to one week

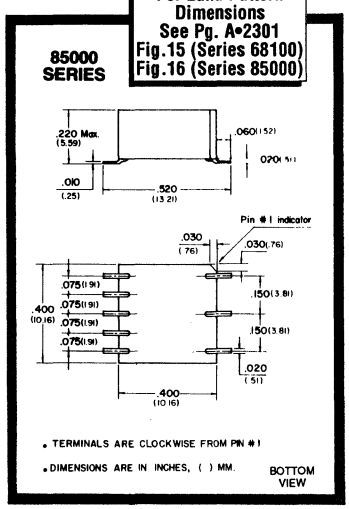
PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225

Internet: http://www.picoelectronics.com E-mail: HLSC73A@prodigy.com

MIL-STD-1553 Interface Transformers Multiplex Data BUS Pulse Transformers

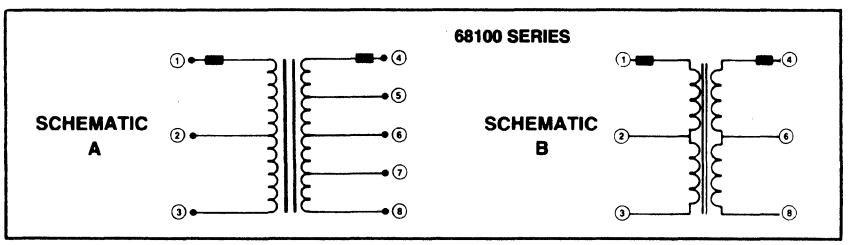


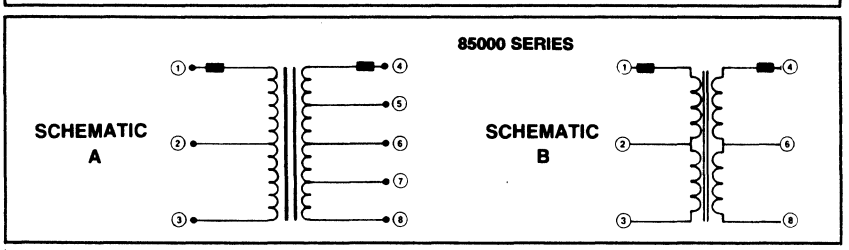


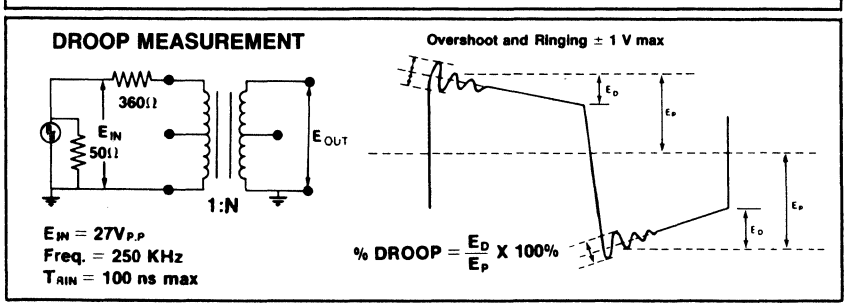
These pulse transformers manufactured to MIL-STD-1553 COMMAND/RESPONSE MULTIPLEX DATA BUS requirements. They also are manufactured to MIL-T-21038 specifications and are designed to meet MAC AIR SPECIFICATIONS A3818, A5690, A5232 and A4905.

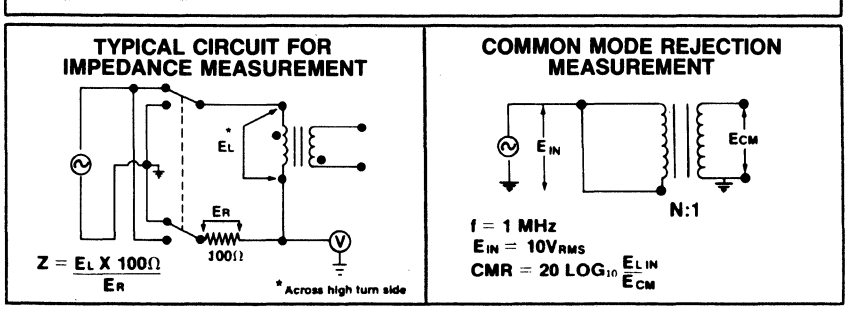
All of these transformers exhibit superior electrical performance. Common mode rejection ratio is greater than 45dB at 1 MHz. Input impedance is greater than 3000 ohms over the band from 75 kHz to 1mHz at 1V rms. This series possesses exceptional waveform integrity: Rise time and fall time is less than 100 nanoseconds. Overshoot and ringing is less than ± 1V peak. Droop is less than 20%.

PICO PART NUMBER 68100 Series	PICO PART NUMBER 85000 Series	TURNS RATIO	PRIMARY	SECONDARY	% DROOP (Typical)	CMR dB (Typical)	SCHEMATIC	PRICE (1–9)
68110	85010	1CT : 1CT 1CT : .707CT	1–3 1–3	4–8 5–7	10	50	A	33.67
68120	85020	1.4CT : 1CT 2CT : 1CT	1–3 1–3	4–8 5–7	10	50	A	33.67
68130	85030	1.25CT : 1CT 1.66CT : 1CT	1–3 1–3	4–8 5–7	10	50	A	33.67
68140	85040	2.3CT : 1CT 3.2CT : 1 CT	1–3 1–3	4–8 5–7	10	50	A	33.67
68150	85050	1CT : 1CT	1–3	4–8	10	50	B	27.76
68160	85060	1CT : 1.41CT	1–3	4–8	10	50	B	27.76
68170	85070	1CT : 1.66CT	1–3	4–8	10	50	B	27.76
68180	85080	1CT : 2CT	1–3	4–8	10	50	B	27.76









SPECIFICATIONS:

- Units manufactured to MIL-T-21038 and MIL STD 1553
- IMPEDANCE ..... greater than 3KΩ over the band from 75kHz to 1MHz
- DROOP ..... 20% max.
- OVERSHOOT ..... 1V peak
- COMMON MODE REJECTION (CMR) greater than 45dB.
- DIELECTRIC STRENGTH: ..... All Units Tested at 200 V RMS.
- INSULATION RESISTANCE ..... Greater Than 10,000 Megohms at 300 V DC.
- WEIGHT: .... 5 Grams.
- OPERATING TEMPERATURE: ..... -55°C to +130°C
- TERMINALS: Meet solderability per MIL- STD-202 Method 208

Delivery— stock to one week

*For immediate engineering assistance or to place an order—**Call Toll Free 800-228-9747***

PICO Electronics, Inc.
143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225
Internet: http://www.picoelectronics.com E-Mail: HLSC73A@prodigy.com

SURFACE MOUNT

Units are electrical equivalents of QPL MIL-T-21038/27C

Units are manufactured to MIL-T-21038, Type TP7SXNNNNKZ

SPECIFICATIONS:

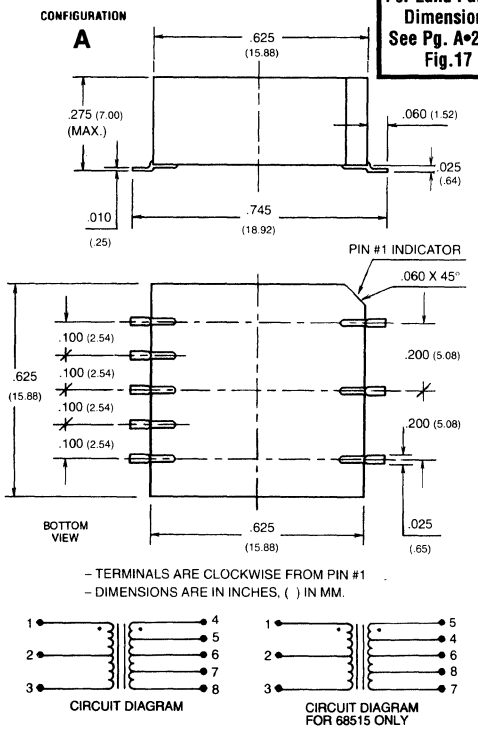
- These units are in strict compliance to MIL-T-21038/27C, type TP7SXNNNNKZ
- IMPEDANCE ..... Minimum value shown in table. These values will be met from 75 kHz to 1MHz over temp. range of −55°C to +130°C
- DROOP ..... 20% max.
- OVERSHOOT ..... 1V peak
- COMMON MODE REJECTION (CMR) 45dB minimum
- DIELECTRIC WITHSTANDING ..... 100 VRMS
- INSULATION RESISTANCE ..... 1K meghoms min. at 100 VDC
- WEIGHT..... 5 grams max.
- CASE..... epoxy

ELECTRICAL CHARACTERISTICS AND DIMENSIONS

PICO PART NUMBER	TURNS RATIO	PRIMARY	SECONDARY	DC RESISTANCE OHMS (MAX)	IMPEDANCE OHMS (MIN)	CONFIGURATION	PICO PRICE 1-4
68500	1:1 ±3% 1:.707 ±3%	1-3 1-3	4-8 5-7	1-3 3.0 4-8 3.0	(1-3) 4,000	A	46.15
68505	1.4:1 ±3% 2:1 ±3%	1-3 1-3	4-8 5-7	1-3 3.5 4-8 3.0	(1-3) 7,200	A	50.76
68510	1.25:1 ±3% 1.66:1 ±3%	1-3 1-3	4-8 5-7	1-3 3.2 4.8 3.0	(1-3) 4,000	A	46.15
68515	2.3:1 ±3% 3.2:1 ±3%	4-8 5-7	1-3 1-3	1-3 1.2 4-8 3.0	(5-7) 3,000	A	46.15
68520	1:1.41 ±3%	1-3	4-6	1-3 2.2 4-6 2.7	(3-4) 3,000	C	33.69
68525	1:1 ±3%	1-3	4-6	1-3 2.5 4-6 2.8	(1-5) 3,000	B	33.69
68530	1:1.41 ±3%	1-3	4-6	1-3 2.2 4-6 2.7	(2-6) 3,000	B	33.69
68535	1:1.66 ±3%	1-3	4-6	1-3 1.5 4-6 2.4	(2.6) 3,000	B	33.69
68540	1:2 ±3%	1-3	4-6	1-3 1.3 4-6 2.6	(2-6) 3,000	B	33.69
68545	2.12:1 ±3% 1.5:1 ±3%	4-8 5-7	1-3 1-3	1-3 1.0 4-8 3.5	(4-8) 4,0000	A	46.15
68550	1:2.5 ±3% 1:1.79 ±3%	1-3 1-3	4-8 5-7	1-3 1.0 4-8 3.5	(4-8) 4,000	A	46.15
68555	1:1.5 ±3%	1-5	2-6	1-3 .90 4-8 2.5	(2-6) 3,000	B	33.69
68560	1:1.79 ±3%	1-5	2-6	1-3 .90 4-8 2.5	(2-6) 3,000	B	33.69
68565	1:2.5 ±3%	1-5	2-6	1-3 1.0 4-8 2.8	(2-6) 3,000	B	33.69

CONFIGURATION A

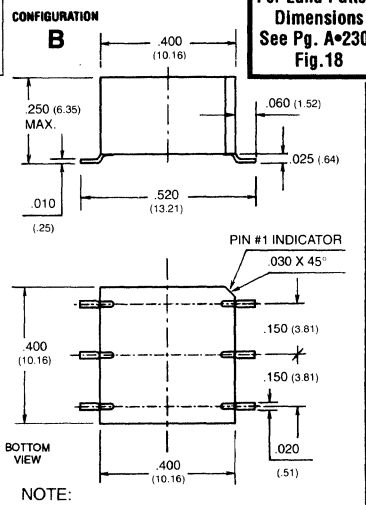
For Land Pattern Dimensions See Pg. A•2301 Fig.17



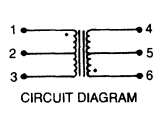
– TERMINALS ARE CLOCKWISE FROM PIN #1
– DIMENSIONS ARE IN INCHES, ( ) IN MM.

CONFIGURATION B

For Land Pattern Dimensions See Pg. A•2301 Fig.18

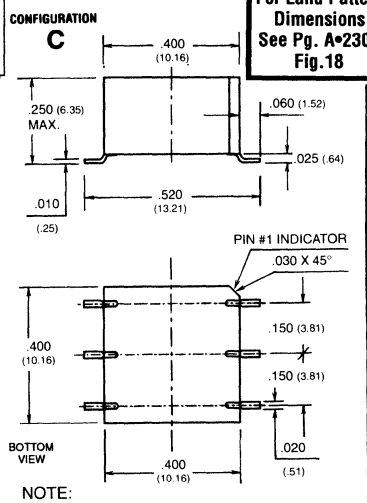


NOTE:
– DIMENSIONS ARE IN INCHES, ( ) IN MM.
– TERMINALS ARE CLOCKWISE FROM PIN #1.
– FOR CONFIGURATION "C" TERMINALS

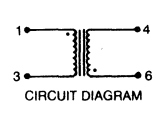


CONFIGURATION C

For Land Pattern Dimensions See Pg. A•2301 Fig.18



NOTE:
– DIMENSIONS ARE IN INCHES, ( ) IN MM.
– TERMINALS ARE CLOCKWISE FROM PIN #1.
– FOR CONFIGURATION "C" TERMINALS
2 & 5 ARE DUMMY PINS.



For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

Delivery— stock to one week

PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225

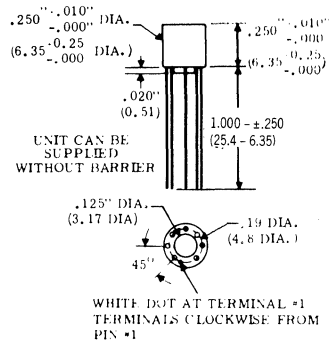
Internet: http://www.picoelectronics.com E-mail: HLSC73A@prodigy.com

1/4"x1/4"

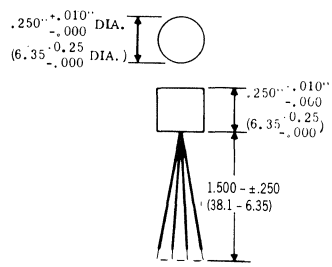
PICO's ultra-miniature transformers

For Surface Mount Versions of this series, see pgs. A•2256-2257

F SERIES Plug-In



G SERIES Insulated Leads



DIMENSIONS ARE IN INCHES (MM)

SPECIFICATIONS

- MIL-T-27: ..... All units manufactured to MIL-T-27, Military Designation is TF5R21ZZ for Transformers, TF5R20ZZ for Inductors.
- FREQUENCY RESPONSE: ..... ±3dB, 400 Hz-250 KHz at 1.0 Milliwatt.
- MAXIMUM DISTORTION: ..... 5% With Rated Power Level at 1 KHz and 400 Hz.
- DIELECTRIC STRENGTH: ..... All Units Tested at 200 V RMS.
- INSULATION RESISTANCE: ..... Greater Than 10,000 Megohms at 500 V DC.
- WEIGHT: ..... 1.1 Grams.
- OPERATING TEMPERATURE: -55°C to +105°C (All Units Can Be Supplied to Class S Requirements, +130°C)
- TERMINALS..... Solid .012 Diameter Conductor. Solderability per MIL-STD-202 Method 208.
- THERMAL SHOCK: ..... 25 Cycles, Method 107D, MIL-STD-202E, Test Condition A-1.

Delivery— stock to one week

PART NUMBER		PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS		POWER MILLIWATTS 1 KHz and higher	POWER MILLIWATTS 400 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESISTANCE OHMS		TURNS RATIO PRIM/SEC		PRICES 1-9***	
F Series Plug-In	G Series Insulated Leads		SER	PAR					SER CONN	PAR CONN	SEC SER CONN	SEC PAR CONN	F-Series	G-Series
F-28003	G-29003	10 ct	10 ct	2.5	125	20	11.5	1.1	1.35	.34	1:1	2:1	27.67	26.32
F-28005	G-29005	20 ct	8 ct	2	125	20	8	2.1	1.28	.32	1.58:1	3.16:1	27.67	26.32
F-28010	G-29010	20 ct	20 ct	5	125	20	8	2.1	2.56	.64	1:1	2:1	27.67	26.32
F-28015	G-29015	32 ct	32 ct	8	125	20	6.5	3.52	4.32	1.08	1:1	2:1	27.67	26.32
F-28020	G-29020	40 ct	40 ct	10	125	20	5.6	4	4.77	1.19	1:1	2:1	27.46	26.32
F-28025	G-29025	48 ct	16 ct	4	125	20	5.2	4.3	2.3	.58	1.73:1	3.46:1	25.16	23.94
F-28030	G-29030	50 ct	50 ct	12.5	125	20	5	5.5	6.6	1.65	1:1	2:1	25.16	23.94
F-28035	G-29035	80 ct	32 ct	8	125	20	4	8.5	4.25	1.06	1.58:1	3.16:1	27.46	23.94
F-28040	G-29040	100 ct	40 ct	10	125	20	3.6	12.1	4.85	1.21	1.58:1	3.16:1	27.46	23.94
F-28045	G-29045	100 ct	100 ct	25	125	20	3.6	12.1	12	3	1:1	2:1	25.16	23.94
F-28050	G-29050	120 ct	12.8 ct	3.2	125	20	3.3	13.2	1.6	.4	3.06:1	6.12:1	25.16	23.94
F-28055	G-29055	120 ct	60 ct	15	125	20	3.3	13.2	7.3	1.83	1.41:1	2.83:1	30.07	23.94
F-28060	G-29060	120 ct	120 ct	30	125	20	3.3	13.2	16	4	1:1	2:1	30.07	28.54
F-28065	G-29065	150 ct	12 ct	3	125	20	3	15	1.56	.39	3.54:1	7.07:1	27.32	26.01
F-28070	G-29070	150 ct	50 ct	12.5	125	20	3	15	6.6	1.65	1.73:1	3.46:1	30.07	31.73
F-28075	G-29075	150 ct	100 ct	25	125	20	3	15	14.5	3.63	1.22:1	2.45:1	30.07	28.54
F-28080	G-29080	150 ct	150 ct	37.5	125	20	3	15	18.3	4.58	1:1	2:1	30.07	28.54
F-28085	G-29085	150 ct	600 ct	150	125	20	3	15	72	18	1:2	1:1	30.07	28.54
F-28090	G-29090	200 ct	200 ct	50	125	20	2.5	22	26.8	6.7	1:1	2:1	30.07	28.54
F-28095	G-29095	300 ct	12 ct	3	125	20	2	33	1.56	.39	5:1	10:1	30.07	28.54
F-28100	G-29100	300 ct	50 ct	12.5	125	20	2	33	6.6	1.65	2.45:1	4.9:1	30.07	28.54
F-28105	G-29105	300 ct	150 ct	37.5	125	20	2	33	18.3	4.58	1.41:1	2.83:1	30.07	28.54
F-28110	G-29110	300 ct	300 ct	75	125	20	2	33	40.3	10.08	1:1	2:1	27.32	28.54
F-28115	G-29115	300 ct	600 ct	150	125	20	2	33	72	18	1:1.41	1.41:1	32.24	26.01
F-28120	G-29120	320 ct	12.8 ct	3.2	125	20	2	34	1.6	0.4	5:1	10:1	32.24	30.62
F-28125	G-29125	400 ct	40 ct	10	125	20	1.8	49	4.7	1.18	3.16:1	6.32:1	32.24	30.62
F-28130	G-29130	400 ct	120 ct	30	125	20	1.8	49	16.3	4.08	1.83:1	3.65:1	32.24	30.62
F-28135	G-29135	400 ct	200 ct	50	125	20	1.8	49	27.3	6.83	1.41:1	2.83:1	32.24	30.62
F-28140	G-29140	400 ct	400 ct	100	125	20	1.8	49	49	12.25	1:1	2:1	29.31	27.90
F-28145	G-29145	400 ct	1000 ct	250	125	20	1.8	49	120	30	1:1.58	1.26:1	32.24	30.62
F-28150	G-29150	400 ct	2000 ct	500	125	20	1.8	49	270	67.5	1:2.24	1:1.12	32.24	30.62
F-28155	G-29155	400 ct	4000 ct	1000	125	20	1.8	49	476	119	1:3.16	1:1.58	32.24	30.62
F-28160	G-29160	500 ct	12.8 ct	3.2	125	20	1.6	54	1.6	0.4	6.25:1	12.5:1	29.31	27.90
F-28165	G-29165	500 ct	16 ct	4	125	20	1.6	54	2.3	0.58	5.6:1	11.2:1	29.31	27.90
F-28170	G-29170	500 ct	50 ct	12.5	125	20	1.6	54	6.6	1.65	3.16:1	6.32:1	29.31	27.90
F-28175	G-29175	500 ct	150 ct	37.5	125	20	1.6	54	18.3	4.58	1.83:1	3.65:1	29.31	27.90
F-28180	G-29180	500 ct	500 ct	125	125	20	1.6	54	65	16.3	1:1	2:1	32.24	30.62
F-28185	G-29185	*500 ct	500 ct	-	125	20	1.6	54	65	-	1:1	-	32.24	30.62
F-28190	G-29190	500 ct	600 ct	150	125	20	1.6	54	72	18	1:1.1	1.83:1	32.24	30.62
F-28195	G-29195	600 ct	12.8 ct	3.2	125	20	1.5	59	1.6	0.4	6.85:1	13.7:1	32.24	30.59
F-28200	G-29200	600 ct	30 ct	7.5	125	20	1.5	59	4.1	1.03	4.47:1	8.94:1	29.31	27.90
F-28205	G-29205	600 ct	48 ct	12	125	20	1.5	59	5.2	1.3	3.54:1	7.07:1	29.31	27.90
F-28210	G-29210	600 ct	200 ct	50	125	20	1.5	59	26.5	6.63	1.73:1	3.46:1	29.31	27.90
F-28215	G-29215	600 ct	600 ct	150	125	20	1.5	59	72	18	1:1	2:1	29.31	27.90
F-28220	G-29220	*600 ct	600 ct	-	125	20	1.5	59	72	-	1:1	-	32.24	30.59
F-28225	G-29225	600 ct	1200 ct	300	125	20	1.5	59	160	40	1:1.41	1.41:1	29.31	27.90
F-28230	G-29230	640 ct	12.8 ct	3.2	125	20	1.5	62	1.6	0.4	7.07:1	14.14:1	29.31	27.90
F-28235	G-29235	700 ct	100 ct	25	125	20	1.35	65	12	3	2.65:1	5.29:1	29.31	27.90
F-28240	G-29240	800 ct	12.8 ct	3.2	125	20	1.3	88	16	4	7.9:1	15.8:1	32.24	30.59
F-28245	G-29245	800 ct	48 ct	12	125	20	1.3	88	6.7	1.68	4.08:1	8.16:1	30.07	27.90
F-28250	G-29250	800 ct	800 ct	200	125	20	1.3	88	106	26.5	1:1	2:1	30.07	27.90
F-28255	G-29255	900 ct	600 ct	150	125	20	1.2	93	74	18.5	1.22:1	2.45:1	30.07	27.90
F-28260	G-29260	1000 ct	12 ct	3	125	20	1.2	120	1.55	0.39	9.13:1	18.3:1	33.10	31.42
F-28265	G-29265	1000 ct	50 ct	12.5	125	20	1.2	120	6.6	1.65	4.47:1	8.94:1	33.10	31.42
F-28270	G-29270	1000 ct	1000 ct	250	125	20	1.2	120	120	30	1:1	2:1	30.07	27.90
F-28275	G-29275	1060 ct	12.8 ct	3.2	125	20	1.2	125	1.6	0.4	9.1:1	18.2:1	33.10	31.42
F-28280	G-29280	1200 ct	12.8 ct	3.2	125	20	1	133	1.6	0.4	9.68:1	19.4:1	33.10	31.42
F-28285	G-29285	1200 ct	500 ct	125	125	20	1	133	65	16.25	1.55:1	3.1:1	33.10	31.42
F-28290	G-29290	1200 ct	1200 ct	300	125	20	1	133	160	40	1:1	2:1	33.10	31.42
F-28295	G-29295	*1200 ct	1200 ct	-	125	20	1	133	160	-	1:1	-	33.10	31.42
F-28300	G-29300	1500 ct	12 ct	3	125	20	1	180	1.55	0.39	11.2:1	22.4:1	33.10	31.42
F-28305	G-29305	1500 ct	500 ct	125	125	20	1	180	65	16.3	1.73:1	3.46:1	30.07	27.90
F-28310	G-29310	*1500 ct	600 ct	-	125	20	1	180	73	-	1.58:1	-	30.07	27.90
F-28315	G-29315	*1500 ct	1500 ct	-	125	20	1	180	215	-	1:1	-	33.10	31.42
F-28320	G-29320	1600 ct	12.8 ct	3.2	125	20	1	190	1.6	0.4	11.2:1	22.4:1	33.10	31.42
F-28325	G-29325	2000 ct	8 ct	2	125	20	0.8	218	1	.25	15.8:1	31.6:1	33.10	31.42
F-28330	G-29330	2000 ct	2000 ct	500	125	20	0.8	218	260	65	1:1	2:1	33.10	31.42
F-28335	G-29335	*2000 ct	2000 ct	-	125	20	0.8	218	260	-	1:1	-	33.10	31.42
F-28340	G-29340	2000 ct	8000 ct	2000	125	20	0.8	218	830	207.5	1:2	1:1	32.24	30.70

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York
*INCLUDED ELECTROSTATIC SHIELD

For immediate engineering assistance or to place an order—
Call Toll Free 800-228-9747

PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225
Internet: http://www.picoelectronics.com E-Mail: HLSC73A@prodigy.com

PART NUMBER F Series Plug-In	PART NUMBER G Series Insulated Leads	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS PAR	POWER MILIWATTS 1 KHz and higher	POWER MILIWATTS 400 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	SECONDARY DC RESISTANCE OHMS PAR CONN	TURNS RATIO PRIM/SEC SEC SER CONN	TURNS RATIO PRIM/SEC SEC PAR CONN	PRICES 1-9*** F-Series	PRICES 1-9*** G-Series
F-28345	G-29345	2500 ct	2500 ct	625	125	20	0.75	280	280	70	1:1	2:1	32.24	30.70
F-28350	G-29350	3000 ct	3000 ct	725	125	20	0.65	330	330	82.5	1:1	2:1	32.24	30.70
F-28355	G-29355	*3000 ct	3000 ct	-	125	20	0.65	330	330	-	1:1	-	33.10	31.42
F-28360	G-29360	3600 ct	3600 ct	900	125	20	0.6	370	450	112.5	1:1	2:1	32.24	30.70
F-28365	G-29365	4000 ct	16 ct	4	125	20	0.57	400	2.3	0.58	15.8:1	31.6:1	32.24	30.70
F-28370	G-29370	4000 ct	600 ct	150	125	20	0.57	400	73	18.25	2.58:1	5.16:1	32.24	30.70
F-28375	G-29375	4000 ct	1000 ct	250	125	20	0.57	400	120	30	2:1	4:1	32.24	30.70
F-28380	G-29380	*4000 ct	8000 ct	-	125	20	0.57	400	1070	-	1:1.41	-	35.48	33.69
F-28385	G-29385	5000 ct	500 ct	125	125	20	0.5	540	65	16.25	3.16:1	6.32:1	32.24	30.70
F-28390	G-29390	5000 ct	5000 ct	1250	125	20	0.5	540	650	162.5	1:1	2:1	35.48	33.69
F-28395	G-29395	7500 ct	50 ct	12.5	125	20	0.5	835	6.6	1.65	12.2:1	24.5:1	35.48	33.69
F-28400	G-29400	7500 ct	100 ct	25	125	20	0.4	835	12	3	8.66:1	17.3:1	33.00	31.44
F-28405	G-29405	7500 ct	600 ct	150	125	20	0.4	835	72	18	3.54:1	7.07:1	33.00	31.44
F-28410	G-29410	7500 ct	2500 ct	625	125	20	0.4	835	280	70	1.73:1	3.46:1	33.00	31.44
F-28415	G-29415	*7500 ct	7500 ct	-	125	20	0.4	835	1020	-	1:1	-	33.00	31.44
F-28420	G-29420	8000 ct	12.8 ct	3.2	125	20	0.4	865	1.6	0.4	25:1	50:1	35.48	33.69
F-28425	G-29425	8000 ct	1000 ct	250	125	20	0.4	865	120	30	2.83:1	5.66:1	35.48	33.69
F-28430	G-29430	*8000 ct	1200 ct	-	125	20	0.4	865	160	-	2.58:1	-	35.48	33.69
F-28435	G-29435	*9000 ct	9000 ct	-	125	20	0.4	1160	1160	-	1:1	-	35.48	33.69
F-28440	G-29440	10,000 ct	12.8 ct	3.2	125	20	0.36	1200	1.6	0.4	28:1	56:1	35.48	33.69
F-28445	G-29445	10,000 ct	16 ct	4	125	20	0.36	1200	1.77	0.44	25:1	50:1	33.00	31.44
F-28450	G-29450	10,000 ct	100 ct	25	125	20	0.36	1200	12	3	10:1	20:1	33.00	31.44
F-28455	G-29455	10,000 ct	200 ct	50	125	20	0.36	1200	27	6.75	7.07:1	14.14:1	33.00	31.44
F-28460	G-29460	10,000 ct	500 ct	125	125	20	0.36	1200	65	16.25	4.47:1	8.94:1	33.00	31.44
F-28465	G-29465	10,000 ct	600 ct	150	125	20	0.36	1200	72	18	4.08:1	8.16:1	33.00	31.44
F-28470	G-29470	10,000 ct	1000 ct	250	125	20	0.36	1200	120	30	3.16:1	6.32:1	33.00	31.44
F-28475	G-29475	10,000 ct	1200 ct	300	125	20	0.36	1200	160	40	2.88:1	5.77:1	33.00	31.44
F-28480	G-29480	10,000 ct	1500 ct	375	125	20	0.36	1200	215	53.8	2.58:1	5.16:1	33.10	33.69
F-28485	G-29485	10,000 ct	2000 ct	500	125	20	0.36	1200	260	65	2.24:1	4.47:1	33.10	31.44
F-28490	G-29490	10,000 ct	5000 ct	1250	125	20	0.36	1200	650	162.5	1.41:1	2.83:1	33.10	31.44
F-28495	G-29495	10,000 ct	7500 ct	1875	125	20	0.36	1200	1020	255	1.15:1	2.3:1	33.10	31.44
F-28500	G-29500	10,000 ct	10,000 ct	2500	125	20	0.36	1200	1200	300	1:1	2:1	30.07	28.64
F-28505	G-29505	*10,000 ct	10,000 ct	-	125	20	0.36	1200	1440		1:1	-	35.48	33.69
F-28510	G-29510	15,000 ct	400 ct	100	100	15	0.35	1420	43	10.75	6.12:1	12.24:1	33.10	31.44
F-28515	G-29515	15,000 ct	500 ct	125	100	15	0.35	1420	49	12.25	5.48:1	10.95:1	33.10	31.44
F-28520	G-29520	15,000 ct	600 ct	150	100	15	0.35	1420	68	17	5:1	10:1	33.10	31.44
F-28525	G-29525	15,000 ct	10,000 ct	2500	100	15	0.35	1420	1100	275	1.22:1	2.45:1	33.10	31.44
F-28530	G-29530	*15,000 ct	15,000 ct	-	100	15	0.35	1420	1730	-	1:1	-	35.48	33.69
F-28535	G-29535	15,000 ct	15,000 ct	3750	100	15	0.35	1420	1730	433	1:1	2:1	33.10	31.44
F-28540	G-29540	16,000 ct	1000 ct	250	100	15	0.35	1500	115	28.75	4:1	8:1	33.10	31.44
F-28545	G-29545	20,000 ct	500 ct	125	100	15	0.3	1600	60	15	6.33:1	12.65:1	35.48	33.69
F-28550	G-25550	20,000 ct	600 ct	150	100	15	0.3	1600	66	16.5	5.77:1	11.55:1	35.48	33.69
F-28555	G-29555	20,000 ct	800 ct	200	100	15	0.3	1600	94	23.5	5:1	10:1	35.48	33.69
F-28560	G-29560	20,000 ct	1000 ct	250	100	15	0.3	1600	106	26.5	4.47:1	8.94:1	35.48	33.69
F-28565	G-29565	20,000 ct	5000 ct	1250	100	15	0.3	1600	600	150	2:1	4:1	35.48	33.69
F-28570	G-29570	20,000 ct	10,000 ct	2500	100	15	0.3	1600	1100	275	1.41:1	2.83:1	35.48	33.69
F-SHIELD	MU-METAL SHIELD .285" d × .268" h (7.24 mm d × 6.73 mm h) SINGLE SHIELD												3.50	
FYY-SHIELD	MU-METAL SHIELD .315" d × .275" h (8.0 mm d × 6.99 mm h) USE WITH F-SHIELD FOR DOUBLE SHIELDING												3.50	
G-SHIELD	MU-METAL SHIELD .285" d × .335" h (7.24 mm d × 8.51 mm h) SINGLE SHIELD													3.50
GYY-SHIELD	MU-METAL SHIELD .315" d × .40" h (8.00 mm d × 10.16 mm h) USE WITH G-SHIELD FOR DOUBLE SHIELDING													3.50
GXX-SHIELD	MU-METAL SHIELD .35" d × .465" h (8.89 mm d × 11.81 mm h) USE WITH G-SHIELD AND GYY SHIELD FOR TRIPLE SHIELDING													3.50

*INCLUDES ELECTROSTATIC SHIELD ***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%

Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

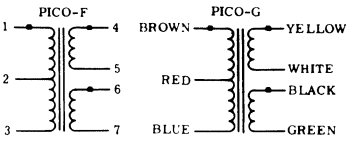
INDUCTORS

PART NUMBER F-SERIES	PART NUMBER G-SERIES	INDUCTANCE HENRIES	DC CURRENT ma	DC RESISTANCE OHMS	PRICES 1-9*** F SERIES	PRICES 1-9*** G SERIES
F-5825	G-6125	SERIES 10.0	0	2250	27.32	26.01
		SERIES 2.75	2			
		PARALLEL 2.5	0	560		
		PARALLEL .65	4			
F-5830	G-6130	SERIES 5.5	0	1000	27.32	26.01
		SERIES 1.5	2			
		PARALLEL 1.3	0	250		
		PARALLEL .40	4			
F-5835	G-6135	SERIES .85	1	240	27.32	26.01
		SERIES .25	6			
		PARALLEL .21	2	60		
		PARALLEL .06	12			
F-5840	G-6140	SERIES .6	0	144	27.32	26.01
		SERIES .15	5			
		PARALLEL .15	0	36		
		PARALLEL .04	10			

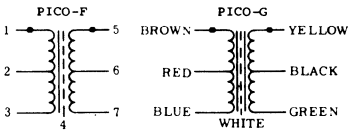
F SERIES Plug-In

G SERIES Insulated Leads

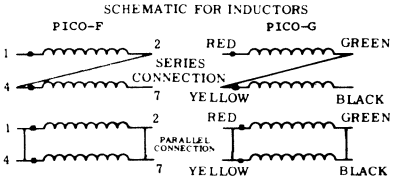
SCHEMATIC FOR TRANSFORMERS WITH SPLIT SECONDARIES



SCHEMATIC FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



SCHEMATIC FOR INDUCTORS



FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- 5 MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED
- VARIATION OF STANDARD DESIGNS AVAILABLE
- SPECIAL PRODUCTION TECHNIQUES ENSURE UNIFORM SIZE AND LEADS WHICH ARE FREE OF ENCAPSULANT. NO MENISCUS IN LEAD AREA.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

This Product is Patented

INDUCTORS

ALL INDUCTORS HAVE SPLIT WINDINGS AND MEASUREMENTS ARE LISTED FOR BOTH SERIES AND PARALLEL CONNECTIONS. TWO VALUES OF INDUCTANCE. EACH AT A PARTICULAR VALUE OF D.C. CURRENT, ARE LISTED FOR EACH INDUCTOR.

Delivery— stock to one week

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

PICO Electronics, Inc.

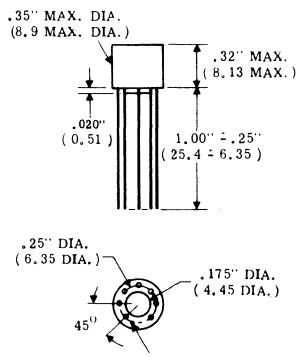
143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225

Internet: http://www.picoelectronics.com E-mail: HLSC73A@prodigy.com

PICO's ultra-miniature transformers

For Surface Mount Versions of this series, see pgs. A•2258-2259

W SERIES Plug-In



PICO PART NUMBER W Series Plug-In	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER WATTS 1 KHz and higher	400 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIM DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS/RATIO PRIM/SEC SEC SER CONN	SEC PAR CONN	PICO PRICES 1-9 *** W-Series
W-26003	10 ct	10 ct	2.5	.4	.075	31.6	1.1	1.3	.33	1:1	2:1	20.41
W-26005	20 ct	8 ct	2	.4	.075	22.3	2.2	1	.25	1.58:1	3.16:1	20.41
W-26010	20 ct	20 ct	5	.4	.075	22.3	2.2	2.6	.65	1:1	2:1	20.41
W-26015	32 ct	32 ct	8	.4	.075	17.6	3.5	4.2	1.05	1:1	2:1	20.41
W-26020	40 ct	40 ct	10	.4	.075	15.8	4	4.5	1.2	1:1	2:1	20.41
W-26025	48 ct	16 ct	4	.4	.075	14.4	5.3	1.9	.48	1.73:1	3.46:1	21.64
W-26030	50 ct	50 ct	12.5	.4	.075	14.1	5.6	6.5	1.6	1:1	2:1	21.64
W-26035	80 ct	32 ct	8	.4	.075	11.1	8	4	1	1.58:1	3.16:1	25.72
W-26040	100 ct	40 ct	10	.4	.075	10	10	4.5	1.2	1.58:1	3.16:1	21.64
W-26045	100 ct	100 ct	25	.4	.075	10	10	12	3	1:1	2:1	21.64
W-26050	120 ct	12.8 ct	3.2	.4	.075	9.1	12	1.5	.38	3.06:1	6.12:1	19.47
W-26055	120 ct	60 ct	15	.4	.075	9.1	12	7.2	1.8	1.41:1	2.83:1	25.72
W-26060	120 ct	120 ct	30	.4	.075	9.1	12	14.5	3.6	1:1	2:1	25.72
W-26065	150 ct	12 ct	3	.4	.075	8.2	15	1.5	.38	3.54:1	7.08:1	19.47
W-26070	150 ct	50 ct	12.5	.4	.075	8.2	15	6	1.5	1.73:1	3.46:1	21.64
W-26075	150 ct	100 ct	25	.4	.075	8.2	15	12	3	1.22:1	2.45:1	21.64
W-26080	150 ct	150 ct	37.5	.4	.075	8.2	15	16.8	4.2	1:1	2:1	25.72
W-26085	150 ct	600 ct	150	.4	.075	8.2	15	70	17.5	1:2	1:1	21.64
W-26090	200 ct	200 ct	50	.4	.075	7	20	24	6	1:1	2:1	21.64
W-26095	300 ct	12ct	3	.4	.075	5.8	30	1.5	.38	5:1	10:1	19.47
W-26100	300 ct	50 ct	12.5	.4	.075	5.8	30	6	1.5	2.45:1	4.9:1	21.64
W-26105	300 ct	150 ct	37.5	.4	.075	5.8	30	18	4.5	1.41:1	2.83:1	21.64
W-26110	300 ct	300 ct	75	.4	.075	5.8	30	36	9	1:1	2:1	25.72
W-26115	300 ct	600 ct	150	.4	.075	5.8	30	72	18	1:1.41	1.41:1	19.47
W-26120	320 ct	12.8 ct	3.2	.4	.075	5.6	32	1.5	.38	5:1	10:1	19.47
W-26125	400 ct	40 ct	10	.4	.075	5	40	4.5	1:1	3.16:1	6.32:1	25.72
W-26130	400 ct	120 ct	30	.4	.075	5	40	14	3.5	1.83:1	3.65:1	25.72
W-26135	400 ct	200 ct	50	.4	.075	5	40	24	6	1.41:1	2.83:1	21.64
W-26140	400 ct	400 ct	100	.4	.075	5	40	48	12	1:1	2:1	25.72
W-26145	400 ct	1000 ct	250	.4	.075	5	40	120	30	1:1.58	1.26:1	29.49
W-26150	400 ct	2000 ct	500	.4	.075	5	40	240	60	1:2.24	1:1.12	29.49
W-26155	400 ct	4000 ct	1000	.4	.075	5	40	480	120	1:3.16	1:1.58	26.65
W-26160	500 ct	12.8 ct	3.2	.4	.075	4.5	50	1.5	.38	6.25:1	12.5:1	22.57
W-26165	500 ct	16 ct	4	.4	.075	4.5	50	2	.5	5.6:1	11.2:1	22.57
W-26170	500 ct	50 ct	12.5	.4	.075	4.5	50	6	1.5	3.16:1	6.32:1	22.57
W-26175	500 ct	150 ct	37.5	.4	.075	4.5	50	18	4.5	1.83:1	3.65:1	22.57
W-26180	500 ct	500 ct	125	.4	.075	4.5	50	60	15	1:1	2:1	22.57
W-26185	*500 ct	500 ct	–	.4	.075	4.5	50	60	–	1:1	–	22.57
W-26190	500 ct	600 ct	150	.4	.075	4.5	50	72	18	1:1.1	1.83:1	22.57
W-26195	600 ct	12.8 ct	3.2	.4	.075	4.1	60	1.5	.38	6.85:1	13.7:1	19.47
W-26200	600 ct	30 ct	7.5	.4	.075	4.1	60	3.6	.9	4.47:1	8.94:1	20.41
W-26205	600 ct	48 ct	12	.4	.075	4.1	60	5.8	1.45	3.54:1	7.07:1	20.41
W-26210	600 ct	200 ct	50	.4	.075	4.1	60	24	6	1.73:1	3.46:1	20.41
W-26215	600 ct	600 ct	150	.4	.075	4.1	60	72	18	1:1	2:1	20.41
W-26220	*600 ct	600 ct	–	.4	.075	4.1	60	72	–	1:1	–	22.58
W-26225	600 ct	1200 ct	300	.4	.075	4.1	60	144	36	1:1.41	1.41:1	20.41
W-26230	640 ct	12.8 ct	3.2	.4	.075	3.9	64	1.5	.38	7.07:1	14.14:1	20.41
W-26235	700 ct	100 ct	25	.4	.075	3.8	70	12	3	2.65:1	5.29:1	20.41
W-26240	800 ct	12.8 ct	3.2	.4	.075	3.5	80	1.5	.38	7.9:1	15.8:1	20.41
W-26245	800 ct	48 ct	12	.4	.075	3.5	80	5.8	1.45	4.08:1	8.16:1	22.58
W-26250	800 ct	800 ct	200	.4	.075	3.5	80	96	24	1:1	2:1	20.41
W-26255	900 ct	600 ct	150	.4	.075	3.3	90	72	18	1.22:1	2.45:1	20.41
W-26260	1000 ct	12 ct	3	.4	.075	3.2	100	1.5	.38	9.13:1	18.3:1	20.41
W-26265	1000 ct	50 ct	12.5	.4	.075	3.2	100	6	1.5	4.47:1	8.94:1	22.58
W-26270	1000 ct	1000 ct	250	.4	.075	3.2	100	120	30	1:1	2:1	22.58
W-26275	1060 ct	12.8 ct	3.2	.4	.075	3.1	106	1.5	.38	9.1:1	18.2:1	20.41
W-26280	1200 ct	12.8 ct	3.2	.4	.075	2.9	120	1.5	.38	9.68:1	19.4:1	18.38
W-26285	1200 ct	500 ct	125	.4	.075	2.9	120	60	15	1.55:1	3.1:1	18.38
W-26290	1200 ct	1200 ct	300	.4	.075	2.9	120	140	35	1:1	2:1	18.38
W-26295	*1200 ct	1200 ct	–	.4	.075	2.9	120	140	–	1:1	–	25.15
W-26300	1500 ct	12 ct	3	.4	.075	2.6	150	1.5	.38	11.2:1	22.4:1	20.41
W-26305	1500 ct	500 ct	125	.4	.075	2.6	150	60	15	1.73:1	3.46:1	22.58
W-26310	*1500 ct	600 ct	–	.4	.075	2.6	150	72	–	1.58:1	–	22.58
W-26315	*1500 ct	1500 ct	–	.4	.075	2.6	150	180	–	1:1	–	22.58
W-26320	1600 ct	12.8 ct	3.2	.4	.075	2.5	160	1.5	.38	11.2:1	22.4:1	20.41
W-26325	2000 ct	8 ct	2	.4	.075	2.2	200	1	.25	15.8:1	31.6:1	26.65
W-26330	2000 ct	2000 ct	500	.4	.075	2.2	200	240	60	1:1	2:1	26.65
W-26335	*2000 ct	2000 ct	–	.4	.075	2.2	200	240	–	1:1	–	29.49
W-26340	2000 ct	8000 ct	2000	.4	.075	2.2	200	960	240	1:2	1:1	26.65
W-26345	2500 ct	2500 ct	625	.4	.075	2	250	300	75	1:1	2:1	26.65

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York
*INCLUDED ELECTROSTATIC SHIELD

SPECIFICATIONS

- **MIL-T-27:** ..... All units manufactured to MIL-T-27, Military Designation is TF5S21ZZ for Transformers, TF5S20ZZ for Inductors.
- **FREQUENCY RESPONSE:** ..... ±3db, 400 Hz-100 KHz at 1.0 Milliwatt.
- **MAXIMUM DISTORTION:** ..... 5% With Rated Power Level at 1 KHz and 400 Hz.
- **DIELECTRIC STRENGTH:** ..... All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:** ... Greater Than 10,000 Megohms at 300 V DC.
- **WEIGHT:** ..... 2.5 Grams
- **OPERATING TEMPERATURE:** ..... –55°C to +130°C
- **TERMINALS:** ..... Solid .016 Diameter Conductor. Meet solderability per MIL-STD-202 Method 208
- **THERMAL SHOCK:** ..... 25 Cycles, Method 107, MIL-STD-202, Test Condition –55°C to +130°C

Delivery— stock to one week

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225

Internet: http://www.picoelectronics.com E-mail: HLSC73A@prodigy.com

PICO PART NUMBER W Series Plug-In	PRIMARY IMPED OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER WATTS 1 KHz and higher	400 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIM DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS/RATIO PRIM/SEC SEC SER CONN	SEC PAR CONN	PICO PRICES 1-9 *** W-Series
W-26350	3000 ct	3000 ct	725	.4	.075	1.8	300	360	90	1:1	2:1	21.64
W-26355	*3000 ct	3000 ct	–	.4	.075	1.8	300	360	–	1:1	–	29.49
W-26360	3600 ct	3600 ct	900	.4	.075	1.7	360	432	108	1:1	2:1	21.64
W-26365	4000 ct	16 ct	4	.4	.075	1.6	400	1.9	.47	15.8:1	31.6:1	26.65
W-26370	4000 ct	600 ct	150	.4	.075	1.6	400	72	18	2.58:1	5.16:1	26.65
W-26375	4000 ct	1000 ct	250	.4	.075	1.6	400	120	30	2:1	4:1	29.49
W-26380	*4000 ct	8000 ct	–	.4	.075	1.6	400	960	–	1:1.41	–	29.49
W-26385	5000 ct	500 ct	125	.4	.075	1.4	500	60	15	3.16:1	6.32:1	22.58
W-26390	5000 ct	5000 ct	1250	.4	.075	1.4	500	600	150	1:1	2:1	22.58
W-26395	7500 ct	50 ct	12.5	.33	.075	1.2	750	6	1.5	12.2:1	24.5:1	22.58
W-26400	7500 ct	100 ct	25	.33	.075	1.2	750	12	3	8.66:1	17.3:1	22.58
W-26405	7500 ct	600 ct	150	.33	.075	1.2	750	72	18	3.54:1	7.07:1	25.14
W-26410	7500 ct	2500 ct	625	.33	.075	1.2	750	300	75	1.73:1	3.46:1	25.14
W-26415	*7500 ct	7500 ct	–	.33	.075	1.2	750	900	–	1:1	–	29.49
W-26420	8000 ct	12.8 ct	3.2	.3	.075	1.1	800	1.5	.38	25:1	50:1	22.58
W-26425	8000 ct	1000 ct	250	.3	.075	1.1	800	120	30	2.83:1	5.66:1	25.14
W-26430	*8000 ct	1200 ct	–	.3	.075	1.1	800	144	–	2.58:1	–	29.49
W-26435	*9000 ct	9000 ct	–	.27	.075	1.1	900	1080	–	1:1	–	29.49
W-26440	10,000 ct	12.8 ct	3.2	.25	.075	1.0	1000	1.5	.38	28:1	56:1	20.41
W-26445	10,000 ct	16 ct	4	.25	.075	1.0	1000	1.92	.48	25:1	50:1	20.41
W-26450	10,000 ct	100 ct	25	.25	.075	1.0	1000	12	3	10:1	20:1	22.58
W-26455	10,000 ct	200 ct	50	.25	.075	1.0	1000	24	6	7.07:1	14.14:1	22.58
W-26460	10,000 ct	500 ct	125	.25	.075	1.0	1000	60	15	4.47:1	8.94:1	22.58
W-26465	10,000 ct	600 ct	150	.25	.075	1.0	1000	72	18	4.08:1	8.16:1	22.58
W-26470	10,000 ct	1000 ct	250	.25	.075	1.0	1000	120	30	3.16:1	6.32:1	22.58
W-26475	10,000 ct	1200 ct	300	.25	.075	1.0	1000	144	36	2.89:1	5.77:1	26.65
W-26480	10,000 ct	1500 ct	375	.25	.075	1.0	1000	180	45	2.58:1	5.16:1	26.65
W-26485	10,000 ct	2000 ct	500	.25	.075	1.0	1000	240	60	2.24:1	4.47:1	26.09
W-26490	10,000 ct	5000 ct	1250	.25	.075	1.0	1000	600	150	1.41:1	2.83:1	26.09
W-26495	10,000 ct	7500 ct	1875	.25	.075	1.0	1000	900	225	1.15:1	2.3:1	26.65
W-26500	10,000 ct	10,000 ct	2500	.25	.075	1.0	1000	1200	300	1:1	2:1	25.72
W-26505	*10,000 ct	10,000 ct	–	.25	.075	1.0	1000	1200	–	1:1	–	29.49
W-26510	15,000 ct	400 ct	100	.16	.075	.82	1500	48	12	6.12:1	12.24:1	25.72
W-26515	15,000 ct	500 ct	125	.16	.075	.82	1500	60	15	5.48:1	10.95:1	25.72
W-26520	15,000 ct	600 ct	150	.16	.075	.82	1500	72	18	5:1	10:1	25.72
W-26525	15,000 ct	10,000 ct	2500	.16	.075	.82	1500	1200	300	1.22:1	2.45:1	25.72
W-26530	*15,000 ct	15,000 ct	–	.16	.075	.82	1500	1800	–	1:1	–	29.49
W-26535	15,000 ct	15,000 ct	3750	.16	.075	.82	1500	1800	450	1:1	2:1	26.55
W-26540	16,000 ct	1,000 ct	250	.15	.075	.8	1600	120	30	4:1	8:1	26.55
W-26545	20,000 ct	500 ct	125	.125	.075	.7	2000	60	15	6.33:1	12.65:1	25.72
W-26550	20,000 ct	600 ct	150	.125	.075	.7	2000	72	18	5.77:1	11.55:1	25.72
W-26555	20,000 ct	800 ct	200	.125	.075	.7	2000	96	24	5:1	10:1	23.51
W-26560	20,000 ct	1000 ct	250	.125	.075	.7	2000	120	30	4.47:1	8.94:1	29.49
W-26565	20,000 ct	5000 ct	1250	.125	.075	.7	2000	600	150	2:1	4:1	25.72
W-26570	20,000 ct	10,000 ct	2500	.125	.075	.7	2000	1200	300	1.41:1	2.83:1	25.72
W-26575	*20,000 ct	20,000 ct	–	.125	.075	.7	2000	2400	–	1:1	–	29.49
W-26580	25,000 ct	500 ct	125	.1	.075	.63	2500	60	15	7.07:1	14.14:1	26.65
W-26585	25,000 ct	1000 ct	250	.1	.075	.63	2500	120	30	5:1	10:1	26.65
W-26590	30,000 ct	50 ct	12.5	.083	.075	.58	3000	6	1.5	24.5:1	49:1	26.65
W-26595	30,000 ct	1200 ct	300	.083	.075	.58	3000	144	36	5:1	10:1	26.65
W-26600	30,000 ct	500 ct	125	.083	.075	.58	3000	60	15	7.75:1	15.5:1	26.65
W-26605	30,000 ct	200 ct	50	.083	.075	.58	3000	24	6	12.25:1	24.5:1	26.65
W-26610	30,000 ct	5,000 ct	1250	.083	.075	.58	3000	600	150	2.45:1	4.9:1	26.65
W-26615	30,000 ct	10,000 ct	2500	.083	.075	.58	3000	1200	300	1.73:1	3.46:1	26.65
W-26620	*30,000 ct	30,000 ct	–	.083	.075	.58	3000	3600	–	1:1	–	29.49
W-26625	40,000 ct	400 ct	100	.062	.062	.5	4000	48	12	10:1	20:1	29.49
W–SHIELD MU–METAL SHIELD .37"D x .32"H (9.4mmD x 8.1mmH) SINGLE SHIELD												3.52
WXX–SHIELD MU–METAL SHIELD .395"D x .33"H (10mmD x 8.4mmH) USE WITH W SHIELD FOR DOUBLE SHIELDING												3.52

*INCLUDES ELECTROSTATIC SHIELD

***Discount Prices: 1–9 Net; 10–24 less 10%; 25–49 less 16%; 50–99 less 23%; 100-499 less 30%

Ordering Instructions:
No minimum. Net 30 days
F.O.B. Pelham, New York

INDUCTORS

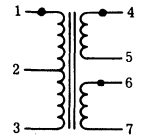
ALL INDUCTORS HAVE SPLIT WINDINGS AND MEASUREMENTS ARE LISTED FOR BOTH SERIES AND PARALLEL CONNECTIONS. TWO VALUES OF INDUCTANCE, EACH AT A PARTICULAR VALUE OF D.C. CURRENT, ARE LISTED FOR EACH INDUCTOR.

PICO PART NUMBER	INDUCTANCE SERIES		DC CURRENT ma	DC RESISTANCE OHMS	PRICES 1–9***
W-26705	SERIES	0.1	4	25	20.41
		.08	10		
	PARALLEL	.025	8	6.5	
		.02	20		
W-26710	SERIES	0.9	2	105	20.41
		0.5	6		
	PARALLEL	.23	4	26	
		.13	12		
W-26715	SERIES	2.5	2	630	20.41
		0.9	4		
	PARALLEL	0.6	4	160	
		0.23	8		
W-26720	SERIES	4.5	2	2300	21.67
		1.2	4		
	PARALLEL	1.1	4	575	
		0.3	8		

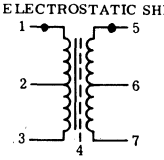
PICO's ultra-miniature transformers

W SERIES Plug-In

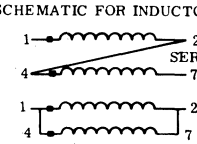
SCHEMATICS FOR TRANSFORMERS WITH SPLIT SECONDARIES



SCHEMATIC FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



SCHEMATIC FOR INDUCTORS



FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED
- VARIATION OF STANDARD DESIGNS AVAILABLE
- SPECIAL PRODUCTION TECHNIQUES ENSURE UNIFORM SIZE AND LEADS WHICH ARE FREE OF ENCAPSULANT. NO MENISCUS IN LEAD AREA.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

THIS PRODUCT IS PATENTED

Delivery— stock to one week

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

PICO Electronics, Inc.

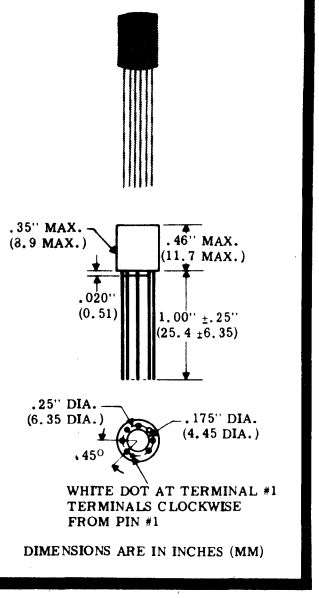
143 Sparks Ave.,
Pelham, NY 10803-1837

FAX: 914-738-8225

Internet:
http://www.picoelectronics.com
E-Mail: ***HLSC73A@prodigy.com***

PICO's ultra-miniature transformers

Y SERIES Plug-In



SPECIFICATIONS

- **MIL-T-27:** ..... All units manufactured to MIL-T-27, Military Designation is TF5S21ZZ for Transformers, TF5S20ZZ for Inductors.
- **FREQUENCY RESPONSE:** ..... ±3db, 300 Hz-100 KHz at 1.0 Milliwatt.
- **MAXIMUM DISTORTION:** **5% With Rated Power Level at 1 KHz, 400 Hz and 300 Hz.**
- **DIELECTRIC STRENGTH:** ..... All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:** ..... Greater Than 10,000 Megohms at 300 V DC.
- **WEIGHT:** ..... 3 Grams
- **OPERATING TEMPERATURE:** ..... –55°C to +130°C
- **TERMINALS:** ..... Solid .016 Diameter Conductor. Meet solderability per MIL-STD-202 Method 208
- **THERMAL SHOCK:** ..... 25 Cycles, Method 107, MIL-STD-202, Test Condition –55°C to +130°C

For immediate engineering assistance or to place an order—
Call Toll Free 800-228-9747

PICO Electronics, Inc.
143 Sparks Ave., Pelham, N.Y. 10803-1837
FAX 914-738-8225
Internet: http://www.picoelectronics.com
E-Mail: HLSC73A@prodigy.com

Delivery— stock to one week

PICO PART NUMBER Y-Series Plug-In	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER WATTS 1KHz and higher	400 Hz and higher	300 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS RATIO PRIME/SEC SEC SER CONN	SEC PAR CONN	PICO PRICES 1–9 *** Y-Series
Y-27003	10 ct	10 ct	2.5	.6	.2	.1	31.6	1	1.25	.32	1:1	2:1	20.42
Y-27005	20 ct	8 ct	2	.6	.2	.1	22.3	2	.9	.23	1.58:1	3.16:1	20.42
Y-27010	20 ct	20 ct	5	.6	.2	.1	22.3	2.1	2.25	.56	1:1	2:1	20.42
Y-27015	32 ct	32 ct	8	.6	.2	.1	17.6	3.4	4	1	1:1	2:1	20.42
Y-27020	40 ct	40 ct	10	.6	.2	.1	15.8	4.2	4.5	1.13	1:1	2:1	20.42
Y-27025	48 ct	16 ct	4	.6	.2	.1	14.4	5	1.8	.45	1.73:1	3.46:1	20.42
Y-27030	50 ct	50 ct	12.5	.6	.2	.1	14.1	5.25	5.6	1.4	1:1	2:1	20.42
Y-27035	80 ct	32 ct	8	.6	.2	.1	11.1	8.4	4	1	1.58:1	3.16:1	26.86
Y-27040	100 ct	40 ct	10	.6	.2	.1	10	10	4.5	1.13	1.58:1	3.16:1	26.86
Y-27045	100 ct	100 ct	25	.6	.2	.1	10	11	11.25	2.8	1:1	2:1	26.86
Y-27050	120 ct	12.8 ct	3.2	.6	.2	.1	9.1	14.4	1.8	.45	3.06:1	6.12:1	19.46
Y-27055	120 ct	60 ct	15	.6	.2	.1	9.1	14.4	8.4	2.1	1.41:1	2.83:1	25.71
Y-27060	120 ct	120 ct	30	.6	.2	.1	9.1	14.4	16.8	4.2	1:1	2:1	25.71
Y-27065	150 ct	12 ct	3	.6	.2	.1	8.2	15	1.5	.38	3.54:1	7.08:1	19.46
Y-27070	150 ct	50 ct	12.5	.6	.2	.1	8.2	15	6	1.5	1.73:1	3.46:1	21.64
Y-27075	150 ct	100 ct	25	.6	.2	.1	8.2	15	12	3	1.22:1	2.45:1	21.64
Y-27080	150 ct	150 ct	37.5	.6	.2	.1	8.2	15	18	4.5	1:1	2:1	25.33
Y-27085	150 ct	600 ct	150	.6	.2	.1	8.2	15	72	18	1:2	1:1	21.64
Y-27090	200 ct	200 ct	50	.6	.2	.1	7	22	24	6	1:1	2:1	21.64
Y-27095	300 ct	12 ct	3	.6	.2	.1	5.8	30	1.4	.35	5:1	10:1	19.46
Y-27100	300 ct	50 ct	12.5	.6	.2	.1	5.8	30	6	1.5	2.45:1	4.9:1	21.64
Y-27105	300 ct	150 ct	37.5	.6	.2	.1	5.8	30	18	4.5	1.41:1	2.83:1	21.64
Y-27110	300 ct	300 ct	75	.6	.2	.1	5.8	30	36	9	1:1	2:1	25.71
Y-27115	300 ct	600 ct	150	.6	.2	.1	5.8	30	72	18	1:1.41	1.41:1	20.42
Y-27120	320 ct	12.8 ct	3.2	.6	.2	.1	5.6	36	1.8	.45	5:1	10:1	19.46
Y-27125	400 ct	40 ct	10	.6	.2	.1	5	40	4.8	1.2	3.16:1	6.32:1	25.71
Y-27130	400 ct	120 ct	30	.6	.2	.1	5	40	14.5	3.6	1.83:1	3.65:1	25.71
Y-27135	400 ct	200 ct	50	.6	.2	.1	5	40	24	6	1.4:1	2.83:1	21.46
Y-27140	400 ct	400 ct	100	.6	.2	.1	5	40	48	12	1:1	2:1	25.71
Y-27145	400 ct	1000 ct	250	.6	.2	.1	5	40	125	31	1:1.58	1.26:1	29.49
Y-27150	400 ct	2000 ct	500	.6	.2	.1	5	40	240	60	1:2.24	1:1.12	29.49
Y-27155	400 ct	4000 ct	1000	.6	.2	.1	5	40	480	120	1:3.16	1:1.58	26.64
Y-27160	500 ct	12.8 ct	3.2	.6	.2	.1	4.5	50	1.5	.38	6.25:1	12.5:1	22.88
Y-27165	500 ct	16 ct	4	.6	.2	.1	4.5	50	1.9	.48	5.6:1	11.2:1	22.88
Y-27170	500 ct	50 ct	12.5	.6	.2	.1	4.5	50	6	1.5	3.16:1	6.32:1	22.88
Y-27175	500 ct	150 ct	37.5	.6	.2	.1	4.5	50	18	4.5	1.83:1	3.65:1	22.88
Y-27180	500 ct	500 ct	125	.6	.2	.1	4.5	50	60	15	1:1	2:1	22.88
Y-27185	*500 ct	500 ct	–	.6	.2	.1	4.5	50	60	–	1:1	–	22.88
Y-27190	500 ct	600 ct	150	.6	.2	.1	4.5	50	72	18	1:1.1	1.83:1	20.42
Y-27195	600 ct	12.8 ct	3.2	.6	.2	.1	4.1	60	1.5	.38	6.85:1	13.7:1	18.38
Y-27200	600 ct	30 ct	7.5	.6	.2	.1	4.1	60	3.6	.9	4.47:1	8.94:1	20.42
Y-27205	600 ct	48 ct	12	.6	.2	.1	4.1	60	5.8	1.45	3.54:1	7.07:1	20.42
Y-27210	600 ct	200 ct	50	.6	.2	.1	4.1	60	24	6	1.73:1	3.46:1	20.42
Y-27215**	600 ct	600 ct	150	.6	.2	.1	4.1	60	72	18	1:1	2:1	20.42
Y-27220**	*600 ct	600 ct	–	.6	.2	.1	4.1	60	72	–	1:1	–	20.42
Y-27225**	600 ct	1200 ct	300	.6	.2	.1	4.1	60	144	36	1:1.41	1.41:1	20.42
Y-27230	640 ct	12.8 ct	3.2	.6	.2	.1	3.9	64	1.5	.38	7.07:1	14.14:1	20.42
Y-27235	700 ct	100 ct	25	.6	.2	.1	3.8	70	12	3	2.65:1	5.29:1	20.42
Y-27240	800 ct	12.8 ct	3.2	.6	.2	.1	3.5	80	1.5	.38	7.9:1	15.8:1	20.42
Y-27245	800 ct	48 ct	12	.6	.2	.1	3.5	80	5.8	1.45	4.08:1	8.16:1	22.88
Y-27250	800 ct	800 ct	200	.6	.2	.1	3.5	80	96	24	1:1	2:1	22.88
Y-27255	900 ct	600 ct	150	.6	.2	.1	3.3	90	72	18	1.22:1	2.45:1	20.42
Y-27260	1000 ct	12 ct	3	.6	.2	.1	3.2	100	1.4	.35	9.13:1	18.3:1	20.42
Y-27265	1000 ct	50 ct	12.5	.6	.2	.1	3.2	100	6	1.5	4.47:1	8.94:1	22.88
Y-27270	1000 ct	1000 ct	250	.6	.2	.1	3.2	100	120	30	1:1	2:1	22.88
Y-27275	1060 ct	12.8 ct	3.2	.6	.2	.1	3.1	106	1.5	.38	9.1:1	18.2:1	20.42
Y-27280	1200 ct	12.8 ct	3.2	.6	.2	.1	2.9	120	1.5	.38	9.68:1	19.4:1	18.38
Y-27285	1200 ct	500 ct	125	.6	.2	.1	2.9	120	60	15	1.55:1	3.1:1	18.38
Y-27290	1200 ct	1200 ct	300	.6	.2	.1	2.9	120	144	36	1:1	2:1	18.38
Y-27295	*1200 ct	1200 ct	–	.6	.2	.1	2.9	120	144	–	1:1	–	20.42
Y-27300	1500 ct	12 ct	3	.6	.2	.1	2.6	150	1.44	.36	11.2:1	22.4:1	20.42
Y-27305	1500 ct	500 ct	125	.6	.2	.1	2.6	150	60	15	1.73:1	3.46:1	22.88
Y-27310	*1500 ct	600 ct	–	.6	.2	.1	2.6	150	72	–	1.58:1	–	29.49
Y-27315	*1500 ct	1500 ct	–	.6	.2	.1	2.6	150	180	–	1:1	–	22.88
Y-27320	1600 ct	12.8 ct	3.2	.6	.2	.1	2.5	160	1.5	.38	11.2:1	22.4:1	20.42
Y-27325	2000 ct	8 ct	2	.6	.2	.1	2.2	200	.96	.24	15.8:1	31.6:1	22.88
Y-27330	2000 ct	2000 ct	500	.6	.2	.1	2.2	200	240	60	1:1	2:1	26.64
Y-27335	*2000 ct	2000 ct	–	.6	.2	.1	2.2	200	240	–	1:1	–	29.49
Y-27340	2000 ct	8000 ct	2000	.6	.2	.1	2.2	200	960	240	1:2	1:1	26.64
Y-27345	2500 ct	2500 ct	625	.6	.2	.1	2	250	300	75	1:1	2:1	26.64
Y-27350	3000 ct	3000 ct	725	.6	.2	.1	1.8	300	360	90	1:1	2:1	21.41
Y-27355	*3000 ct	3000 ct	–	.6	.2	.1	1.8	300	360	–	1:1	–	29.49
Y-27360	3600 ct	3600 ct	900	.6	.2	.1	1.7	360	432	108	1:1	2:1	26.64
Y-27365	4000 ct	16 ct	4	.6	.2	.1	1.6	400	1.92	.48	15.8:1	31.6:1	26.64
Y-27370**	4000 ct	600 ct	150	.6	.2	.1	1.6	400	72	18	2.58:1	5.16:1	26.64
Y-27375	4000 ct	1000 ct	250	.6	.2	.1	1.6	400	120	30	2:1	4:1	26.64
Y-27380	*4000 ct	8000 ct	–	.6	.2	.1	1.6	400	960	–	1:1.41	–	26.64
Y-27385	5000 ct	500 ct	125	.5	.2	.1	1.4	500	60	15	3.16:1	6.32:1	21.41
Y-27390	5000 ct	5000 ct	1250	.5	.2	.1	1.4	500	600	150	1:1	2:1	21.41
Y-27395	7500 ct	50 ct	12.5	.33	.2	.1	1.2	750	6	1.5	12.2:1	24.5:1	21.41
Y-27400	7500 ct	100 ct	25	.33	.2	.1	1.2	750	12	3	8.66:1	17.3:1	22.66
Y-27405	7500 ct	600 ct	150	.33	.2	.1	1.2	750	72	18	3.54:1	7.07:1	25.15

*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION
***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

PICO PART NUMBER Y-Series Plug-In	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER WATTS 1KHz and higher	400 Hz and higher	300 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS RATIO PRIME/SEC SEC SER CONN	SEC OAR CONN	PICO PRICES 1-9 *** Y-Series
Y-27410	7500 ct	2500 ct	625	.33	.2	.1	1.2	750	300	75	1.73:1	3.46:1	25.15
Y-27415	*7500 ct	7500 ct	-	.33	.2	.1	1.2	750	900	-	1:1	-	29.49
Y-27420	8000 ct	12.8 ct	3.2	.3	.2	.1	1.1	800	1.5	.38	25:1	50:1	21.41
Y-27425	8000 ct	1000 ct	250	.3	.2	.1	1.1	800	120	30	2.83:1	5.66:1	21.41
Y-27430	*8000 ct	1200 ct	-	.3	.2	.1	1.1	800	144	-	2.58:1	-	26.64
Y-27435	*9000 ct	9000 ct	-	.27	.2	.1	1.1	900	1080	-	1:1	-	27.69
Y-27440	10,000 ct	12.8 ct	3.2	.25	.2	.1	1.0	1000	1.5	.38	28:1	56:1	20.42
Y-27445	10,000 ct	16 ct	4	.25	.2	.1	1.0	1000	1.92	.48	25:1	50:1	22.57
Y-27450	10,000 ct	100 ct	25	.25	.2	.1	1.0	1000	12	3	10:1	20:1	22.57
Y-27455	10,000 ct	200 ct	50	.25	.2	.1	1.0	1000	24	6	7.07:1	14.14:1	22.57
Y-27460	10,000 ct	500 ct	125	.25	.2	.1	1.0	1000	60	15	4.47:1	8.94:1	22.57
Y-27465	10,000 ct	600 ct	150	.25	.2	.1	1.0	1000	72	18	4.08:1	8.16:1	22.57
Y-27470	10,000 ct	1000 ct	250	.25	.2	.1	1.0	1000	120	30	3.16:1	6.32:1	22.57
Y-27475	10,000 ct	1200 ct	300	.25	.2	.1	1.0	1000	144	36	2.89:1	5.77:1	22.57
Y-27480	10,000 ct	1500 ct	375	.25	.2	.1	1.0	1000	180	45	2.58:1	5.16:1	24.60
Y-27485	10,000 ct	2000 ct	500	.25	.2	.1	1.0	1000	240	60	2.24:1	4.47:1	24.60
Y-27490	10,000 ct	5000 ct	1250	.25	.2	.1	1.0	1000	600	150	1.41:1	2.83:1	26.33
Y-27495	10,000 ct	7500 ct	1875	.25	.2	.1	1.0	1000	900	225	1.15:1	2.3:1	26.33
Y-27500	10,000 ct	10,000 ct	2500	.25	.2	.1	1.0	1000	1200	300	1:1	2:1	25.71
Y-27505	*10,000 ct	10,000 ct	-	.25	.2	.1	1.0	1000	1200	-	1:1	-	28.67
Y-27510	15,000 ct	400 ct	100	.16	.16	.1	.82	1500	48	12	6.12:1	12.24:1	25.71
Y-27515	15,000 ct	500 ct	125	.16	.16	.1	.82	1500	60	15	5.48:1	10.95:1	25.71
Y-27520	15,000 ct	600 ct	150	.16	.16	.1	.82	1500	72	18	5.1	10:1	25.71
Y-27525	15,000 ct	10,000 ct	2500	.16	.16	.1	.82	1500	1200	300	1.22:1	2.45:1	28.67
Y-27530	*15,000 ct	15,000 ct	-	.16	.16	.1	.82	1500	1800	-	1:1	-	28.67
Y-27535	15,000 ct	15,000 ct	3750	.16	.16	.1	.82	1500	1800	450	1:1	2:1	28.67
Y-27540	16,000 ct	1000 ct	250	.15	.15	.1	.8	1600	120	30	4:1	8:1	26.64
Y-27545	20,000 ct	500 ct	125	.125	.125	.1	.7	2000	60	15	6.33:1	12.65:1	25.71
Y-27550	20,000 ct	600 ct	150	.125	.125	.1	.7	2000	72	18	5.77:1	11.55:1	25.71
Y-27555	20,000 ct	800 ct	200	.125	.125	.1	.7	2000	96	24	5:1	10:1	20.42
Y-27560	20,000 ct	1000 ct	250	.125	.125	.1	.7	2000	120	30	4.47:1	8.94:1	25.71
Y-27565	20,000 ct	5000 ct	1250	.125	.125	.1	.7	2000	600	150	2:1	4:1	25.71
Y-27570	20,000 ct	10,000 ct	2500	.125	.125	.1	.7	2000	1200	300	1.41:1	2.83:1	25.71
Y-27575	*20,000 ct	20,000 ct	-	.125	.125	.1	.7	2000	2400	-	1:1	-	25.71
Y-27580	25,000 ct	500 ct	125	.1	.1	.1	.63	2500	60	15	7.07:1	14.14:1	25.71
Y-27585	25,000 ct	1000 ct	250	.1	.1	.1	.63	2500	120	30	5:1	10:1	25.71
Y-27590	30,000 ct	50 ct	12.5	.08	.08	.08	.58	3000	6	1.5	24.5:1	49:1	25.71
Y-27595	30,000 ct	1200 ct	300	.08	.08	.08	.58	3000	144	36	5:1	10:1	25.71
Y-27600	30,000 ct	500 ct	125	.08	.08	.08	.58	3000	60	15	7.75:1	15.5:1	25.71
Y-27605	30,000 ct	200 ct	50	.08	.08	.08	.58	3000	24	6	12.25:1	24.5:1	25.71
Y-27610	30,000 ct	5000 ct	1250	.08	.08	.08	.58	3000	600	150	2.45:1	4.9:1	28.65
Y-27615	30,000 ct	10,000 ct	2500	.08	.08	.08	.58	3000	1200	300	1.73:1	3.46:1	28.65
Y-27620	*30,000 ct	30,000 ct	-	.08	.08	.08	.58	3000	3600	-	1:1	-	28.65
Y-27625	40,000 ct	400 ct	100	.06	.06	.06	.5	4000	48	12	10:1	20:1	28.65
Y-27630	40,000 ct	2,000 ct	500	.06	.06	.06	.5	4000	240	60	4.47:1	8.94:1	28.65
Y-27635	40,000 ct	4,000 ct	1000	.06	.06	.06	.5	4000	480	120	3.16:1	6.32:1	29.72
Y-27640	40,000 ct	20,000 ct	5000	.06	.06	.06	.5	4000	2400	600	1.41:1	2.83:1	28.65
Y-27645	*40,000 ct	40,000 ct	-	.06	.06	.06	.5	4000	4800	-	1:1	-	28.65
Y-27650	50,000 ct	200 ct	50	.05	.05	.05	.45	5000	24	6	15.8:1	31.6:1	29.72
Y-27655	50,000 ct	500 ct	125	.05	.05	.05	.45	5000	60	15	10:1	20:1	29.72
Y-27660	50,000 ct	600 ct	150	.05	.05	.05	.45	5000	72	18	9.13:1	18.26:1	29.72
Y-27665	60,000 ct	15,000 ct	3750	.04	.04	.04	.41	6000	1800	450	2:1	4:1	29.72
Y-27670	62,500 ct	50 ct	12.5	.04	.04	.04	.4	6250	6	1.5	35.4:1	70.7:1	29.72
Y-27675	80,000 ct	15,000 ct	3750	.03	.03	.03	.35	8000	1800	450	2.3:1	4.6:1	29.72
Y-27680	90,000 ct	10,000 ct	2500	.028	.028	.028	.33	9000	1200	300	3:1	6:1	29.72
Y-27685	95,000 ct	15,000 ct	3750	.026	.026	.026	.32	9500	1800	450	2.52:1	5.03:1	29.72
Y-27690	100,000 ct	60 ct	15	.025	.025	.025	.31	10,000	7.2	1.8	40.8:1	81.6:1	32.90
Y-27695	100,000 ct	100 ct	25	.025	.025	.025	.31	10,000	12	3	31.6:1	63.2:1	32.90
Y-27700	100,000 ct	500 ct	125	.025	.025	.025	.31	10,000	60	15	14.1:1	28.3:1	32.90
Y-27705	100,000 ct	10,000 ct	2500	.025	.025	.025	.31	10,000	1200	300	3.16:1	6.32:1	32.90
Y-SHIELD MU-METAL SHIELD .37" DIA. X .46" HT. (9.4MM DIA. X 11.7MM HT.) SINGLE SHIELD													3.51
YXX-SHIELD MU-METAL SHIELD .395" DIA. X .47" HT. (10.1MM DIA. X 11.9"MM HT.) USE WITH Y-SHIELD FOR DOUBLE SHIELDING													3.51

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

*INCLUDES ELECTROSTATIC SHIELD

INDUCTORS

ALL INDUCTORS HAVE SPLIT WINDINGS AND MEASUREMENTS ARE LISTED FOR BOTH SERIES AND PARALLEL CONNECTIONS.

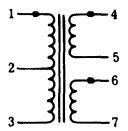
TWO VALUES OF INDUCTANCE, EACH AT A PARTICULAR VALUE OF DC CURRENT, ARE LISTED FOR EACH INDUCTOR.

Y-Series Plug-In	INDUCTANCE SERIES		DC CURRENT ma	DC RESISTANCE OHMS	PRICES 1-9***
Y-27750	SERIES	.075	10	10.5	19.48
		.06	30		
	PARALLEL	.018	20	2.6	
		.015	60		
Y-27760	SERIES	.3	4	25	21.65
		.15	20		
	PARALLEL	.075	8	6.2	
		.04	40		
Y-27770	SERIES	3.5	2	560	21.65
		1.0	5		
	PARALLEL	0.9	4	140	
		0.25	10		
Y-27780	SERIES	6.0	2	2100	21.65
		1.5	5		
	PARALLEL	1.5	4	525	
		0.38	10		
Y-27790	SERIES	20	1	5100	26.64
		8	3		
	PARALLEL	5	2	1275	
		2	6		

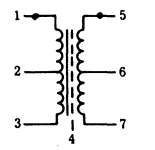
PICO's ultra-miniature transformers

Y SERIES Plug-In

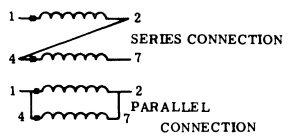
SCHEMATIC FOR TRANSFORMERS WITH SPLIT SECONDARIES



SCHEMATIC FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



SCHEMATIC FOR INDUCTORS



FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED
- VARIATION OF STANDARD DESIGNS AVAILABLE
- PRIMARY AND SECONDARY WINDINGS CAN BE USED EITHER AS INPUT OR OUTPUT.
- SPECIAL PRODUCTION TECHNIQUES ENSURE UNIFORM SIZE AND LEADS WHICH ARE FREE OF ENCAPSULANT. NO MENISCUS IN LEAD AREA.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

THIS PRODUCT IS PATENTED

Delivery— stock to one week

PICO Electronics, Inc.

143 Sparks Ave., Pelham, N.Y. 10803-1837

FAX: 914-738-8225

Internet: http://www.picoelectronics.com

E-mail: HLSC73A@prodigy.com

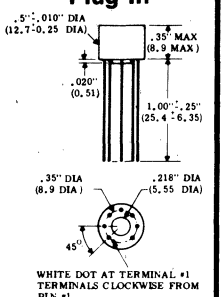
For immediate engineering assistance or to place an order— Call Toll Free 800-228-9747

PICO's ultra-miniature transformers

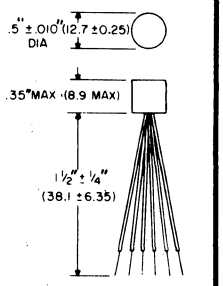
These units can be manufactured and tested to MIL-T-27/357. Contact factory for price and delivery information and appropriate part numbers (MIL-T-27/357-01 thru MIL-T-27/357-114).

For Surface Mount Versions of this series, see pgs. A•2260-2261

L SERIES Plug-In



P SERIES Insulated Leads



DIMENSIONS ARE IN INCHES (MM)

SPECIFICATIONS

- **MIL-T-27:** ..... All units manufactured to MIL-T-27, Military Designation is TF5S21ZZ for Transformers.
- **FREQUENCY RESPONSE:** ..... ±3db, 300 Hz-75 KHz at 1.0 Milliwatt.
- **MAXIMUM DISTORTION:** ..... 5% With Rated Power Level at 1 KHz and 400 Hz.
- **DIELECTRIC STRENGTH:** ..... All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:** ... Greater Than 10,000 Megohms at 300 V DC.
- **WEIGHT:** ..... 5 Grams
- **OPERATING TEMPERATURE:** –55°C to +130°C
- **TERMINALS:** ..... Solid .016 Diameter Conductor. Solderability per MIL-STD-202 Method 208.
- **THERMAL SHOCK:** ..... 25 Cycles, Method 107, MIL-STD-202. Test Condition –55°C to +130°C

PICO Electronics, Inc.
143 Sparks Ave.,
Pelham, NY 10803-1837
FAX: 914-738-8225
Internet:
http://www.picoelectronics.com
E-Mail: ***HLSC73A@prodigy.com***

PICO PART NUMBER			SECONDARY IMPEDANCE OHMS SPLIT WINDINGS		POWER WATTS					SECONDARY DC RESISTANCE OHMS		TURNS RATIO PRIM/SEC		PICO PRICES 1-9***	
L-Series Plug-in	P-Series Insulated Leads	PRIMARY IMPEDANCE OHMS	SER	PAR	1KHz and higher	400 Hz and higher	300 Hz and higher	PRIMARY UNBALANCED DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SER CONN	PAR CONN	SEC SER CONN	SEC PAR CONN	L-Series	P-Series
L-8203	P-9203	20 ct	8 ct	2	.6	.4	.3	30.0	2	1.2	.3	1.58:1	3.16:1	24.26	23.21
L-8205	P-9205	20 ct	20 ct	5	.6	.4	.3	30.0	2	2.8	.7	1:1	2:1	24.26	23.21
L-8210	P-9210	32 ct	32 ct	8	.6	.4	.3	23.0	3.3	4.5	1.13	1:1	2:1	24.26	23.21
L-8215	P-9215	40 ct	40ct	10	.6	.4	.3	21.0	3.7	5	1.25	1:1	2:1	24.26	23.21
L-8218	P-9218	48 ct	16 ct	4	.6	.4	.3	19.0	3.75	3	.75	1.73:1	3.46:1	24.26	23.21
L-8220	P-9220	50 ct	50 ct	12.5	.6	.4	.3	19.0	5	7	1.75	1:1	2:1	24.26	23.21
L-8225	P-9225	80 ct	32 ct	8	.6	.4	.3	15.0	7.5	4.3	1.13	1.58:1	3.16:1	24.26	23.21
L-8228	P-9228	100 ct	40 ct	10	.6	.4	.3	13.0	10.8	5	1.25	1.58:1	3.16:1	24.26	23.21
L-8230	P-9230	100 ct	100 ct	25	.6	.4	.3	13.0	10.8	12	3	1:1	2:1	24.26	23.21
L-8235	P-9235	120 ct	12.8 ct	3.2	.6	.4	.3	12.0	9.3	2.2	.55	3.06:1	6.12:1	24.26	23.21
L-8240	P-9240	120 ct	60 ct	15	.6	.4	.3	12.0	9	7.2	1.8	1.41:1	2.83:1	24.26	23.21
L-8245	P-9245	120 ct	120 ct	30	.6	.4	.3	12.0	11.6	13	3.3	1:1	2:1	24.26	23.21
L-8250	P-9250	150 ct	12 ct	3	.6	.4	.3	11.0	11.2	2.2	.55	3.54:1	7.08:1	24.26	23.21
L-8255	P-9255	150 ct	50 ct	12.5	.6	.4	.3	11.0	13	6.8	1.7	1.73:1	3.46:1	24.26	23.21
L-8260	P-9260	150 ct	100 ct	25	.6	.4	.3	11.0	13	11.8	3	1.22:1	2.45:1	24.26	23.21
L-8265	P-9265	150 ct	150 ct	37.5	.6	.4	.3	11.0	12	18.3	4.6	1:1	2:1	24.26	23.21
L-8270	P-9270	150 ct	600 ct	150	.6	.4	.3	11.0	13	75	19	1:2	1:1	24.26	23.21
L-8275	P-9275	200 ct	200 ct	50	.6	.4	.3	10.0	19	21.3	5.4	1:1	2:1	24.26	23.21
L-8280	P-9280	300 ct	12 ct	3	.6	.4	.3	8.0	24	1.7	.43	5:1	10:1	24.26	23.21
L-8285	P-9285	300 ct	50 ct	12.5	.6	.4	.3	8.0	30	6.8	1.7	2.45:1	4.9:1	24.26	23.21
L-8290	P-9290	300 ct	150 ct	37.5	.6	.4	.3	8.0	30	18	4.6	1.41:1	2.83:1	24.26	23.21
L-8295	P-9295	300 ct	300 ct	75	.6	.4	.3	8.0	30	34	8.5	1:1	2:1	24.26	23.21
L-8300	P-9300	300 ct	600 ct	150	.6	.4	.3	8.0	30	60	15	1:1.41	1.41:1	24.26	23.21
L-8305	P-9305	320 ct	12.8 ct	3.2	.6	.4	.3	7.5	31	1.7	.43	5:1	10:1	24.26	23.21
L-8310	P-9310	400 ct	40 ct	10	.6	.4	.3	7.0	41	4.5	1.13	3.16:1	6.32:1	24.26	23.21
L-8315	P-9315	400 ct	120 ct	30	.6	.4	.3	7.0	41	12	3	1.83:1	3.65:1	24.26	23.21
L-8320	P-9320	400 ct	200 ct	50	.6	.4	.3	7.0	41	21.3	5.4	1.41:1	2.83:1	24.26	23.21
L-8325	P-9325	400 ct	400 ct	100	.6	.4	.3	7.0	41	37.5	9.4	1:1	2:1	24.26	23.21
L-8330	P-9330	400 ct	1000 ct	250	.6	.4	.3	7.0	41	96	24	1:1.58	1.26:1	24.26	23.21
L-8335	P-9335	400 ct	2000 ct	500	.6	.4	.3	7.0	41	212	53	1:2.24	1:1.12	24.26	23.21
L-8340	P-9340	400 ct	4000 ct	1000	.6	.4	.3	7.0	41	375	94	1:3.16	1:1.58	24.26	23.21
L-8342	P-9342	500 ct	12.8 ct	3.2	.6	.4	.3	6.0	48	1.7	.43	6.25:1	12.5:1	24.26	23.21
L-8344	P-9344	500 ct	16 ct	4	.6	.4	.3	6.0	48	1.9	.5	5.6:1	11.2:1	24.26	23.21
L-8345	P-9345	500 ct	50 ct	12.5	.6	.4	.3	6.0	39	6.8	1.7	3.16:1	6.32:1	24.26	23.21
L-8347	P-9347	500 ct	150 ct	37.5	.6	.4	.3	6.0	48	18	4.6	1.83:1	3.65:1	24.26	23.21
L-8350	P-9350	500 ct	500 ct	125	.6	.4	.3	6.0	48	54	13.5	1:1	2:1	24.26	23.21
L-8355	P-9355	*500 ct	500 ct	–	.6	.4	.3	6.0	48	68	–	1:1	–	25.26	24.26
L-8360	P-9360	500 ct	600 ct	150	.6	.4	.3	6.0	48	59	15	1:1.1	1.83:1	24.26	24.26
L-8365	P-9365	600 ct	12.8 ct	3.2	.6	.4	.3	5.5	53	1.7	.43	6.85:1	13.7:1	24.26	24.26
L-8367	P-9367	600 ct	30 ct	7.5	.6	.4	.3	5.5	53	4.2	1.1	4.47:1	8.94:1	24.26	24.26
L-8370	P-9370	600 ct	48 ct	12	.6	.4	.3	5.5	53	6.8	1.7	3.54:1	7.07:1	24.26	24.26
L-8375	P-9375	600 ct	200 ct	50	.6	.4	.3	5.5	53	21.3	5.3	1.73:1	3.46:1	24.26	23.44
L-8380**	P-9380	600 ct	600 ct	150	.6	.4	.3	5.5	57	79	20	1:1	2:1	24.26	23.44
L-8385**	P-9385	*600 ct	600 ct	–	.6	.4	.3	5.5	53	75	–	1:1	–	25.26	24.26
L-8387**	P-9387	600 ct	1200 ct	300	.6	.4	.3	5.5	53	105	26	1:1.41	1.41:1	24.26	23.44
L-8390	P-9390	640 ct	12.8 ct	3.2	.6	.4	.3	5.5	66	1.7	.43	7.07:1	14.14:1	24.26	23.44
L-8395	P-9395	700 ct	100 ct	25	.6	.4	.3	5.0	69	12	3	2.65:1	5.29:1	24.26	23.44
L-8400	P-9400	800 ct	12.8 ct	3.2	.6	.4	.3	5.0	75	1.7	.43	7.9:1	15.8:1	24.26	23.44
L-8405	P-9405	800 ct	48 ct	12	.6	.4	.3	5.0	75	6.8	1.7	4.08:1	8.16:1	24.26	23.44
L-8410	P-9410	800 ct	800 ct	200	.6	.4	.3	5.0	75	105	26	1:1	2:1	24.26	23.44
L-8415	P-9415	900 ct	600 ct	150	.6	.4	.3	4.5	79	75	19	1.22:1	2.45:1	24.26	23.44
L-8420	P-9420	1000 ct	12 ct	3	.6	.4	.3	4.5	103	1.6	.4	9.13:1	18.3:1	24.26	23.44
L-8425	P-9425	1000 ct	50 ct	12.5	.6	.4	.3	4.5	103	6.4	1.6	4.47:1	8.94:1	24.26	23.44
L-8430	P-9430	1000 ct	1000 ct	250	.6	.4	.3	4.5	103	115	28	1:1	2:1	24.26	23.44
L-8435	P-9435	1060 ct	12.8 ct	3.2	.6	.4	.3	4.0	108	1.7	.43	9.1:1	18.2:1	24.26	23.44
L-8440	P-9440	1200 ct	12.8 ct	3.2	.6	.4	.3	4.0	113	1.7	.43	9.68:1	19.4:1	24.26	23.44
L-8445	P-9445	1200 ct	500 ct	125	.6	.4	.3	4.0	113	54	13.5	1.55:1	3.1:1	24.26	23.44
L-8450	P-9450	1200 ct	1200 ct	300	.6	.4	.3	4.0	113	126	31.6	1:1	2:1	24.26	23.44
L-8455	P-9455	*1200 ct	1200 ct	–	.6	.4	.3	4.0	111	125	–	1:1	–	25.26	24.26
L-8460	P-9460	1500 ct	12 ct	3	.6	.4	.3	3.5	126	1.6	.4	11.2:1	22.4:1	24.26	23.44
L-8465	P-9465	1500 ct	500 ct	125	.6	.4	.3	3.5	126	68	17	1.73:1	3.46:1	24.26	23.44
L-8470	P-9470	*1500 ct	600 ct	–	.6	.4	.3	3.5	126	94	–	1.58:1	–	25.26	24.26
L-8475	P-9475	*1500 ct	1500 ct	–	.6	.4	.3	3.5	126	176	–	1:1	–	25.26	24.26
L-8480	P-9480	1600 ct	12.8 ct	3.2	.6	.4	.3	3.5	130	1.7	.43	11.2:1	22.4:1	24.26	23.44
L-8483	P-9483	2000 ct	8 ct	2	.6	.4	.3	3.0	210	1.2	.3	15.8:1	31.6:1	24.26	23.44
L-8485	P-9485	2000 ct	2000 ct	500	.6	.4	.3	3.0	198	218	55	1:1	2:1	24.26	23.44
L-8490	P-9490	*2000 ct	2000 ct	–	.6	.4	.3	3.0	198	218	–	1:1	–	24.26	23.44
L-8495	P-9495	2000 ct	8000 ct	2000	.6	.4	.3	3.0	198	850	213	1:2	1:1	24.26	23.44
L-8497	P-9497	2500 ct	2500 ct	625	.6	.4	.3	2.5	220	305	76	1:1	2:1	24.26	23.44
L-8500	P-9500	3000 ct	3000 ct	750	.6	.4	.3	2.5	243	335	84	1:1	2:1	24.26	23.44

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

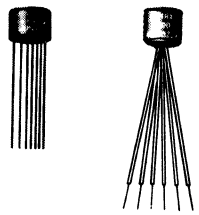
*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION

PICO PART NUMBER L-Series Plug-In	PICO PART NUMBER P-Series Insulated Leads	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS PAR	POWER WATTS 1KHz and higher	POWER WATTS 400 Hz and higher	POWER WATTS 300 Hz and higher	PRIMARY UNBALANCED DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	SECONDARY DC RESISTANCE OHMS PAR CONN	TURNS RATIO PRIM/SEC SEC SER CONN	TURNS RATIO PRIM/SEC SEC PAR CONN	PICO PRICES 1-9*** L-Series	PICO PRICES 1-9*** P-Series
L-8505	P-9505	*3000 ct	3000 ct	–	.6	.4	.3	2.5	304	335	–	1:1	–	25.26	24.26
L-8510	P-9510	3600 ct	3600 ct	900	.6	.4	.3	2.5	330	366	92	1:1	2:1	24.26	23.44
L-8512	P-9512	4000 ct	16 ct	4	.6	.4	.3	2.0	350	3	.75	15.8:1	31.6:1	24.26	23.44
L-8514	P-9514	4000 ct	600 ct	150	.6	.4	.3	2.0	350	76	19	2.58:1	5.16:1	24.26	23.44
L-8515	P-9515	4000 ct	1000 ct	250	.6	.4	.3	2.0	350	115	29	2:1	4:1	24.26	23.44
L-8520	P-9520	*4000 ct	8000 ct	–	.6	.4	.3	2.0	350	1062	–	1:1.41	–	25.26	24.26
L-8525	P-9525	5000 ct	500 ct	125	.6	.4	.3	2.0	350	67	17	3.16:1	6.32:1	24.26	23.44
L-8530	P-9530	5000 ct	5000 ct	1250	.6	.4	.3	2.0	390	538	135	1:1	2:1	24.26	23.44
L-8535	P-9535	7500 ct	50 ct	12.5	.6	.4	.3	1.5	600	7	1.75	12.2:1	24.5:1	26.92	26.12
L-8540	P-9540	7500 ct	100 ct	25	.6	.4	.3	1.5	600	12	3	8.66:1	17.3:1	26.92	26.12
L-8545	P-9545	7500 ct	600 ct	150	.6	.4	.3	1.5	600	78	19.5	3.54:1	7.07:1	26.92	26.12
L-8550	P-9550	7500 ct	2500 ct	625	.6	.4	.3	1.5	600	305	77	1.73:1	3.46:1	26.92	26.14
L-8555	P-9555	*7500 ct	7500 ct	–	.6	.4	.3	1.5	750	828	–	1:1	–	28.82	26.91
L-8560	P-9560	8000 ct	12.8 ct	3.2	.6	.4	.3	1.5	750	1.7	.43	25:1	50:1	26.92	26.14
L-8565	P-9565	8000 ct	1000 ct	250	.6	.4	.3	1.5	750	115	29	2.83:1	5.66:1	26.92	26.14
L-8570	P-9570	*8000 ct	1200 ct	–	.6	.4	.3	1.5	750	158	–	2.58:1	–	28.82	26.91
L-8575	P-9575	*9000 ct	9000 ct	–	.6	.4	.3	1.4	796	1100	–	1:1	–	28.82	26.91
L-8580	P-9580	10,000 ct	12.8 ct	3.2	.6	.4	.3	1.4	1048	1.7	.43	28:1	56:1	26.92	26.14
L-8585	P-9585	10,000 ct	16 ct	4	.6	.4	.3	1.4	1048	3	.75	25:1	50:1	26.92	26.14
L-8590	P-9590	10,000 ct	100 ct	25	.6	.4	.3	1.4	839	12	3	10:1	20:1	26.92	26.14
L-8595	P-9595	10,000 ct	200 ct	50	.6	.4	.3	1.4	839	27	6.7	7.07:1	14.14:1	26.92	26.14
L-8600	P-9600	10,000 ct	500 ct	125	.6	.4	.3	1.4	850	67	17	4.47:1	8.94:1	26.92	26.14
L-8605	P-9605	10,000 ct	600 ct	150	.6	.4	.3	1.4	850	74	18.5	4.08:1	8.16:1	26.92	26.14
L-8610	P-9610	10,000 ct	1000 ct	250	.6	.4	.3	1.4	850	115	29	3.16:1	6.32:1	26.92	26.14
L-8615	P-9615	10,000 ct	1200 ct	300	.6	.4	.3	1.4	850	158	39.5	2.89:1	5.77:1	26.92	26.14
L-8620	P-9620	10,000 ct	1500 ct	375	.6	.4	.3	1.4	850	177	44	2.58:1	5.16:1	26.92	26.14
L-8625	P-9625	10,000 ct	2000 ct	500	.6	.4	.3	1.4	850	255	64	2.24:1	4.47:1	26.92	26.14
L-8630	P-9630	10,000 ct	5000 ct	1250	.6	.4	.3	1.4	850	630	158	1.41:1	2.83:1	26.92	26.14
L-8635	P-9635	10,000 ct	7500 ct	1875	.6	.4	.3	1.4	850	772	193	1.15:1	2.3:1	26.92	26.14
L-8640	P-9640	10,000 ct	10,000 ct	2500	.6	.4	.3	1.4	866	1215	304	1:1	2:1	26.92	26.14
L-8645	P-9645	*10,000 ct	10,000 ct	–	.6	.4	.3	1.4	1060	1215	–	1:1	–	28.82	26.91
L-8650	P-9650	15,000 ct	400 ct	100	.6	.4	.3	1.0	1305	47	12	6.12:1	12.24:1	26.92	26.14
L-8652	P-9652	15,000 ct	500 ct	125	.6	.4	.3	1.0	1305	53	13	5.48:1	10.95:1	26.92	26.14
L-8655	P-9655	15,000 ct	600 ct	150	.6	.4	.3	1.0	1305	72.5	18	5:1	10:1	26.92	26.14
L-8660	P-9660	15,000 ct	10,000 ct	2500	.6	.4	.3	1.0	1305	1215	304	1.22:1	2.45:1	26.92	26.14
L-8665	P-9665	*15,000 ct	15,000 ct	–	.6	.4	.3	1.0	1305	1800		1:1		28.82	26.91
L-8670	P-9670	15,000 ct	15,000 ct	3750	.6	.4	.3	1.0	1305	1800	450	1:1	2:1	26.92	26.14
L-8675	P-9675	16,000 ct	1000 ct	250	.6	.4	.3	1.0	1343	115	29	4:1	8:1	26.92	26.14
L-8680	P-9680	20,000 ct	500 ct	125	.5	.4	.3	1.0	1560	68	17	6.33:1	12.65:1	28.82	26.91
L-8685	P-9685	20,000 ct	600 ct	150	.5	.4	.3	1.0	1560	75	19	5.77:1	11.55:1	28.82	26.91
L-8690	P-9690	20,000 ct	800 ct	200	.5	.4	.3	1.0	1560	108	27	5:1	10:1	28.82	26.91
L-8695	P-9695	20,000 ct	1000 ct	250	.5	.4	.3	1.0	1560	121	30.5	4.47:1	8.94:1	28.82	26.91
L-8700	P-9700	20,000 ct	5000 ct	1250	.5	.4	.3	1.0	1560	672	168	2:1	4:1	28.82	26.91
L-8705	P-9705	20,000 ct	10,000 ct	2500	.5	.4	.3	1.0	1560	1520	380	1.41:1	2.83:1	28.82	26.91
L-8710	P-9710	*20,000 ct	20,000 ct	–	.5	.4	.3	1.0	1560	2727	682	1:1	–	29.98	28.82
L-8715	P-9715	25,000 ct	500 ct	125	.4	.4	.3	0.8	2170	68	17	7.07:1	14.14:1	28.82	26.91
L-8720	P-9720	25,000 ct	1000 ct	250	.4	.4	.3	0.8	2170	120	30	5:1	10:1	28.82	26.91
L-8725	P-9725	30,000 ct	50 ct	12.5	.33	.33	.3	0.8	2400	7	1.75	24.5:1	49:1	29.98	28.82
L-8730	P-9730	30,000 ct	1200 ct	300	.33	.33	.3	0.8	2400	156	39	5:1	10:1	29.98	28.82
L-8732	P-9732	30,000 ct	500 ct	125	.33	.33	.3	0.8	2400	68	17	7.75:1	15.5:1	29.98	28.82
L-8734	P-9734	30,000 ct	200 ct	50	.33	.33	.3	0.8	2400	29	7.2	12.25:1	24.5:1	29.98	28.82
L-8735	P-9735	30,000 ct	5000 ct	1250	.33	.33	.3	0.8	2400	673	169	2.45:1	4.9:1	29.98	28.82
L-8740	P-9740	30,000 ct	10,000 ct	2500	.33	.33	.3	0.8	2400	1520	380	1.73:1	3.46:1	29.98	28.82
L-8745	P-9745	*30,000 ct	30,000 ct	–	.33	.33	.3	0.8	3000	3310	–	1:1	–	32.19	30.27
L-8750	P-9750	40,000 ct	400 ct	100	.25	.25	.25	0.7	3400	57	14.3	10:1	20:1	32.19	30.27
L-8755	P-9755	40,000 ct	2000 ct	500	.25	.25	.25	0.7	3400	268	67	4.47:1	8.94:1	32.19	30.27
L-8760	P-9760	40,000 ct	4000 ct	1000	.25	.25	.25	0.7	3400	476	119	3.16:1	6.32:1	32.19	30.27
L-8765	P-9765	40,000 ct	20,000 ct	5000	.25	.25	.25	0.7	3400	2700	675	1.41:1	2.83:1	32.19	30.27
L-8770	P-9770	*40,000 ct	40,000 ct	–	.25	.25	.25	0.7	3400	4750	–	1:1	–	35.90	34.32
L-8775	P-9775	50,000 ct	200 ct	50	.2	.2	.2	0.6	4850	27	6.7	15.8:1	31.6:1	35.90	34.32
L-8777	P-9777	50,000 ct	500 ct	125	.2	.2	.2	0.6	4850	68	17	10:1	20:1	35.90	34.32
L-8779	P-9779	50,000 ct	600 ct	150	.2	.2	.2	0.6	4850	75	18.5	9.13:1	18.26:1	35.90	34.32
L-8780	P-9780	60,000 ct	15,000 ct	3750	.16	.16	.16	0.5	5275	2250	563	2:1	4:1	38.71	37.76
L-8785	P-9785	62,500 ct	50 ct	12.5	.16	.16	.16	0.5	5445	8.7	2.2	35.4:1	70.7:1	38.71	37.76
L-8787	P-9787	80,000 ct	15,000 ct	3750	.12	.12	.12	0.4	6130	2250	563	2.3:1	4.6:1	38.71	37.76
L-8790	P-9790	90,000 ct	10,000 ct	2500	.1	.1	.1	0.4	8140	1520	380	3:1	6:1	40.67	39.18
L-8795	P-9795	95,000 ct	15,000 ct	3750	.1	.1	.1	0.4	8400	2250	563	2.52:1	5.03:1	40.67	39.18
L-8800	P-9800	100,000 ct	60 ct	15	.1	.1	.1	0.4	8750	9.2	2.3	40.8:1	81.6:1	40.67	39.18
L-8805	P-9805	100,000 ct	100 ct	25	.1	.1	.1	0.4	8750	15	3.8	31.6:1	63.2:1	40.67	39.18
L-8810	P-9810	100,000 ct	500 ct	125	.1	.1	.1	0.4	8750	68	17	14.1:1	28.3:1	40.67	39.18
L-8815	P-9815	100,000 ct	10,000 ct	2500	.1	.1	.1	0.4	8750	1535	385	3.16:1	6.32:1	40.67	39.18
L-SHIELD		MU-METAL SHIELD .53" d X .41" h (13.46 mm d X 10.41 mm h)												3.50	
P-SHIELD		MU-METAL SHIELD .53" d X .41" h (13.46 mm d X 10.41 mm h)													3.50

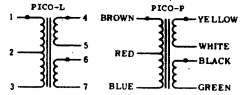
*INCLUDES ELECTROSTATIC SHIELD

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

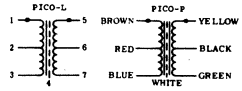
L SERIES Plug-In P SERIES Insulated Leads



SCHEMATIC FOR TRANSFORMERS WITH SPLIT SECONDARIES



SCHEMATIC FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED.
- VARIATION OF STANDARD DESIGNS AVAILABLE
- PRIMARY AND SECONDARY WINDINGS CAN BE USED EITHER AS INPUT OR OUTPUT.
- SPECIAL PRODUCTION TECHNIQUES ENSURE UNIFORM SIZE AND LEADS WHICH ARE FREE OF ENCAPSULANT. NO MENISCUS IN LEAD AREA.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

PICO Electronics, Inc.

143 Sparks Ave.,
Pelham, NY 10803-1837

FAX: 914-738-8225

Internet:
http://www.picoelectronics.com
E-Mail: ***HLSC73A@prodigy.com***

Delivery— stock to one week

For immediate engineering assistance or to place an order—

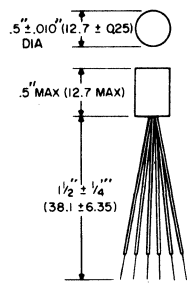
Call Toll Free 800-228-9747

PICO's ultra-miniature transformers

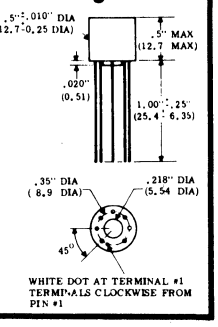
These units can be manufactured and tested to MIL-T-27/358. Contact factory for price and delivery information and appropriate parts numbers (MIL-T-27/358-01 thru MIL-T-27/358-123).

For Surface Mount Versions of this series, see pgs. A•2262-2263

K SERIES Insulated Leads



N SERIES Plug-In



DIMENSIONS ARE IN INCHES (MM)

PICO PART NUMBER			SECONDARY IMPEDANCE OHMS SPLIT WINDINGS		POWER WATTS					SECONDARY DC RESISTANCE OHMS		TURNS RATIO PRIM/SEC		PICO PRICES 1-9***	
K-Series Insulated Leads	N-Series Plug-In	PRIMARY IMPEDANCE OHMS	SER	PAR	1KHz and higher	400 Hz and higher	150 Hz and higher	PRIMARY UNBALANCED DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SER CONN	PAR CONN	SEC SER CONN	SEC PAR CONN	K-Series	N-Series
K-7203	N-6203	20 ct	8 ct	2	1.0	.75	.11	22.0	1.75	1.0	.25	1.58:1	3.16:1	23.44	24.26
K-7205	N-6205	20 ct	20 ct	5	1.0	.75	.11	22.0	1.75	2.5	.63	1:1	2:1	23.44	24.26
K-7210	N-6210	32 ct	32 ct	8	1.0	.75	.11	18.0	2.7	3.7	.93	1:1	2:1	23.44	24.26
K-7215	N-6215	40 ct	40 ct	10	1.0	.75	.11	16.0	3	5.2	1.3	1:1	2:1	23.44	24.26
K-7218	N-6218	48 ct	16ct	4	1.0	.75	.11	13.0	4.5	2.4	.6	1.73:1	3.46:1	23.44	24.26
K-7220	N-6220	50 ct	50 ct	12.5	1.0	.75	.11	13.0	4.5	6.2	1.6	1:1	2:1	23.44	24.26
K-7225	N-6225	80 ct	32 ct	8	1.0	.75	.11	11.0	6.6	3.7	.93	1.58:1	3.16:1	23.44	24.26
K-7228	N-6228	100 ct	40 ct	10	1.0	.75	.11	10.0	9.7	5.6	1.4	1.58:1	3.16:1	23.44	24.26
K-7230	N-6230	100 ct	100 ct	25	1.0	.75	.11	10.0	9.7	11	2.8	1:1	2:1	23.44	24.26
K-7235	N-6235	120 ct	12.8 ct	3.2	1.0	.75	.11	9.0	10.8	1.6	.4	3.06:1	6.12:1	23.44	24.26
K-7240	N-6240	120 ct	60 ct	15	1.0	.75	.11	9.0	10.8	8.5	2.2	1.41:1	2.83:1	23.44	24.26
K-7245	N-6245	120 ct	120 ct	30	1.0	.75	.11	9.0	10.8	15	3.8	1:1	2:1	23.44	24.26
K-7250	N-6250	150 ct	12 ct	3	1.0	.75	.11	8.0	13.5	1.75	.44	3.54:1	7.08:1	23.44	24.26
K-7255	N-6255	150 ct	50 ct	12.5	1.0	.75	.11	8.0	12	5.8	1.5	1.73:1	3.46:1	23.44	24.26
K-7260	N-6260	150 ct	100 ct	25	1.0	.75	.11	8.0	12	13	3.3	1.22:1	2.44:1	23.44	24.26
K-7265	N-6265	150 ct	150 ct	37.5	1.0	.75	.11	8.0	12	20	5	1:1	2:1	23.44	24.26
K-7270	N-6270	150 ct	600 ct	150	1.0	.75	.11	8.0	12	82	20.5	1:2	1:1	23.44	24.26
K-7275	N-6275	200 ct	200 ct	50	1.0	.75	.11	7.0	17	24	6.0	1:1	2:1	23.44	24.26
K-7280	N-6280	300 ct	12 ct	3	1.0	.75	.11	5.0	30	1.75	.44	5:1	10:1	23.44	24.26
K-7285	N-6285	300 ct	50 ct	12.5	1.0	.75	.11	5.0	27	6.2	1.6	2.45:1	4.9:1	23.44	24.26
K-7290	N-6290	300 ct	150 ct	37.5	1.0	.75	.11	5.0	26	21	5.3	1.41:1	2.83:1	23.44	24.26
K-7295	N-6295	300 ct	300 ct	75	1.0	.75	.11	5.0	27	38	9.5	1:1	2:1	23.44	24.26
K-7300	N-6300	300 ct	600 ct	150	1.0	.75	.11	5.0	27	66	17	1.41:1	1.41:1	23.44	24.26
K-7305	N-6305	320 ct	12.8 ct	3.2	1.0	.75	.11	5.0	30	1.75	.44	5:1	10:1	23.44	24.26
K-7310	N-6310	400 ct	40 ct	10	1.0	.75	.11	5.0	39	4.3	1.1	3.16:1	6.32:1	23.44	24.26
K-7315	N-6315	400 ct	120 ct	30	1.0	.75	.11	5.0	30	14	3.5	1.83:1	3.65*1	23.44	24.26
K-7320	N-6320	400 ct	200 ct	50	1.0	.75	.11	5.0	39	24	6	1.41:1	2.83:1	23.44	24.26
K-7325	N-6325	400 ct	400 ct	100	1.0	.75	.11	5.0	39	42	10.5	1:1	2:1	23.44	24.26
K-7330	N-6330	400 ct	1000 ct	250	1.0	.75	.11	5.0	39	109	28	1:1.58	1.26:1	23.44	24.26
K-7335	N-6335	400 ct	2000 ct	500	1.0	.75	.11	5.0	39	198	49	1:2.24	1:1.12	23.44	24.26
K-7340	N-6340	400 ct	4000 ct	1000	1.0	.75	.11	5.0	39	436	109	1:3.16	1:1.58	23.44	24.26
K-7342	N-6342	500 ct	12.8 ct	3.2	1.0	.75	.11	4.5	43	1.6	.4	6.25:1	12.5:1	23.44	24.26
K-7344	N-6344	500 ct	16 ct	4	1.0	.75	.11	4.5	43	2.3	.56	5.6*1	11.2:1	23.44	24.26
K-7345	N-6345	500 ct	50 ct	12.5	1.0	.75	.11	4.5	43	5.8	1.5	3.16:1	6.32:1	23.44	24.26
K-7347	N-6347	500 ct	150 ct	37.5	1.0	.75	.11	4.5	43	19.8	5	1.83:1	3.65:1	23.44	24.26
K-7350	N-6350	500 ct	500 ct	125	1.0	.75	.11	4.5	43	60	15	1:1	2:1	23.44	24.26
K-7355	N-6355	*500 ct	500 ct	–	1.0	.75	.11	4.5	43	60	–	1:1	–	24.26	25.26
K-7360	N-6360	500 ct	600 ct	150	1.0	.75	.11	4.5	43	66	17	1:1.1	1.83:1	23.44	24.26
K-7365	N-6365	600 ct	12.8 ct	3.2	1.0	.75	.11	4.0	68	1.75	.44	6.85:1	13.7:1	23.44	24.26
K-7367	N-6367	600 ct	30 ct	7.5	1.0	.75	.11	4.0	60	3.7	.93	4.47:1	8.94:1	23.44	24.26
K-7370	N-6370	600 ct	48 ct	12	1.0	.75	.11	4.0	60	5.9	1.5	3.54:1	7.07:1	23.44	24.26
K-7375	N-6375	600 ct	200 ct	50	1.0	.75	.11	4.0	60	25	6.3	1.73:1	3.46:1	23.44	24.26
K-7380**	N-6380**	600 ct	600 ct	150	1.0	.75	.11	4.0	60	66	17	1:1	2:1	23.44	24.26
K-7385**	N-6385**	*600 ct	600 ct	–	1.0	.75	.11	4.0	60	68	–	1:1	–	24.26	25.26
K-7386**	N-6386**	*600 ct	900 ct	–	1.0	.75	.11	4.0	60	104	–	1:1.22	–	24.26	25.26
K-7387**	N-6387**	600 ct	1200 ct	300	1.0	.75	.11	4.0	60	116	29	1:1.41	1.41:1	23.44	24.26
K-7390	N-6390	640 ct	12.8 ct	3.2	1.0	.75	.11	4.0	69	1.75	.44	7.07:1	14.14:1	23.44	24.26
K-7395	N-6395	700 ct	100 ct	25	1.0	.75	.11	4.0	62	10.6	2.7	2.65:1	5.29:1	23.44	24.26
K-7400	N-6400	800 ct	12.8 ct	3.2	1.0	.75	.11	3.5	78	1.75	.44	7.91:1	15.8:1	23.44	24.26
K-7405	N-6405	800 ct	48 ct	12	1.0	.75	.11	3.5	74	6	1.5	4.08:1	8.16:1	23.44	24.26
K-7410	N-6410	800 ct	800 ct	200	1.0	.75	.11	3.5	74	102	26	1:1	2:1	23.44	24.26
K-7415	N-6415	900 ct	600 ct	150	1.0	.75	.11	3.0	90	66	17	1.23:1	2.45:1	23.44	24.26
K-7417**	N-6417**	*900 ct	900 ct	–	1.0	.75	.11	3.0	90	102	–	1:1	–	24.26	25.26
K-7420	N-6420	1000 ct	12 ct	3	1.0	.75	.11	3.0	115	1.75	.44	9.13:1	18.26:1	23.44	24.26
K-7425	N-6425	1000 ct	50 ct	12.5	1.0	.75	.11	3.0	100	5.8	1.5	4.47:1	8.94:1	23.44	24.26
K-7430	N-6430	1000 ct	1000 ct	250	1.0	.75	.11	3.0	75	103	26	1:1	2:1	23.44	24.26
K-7435	N-6435	1060 ct	12.8 ct	3.2	1.0	.75	.11	3.0	115	1.75	.44	9.1:1	18.2:1	23.44	24.26
K-7440	N-6440	1200 ct	12.8 ct	3.2	1.0	.75	.11	3.0	122	1.75	.44	9.68:1	19.4:1	23.44	24.26
K-7445	N-6445	1200 ct	500 ct	125	1.0	.75	.11	3.0	113	63	16	1.55:1	3.1:1	23.44	24.26
K-7450	N-6450	1200 ct	1200 ct	300	1.0	.75	.11	3.0	113	155	39	1:1	2:1	23.44	24.26
K-7455	N-6455	*1200 ct	1200 ct	–	1.0	.75	.11	3.0	109	150	–	1:1	–	24.26	25.26
K-7460	N-6460	1500 ct	12 ct	3	1.0	.75	.11	2.5	140	1.75	.44	11.18:1	22.36:1	23.44	24.26
K-7465	N-6465	1500 ct	500 ct	125	1.0	.75	.11	2.5	150	60	15	1.73:1	3.46:1	23.44	24.26
K-7470	N-6470	*1500 ct	600 ct	–	1.0	.75	.11	2.5	150	66	–	1.58:1	–	24.26	25.26
K-7475	N-6475	*1500 ct	1500 ct	–	1.0	.75	.11	2.5	150	168	–	1:1	–	24.26	25.26
K-7480	N-6480	1600 ct	12.8 ct	3.2	1.0	.75	.11	2.5	140	1.75	.44	11.18:1	22.36:1	23.44	24.26
K-7483	N-6483	2000 ct	8 ct	2	1.0	.75	.11	2.0	250	1.0	.25	15.8:1	31.6:1	23.44	24.26
K-7485	N-6485	2000 ct	2000 ct	500	1.0	.75	.11	2.0	185	255	64	1:1	2:1	23.44	24.26
K-7490	N-6490	*2000 ct	2000 ct	–	1.0	.75	.11	2.0	175	240	–	1:1	–	24.26	25.26
K-7495	N-6495	2000 ct	8000 ct	2000	1.0	.75	.11	2.0	185	1015	254	1:2	1:1	23.44	24.26
K-7497	N-6497	2500 ct	2500 ct	625	1.0	.75	.11	2.0	245	268	68	1:1	2:1	23.44	24.26
K-7500	N-6500	3000 ct	3000 ct	750	1.0	.75	.11	1.8	267	295	74	1:1	2:1	23.44	24.26
K-7505	N-6505	*3000ct	3000 ct	–	1.0	.75	.11	1.8	267	368	–	1:1	–	24.26	25.26
K-7510	N-6510	3600 ct	3600 ct	900	1.0	.75	.11	1.5	300	413	103	1:1	2:1	23.44	24.23
K-7512	N-6512	4000 ct	16 ct	4	1.0	.75	.11	1.5	395	2.5	.65	15.8:1	31.6:1	23.44	24.26
K-7514**	N-6514**	4000 ct	600 ct	150	1.0	.75	.11	1.5	395	66	17	2.58:1	5.16:1	23.44	24.26

SPECIFICATIONS

- **MIL-T-27:** ..... All units manufactured to MIL-T-27, Audio Transformers are Type TF5S21ZZ
- **FREQUENCY RESPONSE:** ..... ±3db, 150 Hz-75 KHz at 1.0 Milliwatt. (When Primary Impedance ≥ 50K Ohms, ±3 db 150 Hz to 20 KHz)
- **MAXIMUM DISTORTION:** ..... 5% With Rated Power Level at 1 KHz, 400 Hz and 150 Hz.
- **DIELECTRIC STRENGTH:** ..... All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:** ..... Greater Than 10,000 Megohms at 300 V DC.
- **WEIGHT:** ..... 7.5 Grams
- **OPERATING TEMPERATURE:** .. –55°C to +130°C
- **TERMINALS:** ..... Solid .016 Diameter Conductor Solderability per MIL-STD-202 Method 208.
- **THERMAL SHOCK:** ..... 25 Cycles, Method 107, MIL-STD-202, Test Condition –55°C to +130°C

Delivery: Stock to one week

THIS PRODUCT IS PATENTED

*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

PICO PART NUMBER			SECONDARY IMPEDANCE OHMS SPLIT WINDINGS		POWER WATTS					SECONDARY DC RESISTANCE OHMS		TURNS RATIO PRIM/SEC		PICO PRICES 1-9***	
K-Series Insulated Leads	N-Series Plug-In	PRIMARY IMPEDANCE OHMS	SER	PAR	1KHz and higher	400 Hz and higher	150 Hz and higher	PRIMARY UNBALANCED DC CURRENT ma	PRIMARY DC RESISTANCE OHMS	SER CONN	PAR CONN	SEC SER CONN	SEC PAR CONN	K-Series	N-Series
K-7515	N-6515	4000 ct	1000 ct	250	1.0	.75	.11	1.5	395	108	27	2:1	4:1	23.49	24.26
K-7520	N-6520	*4000 ct	8000 ct	–	1.0	.75	.11	1.5	390	955	–	1:1.41	–	24.26	25.26
K-7525	N-6525	5000 ct	500 ct	125	1.0	.75	.11	1.3	450	62	16	3.16:1	6.32:1	23.44	24.26
K-7530	N-6530	5000 ct	5000 ct	1250	1.0	.75	.11	1.3	450	620	155	1:1	2:1	23.44	24.27
K-7535	N-6535	7500 ct	50 ct	12.5	1.0	.75	.11	1.0	670	6	1.5	12.25:1	24.5:1	26.14	26.93
K-7540	N-6540	7500 ct	100 ct	25	1.0	.75	.11	1.0	670	11	2.8	8.66:1	17.32:1	26.14	26.93
K-7545	N-6545	7500 ct	600 ct	150	1.0	.75	.11	1.0	670	66	16.5	3.54:1	7.07:1	26.14	26.93
K-7550	N-6550	7500 ct	2500 ct	625	1.0	.75	.11	1.0	670	268	67	1.73:1	3.46:1	26.14	26.93
K-7555	N-6555	*7500 ct	7500 ct	–	1.0	.75	.11	1.0	670	925	–	1:1	–	26.91	29.69
K-7560	N-6560	8000 ct	12.8 ct	3.2	1.0	.75	.11	1.0	765	1.75	.44	25:1	50:1	26.14	26.93
K-7565	N-7565	8000 ct	1000 ct	250	1.0	.75	.11	1.0	695	106	26.5	2.83:1	5.66:1	26.14	26.93
K-7570	N-6570	*8000 ct	1200 ct	–	1.0	.75	.11	1.0	715	153	–	2.58:1	–	26.91	29.69
K-7575	N-6575	*9000 ct	9000 ct	–	1.0	.75	.11	1.0	925	1020	–	1:1	–	26.91	29.69
K-7580	N-6580	10,000 ct	12.8 ct	3.2	1.0	.75	.11	1.0	768	1.6	.4	28:1	56:1	26.14	26.93
K-7585	N-6585	10,000 ct	16 ct	4	1.0	.75	.11	1.0	756	1.7	.43	25:1	50:1	26.14	26.93
K-7590	N-6590	10,000 ct	100 ct	25	1.0	.75	.11	1.0	780	10	2.5	10:1	20:1	26.14	26.93
K-7595	N-6595	10,000 ct	200 ct	50	1.0	.75	.11	1.0	780	24	6	7.07:1	14.14:1	26.14	26.93
K-7600	N-6600	10,000 ct	500 ct	125	1.0	.75	.11	1.0	780	60	15	4.47:1	8.94:1	26.14	26.93
K-7605	N-6605	10,000 ct	600 ct	150	1.0	.75	.11	1.0	780	83	21	4.08:1	8.16:1	26.14	26.93
K-7610	N-6610	10,000 ct	1000 ct	250	1.0	.75	.11	1.0	780	106	27	3.16:1	6.32:1	26.14	26.93
K-7615	N-6615	10,000 ct	1200 ct	300	1.0	.75	.11	1.0	780	145	36	2.89:1	5.77:1	26.14	26.93
K-7620	N-6620	10,000 ct	1500 ct	375	1.0	.75	.11	1.0	780	160	40	2.58:1	5.16:1	26.14	26.93
K-7625	N-6625	10,000 ct	2000 ct	500	1.0	.75	.11	1.0	780	300	75	2.24:1	4.47:1	26.14	26.93
K-7630	N-6630	10,000 ct	5000 ct	1250	1.0	.75	.11	1.0	780	610	153	1.41:1	2.83:1	26.14	26.93
K-7635	N-6635	10,000 ct	7500 ct	1875	1.0	.75	.11	1.0	780	932	233	1.16:1	2.31:1	26.14	26.93
K-7640	N-6640	10,000 ct	10,000 ct	2500	1.0	.75	.11	1.0	780	1075	269	1:1	2:1	26.14	26.93
K-7645	N-6645	*10,000 ct	10,000 ct	–	1.0	.75	.11	1.0	715	985	–	1:1	–	26.91	29.69
K-7650	N-6650	15,000 ct	400 ct	100	.66	.66	.11	0.8	1165	52	13	6.12:1	12.25:1	26.14	26.93
K-7652	N-6652	15,000 ct	500 ct	125	.66	.66	.11	0.8	1165	60	15	5.48:1	10.95:1	26.14	26.93
K-7655	N-6655	15,000 ct	600 ct	150	.66	.66	.11	0.8	1165	80	20	5:1	10:1	26.14	26.93
K-7660	N-6660	15,000 ct	10,000 ct	2500	.66	.66	.11	0.8	1165	1050	263	1.22:1	2.45:1	26.14	26.93
K-7665	N-6665	*15,000 ct	15,000 ct	–	.66	.66	.11	0.8	1165	1600	–	1:1	–	26.91	29.69
K-7670	N-6670	15,000 ct	15,000 ct	3750	.66	.66	.11	0.8	1165	1600	400	1:1	2:1	26.14	26.93
K-7675	N-6675	16,000 ct	1000 ct	250	.62	.62	.11	0.8	1560	108	27	4:1	8:1	26.14	26.93
K-7680	N-6680	20,000 ct	500 ct	125	.5	.5	.11	0.7	1750	60	15	6.32:1	12.65:1	26.14	25.93
K-7685	N-6685	20,000 ct	600 ct	150	.5	.5	.11	0.7	1750	82	20.5	5.77:1	11.55:1	26.14	29.69
K-7690	N-6690	20,000 ct	800 ct	200	.5	.5	.11	0.7	1750	98	24.5	5:1	10:1	26.14	29.69
K-7695	N-6695	20,000 ct	1000 ct	250	.5	.5	.11	0.7	1750	135	34	4.47:1	8.94:1	26.14	29.69
K-7700	N-6700	20,000 ct	5000 ct	1250	.5	.5	.11	0.7	1750	610	153	2:1	4:1	26.14	29.69
K-7705	N-6705	20,000 ct	10,000 ct	2500	.5	.5	.11	0.7	1750	1075	269	1.41:1	2.83:1	26.14	29.69
K-7710	N-6710	*20,000 ct	20,000 ct	–	.5	.5	.11	0.7	1715	2370	–	1:1	–	28.82	29.69
K-7715	N-6715	25,000 ct	500 ct	125	.4	.4	.11	0.6	2470	60	15	7.07:1	14.14:1	26.14	29.98
K-7720	N-6720	25,000 ct	1000 ct	250	.4	.4	.11	0.6	2470	106	27	5:1	10:1	26.14	29.69
K-7725	N-6725	30,000 ct	50 ct	12.5	.33	.33	.11	0.5	2730	6.2	1.6	24.5:1	49:1	28.82	29.69
K-7730	N-6730	30,000 ct	1200 ct	300	.33	.33	.11	0.5	2815	156	39	5:1	10:1	28.82	29.98
K-7732	N-6732	30,000 ct	500 ct	125	.33	.33	.11	0.5	2730	61	15.3	7.7:1	15.5:1	28.82	29.98
K-7734	N-6734	30,000 ct	200 ct	50	.33	.33	.11	0.5	2730	24	6	12.2:1	24.5:1	28.82	29.98
K-7735	N-6735	30,000 ct	5000 ct	1250	.33	.33	.11	0.5	2730	620	155	2.45:1	4.9:1	28.82	29.98
K-7740	N-6740	30,000 ct	10,000 ct	2500	.33	.33	.11	0.5	2730	1090	272	1.73:1	3.46:1	28.82	29.98
K-7745	N-6745	*30,000 ct	30,000 ct	–	.33	.33	.11	0.5	2730	3740	–	1:1	–	30.27	32.19
K-7750	N-6750	40,000 ct	400 ct	100	.25	.25	.11	0.5	3150	53	13	10:1	20:1	30.27	32.19
K-7755	N-6755	40,000 ct	2000 ct	500	.25	.25	.11	0.5	3150	300	75	4.47:1	8.94:1	30.27	32.19
K-7760	N-6760	40,000 ct	4000 ct	1000	.25	.25	.11	0.5	3150	548	137	3.16:1	6.32:1	30.27	32.19
K-7765	N-6765	40,000 ct	20,000 ct	5000	.25	.25	.11	0.5	3150	3075	769	1.41:1	2.83:1	30.27	32.19
K-7770	N-6770	*40,000 ct	40,000 ct	–	.25	.25	.11	0.5	3940	4350	–	1:1	–	34.33	35.90
K-7775	N-6775	50,000 ct	200 ct	50	.2	.2	.11	0.4	4275	24	6	15.8:1	31.6:1	34.33	35.90
K-7777	N-6777	50,000 ct	500 ct	125	.2	.2	.11	0.4	4275	60	15	10:1	20:1	34.33	35.90
K-7778	N-6778	50,000 ct	600 ct	150	.2	.2	.11	0.4	4275	82	21	9.13:1	18.26:1	34.33	35.90
K-7779	N-6779	50,000 ct	50,000 ct	12,500	.2	.2	.11	0.4	4500	6270	1568	1:1	2:1	34.33	35.90
K-7780	N-6780	60,000 ct	15,000 ct	3750	.16	.16	.11	0.4	5960	1650	412	2:1	4:1	37.76	38.87
K-7785	N-6785	62,500 ct	50 ct	12.5	.16	.16	.11	0.4	5960	6	1.5	35.4:1	70.7:1	37.76	38.87
K-7787	N-6787	80,000 ct	15,000 ct	3750	.12	.12	.11	0.3	7200	1690	423	2.3:1	4.6:1	37.76	38.87
K-7789	N-6789	80,000 ct	80,000 ct	20,000	.12	.12	.11	0.3	7200	9920	2480	1:1	2:1	37.76	38.87
K-7790	N-6790	90,000 ct	10,000 ct	2500	.11	.11	.11	0.3	7500	1350	338	3:1	6:1	42.36	40.64
K-7795	N-6795	95,000 ct	15,000 ct	3750	.1	.1	.10	0.3	9550	1635	410	2.5:1	5:1	42.36	40.64
K-7800	N-6800	100,000 ct	60 ct	15	.1	.1	.10	0.3	10,000	8.5	2.2	40.8:1	81.6:1	42.36	40.64
K-7805	N-6805	100,000 ct	100 ct	25	.1	.1	.10	0.3	10,000	14	3.5	31.6:1	63.2:1	42.36	40.64
K-7810	N-6810	100,000 ct	500 ct	125	.1	.1	.10	0.3	10,000	62	15.5	14.1:1	28.3:1	42.36	40.64
K-7813	N-6813	100,000ct	1000 ct	250	.1	.1	.10	0.3	10,000	140	35	10:1	20:1	42.36	40.64
K-7814	N-6814	100,000 ct	2000 ct	500	.1	.1	.10	0.3	10,000	248	62	7.07:1	14.14:1	42.36	40.64
K-7815	N-6815	100,000 ct	10,000 ct	2500	.1	.1	.10	0.3	10,000	1075	270	3.16:1	6.32:1	42.36	40.64
K-7820	N-6820	135,000 ct	82 ct	20.5	.074	.074	.074	0.25	13,700	9.5	2.4	40.6:1	81.2:1	41.26	42.51
K-7823	N-6823	200,000 ct	500 ct	125	.05	.05	.05	0.2	17,340	75	19	20:1	40:1	41.26	42.51
K-7825	N-6825	200,000 ct	1000 ct	250	.05	.05	.05	0.2	17,340	133	33	14.1:1	28.3:1	41.26	42.51
K-7830	N-6830	200,000 ct	10,000 ct	2500	.05	.05	.05	0.2	17,340	1350	336	4.47:1	8.94:1	41.26	42.51
K-7835	N-6835	200,000 ct	20,000 ct	5000	.05	.05	.05	0.2	17,340	3000	750	3.16:1	6.32:1	41.26	43.58
K-7837	N-6837	250,000 ct	200 ct	50	.04	.04	.04	0.2	17,340	28	7	35.4:1	70.7:1	42.48	43.58
K-7840	N-6840	250,000 ct	1000 ct	250	.04	.04	.04	0.2	17,340	118	30	15.8:1	31.6:1	42.48	43.57
K-SHIELD	MU-METAL SHIELD	.53" d X .56" h (13.46 mm d X 14.22 mm h)												3.50	
N-SHIELD	MU-METAL SHIELD	.53" d X .56" h (13.46 mm d X 14.22 mm h)													3.52

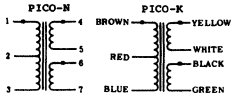
* INCLUDES ELECTROSTATIC SHIELD

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

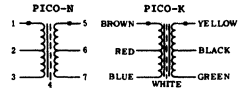
K SERIES Insulated Leads

N SERIES Plug-In

SCHEMATIC FOR TRANSFORMERS WITH SPLIT SECONDARIES



SCHEMATIC FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED.
- VARIATION OF STANDARD DESIGNS AVAILABLE
- PRIMARY AND SECONDARY WINDINGS CAN BE USED EITHER AS INPUT OR OUTPUT.
- SPECIAL PRODUCTION TECHNIQUES ENSURE UNIFORM SIZE AND LEADS WHICH ARE FREE OF ENCAPSULANT. NO MENISCUS IN LEAD AREA.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

PICO Electronics, Inc.

143 Sparks Ave.,
Pelham, NY 10803-1837

FAX: 914-738-8225

Internet:
http://www.picoelectronics.com
E-Mail: ***HLSC73A@prodigy.com***

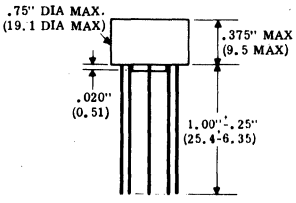
For immediate engineering assistance or to place an order—

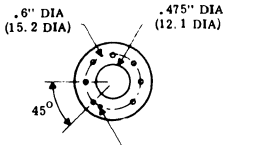
Call Toll Free 800-228-9747

PICO's ultra-miniature transformers

For Surface Mount Versions of this Series see pgs. A•2264-A•2265

R SERIES Plug-In





WHITE DOT AT TERMINAL #1
TERMINALS CLOCKWISE FROM PIN #1

All dimensions are in inches, ( ) = MM

SPECIFICATIONS

- **MIL-T-27:**.....
All units manufactured to MIL-T-27, Audio Transformers are Type TF5S21ZZ
- **FREQUENCY RESPONSE:**.....
±3db, 75 Hz-30 KHz at 1.0 Milliwatt.
- **MAXIMUM DISTORTION:**.....
5% With Rated Power Level at 1 KHz, 300 Hz and 75 Hz.
- **DIELECTRIC STRENGTH:**.....
All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:**...
Greater Than 10,000 Megohms at 300 V DC.
- **WEIGHT:**.....
12 Grams
- **OPERATING TEMPERATURE:**
–55°C to +130°C
- **TERMINALS:**.....
Solid .016 Diameter Conductor. Solderability per MIL-STD-202 Method 208.
- **THERMAL SHOCK:**.....
25 Cycles, Method 107, MIL-STD-202, Test Condition –55°C to +130°C

THIS PRODUCT IS PATENTED

Delivery— stock to one week

PICO PART NUMBER R-Series Plug-In	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS PAR	POWER WATTS 1KHz and higher	POWER WATTS 300 Hz and higher	POWER WATTS 75 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	SECONDARY DC RESISTANCE OHMS PAR CONN	TURNS RATIO PRIME/SEC SEC SER CONN	TURNS RATIO PRIME/SEC SEC PAR CONN	PICO PRICES 1–9 *** R-Series
R-20003	20 ct	8 ct	2	1.5	.9	.03	22	1.6	.76	.19	1.58:1	3.16:1	32.63
R-20005	20 ct	20 ct	5	1.5	.9	.03	22	1.6	1.9	.48	1:1	2:1	32.63
R-20010	32 ct	32 ct	8	1.5	.9	.03	17.5	2.56	3	.75	1:1	2:1	32.63
R-20015	40 ct	40 ct	10	1.5	.9	.03	16	3.2	3.8	.95	1:1	2:1	32.63
R-20018	48 ct	16 ct	4	1.5	.9	.03	14.5	3.84	1.52	.38	1.73:1	3.46:1	32.63
R-20020	50 ct	50 ct	12.5	1.5	.9	.03	14	4	4.75	1.19	1:1	2:1	32.63
R-20025	80 ct	32 ct	8	1.5	.9	.03	11	6.4	3	.75	1.58:1	3.16:1	32.63
R-20028	100 ct	40 ct	10	1.5	.9	.03	10	8	3.8	.95	1.58:1	3.16:1	32.63
R-20030	100 ct	100 ct	25	1.5	.9	.03	10	8	9.5	2.38	1:1	2:1	32.63
R-20035	120 ct	12.8 ct	3.2	1.5	.9	.03	9	9.6	1.22	.3	3.06:1	6.12:1	32.63
R-20040	120 ct	60 ct	15	1.5	.9	.03	9	9.6	5.7	1.4	1.41:1	2.83:1	32.63
R-20045	120 ct	120 ct	30	1.5	.9	.03	9	9.6	11.4	2.85	1:1	2:1	32.63
R-20050	150 ct	12 ct	3	1.5	.9	.03	8	12	1.14	.29	3.54:1	7.08:1	32.63
R-20055	150 ct	50 ct	12.5	1.5	.9	.03	8	12	4.75	1.19	1.73:1	3.46:1	32.63
R-20060	150 ct	100 ct	25	1.5	.9	.03	8	12	9.5	2.38	1.22:1	2.44:1	32.63
R-20065	150 ct	150 ct	37.5	1.5	.9	.03	8	12	14.3	3.56	1:1	2:1	32.63
R-20070	150 ct	600 ct	150	1.5	.9	.03	8	12	57	14.3	1:2	1:1	32.63
R-20075	200 ct	200 ct	50	1.5	.9	.03	7	16	19	4.75	1:1	2:1	32.63
R-20080	300 ct	12 ct	3	1.5	.9	.03	5.5	24	1.14	.29	5:1	10:1	32.63
R-20085	300 ct	50 ct	12.5	1.5	.9	.03	5.5	24	4.75	1.19	2.45:1	4.9:1	32.63
R-20090	300 ct	150 ct	37.5	1.5	.9	.03	5.5	24	14.25	3.56	1.41:1	2.83:1	32.63
R-20095	300 ct	300 ct	75	1.5	.9	.03	5.5	24	28.5	7.13	1:1	2:1	32.63
R-20100	300 ct	600 ct	150	1.5	.9	.03	5.5	24	57	14.25	1:1.41	1.41:1	32.63
R-20105	320 ct	12.8 ct	3.2	1.5	.9	.03	5.5	25.6	1.22	.3	5:1	10:1	32.63
R-20110	400 ct	40 ct	10	1.5	.9	.03	5	32	3.8	.95	3.16:1	6.32:1	32.63
R-20115	400 ct	120 ct	30	1.5	.9	.03	5	32	11.4	2.85	1.83:1	3.65:1	32.63
R-20120	400 ct	200 ct	50	1.5	.9	.03	5	32	19	4.75	1.41:1	2.83:1	32.63
R-20125	400 ct	400 ct	100	1.5	.9	.03	5	32	38	9.5	1:1	2:1	32.63
R-20130	400 ct	1000 ct	250	1.5	.9	.03	5	32	95	23.8	1:1.58	1.26:1	32.63
R-20135	400 ct	2000 ct	500	1.5	.9	.03	5	32	190	47.5	1:2.24	1:1.12	32.63
R-20140	400 ct	4000 ct	1000	1.5	.9	.03	5	32	380	95	1:3.16	1:1.58	32.63
R-20142	500 ct	12.8 ct	3.2	1.5	.9	.03	4.5	40	1.22	.3	6.25:1	12.5:1	32.63
R-20144	500 ct	16 ct	4	1.5	.9	.03	4.5	40	1.52	.38	5.6:1	11.2:1	32.63
R-20145	500 ct	50 ct	12.5	1.5	.9	.03	4.5	40	4.75	1.19	3.16:1	6.32:1	32.63
R-20147	500 ct	150 ct	37.5	1.5	.9	.03	4.5	40	14.25	3.56	1.83:1	3.65:1	32.63
R-20150	500 ct	500 ct	125	1.5	.9	.03	4.5	40	47.5	11.88	1:1	2:1	32.63
R-20155	*500 ct	500 ct	–	1.5	.9	.03	4.5	40	47.5	–	1:1	–	33.98
R-20160	500 ct	600 ct	150	1.5	.9	.03	4.5	40	57	14.25	1:1.1	1.83:1	32.63
R-20165	600 ct	12.8 ct	3.2	1.5	.9	.03	4	48	1.22	.3	6.85:1	13.7	28.50
R-20167	600 ct	30 ct	7.5	1.5	.9	.03	4	48	2.85	.71	4.47:1	8.94:1	28.50
R-20170	600 ct	48 ct	12	1.5	.9	.03	4	48	4.56	1.14	3.54:1	7.07:1	28.50
R-20175	600 ct	200 ct	50	1.5	.9	.03	4	48	19	4.75	1.73:1	3.46:1	28.50
R-20180**	600 ct	600 ct	150	1.5	.9	.03	4	48	57	14.25	1:1	2:1	32.63
R-20185**	*600 ct	600 ct	–	1.5	.9	.03	4	48	57	–	1:1	–	29.68
R-20186**	*600 ct	900 ct	–	1.5	.9	.03	4	48	85.5	–	1:1.22	–	29.68
R-20187**	600 ct	1200 ct	300	1.5	.9	.03	4	48	114	28.5	1:1.41	1.41:1	28.50
R-20190	640 ct	12.8 ct	3.2	1.5	.9	.03	4	51.2	1.22	.3	7.07:1	14.14:1	28.50
R-20195	700 ct	100 ct	25	1.5	.9	.03	3.5	56	9.5	2.38	2.65:1	5.29:1	28.50
R-20200	800 ct	12.8 ct	3.2	1.5	.9	.03	3.5	64	1.22	.3	7.91:1	15.8:1	28.50
R-20205	800 ct	48 ct	12	1.5	.9	.03	3.5	64	4.56	1.14	4.08:1	8.16:1	28.50
R-20210	800 ct	800 ct	200	1.5	.9	.03	3.5	64	76	19	1:1	2:1	28.50
R-20215	900 ct	600 ct	150	1.5	.9	.03	3	72	57	14.3	1.23:1	2.45:1	28.50
R-20217**	*900 ct	900 ct	–	1.5	.9	.03	3	72	85.5	–	1:1	–	29.68
R-20220	1000 ct	12 ct	3	1.5	.9	.03	3	80	1.14	.29	9.13:1	18.26:1	28.50
R-20225	1000 ct	50 ct	12.5	1.5	.9	.03	3	80	4.75	1.19	4.47:1	8.94:1	28.50
R-20230	1000 ct	1000 ct	250	1.5	.9	.03	3	80	95	23.8	1:1	2:1	28.50
R-20235	1060 ct	12.8 ct	3.2	1.5	.9	.03	3	85	1.22	.3	9.1:1	18.2:1	28.50
R-20240	1200 ct	12.8 ct	3.2	1.5	.9	.03	3	96	1.22	.3	9.68:1	19.4:1	28.50
R-20245	1200 ct	500 ct	125	1.5	.9	.03	3	96	47.5	11.88	1.55:1	3.1:1	28.50
R-20250	1200 ct	1200 ct	300	1.5	.9	.03	3	96	114	28.5	1:1	2:1	28.50
R-20255	*1200 ct	1200 ct	–	1.5	.9	.03	3	96	114	–	1:1	–	29.68
R-20260	1500 ct	12 ct	3	1.5	.9	.03	2.5	120	1.14	.29	11.18:1	22.36:1	28.50
R-20265	1500 ct	500 ct	125	1.5	.9	.03	2.5	120	47.5	11.88	1.73:1	3.46:1	28.50
R-20270	*1500 ct	600 ct	–	1.5	.9	.03	2.5	120	57	–	1.58:1	–	29.68
R-20275	*1500 ct	1500 ct	–	1.5	.9	.03	2.5	120	142	–	1:1	–	29.68
R-20280	1600 ct	12.8 ct	3.2	1.5	.9	.03	2.5	128	1.22	3	11.18:1	22.36:1	28.50
R-20283	2000 ct	8 ct	2	1.5	.9	.03	2.2	160	.76	.19	15.8:1	31.6:1	28.50
R-20285	2000 ct	2000 ct	500	1.5	.9	.03	2.2	160	190	47.5	1:1	2:1	28.50
R-20290	*2000 ct	2000 ct	–	1.5	.9	.03	2.2	160	190	–	1:1	–	29.68
R-20295	2000 ct	8000 ct	2000	1.5	.9	.03	2.2	160	760	190	1:2	1:1	28.50
R-20297	2500 ct	2500 ct	625	1.5	.9	.03	2	200	238	59.5	1:1	2:1	28.50
R-20300	3000 ct	3000 ct	750	1.5	.9	.03	1.8	240	285	71.3	1:1	2:1	28.50
R-20305	*3000 ct	3000 ct	–	1.5	.9	.03	1.8	240	285	–	1:1	–	29.68

*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION
***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

*For immediate engineering assistance or to place an order—**Call Toll Free 800-228-9747***

PICO PART NUMBER R-Series Plug-In	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER WATTS 1KHz and higher	300 Hz and higher	75 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS RATIO PRIME/SEC SEC SER CONN	SEC PAR CONN	PICO PRICES 1–9 *** R-Series
R-20310	3600 ct	3600 ct	900	1.5	.9	.03	1.7	288	342	86	1:1	2:1	32.63
R-20312	4000 ct	16 ct	4	1.5	.9	.03	1.6	320	1.52	.38	15.8:1	31.6:1	32.63
R-20314**	4000 ct	600 ct	150	1.5	.9	.03	1.6	320	57	14.3	2.58:1	5.16:1	32.63
R-20315	4000 ct	1000 ct	250	1.5	.9	.03	1.6	320	95	23.8	2:1	4:1	32.63
R-20320	*4000 ct	8000 ct	–	1.5	.9	.03	1.6	320	760	–	1:1.41	–	33.98
R-20325	5000 ct	500 ct	125	1.5	.9	.03	1.4	400	47.5	11.88	3.16:1	6.32:1	32.63
R-20330	5000 ct	5000 ct	1250	1.5	.9	.03	1.4	400	475	119	1:1	2:1	32.63
R-20335	7500 ct	50 ct	12.5	1.3	.9	.03	1.2	600	4.75	1.19	12.25:1	24.5:1	36.34
R-20340	7500 ct	100 ct	25	1.3	.9	.03	1.2	600	9.5	2.38	8.66:1	17.32:1	36.34
R-20345	7500 ct	600 ct	150	1.3	.9	.03	1.2	600	57	14.3	3.54:1	7.07:1	36.34
R-20350	7500 ct	2500 ct	625	1.3	.9	.03	1.2	600	238	59.5	1.73:1	3.46:1	36.34
R-20355	*7500 ct	7500 ct	–	1.3	.9	.03	1.2	600	713	–	1:1	–	38.75
R-20360	8000 ct	12.8 ct	3.2	1.2	.9	.03	1.1	640	1.22	.3	25:1	50:1	36.34
R-20365	8000 ct	1000 ct	250	1.2	.9	.03	1.1	640	95	23.8	2.83:1	5.66:1	36.34
R-20370	*8000 ct	1200 ct	–	1.2	.9	.03	1.1	640	114	–	2.58:1	–	38.75
R-20375	*9000 ct	9000 ct	–	1.1	.9	.03	1.1	720	855	–	1:1	–	38.75
R-20380	10,000 ct	12.8 ct	3.2	1.0	.9	.03	1	800	1.22	.3	28:1	56:1	36.34
R-20385	10,000 ct	16 ct	4	1.0	.9	.03	1	800	1.52	.38	25:1	50:1	36.34
R-20390	10,000 ct	100 ct	25	1.0	.9	.03	1	800	9.5	2.38	10:1	20:1	36.34
R-20395	10,000 ct	200 ct	50	1.0	.9	.03	1	800	19	4.75	7.07:1	14.14:1	36.34
R-20400	10,000 ct	500 ct	125	1.0	.9	.03	1	800	47.5	11.88	4.47:1	8.94:1	36.34
R-20405	10,000 ct	600 ct	150	1.0	.9	.03	1	800	57	14.25	4.08:1	8.16:1	36.34
R-20410	10,000 ct	1000 ct	250	1.0	.9	.03	1	800	95	23.8	3.16:1	6.32:1	36.34
R-20415	10,000 ct	1200 ct	300	1.0	.9	.03	1	800	114	28.5	2.89:1	5.77:1	36.34
R-20420	10,000 ct	1500 ct	375	1.0	.9	.03	1	800	143	35.8	2.58:1	5.16:1	36.34
R-20425	10,000 ct	2000 ct	500	1.0	.9	.03	1	800	190	47.5	2.24:1	4.47:1	36.34
R-20430	10,000 ct	5000 ct	1250	1.0	.9	.03	1	800	475	119	1.41:1	2.83:1	36.34
R-20435	10,000 ct	7500 ct	1875	1.0	.9	.03	1	800	713	178	1.16:1	2.31:1	36.34
R-20440	10,000 ct	10,000 ct	2500	1.0	.9	.03	1	800	950	238	1:1	2:1	36.34
R-20445	*10,000 ct	10,000 ct	–	1.0	.9	.03	1	800	950	–	1:1	–	38.75
R-20450	15,000 ct	400 ct	100	.66	.66	.03	.8	1200	38	9.5	6.12:1	12.25:1	36.34
R-20452	15,000 ct	500 ct	125	.66	.66	.03	.8	1200	48	12	5.48:1	10.95:1	36.34
R-20455	15,000 ct	600 ct	150	.66	.66	.03	.8	1200	57	14.3	5:1	10:1	36.34
R-20460	15,000 ct	10,000 ct	2500	.66	.66	.03	.8	1200	950	238	1.22:1	2.45:1	36.34
R-20465	*15,000 ct	15,000 ct	–	.66	.66	.03	.8	1200	1430	–	1:1	–	38.75
R-20470	15,000 ct	15,000 ct	3750	.66	.66	.03	.8	1200	1430	357	1:1	2:1	36.34
R-20475	16,000 ct	1000 ct	250	.62	.62	.03	.8	1280	95	23.8	4:1	8:1	36.34
R-20480	20,000 ct	500 ct	125	.5	.5	.03	.7	1600	47.5	11.88	6.32:1	12.65:1	38.75
R-20485	20,000 ct	600 ct	150	.5	.5	.03	.7	1600	57	14.25	5.77:1	11.55:1	38.75
R-20490	20,000 ct	800 ct	200	.5	.5	.03	.7	1600	76	19	5:1	10:1	38.75
R-20495	20,000 ct	1000 ct	250	.5	.5	.03	.7	1600	95	23.8	4.47:1	8.94:1	38.75
R-20500	20,000 ct	5000 ct	1250	.5	.5	.03	.7	1600	475	119	2:1	4:1	38.75
R-20505	20,000 ct	10,000 ct	2500	.5	.5	.03	.7	1600	950	238	1.41:1	2.83:1	38.75
R-20510	*20,000 ct	20,000 ct	–	.5	.5	.03	.7	1600	1900	–	1:1	–	40.29
R-20515	25,000 ct	500 ct	125	.4	.4	.03	.6	2000	47.5	11.88	7.07:1	14.14:1	38.75
R-20520	25,000 ct	1000 ct	250	.4	.4	.03	.6	2000	95	23.8	5:1	10:1	38.75
R-20525	30,000 ct	50 ct	12.5	.33	.33	.03	.6	2400	4.75	1.19	24.5:1	49:1	40.29
R-20530	30,000 ct	1200 ct	300	.33	.33	.03	.6	2400	114	28.5	5:1	10:1	40.28
R-20532	30,000 ct	500 ct	125	.33	.33	.03	.6	2400	47.5	11.88	7.7:1	15.5:1	40.28
R-20534	30,000 ct	200 ct	50	.33	.33	.03	.6	2400	19	4.75	12.2:1	24.5:1	40.28
R-20535	30,000 ct	5000 ct	1250	.33	.33	.03	.6	2400	475	119	2.45:1	4.9:1	40.28
R-20540	30,000 ct	10,000 ct	2500	.33	.33	.03	.6	2400	950	238	1.73:1	3.46:1	40.28
R-20545	*30,000 ct	30,000 ct	–	.33	.33	.03	.6	2400	2850	–	1:1	–	43.40
R-20550	40,000 ct	400 ct	100	.25	.25	.03	.5	3200	38	9.5	10:1	20:1	43.40
R-20555	40,000 ct	2000 ct	500	.25	.25	.03	.5	3200	190	47.5	4.47:1	8.94:1	43.40
R-20560	40,000 ct	4000 ct	1000	.25	.25	.03	.5	3200	380	95	3.16:1	6.32:1	43.40
R-20565	40,000 ct	20,000 ct	5000	.25	.25	.03	.5	3200	1900	475	1.41:1	2.83:1	43.40
R-20570	*40,000 ct	40,000 ct	–	.25	.25	.03	.5	3200	3800	–	1:1	–	48.18
R-20575	50,000 ct	200 ct	50	.2	.2	.03	.4	4000	19	4.75	15.8:1	31.6:1	48.18
R-20577	50,000 ct	500 ct	125	.2	.2	.03	.4	4000	47.5	11.88	10:1	20:1	48.18
R-20578	50,000 ct	600 ct	150	.2	.2	.03	.4	4000	57	14.3	9.13:1	18.26:1	48.18
R-20579	50,000 ct	50,000 ct	12,500	.2	.2	.03	.4	4000	4750	1190	1:1	2:1	48.18
R-20580	60,000 ct	15,000 ct	3750	.16	.16	.03	.4	4800	1430	358	2:1	4:1	52.05
R-20585	62,500 ct	50 ct	12.5	.16	.16	.03	.4	5000	4.75	1.19	35.4:1	70.7:1	52.05
R-20587	80,000 ct	15,000 ct	3750	.12	.12	.03	.3	6400	1430	358	2.3:1	4.6:1	52.05
R-20590	90,000 ct	10,000 ct	2500	.11	.11	.03	.3	7200	950	238	3:1	6:1	52.05
R-20595	95,000 ct	15,000 ct	3750	.1	.1	.03	.3	7600	1430	358	2.5:1	5:1	54.63
R-20600	100,000 ct	60 ct	15	.1	.1	.03	.3	8000	5.7	1.43	40.8:1	81.6:1	54.63
R-20605	100,000 ct	100 ct	25	.1	.1	.03	.3	8000	9.5	2.38	31.6:1	63.2:1	54.63
R-20610	100,000 ct	500 ct	125	.1	.1	.03	.3	8000	47.5	11.88	14.1:1	28.3:1	54.63
R-20613	100,000 ct	1000 ct	250	.1	.1	.03	.3	8000	95	23.8	10:1	20:1	54.63
R-20614	100,000 ct	2000 ct	500	.1	.1	.03	.3	8000	190	47.5	7.07:1	14.14:1	54.63
R-20615	100,000 ct	10,000 ct	2500	.1	.1	.03	.3	8000	950	238	3.16:1	6.32:1	54.63
R-20620	135,000 ct	82 ct	20.5	.07	.07	.03	.2	10,800	7.8	1.9	40.6:1	81.2:1	57.07

*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION
***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

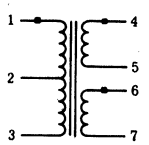
PICO's ultra-miniature transformers

R SERIES Plug-In

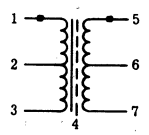
FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED.
- VARIATION OF STANDARD DESIGNS AVAILABLE
- PRIMARY AND SECONDARY WINDINGS CAN BE USED EITHER AS INPUT OR OUTPUT.
- SPECIAL PRODUCTION TECHNIQUES ENSURE UNIFORM SIZE AND LEADS WHICH ARE FREE OF ENCAPSULANT. NO MENISCUS IN LEAD AREA.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

SCHEMATIC FOR TRANSFORMERS WITH SPLIT SECONDARIES



SCHEMATIC FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



PICO Electronics, Inc.

143 Sparks Ave.,
Pelham, NY 10803-1837

FAX: 914-738-8225

Internet:
http://www.picoelectronics.com
E-Mail: ***HLSC73A@prodigy.com***

For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

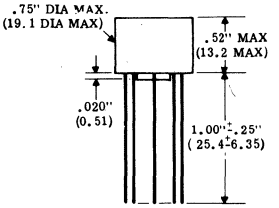
Delivery— stock to one week

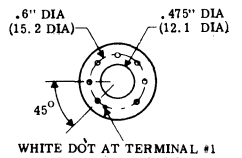
PICO's ultra-miniature transformers

These units can be manufactured and tested to MIL-T-27/359. Contact factory for price and delivery information and appropriate parts numbers (MIL-T-27/359-01 thru MIL-T-27/359-147).

For Surface Mount Versions of this Series see pgs. A•2266-A•2267

S SERIES Plug-In





WHITE DOT AT TERMINAL #1
TERMINALS CLOCKWISE FROM PIN #1

All dimensions are in inches, ( ) = MM

PICO PART NUMBER S-Series Plug-In	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS PAR	POWER WATTS 1KHz and higher	POWER WATTS 300 Hz and higher	POWER WATTS 50 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	SECONDARY DC RESISTANCE OHMS PAR CONN	TURNS RATIO PRIM/SEC SEC SER CONN	TURNS RATIO PRIM/SEC SEC PAR CONN	PICO PRICES 1-9 *** S-Series
S-21003	20 ct	8 ct	2	2.0	1.5	.05	22	1.6	.88	.22	1.58:1	3.16:1	26.62
S-21005	20 ct	20 ct	5	2.0	1.5	.05	22	1.6	2.2	.55	1:1	2:1	26.62
S-21010	32 ct	32 ct	8	2.0	1.5	.05	17.5	2.56	3.52	.88	1:1	2:1	26.62
S-21015	40 ct	40 ct	10	2.0	1.5	.05	16	3.2	4.4	1.1	1:1	2:1	26.62
S-21018	48 ct	16ct	4	2.0	1.5	.05	14.5	3.84	1.76	.44	1.73:1	3.46:1	26.62
S-21020	50 ct	50 ct	12.5	2.0	1.5	.05	14	4	5.5	1.38	1:1	2:1	26.62
S-21025	80 ct	32 ct	8	2.0	1.5	.05	11	6.4	3.52	.88	1.58:1	3.16:1	26.62
S-21028	100 ct	40 ct	10	2.0	1.5	.05	10	8	4.4	1.1	1.58:1	3.16:1	26.62
S-21030	100 ct	100 ct	25	2.0	1.5	.05	10	8	11	2.75	1:1	2:1	26.62
S-21035	120 ct	12.8 ct	3.2	2.0	1.5	.05	9	9.6	1.41	.35	3.06:2	6.12:1	26.62
S-21040	120 ct	60 ct	15	2.0	1.5	.05	9	9.6	6.6	1.65	1.41:1	2.83:1	26.62
S-21045	120 ct	120 ct	30	2.0	1.5	.05	9	9.6	13.2	3.3	1:1	2:1	26.62
S-21050	150 ct	12 ct	3	2.0	1.5	.05	8	12	1.32	.33	3.54:1	7.08:1	26.62
S-21055	150 ct	50 ct	12.5	2.0	1.5	.05	8	12	5.5	1.38	1.73:1	3.46:1	26.62
S-21060	150 ct	100 ct	25	2.0	1.5	.05	8	12	11	2.75	1.22:1	2.44:1	26.62
S-21065	150 ct	150 ct	37.5	2.0	1.5	.05	8	12	16.5	4.13	1:1	2:1	26.62
S-21070	150 ct	600 ct	150	2.0	1.5	.05	8	12	66	16.5	1:2	1:1	26.62
S-21075	200 ct	200 ct	50	2.0	1.5	.05	7	16	22	5.5	1:1	2:1	26.62
S-21080	300 ct	12 ct	3	2.0	1.5	.05	5.5	24	1.32	.33	5:1	10:1	26.62
S-21085	300 ct	50 ct	12.5	2.0	1.5	.05	5.5	24	5.5	1.38	2.45:1	4.9:1	26.62
S-21090	300 ct	150 ct	37.5	2.0	1.5	.05	5.5	24	16.5	4.13	1.41:1	2.83:1	26.62
S-21095	300 ct	300 ct	75	2.0	1.5	.05	5.5	24	33	8.25	1:1	2:1	26.62
S-21100	300 ct	600 ct	150	2.0	1.5	.05	5.5	24	66	16.5	1:1.41	1.41:1	26.62
S-21105	320 ct	12.8 ct	3.2	2.0	1.5	.05	5.5	25.6	1.41	.35	5:1	10:1	26.62
S-21110	400 ct	40 ct	10	2.0	1.5	.05	5	32	4.4	1.1	3.16:1	6.32:1	26.62
S-21115	400 ct	120 ct	30	2.0	1.5	.05	5	32	13.2	3.3	1.83:1	3.65:1	26.62
S-21120	400 ct	200 ct	50	2.0	1.5	.05	5	32	22	5.5	1.41:1	2.83:1	26.62
S-21125	400 ct	400 ct	100	2.0	1.5	.05	5	32	44	11	1:1	2:1	26.62
S-21130	400 ct	1000 ct	250	2.0	1.5	.05	5	32	110	27.5	1:1.58	1.26:1	26.62
S-21135	400 ct	2000 ct	500	2.0	1.5	.05	5	32	220	55	1:2.24	1:1.12	26.62
S-21140	400 ct	4000 ct	1000	2.0	1.5	.05	5	32	440	110	1:3.16	1:1.58	26.62
S-21142	500 ct	12.8 ct	3.2	2.0	1.5	.05	4.5	40	1.41	.35	6.25:1	12.5:1	26.62
S-21144	500 ct	16 ct	4	2.0	1.5	.05	4.5	40	1.76	.44	5.6:1	11.2:1	26.62
S-21145	500 ct	50 ct	12.5	2.0	1.5	.05	4.5	40	5.5	1.38	3.16:1	6.32:1	26.62
S-21147	500 ct	150 ct	37.5	2.0	1.5	.05	4.5	40	16.5	4.13	1.83:1	3.65:1	26.62
S-21150	500 ct	500 ct	125	2.0	1.5	.05	4.5	40	55	13.75	1:1	2:1	26.62
S-21155	*500 ct	500 ct	–	2.0	1.5	.05	4.5	40	55	–	1:1	–	27.68
S-21160	500 ct	600 ct	150	2.0	1.5	.05	4.5	40	66	16.5	1:1.1	1.83:1	26.62
S-21165	600 ct	12.8 ct	3.2	2.0	1.5	.05	4	48	1.41	.35	6.85:1	13.7	26.62
S-21167	600 ct	30 ct	7.5	2.0	1.5	.05	4	48	3.3	.83	4.47:1	8.94:1	26.62
S-21170	600 ct	48 ct	12	2.0	1.5	.05	4	48	5.28	1.37	3.54:1	7.07:1	26.62
S-21175	600 ct	200 ct	50	2.0	1.5	.05	4	48	22	5.5	1.73:1	3.46:1	26.62
S-21180**	600 ct	600 ct	150	2.0	1.5	.05	4	48	66	16.5	1:1	2:1	26.62
S-21185**	*600 ct	600 ct	–	2.0	1.5	.05	4	48	66	–	1:1	–	27.68
S-21186**	*600 ct	900 ct	–	2.0	1.5	.05	4	48	99	–	1:1.22	–	27.68
S-21187**	600 ct	1200 ct	300	2.0	1.5	.05	4	48	132	33	1:1.41	1.41:1	26.62
S-21190	640 ct	12.8 ct	3.2	2.0	1.5	.05	4	51	1.41	.35	7.07:1	14.14:1	26.62
S-21195	700 ct	100 ct	25	2.0	1.5	.05	3.5	56	11	2.75	2.65:1	5.29:1	26.62
S-21200	800 ct	12.8 ct	3.2	2.0	1.5	.05	3.5	64	1.41	.35	7.91:1	15.8:1	26.62
S-21205	800 ct	48 ct	12	2.0	1.5	.05	3.5	64	5.28	1.32	4.08:1	8.16:1	26.62
S-21210	800 ct	800 ct	200	2.0	1.5	.05	3.5	64	88	22	1:1	2:1	26.62
S-21215	900 ct	600 ct	150	2.0	1.5	.05	3	72	66	16.5	1.23:1	2.45:1	26.62
S-21217**	*900 ct	900 ct	–	2.0	1.5	.05	3	72	99	–	1:1	–	27.68
S-21220	1000 ct	12 ct	3	2.0	1.5	.05	3	80	1.32	.33	9.13:1	18.26:1	26.62
S-21225	1000 ct	50 ct	12.5	2.0	1.5	.05	3	80	5.5	1.38	4.47:1	8.94:1	26.62
S-21230	1000 ct	1000 ct	250	2.0	1.5	.05	3	80	110	27.5	1:1	2:1	26.62
S-21235	1060 ct	12.8 ct	3.2	2.0	1.5	.05	3	85	1.41	.35	9.1:1	18.2:1	26.62
S-21240	1200 ct	12.8 ct	3.2	2.0	1.5	.05	3	96	1.41	.35	9.68:1	19.4:1	26.62
S-21245	1200 ct	500 ct	125	2.0	1.5	.05	3	96	55	13.75	1.55:1	3.1:1	26.62
S-21250	1200 ct	1200 ct	300	2.0	1.5	.05	3	96	132	33	1:1	2:1	26.62
S-21255	*1200 ct	1200 ct	–	2.0	1.5	.05	3	96	132	–	1:1	–	27.68
S-21260	1500 ct	12 ct	3	2.0	1.5	.05	2.5	120	1.32	.33	11.18:1	22.36:1	26.62
S-21265	1500 ct	500 ct	125	2.0	1.5	.05	2.5	120	55	13.75	1.73:1	3.46:1	26.62
S-21270	*1500 ct	600 ct	–	2.0	1.5	.05	2.5	120	66	–	1.58:1	–	27.68
S-21275	*1500 ct	1500 ct	–	2.0	1.5	.05	2.5	120	165	–	1:1	–	27.68
S-21280	1600 ct	12.8 ct	3.2	2.0	1.5	.05	2.5	128	1.41	.35	11.18:1	22.36:1	26.62
S-21283	2000 ct	8 ct	2	2.0	1.5	.05	2.2	160	.88	.22	15.8:1	31.6:1	26.62
S-21285	2000 ct	2000 ct	500	2.0	1.5	.05	2.2	160	220	55	1:1	2:1	26.62
S-21290	*2000 ct	2000 ct	–	2.0	1.5	.05	2.2	160	220	–	1:1	–	27.68
S-21295	2000 ct	8000 ct	2000	2.0	1.5	.05	2.2	160	880	220	1:2	1:1	27.68
S-21297	2500 ct	2500 ct	625	2.0	1.5	.05	2	200	275	69	1:1	2:1	27.68
S-21300	3000 ct	3000 ct	750	2.0	1.5	.05	1.8	240	330	83	1:1	2:1	27.68
S-21305	*3000 ct	3000 ct	–	2.0	1.5	.05	1.8	240	330	–	1:1	–	27.68

*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION
***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

SPECIFICATIONS

- **MIL-T-27:** All units manufactured to MIL-T-27, Audio Transformers are Type TF5S21ZZ
- **FREQUENCY RESPONSE:** ±3db, 50 Hz-30 KHz at 1.0 Milliwatt. (±0.5 db, 300 Hz-5 KHz)
- **MAXIMUM DISTORTION:** 5% With Rated Power Level at 1 KHz, 300 Hz and 50 Hz.
- **DIELECTRIC STRENGTH:** All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:** Greater Than 10,000 Megohms at 300 V DC.
- **WEIGHT:** 17 Grams
- **OPERATING TEMPERATURE:** –55°C to +130°C
- **TERMINALS:** Solid .020 Diameter Conductor. Solderability per MIL-STD-202 Method 208.
- **THERMAL SHOCK:** 25 Cycles, Method 107, MIL-STD-202, Test Condition –55°C to +130°C

THIS PRODUCT IS PATENTED

For immediate engineering assistance or to place an order—
Call Toll Free 800-228-9747

PICO Electronics, Inc.

143 Sparks Ave., Pelham, N.Y. 10803-1837

FAX: 914-738-8225

Internet: http://www.picoelectronics.com
E-mail: HLSC73A@prodigy.com

PICO PART NUMBER S-Series Plug-In	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER WATTS 1KHz and higher	300 Hz and higher	50 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS RATIO PRIM/SEC SEC SER CONN	SEC PAR CONN	PICO PRICES 1-9 *** S-Series
S-21310	3600 ct	3600 ct	900	2.0	1.5	.05	1.7	288	396	99	1:1	2:1	27.68
S-21312	4000 ct	16 ct	4	2.0	1.5	.05	1.6	320	1.76	.44	15.8:1	31.6:1	27.68
S-21314**	4000 ct	600 ct	150	2.0	1.5	.05	1.6	320	66	16.5	2.58:1	5.16:1	27.68
S-21315	4000 ct	1000 ct	250	2.0	1.5	.05	1.6	320	110	27.5	2:1	4:1	27.68
S-21320	*4000 ct	8000 ct	–	2.0	1.5	.05	1.6	320	880	–	1:1.41	–	27.68
S-21325	5000 ct	500 ct	125	2.0	1.5	.05	1.4	400	55	13.8	3.16:1	6.32:1	26.62
S-21330	5000 ct	5000 ct	1250	2.0	1.5	.05	1.4	400	550	138	1:1	2:1	26.62
S-21335	7500 ct	50 ct	12.5	1.3	1.3	.05	1.2	600	5.5	1.38	12.25:1	24.5:1	29.48
S-21340	7500 ct	100 ct	25	1.3	1.3	.05	1.2	600	11	2.75	8.66:1	17.32:1	29.48
S-21345	7500 ct	600 ct	150	1.3	1.3	.05	1.2	600	66	16.5	3.54:1	7.07:1	29.48
S-21350	7500 ct	2500 ct	625	1.3	1.3	.05	1.2	600	275	69	1.73:1	3.46:1	29.48
S-21355	*7500 ct	7500 ct	–	1.3	1.3	.05	1.2	600	825	–	1:1	–	31.87
S-21360	8000 ct	12.8 ct	3.2	1.2	1.2	.05	1.1	640	1.4	.35	25:1	50:1	29.48
S-21365	8000 ct	1000 ct	250	1.2	1.2	.05	1.1	640	110	27.5	2.83:1	5.66:1	29.48
S-21370	*8000 ct	1200 ct	–	1.2	1.2	.05	1.1	640	132	–	2.58:1	–	31.87
S-21375	*9000 ct	9000 ct	–	1.1	1.1	.05	1.1	720	990	–	1:1	–	31.87
S-21380	10,000 ct	12.8 ct	3.2	1.0	1.0	.05	1	800	1.4	.35	28:1	56:1	29.48
S-21385	10,000 ct	16 ct	4	1.0	1.0	.05	1	800	1.76	.44	25:1	50:1	29.48
S-21390	10,000 ct	100 ct	25	1.0	1.0	.05	1	800	11	2.75	10:1	20:1	29.48
S-21395	10,000 ct	200 ct	50	1.0	1.0	.05	1	800	22	5.5	7.07:1	14.14:1	29.48
S-21400	10,000 ct	500 ct	125	1.0	1.0	.05	1	800	55	13.75	4.47:1	8.94:1	29.48
S-21405	10,000 ct	600 ct	150	1.0	1.0	.05	1	800	66	16.5	4.08:1	8.16:1	29.48
S-21410	10,000 ct	1000 ct	250	1.0	1.0	.05	1	800	110	27.5	3.16:1	6.32:1	29.48
S-21415	10,000 ct	1200 ct	300	1.0	1.0	.05	1	800	132	33	2.89:1	5.77:1	29.48
S-21420	10,000 ct	1500 ct	375	1.0	1.0	.05	1	800	165	41.3	2.58:1	5.16:1	29.48
S-21425	10,000 ct	2000 ct	500	1.0	1.0	.05	1	800	220	55	2.24:1	4.47:1	29.48
S-21430	10,000 ct	5000 ct	1250	1.0	1.0	.05	1	800	550	138	1.41:1	1.83:1	29.48
S-21435	10,000 ct	7500 ct	1875	1.0	1.0	.05	1	800	825	206	1.16:1	2.31:1	29.48
S-21440	10,000 ct	10,000 ct	2500	1.0	1.0	.05	1	800	1100	275	1:1	2:1	29.48
S-21445	*10,000 ct	10,000 ct	–	1.0	1.0	.05	1	800	1100	–	1:1	–	31.87
S-21450	15,000 ct	400 ct	100	.65	.65	.05	.8	1200	44	11	6.12:1	12.25.1	29.48
S-21452	15,000 ct	500 ct	125	.65	.65	.05	.8	1200	55	13.8	5.48:1	10.95:1	29.48
S-21455	15,000 ct	600 ct	150	.65	.65	.05	.8	1200	66	16.5	5:1	10.:1	29.48
S-21460	15,000 ct	10,000 ct	2500	.65	.65	.05	.8	1200	1100	275	1.22:1	2.45:1	29.48
S-21465	*15,000 ct	15,000 ct	–	.65	.65	.05	.8	1200	1650	–	1:1		31.87
S-21470	15,000 ct	15,000 ct	3750	.65	.65	.05	.8	1200	1650	413	1:1	2:1	29.48
S-21475	16,000 ct	1000 ct	250	.62	.62	.05	.8	1280	110	27.5	4:1	8:1	29.48
S-21480	20,000 ct	500 ct	125	.5	.5	.05	.7	1600	55	13.8	6.32:1	12.65:1	31.87
S-21485	20,000 ct	600 ct	150	.5	.5	.05	.7	1600	66	16.5	5.77:1	11.55:1	31.87
S-21490	20,000 ct	800 ct	200	.5	.5	.05	.7	1600	88	22	5:1	10:1	31.87
S-21495	20,000 ct	1000 ct	250	.5	.5	.05	.7	1600	110	27.5	4.47:1	8.94:1	31.87
S-21500	20,000 ct	5000 ct	1250	.5	.5	.05	.7	1600	550	138	2:1	4:1	31.87
S-21505	20,000 ct	10,000 ct	2500	.5	.5	.05	.7	1600	1100	275	1:41:1	2.83:1	31.87
S-21510	*20,000 ct	20,000 ct	–	.5	.5	.05	.7	1600	2200	–	1:1	–	32.82
S-21515	25,000 ct	500 ct	125	.4	.4	.05	.6	2000	55	13.8	7.07:1	14.14:1	31.87
S-21520	25,000 ct	1000 ct	250	.4	.4	.05	.6	2000	110	27.5	5:1	10:1	31.87
S-21525	30,000 ct	50 ct	12.5	.33	.33	.05	.6	2400	5.5	1.38	24.5:1	49:1	32.83
S-21530	30,000 ct	1200 ct	300	.33	.33	.05	.6	2400	132	33	5:1	10:1	32.83
S-21532	30,000 ct	500 ct	125	.33	.33	.05	.6	2400	55	13.8	7.7:1	15.5:1	32.83
S-21534	30,000 ct	200 ct	50	.33	.33	.05	.6	2400	22	5.5	12.2:1	24.5:1	32.83
S-21535	30,000 ct	5000 ct	1250	.33	.33	.05	.6	2400	550	137.5	2.45:1	4.9:1	32.83
S-21540	30,000 ct	10,000 ct	2500	.33	.33	.05	.6	2400	1100	275	1.73:1	3.46:1	32.83
S-21545	*30,000 ct	30,000 ct	–	.33	.33	.05	.6	2400	3300	–	1:1	–	35.29
S-21550	40,000 ct	400 ct	100	.25	.25	.05	.5	3200	44	11	10:1	20:1	35.29
S-21555	40,000 ct	2000 ct	500	.25	.25	.05	.5	3200	220	55	4.47:1	8.94:1	35.29
S-21560	40,000 ct	4000 ct	1000	.25	.25	.05	.5	3200	440	110	3.16:1	6.32:1	35.29
S-21565	40,000 ct	20,000 ct	5000	.25	.25	.05	.5	3200	2200	550	1.41:1	2.83:1	35.29
S-21570	*40,000 ct	40,000 ct	–	.25	.25	.05	.5	3200	4400	–	1:1	–	39.29
S-21575	50,000 ct	200 ct	50	.2	.2	.05	.4	4000	22	5.5	15.8:1	31.6:1	39.29
S-21577	50,000 ct	500 ct	125	.2	.2	.05	.4	4000	55	13.8	10:1	20:1	39.29
S-21578	50,000 ct	600 ct	150	.2	.2	.05	.4	4000	66	16.5	9.13:1	18.26:1	39.29
S-21579	50,000 ct	50,000 ct	12,500	.2	.2	.05	.4	4000	5500	1380	1:1	2:1	39.29
S-21580	60,000 ct	15,000 ct	3750	.16	.16	.05	.4	4800	1650	413	2:1	4:1	39.65
S-21585	62,500 ct	50 ct	12.5	.16	.16	.05	.4	5000	5.5	1.38	35.4:1	70.7:1	39.65
S-21587	80,000 ct	15,000 ct	3750	.12	.12	.05	.3	6400	1650	413	2.3:1	4.6:1	39.65
S-21590	90,000 ct	10,000 ct	2500	.11	.11	.05	.3	7200	1100	275	3:1	6:1	44.54
S-21595	95,000 ct	15,000 ct	3750	.1	.1	.05	.3	7600	1650	413	2.5:1	5:1	44.54
S-21600	100,000 ct	60 ct	15	.1	.1	.05	.3	8000	6.6	1.65	40.8:1	81.6:1	44.54
S-21605	100,000 ct	100 ct	25	.1	.1	.05	.3	8000	11	2.75	31.6:1	63.2:1	44.54
S-21610	100,000 ct	500 ct	125	.1	.1	.05	.3	8000	55	13.8	14.1:1	28.3:1	44.54
S-21613	100,000 ct	1000 ct	250	.1	.1	.05	.3	8000	110	27.5	10:1	20:1	44.54
S-21614	100,000 ct	2000 ct	500	.1	.1.	.05	.3	8000	220	55	7.07:1	14.14:1	44.54
S-21615	100,000 ct	10,000 ct	2500	.1	.1	.05	.3	8000	1100	275	3.16:1	6.32:1	44.54
S-21620	135,000 ct	82 ct	20.5	.07	.07	.05	.2	10,800	9	2.25	40.6:1	81.2:1	46.54

*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

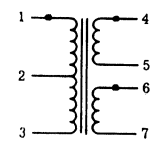
PICO's ultra-miniature transformers

S SERIES
Plug-In

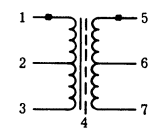
FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED.
- VARIATION OF STANDARD DESIGNS AVAILABLE
- PRIMARY AND SECONDARY WINDINGS CAN BE USED EITHER AS INPUT OR OUTPUT.
- SPECIAL PRODUCTION TECHNIQUES ENSURE UNIFORM SIZE AND LEADS WHICH ARE FREE OF ENCAPSULANT. NO MENISCUS IN LEAD AREA.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

SCHEMATIC FOR TRANSFORMERS WITH SPLIT SECONDARIES



SCHEMATIC FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



PICO Electronics, Inc.

143 Sparks Ave.,
Pelham, NY 10803-1837

FAX: 914-738-8225

Internet:
http://www.picoelectronics.com
E-Mail: ***HLSC73A@prodigy.com***

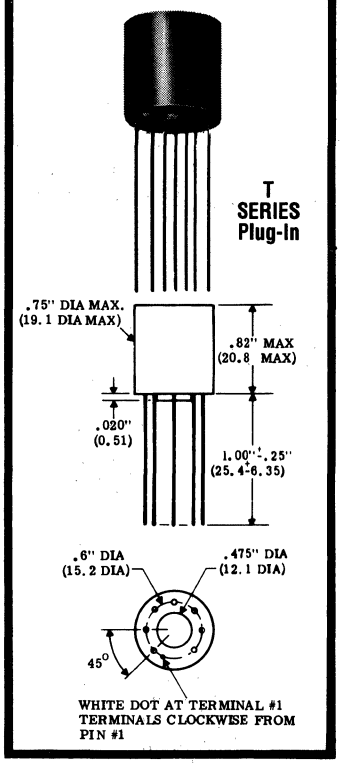
For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

Delivery— stock to one week

PICO's ultra-miniature transformers

For Surface Mount Versions of this Series see pgs. A•2268-A•2269



All dimensions are in inches, ( ) = MM

PICO PART NUMBER T-Series Plug-In	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS PAR	POWER WATTS 1KHz and higher	POWER WATTS 300 Hz and higher	POWER WATTS 20 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	SECONDARY DC RESISTANCE OHMS PAR CONN	TURNS RATIO PRIME/SEC SEC SER CONN	TURNS RATIO PRIME/SEC SEC PAR CONN	PICO PRICES 1-9 *** T-Series
T-22003	20 ct	8 ct	2	3.0	2.0	.006	22	1.6	.8	.2	1.58:1	3.16:1	29.23
T-22005	20 ct	20 ct	5	3.0	2.0	.006	22	1.6	2	.5	1:1	2:1	29.23
T-22010	32 ct	32 ct	8	3.0	2.0	.006	17.5	2.56	3.2	.8	1:1	2:1	29.23
T-22015	40 ct	40 ct	10	3.0	2.0	.006	16	3.2	4	1	1:1	2:1	29.23
T-22018	48 ct	16 ct	4	3.0	2.0	.006	14.5	3.84	1.6	.4	1.73:1	3.46:1	29.23
T-22020	50 ct	50 ct	12.5	3.0	2.0	.006	14	4	5	1.25	1:1	2:1	29.23
T-22025	80 ct	32 ct	8	3.0	2.0	.006	11	6.4	3.2	.8	1.58:1	3.16:1	29.23
T-22028	100 ct	40 ct	10	3.0	2.0	.006	10	8	4	1	1.58:1	3.16:1	29.23
T-22030	100 ct	100 ct	25	3.0	2.0	.006	10	8	10	2.5	1:1	2:1	29.23
T-22035	120 ct	12.8 ct	3.2	3.0	2.0	.006	9	9.6	1.3	.32	3.06:1	26.12:1	29.23
T-22040	120 ct	60 ct	15	3.0	2.0	.006	9	9.6	6	1.5	1.41:1	2.83:1	29.23
T-22045	120 ct	120 ct	30	3.0	2.0	.006	9	9.6	12	3	1:1	2:1	29.23
T-22050	150 ct	12 ct	3	3.0	2.0	.006	8	12	1.2	.3	3.54:1	7.08:1	29.23
T-22055	150 ct	50 ct	12.5	3.0	2.0	.006	8	12	5	1.25	1.73:1	3.46:1	29.23
T-22060	150 ct	100 ct	25	3.0	2.0	.006	8	12	10	2.5	1.22:1	2.44:1	29.23
T-22065	150 ct	150 ct	37.5	3.0	2.0	.006	8	12	15	3.75	1:1	2:1	29.23
T-22070	150 ct	600 ct	150	3.0	2.0	.006	8	12	60	15	1:2	1:1	29.23
T-22075	200 ct	200 ct	50	3.0	2.0	.006	7	16	20	5	1:1	2:1	29.23
T-22080	300 ct	12 ct	3	3.0	2.0	.006	5.5	24	1.2	.3	5:1	10:1	29.23
T-22085	300 ct	50 ct	12.5	3.0	2.0	.006	5.5	24	5	1.25	2.45:1	4.9:1	29.23
T-22090	300 ct	150 ct	37.5	3.0	2.0	.006	5.5	24	15	3.75	1.41:1	2.83:1	29.23
T-22095	300 ct	300 ct	75	3.0	2.0	.006	5.5	24	30	7.5	1:1	2:1	29.23
T-22100	300 ct	600 ct	150	3.0	2.0	.006	5.5	24	60	15	1:1.41	1.41:1	29.23
T-22105	320 ct	12.8 ct	3.2	3.0	2.0	.006	5.5	25.6	1.3	.32	5:1	10:1	29.23
T-22110	400 ct	40 ct	10	3.0	2.0	.006	5	32	4	1	3.16:1	16.32:1	29.23
T-22115	400 ct	120 ct	30	3.0	2.0	.006	5	32	12	3	1.83:1	3.65:1	29.23
T-22120	400 ct	200 ct	50	3.0	2.0	.006	5	32	20	5	1.41:1	2.83:1	29.23
T-22125	400 ct	400 ct	100	3.0	2.0	.006	5	32	40	10	1:1	2:1	29.23
T-22130	400 ct	1000 ct	250	3.0	2.0	.006	5	32	100	25	1:1.58	1.26:1	29.23
T-22135	400 ct	2000 ct	500	3.0	2.0	.006	5	32	200	50	1:2.24	1:1.12	29.23
T22140	400 ct	4000 ct	1000	3.0	2.0	.006	5	32	400	100	1:3.16	1:1.58	29.23
T-22142	500 ct	12.8 ct	3.2	3.0	2.0	.006	4.5	40	1.3	.32	6.25:1	12.5:1	29.23
T-22144	500 ct	16 ct	4	3.0	2.0	.006	4.5	40	1.6	.4	5.6:1	11.2:1	29.23
T-22145	500 ct	50 ct	12.5	3.0	2.0	.006	4.5	40	5	1.25	3.16:1	6.32:1	29.23
T-22147	500 ct	150 ct	37.5	3.0	2.0	.006	4.5	40	15	3.75	1.83:1	3.65:1	29.23
T-22150	500 ct	500 ct	125	3.0	2.0	.006	4.5	40	50	12.5	1:1	2:1	29.23
T-22155	*500 ct	500 ct	–	3.0	2.0	.006	4.5	40	50	–	1:1	–	30.46
T-22160	500 ct	600 ct	150	3.0	2.0	.006	4.5	40	60	15	1:1.1	1.83:1	29.23
T-22165	600 ct	12.8 ct	3.2	3.0	2.0	.006	4	48	1.3	.32	6.85:1	13.7:1	29.23
T-22167	600 ct	30 ct	7.5	3.0	2.0	.006	4	48	3	.75	4.47:1	8.94:1	29.23
T-22170	600 ct	48 ct	12	3.0	2.0	.006	4	48	4.8	1.2	3.54:1	7.07:1	29.23
T-22175	600 ct	200 ct	50	3.0	2.0	.006	4	48	20	5	1.73:1	3.46:1	29.23
T-22180**	600 ct	600 ct	150	3.0	2.0	.006	4	48	60	15	1:1	2:1	29.23
T-22185**	*600 ct	600 ct	–	3.0	2.0	.006	4	48	60	–	1:1	–	30.46
T-22186**	*600 ct	900 ct	–	3.0	2.0	.006	4	48	90	–	1:1.22	–	30.46
T-22187**	600 ct	1200 ct	300	3.0	2.0	.006	4	48	120	30	1:1.41	1.41:1	29.23
T-22190	640 ct	12.8 ct	3.2	3.0	2.0	.006	4	51	1.3	.32	7.07:1	14.14:1	29.23
T-22195	700 ct	100 ct	25	3.0	2.0	.006	3.5	56	10	2.5	2.65:1	5.29:1	29.23
T-22200	800 ct	12.8 ct	3.2	3.0	2.0	.006	3.5	64	1.3	.32	7.91:1	15.8:1	29.23
T-22205	800 ct	48 ct	12	3.0	2.0	.006	3.5	64	4.8	1.2	4.08:1	8.16:1	29.23
T-22210	800 ct	800 ct	200	3.0	2.0	.006	3.5	64	80	20	1:1	2:1	29.23
T-22215	900 ct	600 ct	150	3.0	2.0	.006	3	72	60	15	1.22:1	2.45:1	29.23
T-22217**	*900 ct	900 ct	–	3.0	2.0	.006	3	72	90	–	1:1	–	30.46
T-22220	1000 ct	12 ct	3	3.0	2.0	.006	3	80	1.2	.3	9.13:1	18.26:1	29.23
T-22225	1000 ct	50 ct	12.5	3.0	2.0	.006	3	80	5	1.25	4.47:1	8.94:1	29.23
T-22230	1000 ct	1000 ct	250	3.0	2.0	.006	3	80	100	25	1:1	2:1	29.23
T-22235	1060 ct	12.8 ct	3.2	3.0	2.0	.006	3	85	1.3	.32	9.1:1	18.2:1	29.23
T-22240	1200 ct	12.8 ct	3.2	3.0	2.0	.006	3	96	1.3	.32	9.68:1	19.4:1	29.23
T-22245	1200 ct	500 ct	125	3.0	2.0	.006	3	96	50	12.5	1.55:1	3.1:1	29.23
T-22250	1200 ct	1200 ct	300	3.0	2.0	.006	3	96	120	30	1:1	2:1	29.23
T-22255	*1200 ct	1200 ct	–	3.0	2.0	.006	3	96	120	–	1:1	–	30.46
T-22260	1500 ct	12 ct	3	3.0	2.0	.006	2.5	120	1.2	.3	11.18:1	22.36:1	29.23
T-22265	1500 ct	500 ct	125	3.0	2.0	.006	2.5	120	50	12.5	1.73:1	3.46:1	29.23
T-22270	*1500 ct	600 ct	–	3.0	2.0	.006	2.5	120	60	–	1.58:1	–	30.46
T-22275	*1500 ct	1500 ct	–	3.0	2.0	.006	2.5	120	150	–	1:1	–	30.46
T-22280	1600 ct	12.8 ct	3.2	3.0	2.0	.006	2.5	128	1.3	.32	11.18:1	22.36:1	29.23
T-22283	2000 ct	8 ct	2	3.0	2.0	.006	2.2	160	.8	.2	15.8:1	31.6:1	29.23
T-22285	2000 ct	2000 ct	500	3.0	2.0	.006	2.2	160	200	50	1:1	2:1	29.23
T-22290	*2000 ct	2000 ct	–	3.0	2.0	.006	2.2	160	200	–	1:1	–	30.46
T-22295	2000 ct	8000 ct	2000	3.0	2.0	.006	2.2	160	800	200	1:2	1:1	29.23
T-22297	2500 ct	2500 ct	625	3.0	2.0	.006	2	200	250	63	1:1	2:1	29.23
T-22300	3000 ct	3000 ct	750	3.0	2.0	.006	1.8	240	300	75	1:1	2:1	29.23
T-22305	*3000 ct	3000 ct	–	3.0	2.0	.006	1.8	240	300	–	1:1	–	29.23

*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION
***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

SPECIFICATIONS

- **MIL-T-27:** All units manufactured to MIL-T-27, Audio Transformers are Type TF5S21ZZ
- **FREQUENCY RESPONSE:** ±3db, 20 Hz-25 KHz at 1.0 Milliwatt.
- **MAXIMUM DISTORTION:** 5% With Rated Power Level at 1 KHz and 300 Hz. 10% Distortion at 20 Hz.
- **DIELECTRIC STRENGTH:** All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:** Greater Than 10,000 Megohms at 300 V DC.
- **WEIGHT:** 28 Grams
- **OPERATING TEMPERATURE:** –55°C to +130°C
- **TERMINALS:** Solid .020 Diameter Conductor. Solderability per MIL-STD-202 Method 208.
- **THERMAL SHOCK:** 25 Cycles, Method 107, MIL-STD-202, Test Condition –55°C to +130°C

THIS PRODUCT IS PATENTED

Delivery— stock to one week

*For immediate engineering assistance or to place an order—**Call Toll Free 800-228-9747***

PICO PART NUMBER T-Series Plug-In	PRIMARY IMPEDANCE OHMS	SECONDARY IMPEDANCE OHMS SPLIT WINDINGS SER	PAR	POWER WATTS 1KHz and higher	300 Hz and higher	20 Hz and higher	PRIMARY UNBAL DC CURRENT ma	PRIMARY DC RESIST OHMS	SECONDARY DC RESISTANCE OHMS SER CONN	PAR CONN	TURNS RATIO PRIM/SEC SEC SER CONN	SEC PAR CONN	PICO PRICES 1-9 *** T-Series
T-22310	3600 ct	3600 ct	900	2.7	2.0	.006	1.7	288	360	90	1:1	2:1	29.23
T-22312	4000 ct	16 ct	4	2.5	2.0	.006	1.6	320	1.6	.4	15.8:1	31.6:1	29.23
T-22314**	4000 ct	600 ct	150	2.5	2.0	.006	1.6	320	60	15	2.58:1	5.16:1	29.23
T-22315	4000 ct	1000 ct	250	2.5	2.0	.006	1.6	320	100	25	2:1	4:1	29.23
T-22320	*4000 ct	8000 ct	–	2.5	2.0	.006	1.6	320	800	–	1:1.41	–	30.46
T-22325	5000 ct	500 ct	125	2.0	2.0	.006	1.4	400	50	12.5	3.16:1	6.32:1	29.32
T-22330	5000 ct	5000 ct	1250	2.0	2.0	.006	1.4	400	500	125	1:1	2:1	29.32
T-22335	7500 ct	50 ct	12.5	1.3	1.3	.006	1.2	600	5	1.25	12.25:1	24.5:1	32.42
T-22340	7500 ct	100 ct	25	1.3	1.3	.006	1.2	600	10	2.5	8.66:1	17.32:1	32.42
T-22345	7500 ct	600 ct	150	1.3	1.3	.006	1.2	600	60	15	3.54:1	7.07:1	32.42
T-22350	7500 ct	2500 ct	625	1.3	1.3	.006	1.2	600	250	63	1.73:1	3.46:1	32.42
T-22355	*7500 ct	7500 ct	–	1.3	1.3	.006	1.2	600	750	–	1:1	–	34.76
T-22360	8000 ct	12.8 ct	3.2	1.2	1.2	.006	1.1	640	1.3	.32	25:1	50:1	32.42
T-22365	8000 ct	1000 ct	250	1.2	1.2	.006	1.1	640	100	25	2.83:1	5.66:1	32.42
T-22370	*8000 ct	1200 ct	–	1.2	1.2	.006	1.1	640	120	–	2.58:1	–	34.76
T-22375	*9000 ct	9000 ct	–	1.1	1.1	.006	1.1	720	900	–	1:1	–	34.76
T-22380	10,000 ct	12.8 ct	3.2	1.0	1.0	.006	1	800	1.3	.32	28:1	56:1	32.42
T-22385	10,000 ct	16 ct	4	1.0	1.0	.006	1	800	1.6	.4	25:1	50:1	32.42
T-22390	10,000 ct	100 ct	25	1.0	1.0	.006	1	800	10	2.5	10:1	20:1	32.42
T-22395	10,000 ct	200 ct	50	1.0	1.0	.006	1	800	20	5	7.07:1	14.14:1	32.42
T-22400	10,000 ct	500 ct	125	1.0	1.0	.006	1	800	50	12.5	4.47:1	8.94:1	32.42
T-22405	10,000 ct	600 ct	150	1.0	1.0	.006	1	800	60	15	4.08:1	8.16:1	32.42
T-22410	10,000 ct	1000 ct	250	1.0	1.0	.006	1	800	100	25	3.16:1	6.32:1	32.42
T-22415	10,000 ct	1200 ct	300	1.0	1.0	.006	1	800	120	30	2.89:1	5.77:1	32.42
T-22420	10,000 ct	1500 ct	375	1.0	1.0	.006	1	800	150	38	2.58:1	5.16:1	32.42
T-22425	10,000 ct	2000 ct	500	1.0	1.0	.006	1	800	200	50	2.24:1	4.47:1	32.42
T-22430	10,000 ct	5000 ct	1250	1.0	1.0	.006	1	800	500	125	1.41:1	2.83:1	32.42
T-22435	10,000 ct	7500 ct	1875	1.0	1.0	.006	1	800	750	188	1.16:1	2.31:1	32.42
T-22440	10,000 ct	10,000 ct	2500	1.0	1.0	.006	1	800	1000	250	1:1	2:1	32.42
T-22445	*10,000 ct	10,000 ct	–	1.0	1.0	.006	1	800	1000	–	1:1	–	34.76
T-22450	15,000 ct	400 ct	100	.66	.66	.006	.8	1200	40	10	6.12:1	12.25:1	32.42
T-22452	15,000 ct	500 ct	125	.66	.66	.006	.8	1200	50	12.5	5.48:1	10.95:1	32.42
T-22455	15,000 ct	600 ct	150	.66	.66	.006	.8	1200	60	15	5:1	10:1	32.42
T-22460	15,000 ct	10,000 ct	2500	.66	.66	.006	.8	1200	1000	250	1.22:1	2.45:1	32.42
T-22465	*15,000 ct	15,000 ct	–	.66	.66	.006	.8	1200	1500	–	1:1	–	34.76
T-22470	15,000 ct	15,000 ct	3750	.66	.66	.006	.8	1200	1500	375	1:1	2:1	32.42
T-22475	16,000 ct	1000 ct	250	.62	.62	.006	.8	1280	100	25	4:1	8:1	32.42
T-22480	20,000 ct	500 ct	125	.5	.5	.006	.7	1600	50	12.5	6.32:1	12.6:1	34.76
T-22485	20,000 ct	600 ct	150	.5	.5	.006	.7	1600	60	15	5.77:1	11.55:1	34.76
T-22490	20,000 ct	800 ct	200	.5	.5	.006	.7	1600	80	20	5:1	10:1	34.76
T-22495	20,000 ct	1000 ct	250	.5	.5	.006	.7	1600	100	25	4.47:1	8.94:1	34.76
T-22500	20,000 ct	5000 ct	1250	.5	.5	.006	.7	1600	500	125	2:1	4:1	34.76
T-22505	20,000 ct	10,000 ct	2500	.5	.5	.006	.7	1600	1000	250	1.41:1	2.83:1	34.76
T-22510	*20,000 ct	20,000 ct	–	.5	.5	.006	.7	1600	2000	–	1:1	–	36.12
T-22515	25,000 ct	500 ct	125	.4	.4	.006	.6	2000	50	12.5	7.07:1	14.14:1	34.76
T-22520	25,000 ct	1000 ct	250	.4	.4	.006	.6	2000	100	25	5:1	10:1	34.76
T-22525	30,000 ct	50 ct	12.5	.33	.33	.006	.6	2400	5	1.25	24.5:1	49:1	36.12
T-22530	30,000 ct	1200 ct	300	.33	.33	.006	.6	2400	120	30	5:1	10:1	36.12
T-22532	30,000 ct	500 ct	125	.33	.33	.006	.6	2400	50	12.5	7.7:1	15.5:1	36.12
T-22534	30,000 ct	200 ct	50	.33	.33	.006	.6	2400	20	5	12.2:1	24.5:1	36.12
T-22535	30,000 ct	5000 ct	1250	.33	.33	.006	.6	2400	500	125	2.45:1	4.9:1	36.12
T-22540	30,000 ct	10,000 ct	2500	.33	.33	.006	.6	2400	1000	250	1.73:1	3.46:1	36.12
T-22545	*30,000 ct	30,000 ct	–	.33	.33	.006	.6	2400	3000	–	1:1	–	38.73
T-22550	40,000 ct	400 ct	100	.25	.25	.006	.5	3200	40	10	10:1	20:1	38.73
T-22555	40,000 ct	2000 ct	500	.25	.25	.006	.5	3200	200	50	4.47:1	8.94:1	38.73
T-22560	40,000 ct	4000 ct	1000	.25	.25	.006	.5	3200	400	100	3.16:1	6.32:1	38.73
T-22565	40,000 ct	20,000 ct	5000	.25	.25	.006	.5	3200	2000	500	1.41:1	2.83:1	38.73
T-22570	*40,000 ct	40,000 ct	–	.25	.25	.006	.5	3200	4000	–	1:1	–	43.19
T-22575	50,000 ct	200 ct	50	.2	.2	.006	.4	4000	20	5	15.8:1	31.6:1	43.19
T-22577	50,000 ct	500 ct	125	.2	.2	.006	.4	4000	50	12.5	10:1	20:1	43.19
T-22578	50,000 ct	600 ct	150	.2	.2	.006	.4	4000	60	15	9.13:1	18.26:1	43.19
T-22579	50,000 ct	50,000 ct	12,500	.2	.2	.006	.4	4000	5000	1250	1:1	2:1	43.19
T-22580	60,000 ct	15,000 ct	3750	.16	.16	.006	.4	4800	1500	375	2:1	4:1	46.64
T-22585	62,500 ct	50 ct	12.5	.16	.16	.006	.4	5000	5	1.25	35.4:1	70.7:1	46.64
T-22587	80,000 ct	15,000 ct	3750	.12	.12	.006	.3	6400	1500	375	2.3:1	4.6:1	46.64

*INCLUDES ELECTROSTATIC SHIELD
**MINIATURIZED TELEPHONE COUPLING APPLICATION
***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

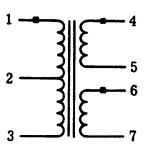
PICO's ultra-miniature transformers

T SERIES Plug-In

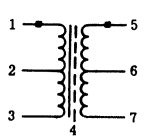
FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- PICO IS APPROVED QPL SOURCE (MIL-T-27)
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED.
- VARIATION OF STANDARD DESIGNS AVAILABLE
- PRIMARY AND SECONDARY WINDINGS CAN BE USED EITHER AS INPUT OR OUTPUT.
- SPECIAL PRODUCTION TECHNIQUES ENSURE UNIFORM SIZE AND LEADS WHICH ARE FREE OF ENCAPSULANT. NO MENISCUS IN LEAD AREA.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

SCHEMATIC FOR TRANSFORMERS WITH SPLIT SECONDARIES



SCHEMATIC FOR TRANSFORMERS WITH ELECTROSTATIC SHIELD



For immediate engineering assistance or to place an order—

Call Toll Free 800-228-9747

Delivery— stock to one week

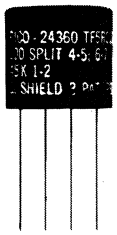
PICO Electronics, Inc.

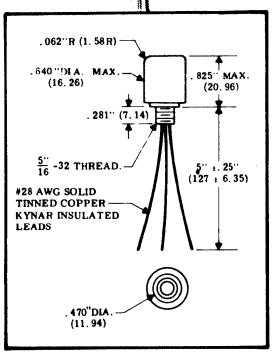
143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225

Internet: http://www.picoelectronics.com E-mail: HLSC73A@prodigy.com

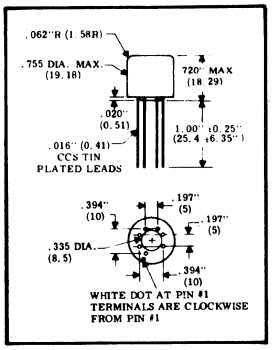
PICO Microphone/Transducer Audio Input Transformers

Used for Professional Sound Studios/Broadcast Mixing Consoles/Control and Instrument Amplifiers.





NOTE:
ALL DIMENSIONS ARE IN INCHES. ( ) = MM



NOTES:
ALL DIMENSIONS ARE IN INCHES. ( ) MM.
CCS-COPPER CLAD STEEL. TINNED 100% ELECTROPLATED PER MIL-T-10727A AND ASTM CCS B452.

- ***Large step-up ratios with flat frequency response over the entire audio range.***
- ***Gapless laminations provide wide bandwidth with extremely low distortion. Use of two magnetic shields made with extra thick mu-metal and gapless core provide negligible hum pick up. All units provided with electrostatic shield.***
- ***Your choice of two package styles, stud mounting with flying leads or low profile plug-in. Identical electrical performance regardless of package style.***
- ***Frequency response ±1 dB, 30 Hz – 15 kHz.***
- ***Low profile plug-in (24000 series) manufactured to MIL-T-27 (TF5R21ZZ).***
- ***Because of gapless laminations, unbalanced DC current should be avoided.***
- ***Typical distortion of 1% at power level of 0 dBm (1 Milliwatt), 30 Hz – 15 kHz. If the low frequency is raised, the power level for 1% distortion is as follows:***

50 Hz - 3 Milliwatts (4.7 dBm)
100 Hz - 10 Milliwatts (10 dBm)
300 Hz - 150 Milliwatts (21.7 dBm)

For immediate engineering assistance or to place an order—
Call Toll Free 800-228-9747

All units have two extra thick mu-metal shields.

Delivery-Stock to 1 week

Modification of standards 9 days!

THIS PRODUCT IS PATENTED

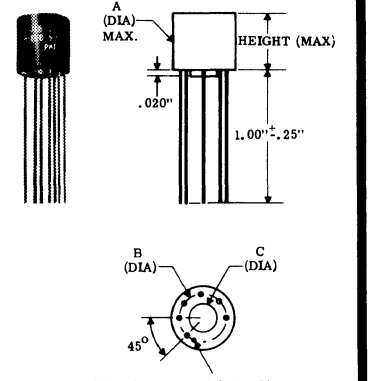
PART NUMBER		IMPEDANCE OHMS		TURNS RATIO PRIM/SEC		D.C. RESISTANCE			TYPICAL PRIM OPEN CIRCUIT IMPEDANCE AT 50 Hz	PRICES 1–9***	
COMMERCIAL STUD MOUNTING	MILITARY PLUG-IN	PRIM	SEC	PRIM SERIES CONN	PRIM PAR CONN	PRIM SERIES CONN	PRIM PAR CONN	SEC		COMMERCIAL STUD MOUNTING	MILITARY PLUG-IN
23120	24120	12.5	5K	1:20	–	4.6	–	1K	125	36.07	43.34
23140	24140	200	200	1:1	–	50	–	75	2K	34.13	39.81
23160	24160	200 ct/50 SPLIT	200	1:1	1:2	50	12.5	75	2K	33.64	40.92
23180	24180	200	2K	1:3.16	–	50	–	580	2K	34.13	39.81
23200	24200	200 ct/50 SPLIT	2K	1:3.16	1:6.33	50	12.5	580	2K	33.64	40.92
23220	24220	200	5K	1:5	–	50	–	1.45K	2K	34.05	39.81
23240	24240	200 ct/50 SPLIT	5K	1:5	1:10	50	12.5	1.45K	2K	34.05	44.65
23260	24260	200	10K	1:7.07	–	50	–	3.45K	2K	33.64	40.92
23280	24280	200 ct/50 SPLIT	10K	1:7.07	1:14.14	50	12.5	3.45K	2K	38.49	45.77
23300	24300	200	20K	1:10	–	85	–	4.75K	2K	35.01	42.24
23320	24320	200 ct/50 SPLIT	20K	1:10	1:20	85	21	4.75K	2K	39.81	47.08
23340	24340	200	45K	1:15	–	85	–	10.4 K	2K	41.65	48.17
23360	24360	200 ct/50 SPLIT	45K	1:15	1:30	85	21	10.4 K	2K	45.77	52.99
23380	24380	200	80K	1:20	–	115	–	13.5 K	2K	43.34	50.57
23400	24400	200 ct/50 SPLIT	80K	1:20	1:40	115	29	13.5 K	2K	48.17	55.40
23420	24420	600 ct	600	1:1	–	140	–	190	6K	33.64	40.92
23440	24440	600 ct/150 SPLIT	600	1:1	1:2	140	35	190	6K	41.65	43.34
23460	24460	600 ct/150 SPLIT	2.4K	1:2	1:4	140	35	575	6K	38.49	45.77
23480	24480	600 ct/150 SPLIT	6K	1:3.16	1:6.33	140	35	1.45 K	6K	40.94	46.02
23500	24500	600 ct/150 SPLIT	15K	1:5	1:10	140	35	3.9 K	6K	43.34	50.57
23520	24520	600 ct/150 SPLIT	30K	1:7.07	1:14.14	140	35	7.05 K	6K	45.77	52.99
23540	24540	600 ct/150 SPLIT	60K	1:10	1:20	199	50	11 K	6K	48.17	55.40
23560	24560	1.2K ct/300 SPLIT	1.2K	1:1	1:2	310	78	430	12K	36.07	43.34
23580	24580	1.2K ct/300 SPLIT	5K	1:2.04	1:4.08	310	78	1.4 K	12K	38.49	45.77
23600	24600	1.2K ct/300 SPLIT	12K	1:3.16	1:6.33	310	78	3.75 K	12K	40.94	46.02
23620	24620	1.2K ct/300 SPLIT	30K	1:5	1:10	475	119	8.45 K	12K	43.34	50.57
23640	24640	10K	10K	1:1	–	2.5 K	–	3.1 K	100K	34.13	39.81

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

PICO Electronics, Inc.
143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225
Internet: http://www.picoelectronics.com E-Mail: HLSC73A@prodigy.com

PICO's miniature 400 Hz transformers

For Surface Mount Versions of this Series see pg. A•2270

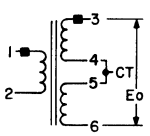


WHITE DOT AT TERMINAL #1
TERMINALS CLOCKWISE FROM PIN #1

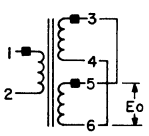
Case Size	Height (Max.)	A (Dia.) Max.	B (Dia.)	C (Dia.)	Terminal Dia.
L	.35	.51	.35	.218	.016 (.41)
N	.5	.51	.35	.218	.016 (.41)
R	.375	.75	.6	.475	.016 (.41)
S	.52	.75	.6	.475	.020 (.51)
T	.82	.75	.6	.475	.020 (.51)

FEATURES
- 400 Hz Aerospace Application
- Smallest Possible Size
- Printed Circuit Plug-In Construction
- Secondary Has Split Winding (Secondary can Be Used at Half Voltage Twice the Current.)

SPECIFICATIONS
- Manufactured to MIL-T-27 (TF5S03ZZ)
- 90°c Ambient
- Input Primary 115v-400 Hz ±20 Hz or 26V-400HZ-±20 Hz (Your Choice-Just Choose The Proper Part No.)
- Regulation is 24% (T Units Have Regulation of 17%)
- Secondary Voltage Adjusted to Nominal Value at Half Load.



SERIES CONNECTED SECONDARY



PARALLEL CONNECTED SECONDARY

This Product is Patented

115V/26V Primary
Printed Circuit Construction

SEC/ VOLT	SEC/ CURRENT ma	SIZE	MODEL NUMBER 115V PRIMARY	MODEL NUMBER 26V PRIMARY	PICO PRICES 1–9*
5.0 CT	75	L	L-8948	L-8951	32.19
	150	N	N-6948	N-6951	32.19
	204	R	R-20650	R-20815	47.54
	338	S	S-21650	S-21815	42.28
	480	T	T-22650	T-22815	44.09
6.3 CT	59.5	L	L-8947	L-8952	32.19
	119	N	N-6947	N-6952	32.19
	162	R	R-20655	R-20820	47.54
	268	S	S-21655	S-21820	42.28
	381	T	T-22655	T-22820	44.09
8.0 CT	47	L	L-8946	L-8953	32.19
	94	N	N-6946	N-6953	32.19
	128	R	R-20660	R-20825	47.54
	211	S	S-21660	S-21825	42.28
	300	T	T-22660	T-22825	44.09
10 CT	37.5	L	L-8945	L-8954	32.19
	75	N	N-6945	N-6954	32.19
	102	R	R-20665	R-20830	47.54
	169	S	S-21665	S-21830	42.28
	240	T	T-22665	T-22830	44.09
12.8 CT	29	L	L-8940	L-8956	32.19
	58.6	N	N-6940	N-6956	32.19
	79.7	R	R-20670	R-20835	47.54
	132	S	S-21670	S-21835	42.28
	188	T	T-22670	T-22835	44.09
14 CT	26.8	L	L-8937	L-8957	32.19
	53.6	N	N-6937	N-6957	32.19
	72.9	R	R-20675	R-20840	47.54
	121	S	S-21675	S-21840	42.28
	171	T	T-22675	T-22840	44.09
16 CT	23	L	L-8935	L-8958	32.19
	47	N	N-6935	N-6958	32.19
	63.8	R	R-20680	R-20845	47.54
	106	S	S-21680	S-21845	42.28
	150	T	T-22680	T-22845	44.091
18 CT	20.8	L	L-8934	L-8959	32.19
	41.7	N	N-6934	N-6959	32.19
	56.7	R	R-20685	R-20850	47.54
	93.9	S	S-21685	S-21850	42.28
	133	T	T-22685	T-22850	44.09
20 CT	18.8	L	L-8933	L-8961	32.19
	37.5	N	N-6933	N-6961	32.19
	51	R	R-20690	R-20855	47.54
	84.5	S	S-21690	S-21855	42.28
	120	T	T-22690	T-22855	44.09
22 CT	17	L	L-8932	L-8962	32.19
	34	N	N-6932	N-6962	32.19
	46.4	R	R-20695	R-20860	47.54
	76.8	S	S-21695	S-21860	42.28
	109	T	T-22695	T-22860	44.09
24 CT	15.5	L	L-8930	L-8963	32.19
	31	N	N-6930	N-6963	32.19
	42.5	R	R-20700	R-20865	47.54
	70.4	S	S-21700	S-21865	42.28
	100	T	T-22700	T-22865	44.09
28 CT	13.4	L	L-8929	L-8964	32.19
	26.8	N	N-6929	N-6964	32.19
	36.4	R	R-20705	R-20870	47.54
	60.4	S	S-21705	S-21870	42.28
	85.7	T	T-22705	T-22870	44.09
31 CT	12	L	L-8927	L-8966	32.19
	24	N	N-6927	N-6966	32.19
	32.9	R	R-20710	R-20875	47.54
	54.5	S	S-21710	S-21875	42.28
	77.4	T	T-22710	T-22875	44.09
36 CT	10.4	L	L-8925	L-8967	32.19
	20.8	N	N-6925	N-6967	32.19
	28.3	R	R-20715	R-20880	47.54
	46.9	S	S-21715	S-21880	42.28
	66.7	T	T-22715	T-22880	44.09
39 CT	9.6	L	L-8924	L-8968	32.19
	19.2	N	N-6924	N-6968	32.19
	26.2	R	R-20720	R-20885	47.54
	43.3	S	S-21720	S-21885	42.28
	61.5	T	T-22720	T-22885	44.09

SEC/ VOLT	SEC/ CURRENT ma	SIZE	MODEL NUMBER 115V PRIMARY	MODEL NUMBER 26V PRIMARY	PICO PRICES 1–9*
43 CT	8.7	L	L-8923	L-8969	32.19
	17.4	N	N-6923	N-6969	32.19
	23.7	R	R-20725	R-20890	47.54
	39.3	S	S-21725	S-21890	42.28
	55.8	T	T-22725	T-22890	44.09
48 CT	7.8	L	L-8922	L-8971	32.19
	15.6	N	N-6922	N-6971	32.19
	21.1	R	R-20730	R-20895	47.54
	35.2	S	S-21730	S-21895	42.28
	50	T	T-22730	T-22895	44.09
56 CT	6.6	L	L-8920	L-8972	32.19
	13.2	N	N-6920	N-6972	32.19
	18.2	R	R-20735	R-20900	47.54
	30.2	S	S-21735	S-21900	42.28
	42.9	T	T-22735	T-22900	44.09
63 CT	6	L	L-8917	L-8973	32.19
	11.9	N	N-6917	N-6973	32.19
	16.2	R	R-20740	R-20905	47.54
	26.9	S	S-21740	S-21905	42.28
	38.2	T	T-22740	T-22905	44.09
68 CT	5.5	L	L-8915	L-8974	32.19
	11	N	N-6915	N-6974	32.19
	15	R	R-20745	R-20910	47.54
	24.9	S	S-21745	S-21910	42.28
	35.3	T	T-22745	T-22910	44.09
80 CT	4.6	L	L-8910	L-8976	32.19
	9.4	N	N-6910	N-6976	32.19
	12.1	R	R-20750	R-20915	47.54
	21.1	S	S-21750	S-21915	42.28
	30	T	T-22750	T-22915	44.09
88 CT	4.2	L	L-8905	L-8977	32.19
	8.5	N	N-6905	N-6977	32.19
	11.6	R	R-20755	R-20920	47.54
	19.2	S	S-21755	S-21920	42.28
	27.3	T	T-22755	T-22920	44.09
100 CT	3.7	L	L-8902	L-8978	32.19
	8.5	N	N-6902	N-6978	32.19
	10.2	R	R-20760	R-20925	47.54
	16.9	S	S-21760	S-21925	42.28
	24	T	T-22760	T-22925	44.09
115 CT	3.2	L	L-8900	L-8979	32.19
	6.5	N	N-6900	N-6979	32.19
	8.9	R	R-20765	R-20930	47.54
	14.7	S	S-21765	S-21930	42.28
	20.9	T	T-22765	T-22930	44.09
123 CT	8.3	R	R-20770	R-20935	47.54
	13.7	S	S-21770	S-21935	42.28
	19.5	T	T-22770	T-22935	44.09
138 CT	7.4	R	R-20775	R-20940	47.54
	12.2	S	S-21775	S-21940	42.28
	17.4	T	T-22775	T-22940	44.09
157 CT	6.5	R	R-20780	R-20945	47.54
	10.8	S	S-21780	S-21945	42.28
	15.3	T	T-22780	T-22945	44.09
175 CT	5.8	R	R-20785	R-20950	47.54
	9.6	S	S-21785	S-21950	42.28
	13.7	T	T-22785	T-22950	44.09
200 CT	5.1	R	R-20790	R-20955	47.54
	8.4	S	S-21790	S-21955	42.28
	12	T	T-22790	T-22955	44.09
220 CT	7.7	S	S-21795	S-21960	44.43
	10.9	T	T-22795	T-22960	46.32
250 CT	6.8	S	S-21800	S-21965	46.54
	9.6	T	T-22800	T-22965	48.53
275 CT	6.1	S	S-21805	S-21970	48.85
	8.7	T	T-22805	T-22970	52.95
310 CT	5.4	S	S-21810	S-21975	50.79
	7.7	T	T-22810	T-22975	57.00

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

For immediate engineering assistance or to place an order—

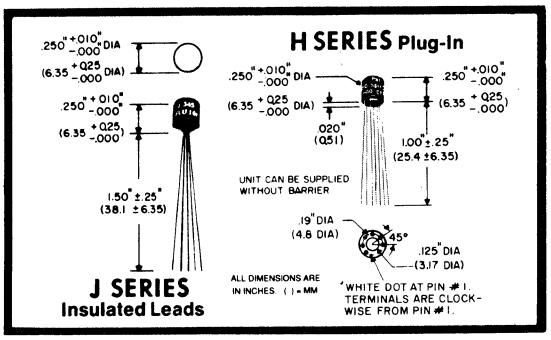
Call Toll Free 800-228-9747

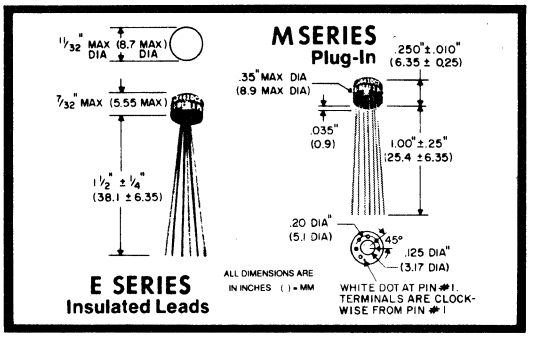
Delivery— stock to one week

PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225
Internet: http://www.picoelectronics.com E-mail: HLSC73A@prodigy.com

PICO's Ultra-Miniature PULSE Transformers





SPECIFICATIONS

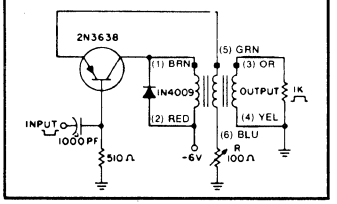
- **MIL-T021038:** All units manufactured to MIL T 21038
- **DIELECTRIC STRENGTH:** All Units Tested at 200 V RMS.
- **INSULATION RESISTANCE:** Greater Than 10,000 Megohms at 300 V DC.
- **WEIGHT:** 1.6 Grams
- **OPERATING TEMPERATURE:** −55°C to +130°C
- **TERMINALS:** Solid .012 Diameter Conductor. Solderability per MIL-STD-202 Method 208.
- **THERMAL SHOCK:** 25 Cycles, Method 107, MIL-STD-202, Test Condition −55°C to +130°C

THIS PRODUCT IS PATENTED

FEATURES

- EXTREME RESISTANCE TO THERMAL SHOCK
- ULTRA MINIATURE SIZE
- BUILT TO MIL-T-21038
- MAGNETIC SHIELDS AVAILABLE
- ELECTROSTATIC SHIELDING CAN BE ADDED
- VARIATION OF STANDARD DESIGNS AVAILABLE
- SPECIAL PRODUCTION TECHNIQUES ENSURE UNIFORM SIZE AND LEADS WHICH ARE FREE OF ENCAPSULANT. NO MENISCUS IN LEAD AREA.
- EVERY UNIT IN THIS CATALOG CAN BE MADE WITH A 300 THERMAL CYCLE GUARANTEE USING PICO'S SPECIAL SR CONSTRUCTION. CONTACT FACTORY FOR DETAILS.

BLOCKING OSCILLATOR TRANSISTOR TEST CIRCUIT



MILITARY DESIGNATION TP7SX4410CZ TURNS RATIO 4:4:1

PICO PART NUMBER		COUPLING CIRCUIT CHARACTERISTICS							BLOCKING OSCILLATOR CIRCUIT					PICO PRICES 1–9 *	
H-Series Plug-In	J-Series Insulated Leads	P Width µSec	Volt Out	Rise Time	% Over Shoot	Droop %	% Back Swing	Imp* in-out,	P Width µSec	Rise Time	% Over Shoot	Droop %	% Back Swing	H-Series	J-Series
H-5400	J-5600	0.05	0.2	0.01	0	0	20	50	0.05	0.01	0	0	35	22.94	20.44
H-5405	J-5605	0.1	0.5	0.015	0	0	20	50	0.1	0.012	0	0	25	22.94	20.44
H-5410	J-5610	0.2	1.2	0.02	0	0	20	100	0.2	0.02	0	0	15	22.94	20.44
H-5415	J-5615	0.5	1.5	0.023	0	5	25	100	0.5	0.023	0	5	15	22.94	20.44
H-5420	J-5620	1	1.5	0.025	0	20	28	100	1	0.03	0	10	15	22.94	20.44
H-5425	J-5625	2	1.5	0.028	0	15	23	100	2	0.035	0	10	15	22.94	20.44
H-5430	J-5630	3	1.5	0.030	0	15	28	100	3	0.04	0	10	15	22.94	20.44
H-5435	J-5635	5	2	0.035	0	20	20	200	5	0.040	0	15	15	22.94	20.44
H-5440	J-5640	10	2	0.05	0	25	25	200	10	0.060	0	15	10	22.94	20.44
H-5445	J-5645	15	2	0.06	0	25	18	200	15	0.07	0	15	15	22.94	20.44
H-5450	J-5650	25	3	0.1	0	30	30	500	25	0.08	0	15	15	22.94	20.44
H-5455	J-5655	50	3	0.3	0	20	20	500	50	0.2	0	10	5	22.94	20.44
H-5460	J-5660	100	6	0.4	0	15	18	500	100	0.35	0	10	15	22.94	20.44

Coupling circuit measurements made with (1) BRN—(2) RED as input and (3) OR—(4) YEL as output. (5) GRN—(6) BLU winding is open: Input Voltage = 1 V

PICO PART NUMBER		COUPLING CIRCUIT CHARACTERISTICS								BLOCKING OSCILLATOR CIRCUIT					D. C. RESISTANCE			PICO PRICES 1–9 *	
E-Series Insulated Leads	M-Series Plug-In	P. WIDTH µSEC.	VOLT OUT	RISE TIME µSEC.	% OVER SHOOT	DROOP %	% BACK SWING	IMP IN/OUT	FREQ RESP. WITHIN 3 DB	P. WIDTH µSEC.	RISE TIME µSEC.	% OVER SHOOT	DROOP %	% BACK SWING	4 TNS BRN RED	4 TNS OR YEL	1 TURN GRN BLU	E-Series	M-Series
E5020	M5300	0.05	10	0.018	0	0	10	50	150 KHz-30 MHz	0.05	0.02	0	0	35	0.21	0.23	0.13	15.87	17.66
E5040	M5305	0.1	10	0.02	0	0	5	50	100 KHz-17 MHz	0.1	0.025	0	0	25	0.47	0.56	0.17	15.87	17.66
E5060	M5310	0.2	8	0.035	0	0	5	100	16 KHz-10 MHz	0.2	0.030	0	0	15	1.0	1.25	0.37	15.87	17.66
E5080	M5315	0.5	8	0.06	0	0	0	100	7 KHz-3.3 MHz	0.5	0.05	0	0	15	1.5	1.80	0.54	15.87	17.66
E5100	M5320	1	8	0.15	0	0	5	100	7 KHz-2.3 MHz	1	0.08	0	0	15	2.5	3.1	0.9	15.87	17.66
E5120	M5325	2	8	0.17	0	0	10	100	2.2 KHz-1.3 MHz	2	0.10	0	0	15	3.0	3.7	1.1	15.87	17.66
E5140	M5330	3	8	0.20	0	0	10	100	1.7 KHz-1.5 MHz	3	0.20	0	0	15	4.9	6.0	1.8	15.87	17.66
E5160	M5335	5	8	0.20	0	15	25	200	1.8 KHz-1.5 MHz	5	0.30	0	0	3	8.0	9.7	2.9	15.87	17.66
E5180	M5340	10	8	0.4	0	15	20	200	1.5 KHz-1.2 MHz	10	0.35	0	5	10	13.0	15.8	4.7	15.87	17.66

MILITARY DESIGNATION TP7SX5310CZ TURNS RATIO 5:3:1

															5 TURNS	3 TURNS	1 TURN		
E5200	M5345	0.1	8	0.01	0	0	5	140/50	170 KHz-32 MHz	0.1	0.01	0	0	20	0.55	0.40	0.15	15.93	17.66
E5220	M5350	1	8	0.05	0	6	10	280/100	12.5 KHz-3.3MHz	1	0.02	5	5	5	3.0	2.2	0.9	15.93	17.66
E5240	M5355	5	8	0.09	0	12	25	560/200	15 KHz-4 MHz	5	0.05	0	10	10	9.5	7.0	2.6	15.93	17.66

PICO Electronics, Inc.
143 Sparks Ave.,
Pelham, NY 10803-1837
FAX: 914-738-8225
Internet:
http://www.picoelectronics.com
E-Mail: ***HLSC73A@prodigy.com***
Call Toll Free 800-228-9747

MILITARY DESIGNATION TP7SX4440CZ TURNS RATIO 4:4:4

PICO PART NUMBER		COUPLING CIRCUIT CHARACTERISTICS											PICO PRICES 1–9 *	
E-Series Insulated Leads	M-Series Plug-In	P. WIDTH µSEC.	VOLT OUT	RISE TIME µSEC.	% OVER SHOOT	DROOP %	% BACK SWING	IMP IN/OUT	FREQ RESP. WITHIN 3 DB	4 TNS BRN RED	4 TNS OR YEL	4 TURNS GRN BLU	E-Series	M-Series
E5181	M-5356	0.05	10	0.018	0	0	10	50	150 KHz-30 MHz	0.21	0.23	0.25	17.66	17.66
E5182	M-5357	0.1	10	0.02	0	0	5	50	100 KHz-17 MHz	0.47	0.56	0.67	17.66	17.66
E5183	M-5358	0.2	8	0.035	0	0	5	100	16 KHz-10 MHz	1.0	1.25	1.56	17.66	17.66
E5184	M-5359	0.5	8	0.06	0	0	0	100	7 KHz-3.3 MHz	1.5	1.80	2.2	17.66	17.66
E5185	M-5360	1	8	0.15	0	0	5	100	7 KHz-2.3 MHz	2.5	3.1	3.9	17.66	17.66
E5186	M-5361	2	8	0.17	0	0	10	100	2.2 KHz-1.3 MHz	3.0	3.7	4.6	17.66	17.66
E5187	M-5362	3	8	0.20	0	0	10	100	1.7 KHz-1.5 MHz	4.9	6.0	7.4	17.66	17.66
E5188	M-5363	5	8	0.20	0	15	25	200	1.8 KHz-1.5 MHz	8.0	9.7	11.8	17.66	17.66
E5189	M-5364	10	8	0.4	0	15	20	200	1.5 KHz-1.2 MHz	13.0	15.8	19.2	17.66	17.66

Coupling circuit measurements made with (1) BRN—(2) RED as input and (3) OR—(4) YEL as output, (5) GRN—(6) BLU winding is open: Input Voltage = 1 V

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

PICO's Pulse Transformers

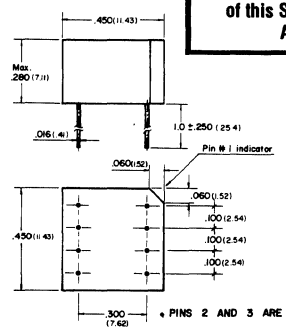
Plug-In

SPECIFICATIONS

- Units manufactured to MIL-T-21038 TP7SXNNNNK2
- **DIELECTRIC STRENGTH:** ..... All Units Tested at 500 V RMS.
- **INSULATION RESISTANCE:** ... Greater Than 10,000 Megohms at 700 V DC.
- **THERMAL SHOCK:** ..... 25 Cycles, Method 107, MIL-STD-202, Test Condition –55°C to +130°C
- **OPERATING TEMPERATURE:** –55°c to +130°c).
- **TERMINALS:** ..... Solid .016 Diameter Conductor. Solderability per MIL-STD-202 Method 208.
- **WEIGHT SIZE:** 1-2.5 Grams, 2-4.5 Grams, 3-8.0 Grams

For Surface Mount Versions of this Series see pg. A•2271

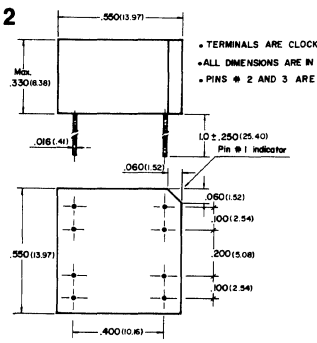
SIZE 1



• TERMINALS ARE CLOCKWISE FROM PIN # 1.
• ALL DIMENSIONS ARE IN INCHES, ( ) = MM.

BOTTOM VIEW

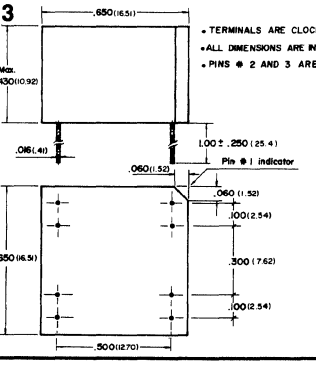
SIZE 2



• TERMINALS ARE CLOCKWISE FROM PIN # 1
• ALL DIMENSIONS ARE IN INCHES, ( ) = MM
• PINS # 2 AND 3 ARE DUMMY PINS.

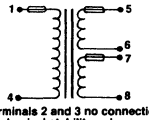
BOTTOM VIEW

SIZE 3



• TERMINALS ARE CLOCKWISE FROM PIN # 1
• ALL DIMENSIONS ARE IN INCHES, ( ) = MM
• PINS # 2 AND 3 ARE DUMMY PINS.

BOTTOM VIEW



Terminals 2 and 3 no connection mechanical stability only

THIS PRODUCT IS PATENTED

Delivery— stock to one week

SIZE 1

PICO PART # PLUG-IN	TURNS RATIO TOLER. ±5%	Lm TYPICAL µH	LEAKAGE IND. VALUE IN µH TYPICAL L (N1-N2)	LEAKAGE IND. VALUE IN µH TYPICAL LL (N1-N3)	WINDING RESISTANCE MAX VALUE IN OHMS R(N1)	R(N2)	R(N3)	TYPICAL INTER-WINDING CAP VALUE IN pF C1 (N1-N2)	C2 (N1-N3)	E.T. RATING VOLT-µsec MIN. PRIMARY	PRICE (1-9)
74005	1:1:1	150	.100	.250	.070	.080	.085	25	12	10	18.30
74010	1:1:1	600	.400	1.1	.15	.18	.21	25	12	20	18.30
74015	1:1:1	1300	.900	2.5	.45	.51	.58	25	12	30	18.30
74020	1:1:1	2400	1.6	4.2	1.14	1.27	1.39	25	12	40	18.30
74025	1:1:1	3700	3.0	6.5	2.0	2.3	2.5	25	12	50	18.30
74030	2:1:1	150	.250	.450	.062	.014	.014	25	12	10	18.30
74035	2:1:1	600	1.0	1.5	.15	.074	.087	25	12	20	18.30
74040	2:1:1	1300	1.5	3.5	.45	.10	.13	25	12	30	18.30
74045	2:1:1	2400	2.2	6.0	1.14	.17	.20	25	12	40	18.30
74050	2:1:1	3700	3.4	9.0	2.07	.29	.32	25	12	50	18.30
74055	3:1:1	200	.617	1.0	.081	.018	.018	25	12	12	18.30
74060	3:1:1	800	1.2	1.5	.18	.035	.040	25	12	24	18.30
74065	3:1:1	1800	2.5	5.0	.37	.15	.16	25	12	36	18.30
74070	3:1:1	3200	4.5	10.0	.62	.25	.28	25	12	48	18.30
74075	3:1:1	5300	7.0	15.0	1.28	.25	.28	25	12	60	18.30
74080	3:3:1	200	200	1.0	.082	.096	.025	25	12	12	18.30
74085	3:3:1	800	1.0	1.5	.18	.22	.042	25	12	24	18.30
74090	3:3:1	1800	2.5	5.0	.58	.73	.28	25	12	36	18.30
74095	3:3:1	3200	4.5	10.0	.95	1.18	.55	25	12	48	18.30
74100	3:3:1	5300	7.0	15.0	1.56	1.78	.69	25	12	60	18.30
74105	4:2:1	200	506	2.0	047	-024	019	25	12	12	18.30
74110	4:2:1	800	1.5	3.0	.18	.071	041	25	12	24	18.30
74115	4:2:1	1800	3.0	5.5	.46	.28	-16	25	12	36	18.30
74120	4:2:1	3200	5.5	10.0	.77	.46	.25	25	12	48	18.30
74125	4:2:1	5300	8.0	15.0	1.25	.72	.40	25	12	60	18.30

SIZE 2

PICO PART # PLUG-IN	TURNS RATIO TOLER. ±5%	Lm TYPICAL µH	LEAKAGE IND. VALUE IN µH TYPICAL L (N1-N2)	LEAKAGE IND. VALUE IN µH TYPICAL LL (N1-N3)	WINDING RESISTANCE MAX VALUE IN OHMS R(N1)	R(N2)	R(N3)	TYPICAL INTER-WINDING CAP VALUE IN pF C1 (N1-N2)	C2 (N1-N3)	E.T. RATING VOLT-µsec MIN. PRIMARY	PRICE (1-9)
74210	1:1:1	250	.350	.712	.038	.046	.048	35	18	16	18.30
74215	1:1:1	1000	.650	1.2	.12	.15	.17	35	18	32	18.30
74220	1:1:1	2250	1.5	3.0	.28	.32	.37	35	18	48	18.30
74225	1:1:1	4000	2.5	5.0	.59	.66	.74	35	18	65	18.30
74230	1:1:1	6200	4.0	8.0	1.27	1.48	1.56	35	18	80	18.30
74235	2:1:1	250	400	815	.038	.014	.015	35	18	16	18.30
74240	2:1:1	1000	800	1.6	.12	.044	.049	35	18	32	18.30
74245	2:1:1	2250	1.8	3.6	.28	.11	.13	35	18	48	18.30
74250	2:1:1	4000	3.2	6.4	.59	.17	.20	35	18	65	18.30
74255	2:1:1	6200	5.0	10.0	1.26	.29	.31	35	18	80	18.30
74260	3:1:1	350	400	900	.036	.017	.023	35	18	19	18.30
74265	3:1:1	1400	1.1	2.2	.15	.035	.039	35	18	38	18.30
74270	3:1:1	3000	2.4	5.0	.42	.062	.068	35	18	57	18.30
74275	3:1:1	5500	4.2	8.0	.75	.23	.24	35	18	76	18.30
74280	3:1:1	9000	6.5	10.0	1.02	.39	.41	35	18	95	18.30
74285	3:3:1	350	450	1.0	.063	.068	.049	35	18	19	18.30
74290	3:3:1	1400	1.2	2.6	.15	.17	.065	35	18	38	18.30
74295	3:3:1	3000	2.5	5.0	.42	.48	089	35	18	57	18.30
74300	3:3:1	5500	4.5	9.0	.94	1.14	.43	35	18	76	18.30
74305	3:3:1	9000	7.0	14.0	1.54	1.74	.64	35	18	95	18.30
74310	4:2:1	350	700	1.64	.040	.023	.014	35	18	19	18.30
74315	4:2:1	1400	1.3	2.7	.12	.067	.035	35	18	38	18.30
74320	4:2:1	3000	2.7	5.5	.42	.12	.070	35	18	57	18.30
74325	4:2:1	5500	4.8	9.0	.94	.27	.15	35	18	76	18.30
74330	4:2:1	9000	7.5	15.0	1.53	.35	.19	35	18	95	18.30

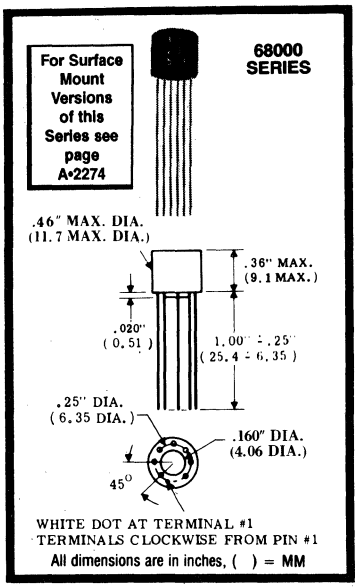
SIZE 3

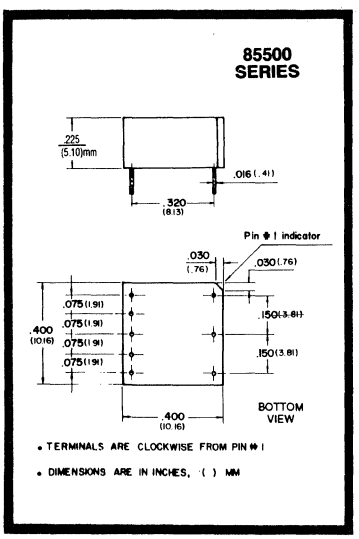
PICO PART # PLUG-IN	TURNS RATIO TOLER. ±5%	Lm TYPICAL µH	LEAKAGE IND. VALUE IN µH TYPICAL L (N1-N2)	LEAKAGE IND. VALUE IN µH TYPICAL LL (N1-N3)	WINDING RESISTANCE MAX VALUE IN OHMS R(N1)	R(N2)	R(N3)	TYPICAL INTER-WINDING CAP VALUE IN pF C1 (N1-N2)	C2 (N1-N3)	E.T. RATING VOLT-µsec MIN. PRIMARY	PRICE (1-9)
74515	1:1:1	300	.300	.400	.044	.048	.054	45	25	25	18.30
74520	1:1:1	1200	1.25	1.9	.095	.11	.13	45	25	50	18.30
74525	1:1:1	2700	1.75	4.2	.22	.26	.29	45	25	75	18.30
74530	1:1:1	4800	3.0	7.3	.46	.52	.59	45	25	100	18.30
74535	1:1:1	7500	4.6	11.4	.81	.90	.99	45	25	125	18.30
74540	2:1:1	300	.514	.630	.044	.013	.017	45	25	25	18.30
74545	2:1:1	1200	.900	1.7	.095	.043	.047	45	25	50	18.30
74550	2:1:1	2700	2.0	3.7	.22	.10	.12	45	25	75	18.30
74555	2:1:1	4800	3.0	6.5	.46	.17	.19	45	25	100	18.30
74560	2:1:1	7500	4.88	10.0	.80	.28	.34	45	25	125	18.30
74565	3:1:1	400	.686	.800	.049	.011	.011	45	25	30	18.30
74570	3:1:1	1600	1.25	3.0	.12	.035	.038	45	25	60	18.30
74575	3:1:1	3600	2.75	6.5	.33	.062	.068	45	25	90	18.30
74580	3:1:1	6400	4.6	1.20	.58	.14	.15	45	25	120	18.30
74585	3:1:1	10000	7.2	18.0	1.25	.13	.15	45	25	150	18.30
74590	3:3:1	400	.400	1.02	.062	.072	.012	45	25	30	18.30
74595	3:3:1	1600	1.25	1.5	.12	.14	.040	45	25	60	18.30
74600	3:3:1	3600	3.0	2.9	.33	.38	.070	45	25	90	18.30
74605	3:3:1	6400	5.3	5.0	.58	.73	.18	45	25	120	18.30
74610	3:3:1	10000	8.2	7.8	1.35	1.40	.20	45	25	150	18.30
74615	4:2:1	400	.580	1.12	.054	.016	.009	45	25	30	18.30
74620	4:2:1	1600	1.2	3.0	.12	.052	.028	45	25	60	18.30
74625	4:2:1	3600	2.75	7.0	.33	.15	.084	45	25	90	18.30
74630	4:2:1	6400	4.6	12.0	.58	.14	.080	45	25	120	18.30
74635	4:2:1	10000	7.1	19.6	1.22	.27	.15	45	25	150	18.30

*For immediate engineering assistance or to place an order—**Call Toll Free 800-228-9747***

PICO Electronics, Inc.
143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225
Internet: http://www.picoelectronics.com E-Mail: HLSC73A@prodigy.com

MIL-STD-1553 Interface Transformers Multiplex Data BUS Pulse Transformers

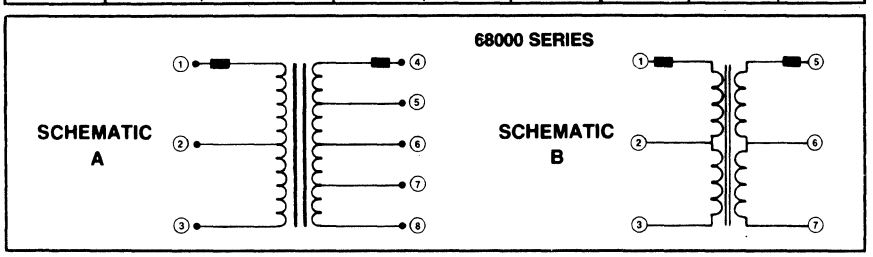


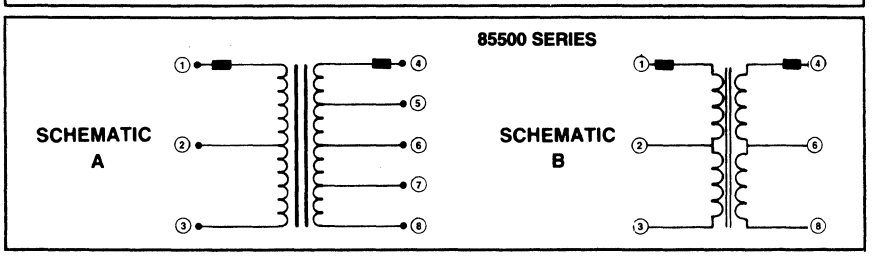


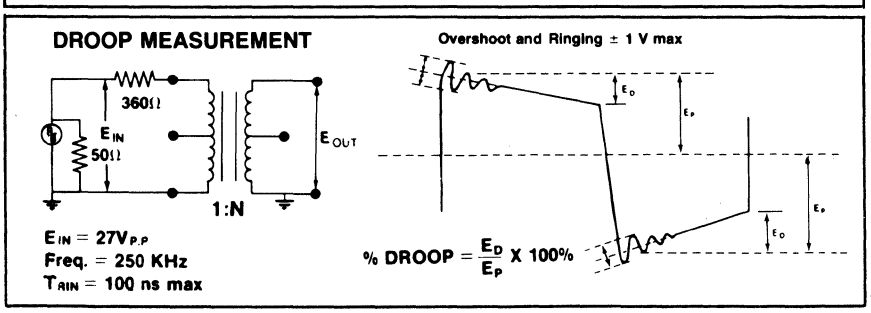
These pulse transformers manufactured to MIL-STD-1553 COMMAND/RESPONSE MULTIPLEX DATA BUS requirements. They also are manufactured to MIL-T-21038 specifications and are designed to meet MAC AIR SPECIFICATIONS A3818, A5690, A5232 and A4905.

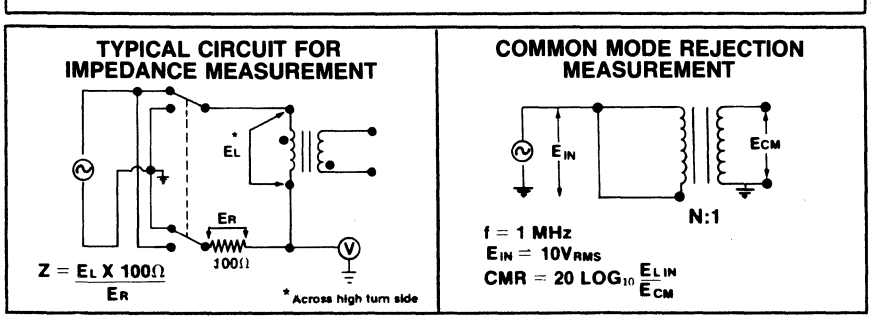
All of these transformers exhibit superior electrical performance. Common mode rejection ratio is greater than 45dB at 1 MHz. Input impedance is greater than 3000 ohms over the band from 75 kHz to 1mHz at 1V rms. This series possesses exceptional waveform integrity: Rise time and fall time is less than 100 nanoseconds. Overshoot and ringing is less than ± 1V peak. Droop is less than 20%.

PICO PART NUMBER 68000 Series	PICO PART NUMBER 85500 Series	TURNS RATIO	PRIMARY	SECONDARY	% DROOP (Typical)	CMR dB (Typical)	SCHEMATIC	PRICE (1–9)
68010	85510	1CT : 1CT 1CT : .707CT	1–3 1–3	4–8 5–7	10	50	A	33.67
68020	85520	1.4CT : 1CT 2CT : 1CT	1–3 1–3	4–8 5–7	10	50	A	33.67
68030	85530	1.25CT : 1CT 1.66CT : 1CT	1–3 1–3	4–8 5–7	10	50	A	33.67
68040	85540	2.3CT : 1CT 3.2CT : 1 CT	1–3 1–3	4–8 5–7	10	50	A	33.67
68050	85550	1CT : 1CT	1–3	5–7 | 4–8	10	50	B	27.76
68060	85560	1CT : 1.41CT	1–3	5–7 | 4–8	10	50	B	27.76
68070	85570	1CT : 1.66CT	1–3	5–7 | 4–8	10	50	B	27.76
68080	85580	1CT : 2CT	1–3	5–7 | 4–8	10	50	B	27.76









SPECIFICATIONS:

- Units manufactured to MIL-T-21038 and MIL STD 1553
- IMPEDANCE ..... greater than 3KΩ over the band from 75kHz to 1MHz
- DROOP ..... 20% max.
- OVERSHOOT ..... 1V peak
- COMMON MODE REJECTION (CMR) greater than 45dB.
- DIELECTRIC STRENGTH: ..... All Units Tested at 200 V RMS.
- INSULATION RESISTANCE ..... Greater Than 10,000 Megohms at 300 V DC.
- WEIGHT: ... 4 Grams.
- OPERATING TEMPERATURE: ..... -55°C to +130°C
- TERMINALS: ..... Solid .012 Diameter Conductor. Meet solderability per MIL- STD-202 Method 208

*For immediate engineering assistance or to place an order—**Call Toll Free 800-228-9747***

PICO Electronics, Inc.

143 Sparks Ave., Pelham, NY 10803-1837 • FAX: 914-738-8225

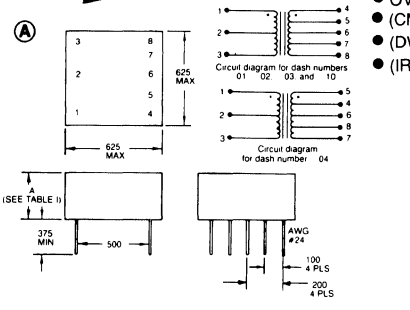
Internet: http://www.picoelectronics.com E-Mail: HLSC73A@prodigy.com

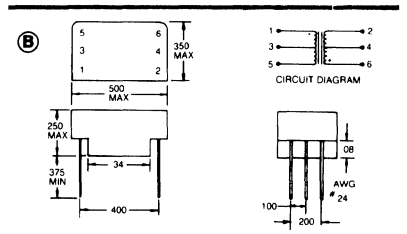
For Surface Mount ELECTRICAL EQUIVALENTS see pg. A•2275

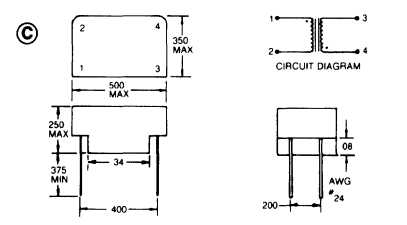
- These units are in strict compliance to MIL-T-21038/27C, type TP7SXNNNNKZ
- IMPEDANCE ..... Minimum value shown in table. These values will be met from 75 kHz to 1MHz over temp. range of −55°C to +130°C
- DROOP ..... 20% max.
- OVERSHOOT ..... 1V peak
- (CMR) ..... 45dB minimum
- (DWV) ..... 100 VRMS
- (IR) ... 1K meghoms min. at 100 VDC

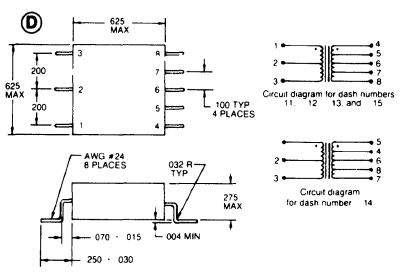
QPL Standards

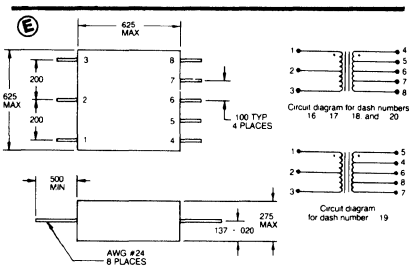
Units Meet MIL-T-21038/27, Type TP7SXNNNNKZ

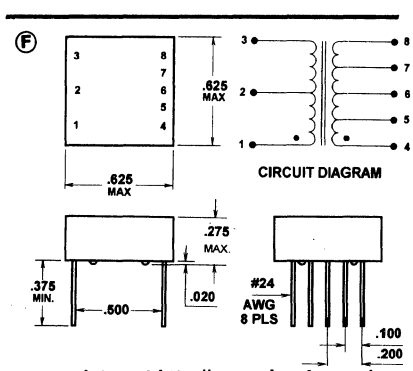












PICO PART NUMBER	MILITARY DESIGNATION MIL-T-21038/27C	TURNS RATIO	PRIMARY	SECONDARY	DC RESISTANCE OHMS (MAX)	IMPEDANCE OHMS (MIN)	CONFIGURATION	"A" MAX	PICO* PRICE 1-4
68201	-01	1:1 ±3% 1:.707 ±3%	1-3 1-3	4-8 5-7	1-3 3.0 4-8 3.0	(1-3) 4,000	A	.300	46.15
68206	-02	1.4:1 ±3% 2:1 ±3%	1-3 1-3	4-8 5-7	1-3 3.5 4-8 3.0	(1-3) 7,200	A	.250	50.76
68211	-03	1.25:1 ±3% 1.66:1 ±3%	1-3 1-3	4-8 5-7	1-3 3.2 4-8 3.0	(1-3) 4,000	A	.250	48.23
68216	-04	2.3:1 ±3% 3.2:1 ±3%	4-8 5-7	1-3 1-3	1-3 1.2 4-8 3.0	(5-7) 3,000	A	.300	46.15
68221	-05	1:1.41 ±3%	1-2	3-4	1-2 2.2 3-4 2.7	(3-4) 3,000	C	---	33.69
68226	-06	1:1 ±3%	1-5	2-6	1-5 2.5 2-6 2.8	(1-5) 3,000	B	---	33.69
68231	-07	1:1.41 ±3%	1-5	2-6	1-5 2.2 2-6 2.7	(2-6) 3,000	B	---	33.69
68235	-08	1:1.66 ±3%	1-5	2-6	1-5 1.5 2-6 2.4	(2-6) 3,000	B	---	33.69
68241	-09	1:2 ±3%	1-5	2-6	1-5 1.3 2-6 2.6	(2-6) 3,000	B	---	33.69
68246	-10	2.12:1 ±3% 1.5:1 ±3%	4-8 5-7	1-3 1-3	1-3 1.0 4-8 3.5	(4-8) 4,0000	A	.250	46.15
68251	-11	1:1 ±3% 1.707:1 ±3%	1-3 1-3	4-8 5-7	1-3 3.0 4-8 3.0	(1-3) 4,000	D	---	46.15
68256	-12	1.4:1 ±3% 2:1 ±3%	1-3 1-3	4-8 5-7	1-3 3.5 4-8 3.0	(1-3) 7,200	D	----	50.76
68261	-13	1.25:1 ±3% 1.66:1 ±3%	1-3 1-3	4-8 5-7	1-3 3.2 4-8 3.0	(1-3) 4,000	D	---	50.76
68266	-14	2.3:1 ±3% 3.2:1 ±3%	4-8 5-7	1-3 1-3	1-3 1.2 4-8 3.0	(5-7) 3,000	D	---	50.76
68271	-15	2.12:1 ±3% 1.5:1 ±3%	4-8 5-7	1-3 1-3	1-3 1.0 4-8 3.5	(4-8) 4,000	D	---	50.76
68276	-16	1:1 ±3% 1:.707 ±3%	1-3 1-3	4-8 5-7	1-3 3.0 4-8 3.0	(1-3) 4,000	E	---	50.76
68281	-17	1.4:1 ±3% 2:1 ±3%	1-3 1-3	4-8 5-7	1-3 3.5 4-8 3.0	(1-3) 7,200	E	---	50.76
68286	-18	1.25:1 ±3% 1.66:1 ±3%	1-3 1-3	4-8 5-7	1-3 3.2 4-8 3.0	(1-3) 4,000	E	---	50.76
68291	-19	2.3:1 ±3% 3.2:1 ±3%	4-8 5-7	1-3 1-3	1-3 1.2 4-8 3.0	(5-7) 3,000	E	---	50.76
68296	-20	2.12:1 ±3% 1.5:1 ±3%	4-8 5-7	1-3 1-3	1-3 1.0 4-8 3.5	(4-8) 4,000	E	----	50.76
68306	-21	1:1 ±3% 1:.707 ±3%	1-3 1-3	4-8 5-7	1-3 3.0 4-8 3.0	(1-3) 4,000	F	—	46.15
68311	-22	1.4:1 ±3% 2:1 ±3%	1-3 1-3	4-8 5-7	1-3 3.5 4-8 3.0	(1-3) 7,200	F	—	50.76
68316	-23	1.25:1 ±3% 1.66:1 ±3%	1-3 1-3	4-8 5-7	1-3 3.2 4-8 3.0	(1-3) 4,000	F	—	46.15
68321	-24	1:2.12 ±3% 1:1.50 ±3%	1-3 1-3	4-8 5-7	1-3 1.0 4-8 3.5	(4-8) 4,000	F	—	46.15
68326	-25	1:2.5 ±3% 1:1.79 ±3%	1-3 1-3	4-8 5-7	1-3 1.0 4-8 3.5	(4-8) 4,000	F	—	46.15
68331	-26	1:2.5 ±3% 1:1.79 ±3%	1-3 1-3	4-8 5-7	1-3 1.0 4-8 3.5	(4-8) 4,000	A	.250	46.15
68336	-27	1:2.5 ±3% 1:1.79 ±3%	1-3 1-3	4-8 5-7	1-3 1.0 4-8 3.5	(4-8) 4,000	D	—	46.15
68341	-28	1:1.5 ±3%	1-5	2-6	1-3 .90 4-8 2.5	(2-6) 3,000	B	—	33.69
68346	-29	1:1.79 ±3%	1-5	2-6	1-3 .90 4-8 2.5	(2-6) 3,000	B	—	33.69
68351	-30	1:2.5 ±3%	1-5	2-6	1-3 1.0 4-8 2.8	(2-6) 3,000	B	—	33.69
68356	-31	1:2.5 ±3% 1:1.79 ±3%	1-3 1-3	4-8 5-7	1-3 1.0 4-8 3.5	(4-8) 4,000	E	—	50.76

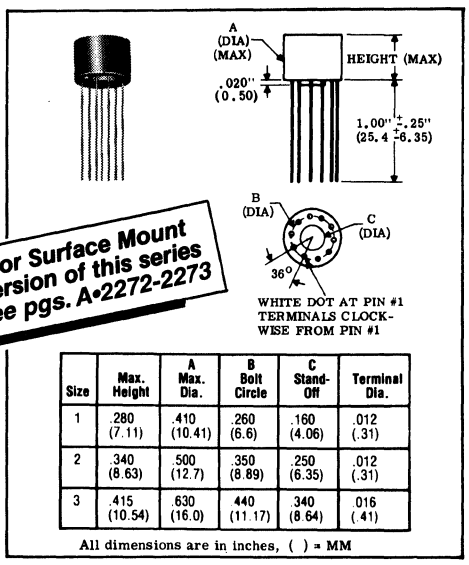
Ultra Miniature DC-DC Converter Transformers

Input Voltages of: 5V, 12V, 24V and 48V

Power Levels up to 40 Watts

All units are magnetically shielded

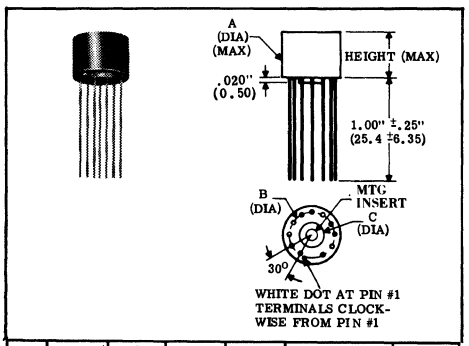
All units can be supplied with higher or lower output voltages. Delivery- stock to one week, special voltages 9 days.



For Surface Mount version of this series see pgs. A•2272-2273

Size	Max. Height	A Max. Dia.	B Bolt Circle	C Stand-Off	Terminal Dia.
1	.280 (7.11)	.410 (10.41)	.260 (6.6)	.160 (4.06)	.012 (.31)
2	.340 (8.63)	.500 (12.7)	.350 (8.89)	.250 (6.35)	.012 (.31)
3	.415 (10.54)	.630 (16.0)	440 (11.17)	.340 (8.64)	.016 (.41)

All dimensions are in inches, ( ) = MM



Size	Max. Height	A Max. Dia.	B Bolt Circle	C Stand-Off	Mtg. Insert	Terminal Dia.
4	.500 (12.7)	.800 (20.32)	.560 (14.22)	.460 (11.68)	—	.016 (.41)
5	.650 (16.51)	.950 (24.13)	.670 (17.0)	.570 (14.48)	6-32 UNC 8 Threads Deep	.020 (.51)
6	.745 (18.92)	1.125 (28.57)	.800 (20.32)	.700 (17.78)	6-32 UNC 8 Threads Deep	.020 (.51)

All dimensions are in inches, ( ) = MM
Note: Sizes 5 and 6 - pins 5, 8 and 9 are omitted

FEATURES

1) Units can be used as self-saturating or for linear switching applications. Operation over ambient temperature range from —55° to +105°c. All units manufactured to the requirements of MIL-T-27 (TF5S40ZZ)
2) All units can be supplied with higher or lower secondary voltages at the same power levels.
3) Secondary can be connected for full-wave bridge or dual bridge.
4) All units are magnetically shielded.

INPUT 5 VOLTS

PART NUMBER	D. C. OUT VOLTS FULL WAVE BRIDGE	FULL WAVE	DUAL BRIDGE	MAX. POWER OUT -55°C-+105°C	-55°C-+70°C	APPROX. SWITCH FREQ. SELF-SATURATED	SQUARE-WAVE DRIVEN**	SIZE	*** PRICE 1-9
31021	10	5	±5	1.5W	3W	15K	30K TO 60K	1	37.77
31041	12	6	±6	1.5W	3W	15K	30K TO 60K	1	37.77
31061	28	14	±14	1.5W	3W	15K	30K TO 60K	1	37.77
31081	48	24	±24	1.5W	3W	20K	40K TO 60K	1	37.77
31101	100	50	±50	1.5W	3W	20K	40K TO 60K	1	37.77
32106	10	5	±5	3W	4.5W	15K	30K TO 60K	2	37.77
32126	12	6	±6	3W	4.5W	15K	30K TO 60K	2	37.77
32146	28	14	±14	3W	4.5W	15K	30K TO 60K	2	37.77
32166	48	24	±24	3W	4.5W	20K	40K TO 60K	2	37.77
32186	100	50	±50	3W	4.5W	20K	40K TO 60K	2	37.77
32189	150	75	±75	3W	–	10K	30K TO 60K	2	43.50
32192	200	100	±100	3W	–	10K	30K TO 60K	2	43.50
32195	300	150	±150	3W	–	10K	30K TO 60K	2	43.50
33104	10	5	±5	5W	7.5W	10K	20K TO 50K	3	37.77
33124	12	6	±6	5W	7.5W	10K	20K TO 50K	3	37.77
33144	28	14	±14	5W	7.5W	10K	20K TO 50K	3	37.77
33164	48	24	±24	5W	7.5W	10K	20K TO 50K	3	37.77
33184	100	50	±50	5W	7.5W	10K	20K TO 50K	3	37.77
33187	150	75	±75	5W	–	10K	30K TO 60K	3	43.50
33190	200	100	±100	5W	–	10K	30K TO 60K	3	43.50
33193	300	150	±150	5W	–	10K	30K TO 60K	3	43.50
34501	10	5	±5	10W	14W	10K	20K TO 40K	4	37.77
34521	28	14	±14	10W	14W	10K	20K TO 40K	4	37.77
34541	40	24	±24	10W	14W	10K	20K TO 40K	4	37.77

** Lower switching frequency may be used at lower output power.

INPUT 12 VOLTS

PART NUMBER	D. C. OUT VOLTS FULL WAVE BRIDGE	FULL WAVE	DUAL BRIDGE	MAX. POWER OUT -55°C-+105°C	-55°C-+70°C	APPROX. SWITCH FREQ. SELF-SATURATED	SQUARE-WAVE DRIVEN**	SIZE	*** PRICE 1-9
31121	12	6	±6	1.5W	3W	15K	30K TO 60K	1	37.77
31141	24	12	±12	1.5W	3W	15K	30K TO 60K	1	37.77
31161	28	14	±14	1.5W	3W	15K	30K TO 60K	1	37.77
31181	48	24	±24	1.5W	3W	20K	40K TO 60K	1	37.77
31201	100	50	±50	1.5W	3W	20K	40K TO 60K	1	37.77
32206	12	6	±6	3W	4.5W	15K	30K TO 60K	2	37.77
32226	24	12	±12	3W	4.5W	15K	30K TO 60K	2	37.77
32246	28	14	±14	3W	4.5W	15K	30K TO 60K	2	37.77
32266	48	24	±24	3W	4.5W	20K	40K TO 60K	2	37.77
32286	100	50	±50	3W	4.5W	20K	40K TO 60K	2	37.77
32289	150	75	±75	3W	–	10K	30K TO 60K	2	43.50
32292	200	100	±100	3W	–	10K	30K TO 60K	2	43.50
32295	300	150	±150	3W	–	10K	30K TO 60K	2	43.50
33204	12	6	±6	5W	7.5W	15K	30K TO 60K	3	37.77
33224	28	14	±14	5W	7.5W	15K	30K TO 60K	3	37.77
33244	48	24	±24	5W	7.5W	20K	40K TO 60K	3	37.77
33264	100	50	±50	5W	7.5W	20K	40K TO 60K	3	37.77
33267	150	75	±75	5W	–	10K	30K TO 60K	3	43.50
33270	200	100	±100	5W	–	10K	30K TO 60K	3	43.50
33273	300	150	±150	5W	–	10K	30K TO 60K	3	43.50
34561	24	12	±12	10W	14W	15K	30K TO 50K	4	37.77
34581	28	14	±14	10W	14W	15K	30K TO 50K	4	37.77
34601	48	24	±24	10W	14W	15K	30K TO 50K	4	37.77
34604	100	50	±50	7.5W	–	10K	30K TO 60K	4	43.50
34607	150	75	±75	7.5W	–	10K	30K TO 60K	4	43.50
34610	200	100	±100	7.5W	–	10K	30K TO 60K	4	43.50
34613	300	150	±150	7.5W	–	10K	30K TO 60K	4	43.50
35110	24	12	±12	17W	25W	–	30K TO 60K	5	54.34
35130	28	14	±14	17W	25W	–	30K TO 60K	5	54.34
35150	48	24	±24	17W	25W	–	30K TO 60K	5	54.34

** Lower switching frequency may be used at lower output power.

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

*For immediate engineering assistance or to place an order—**Call Toll Free 800-288-9747** • FAX 914-738-8225*

INPUT 24 VOLTS

PART NUMBER	D. C. OUT VOLTS BRIDGE	FULL WAVE	DUAL BRIDGE	MAX. POWER OUT -55°c-+105°c	- 55°c-+70°c	APPROX. SWITCH FREQ. SELF-SATURATED	SQUARE-WAVE DRIVEN**	SIZE	*** PRICE 1-9
31221	10	5	±5	1.5W	3W	15K	30K TO 60K	1	37.77
31241	28	14	±14	1.5W	3W	15K	30K TO 60K	1	37.77
31261	48	24	±24	1.5W	3W	20K	40K TO 60K	1	37.77
31281	100	50	±50	1.5W	3W	20K	40K TO 60K	1	37.77
32306	10	5	±5	3W	4.5W	15K	30K TO 60K	2	37.77
32326	28	14	±14	3W	4.5W	15K	30K TO 60K	2	37.77
32346	48	24	±24	3W	4.5W	20K	40K TO 60K	2	37.77
32366	100	50	±50	3W	4.5W	20K	40K TO 60K	2	37.77
32369	150	75	±75	3W	–	10K	30K TO 60K	2	43.50
32372	200	100	±100	3W	–	10K	30K TO 60K	2	43.50
32375	300	150	±150	3W	–	10K	30K TO 60K	2	43.50
33284	10	5	±5	5W	7.5W	15K	30K TO 60K	3	37.77
33304	28	14	±14	5W	7.5W	15K	30K TO 60K	3	37.77
33324	48	24	±24	5W	7.5W	20K	40K TO 60K	3	37.77
33344	100	50	±50	5W	7.5W	20K	40K TO 60K	3	37.77
33347	150	75	±75	5W	–	10K	30K TO 60K	3	43.50
33350	200	100	±100	5W	–	10K	30K TO 60K	3	43.50
33353	300	150	±150	5W	–	10K	30K TO 60K	3	43.50
34621	28	14	±14	10W	14W	15K	30K TO 50K	4	37.77
34641	48	24	±24	10W	14W	15K	30K TO 50K	4	37.77
34644	100	50	±50	7.5W	–	10K	30K TO 60K	4	43.50
34647	150	75	±75	7.5W	–	10K	30K TO 60K	4	43.50
34650	200	100	±100	7.5W	–	10K	30K TO 60K	4	43.50
34653	300	150	±150	7.5W	–	10K	30K TO 60K	4	43.50
35170	24	12	±12	17W	25W	–	30K TO 60K	5	54.34
35190	28	14	±14	17W	25W	–	30K TO 60K	5	54.34
35210	48	24	±24	17W	25W	–	30K TO 60K	5	54.34
36710	48	24	±24	25W	40W	–	30K TO 60K	6	65.39
36730	56	28	±28	25W	40W	–	30K TO 60K	6	65.39

** Lower switching frequency may be used at lower output power.

INPUT 48 VOLTS

PART NUMBER	D. C. OUT VOLTS BRIDGE	FULL WAVE	DUAL BRIDGE	MAX. POWER OUT -55°c-+105°c	- 55°c-+70°c	APPROX. SWITCH FREQ. SELF-SATURATED	SQUARE-WAVE DRIVEN**	SIZE	*** PRICE 1-9
31301	24	12	±12	1.5W	3W	15K	30K TO 60K	1	37.77
31321	48	24	±24	1.5W	3W	20K	40K TO 60K	1	37.77
31341	100	50	±50	1.5W	3W	20K	40K TO 60K	1	37.77
31361	150	75	±75	1.5W	3W	20K	40K TO 60K	1	37.77
32386	24	12	±12	3W	4.5W	15K	30K TO 60K	2	37.77
32406	48	24	±24	3W	4.5W	20K	40K TO 60K	2	37.77
32426	100	50	±50	3W	4.5W	20K	40K TO 60K	2	37.77
32446	150	75	±75	3W	4.5W	20K	40K TO 60K	2	37.77
32449	200	100	±100	3W	4.5W	10K	30K TO 60K	2	43.50
32452	300	150	±150	3W	4.5W	10K	30K TO 60K	2	43.50
33364	24	12	±12	5W	7.5W	15K	30K TO 60K	3	37.77
33384	48	24	±24	5W	7.5W	20K	40K TO 60K	3	37.77
33404	100	50	±50	5W	7.5W	20K	40K TO 60K	3	37.77
33424	150	75	±75	5W	7.5W	20K	40K TO 60K	3	37.77
33427	200	100	±100	5W	–	10K	30K TO 60K	3	43.50
33430	300	150	±150	5W	–	10K	30K TO 60K	3	43.50
34661	24	12	±12	10W	14W	15K	30K TO 50K	4	37.77
34681	48	24	±24	10W	14W	15K	30K TO 50K	4	37.77
34701	56	28	±28	10W	14W	15K	30K TO 50K	4	37.77
34704	100	50	±50	7.5W	–	10K	30K TO 60K	4	43.50
34707	150	75	±75	7.5W	–	10K	30K TO 60K	4	43.50
34710	200	100	±100	7.5W	–	10K	30K TO 60K	4	43.50
34713	300	150	±150	7.5W	–	10K	30K TO 60K	4	43.50
35230	24	12	±12	17W	25W	–	30K TO 60K	5	54.34
35250	48	24	±24	17W	25W	–	30K TO 60K	5	54.34
35270	56	28	±28	17W	25W	–	30K TO 60K	5	54.34
36750	48	24	±24	25W	40W	–	30K TO 60K	6	65.39
36770	56	28	±28	25W	40W	–	30K TO 60K	6	65.39
36790	100	50	±50	25W	40W	–	30K TO 60K	6	65.39

** Lower switching frequency may be used at lower output power.

***Discount Prices: 1-9 Net; 10-24 less 10%; 25-49 less 16%; 50-99 less 23%; 100-499 less 30%
Ordering Instructions: No minimum. Net 30 days F.O.B. Pelham, New York

SCHEMATIC FOR SIZES 1, 2 & 3 USING TRANSFORMERS AS SELF-SATURATING

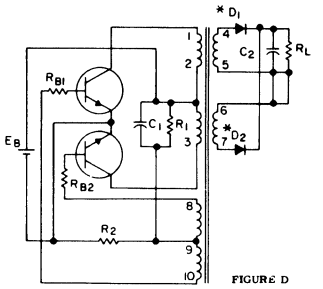


FIGURE D

SCHEMATIC FOR SIZES 1, 2, AND 3 USING TRANSFORMERS AS LINEAR SWITCHING

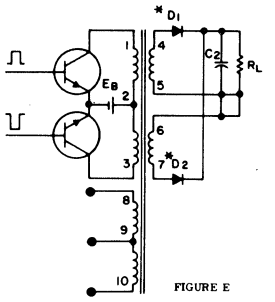


FIGURE E

* D1 AND D2 USE SCHOTTKY OR FAST SWITCHING DIODES

SCHEMATIC FOR SIZE 4 USING TRANSFORMER AS SELF-SATURATING

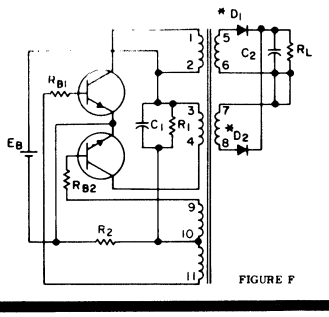


FIGURE F

SCHEMATIC FOR SIZE 4 USING TRANSFORMERS AS LINEAR SWITCHING.

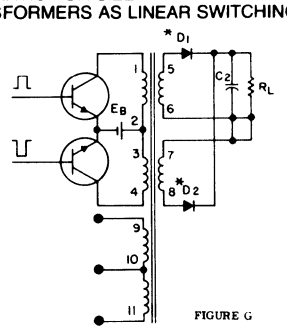


FIGURE G

*D1 & D2 USE SCHOTTKY OR FAST SWITCHING DIODES

SCHEMATIC FOR SIZES 5 & 6 USING TRANSFORMERS AS LINEAR SWITCHING.

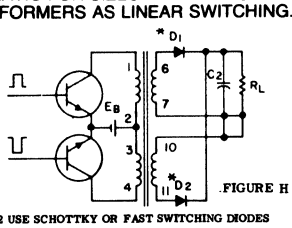


FIGURE H

*D1 & D2 USE SCHOTTKY OR FAST SWITCHING DIODES

PICO Electronics, Inc. 143 Sparks Ave., Pelham, N.Y. 10803-1837 • FAX: 914-738-8225

Recommended Land Pattern Dimensions For Surface Mount Transformers

Note: All dimensions are inches

PICO 86000 Series

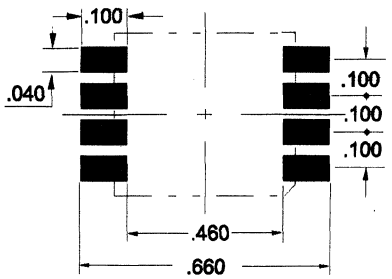


Fig. 1

PICO 78000 Series

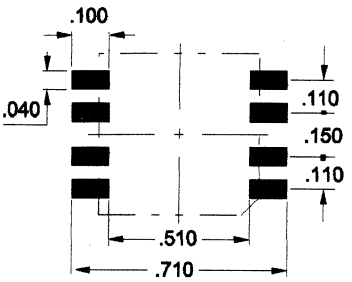


Fig. 2

PICO 70000 Series

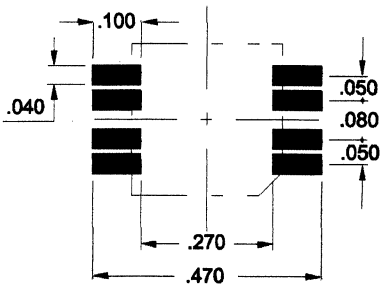


Fig. 3

PICO 80000 Series

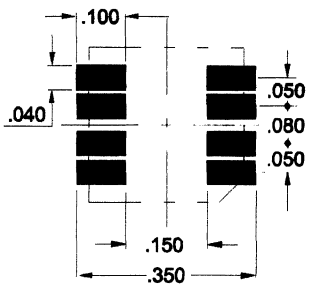


Fig. 4

PICO 71000 Series

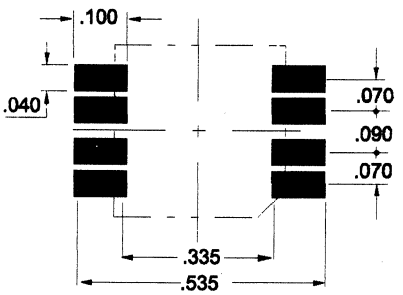


Fig. 5

PICO 81000 Series

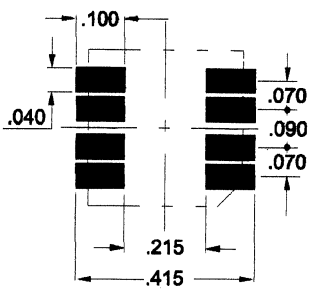


Fig. 6

PICO 76000 & 77000 Series

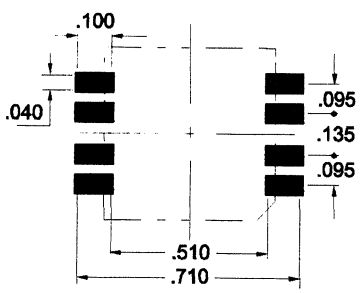


Fig. 7

PICO 82000, 83000 &84000 Series

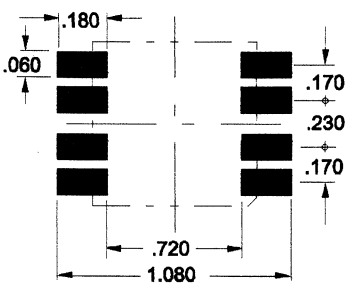


Fig. 8

PICO 75000 Series Size #1

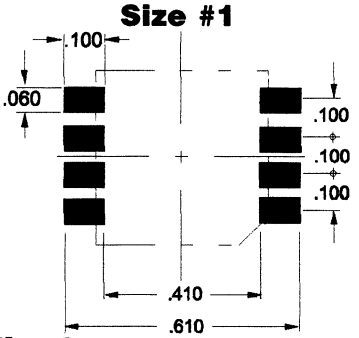


Fig. 9

PICO Electronics, Inc.

143 Sparks Avenue, Pelham, NY 10803-1837 • 914-738-1400

Call Toll Free 800-228-9747 • FAX 914-738-8225

Internet: http://www.picoelectronics.com • E-Mail: HLSC73A@prodigy.com

Recommended Land Pattern Dimensions For Surface Mount Transformers

Note: All dimensions are inches

PICO 75000 Series, Size #2

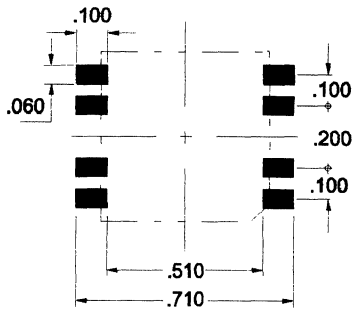


Fig. 10

PICO 75000 Series, Size #3

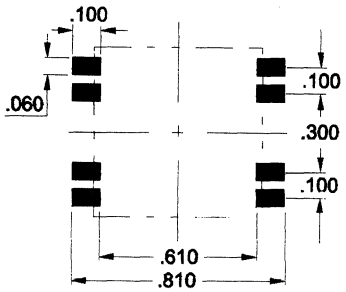


Fig. 11

PICO 31000 Series, Size #1

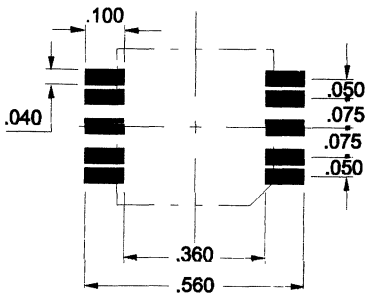


Fig. 12

PICO 32000 Series, Size #2

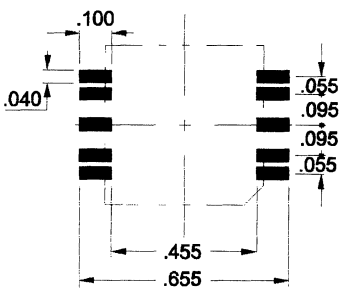


Fig. 13

PICO 33000 Series, Size #3

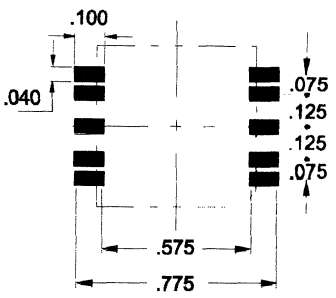


Fig. 14

PICO 68100 Series

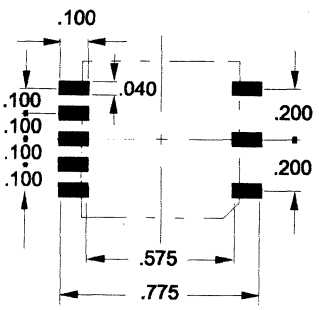


Fig. 15

PICO 85000 Series

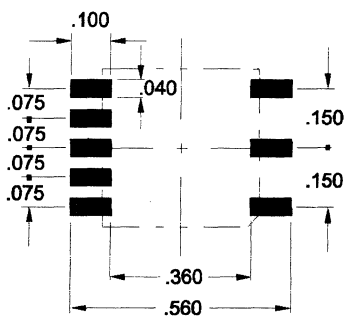


Fig. 16

PICO 68500 Series, Config. A

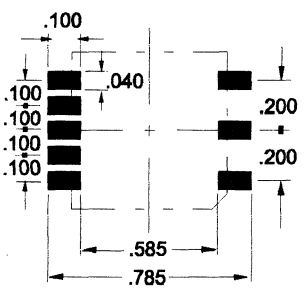


Fig. 17

PICO 68500 Series Config. B & C

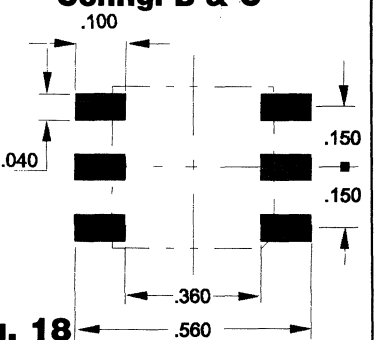


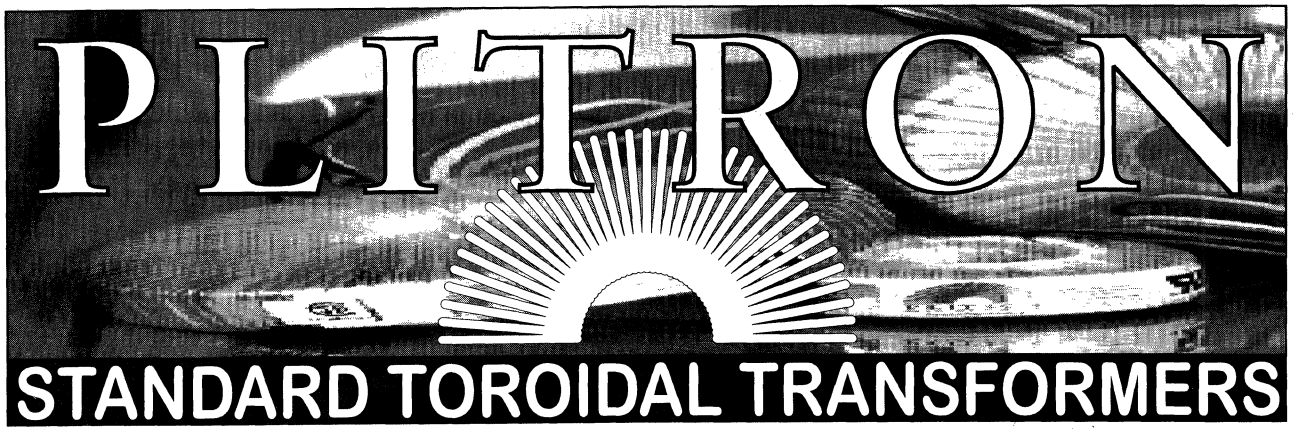
Fig. 18

PICO Electronics, Inc.

143 Sparks Avenue, Pelham, NY 10803-1837 • 914-738-1400

Call Toll Free 800-228-9747 • FAX 914-738-8225

Internet: http://www.picoelectronics.com • E-Mail: HLSC73A@prodigy.com



STANDARD TOROIDAL TRANSFORMERS

Standard Power Transformer Line

- For general purpose applications and prototypes
- Economical in high volumes
- Power levels: 8VA to 1500VA
- See table below for details and sample pricing
- UL recognised and CSA approved
- Tight regulation
- Approx. ½ size and weight of conventional transformers
- Low temperature rise, less than 40°C
- High efficiency
- Single, dual or multi-tapped primaries
- Choice of dozens of matched secondary voltages
- Options: screen, shield, thermal protection, stranded leads, potted centre

Standard Power Transformer Part No. Code & Prices

CODE	Pwr. VA	Reg. %	Size (mm) & Weight OD	H	kg	* Price 1-4
99	8	22	55	30	0.25	36.38
00	15	20	63	37	0.35	39.41
01	30	18	70	38	0.45	39.48
02	50	13	80	45	0.90	43.11
03	80	12	97	39	1.00	45.25
04	120	11	95	47	1.20	48.51
05	160	8	110	50	1.80	54.05
06	225	7	110	55	2.20	59.59
07	300	6	110	62	2.60	68.68
08	500	4	135	67	4.00	87.13
09	625	4	145	83	5.00	94.63
10	750	4	150	85	5.50	99.51
11	1000	4	160	85	6.30	118.41
12	1500	4	200	80	11.70	169.40

CODE	Input Volts AC	Freq. Hz
A	117	60
7	115/230	50/60
5	100/120/220/240	50/60

CODE	Screen / Shield Options
0	None
1	Elecrtostatic Screen
2	Magnetic Shield
3	Both Screen & Shield

Part # 087026000 is:
500VA;
115/230 VAC, 50Hz input;
2 x 40VAC outputs at 6.25A each;
Metal disk mounting;
no options
$87.13, 1-4 units.

0	8	7	0	2	6	0	0	0

CODE	Output (VAC RMS) Sec1	Sec2	Availability
10	6	6	8 to 30VA
11	9	9	8 to 120VA
12	12	12	"
13	15	15	8 to 160VA
14	18	18	8 to 225VA
15	22	22	8 to 300VA
16	25	25	8 to 750VA
17	30	30	"
41	31	31	"
19	33	33	8 to 1000VA
18	35	35	"
26	40	40	All models
25	45	45	"
33	50	50	"
42	55	55	"
52	60	60	"
28	110	—	"
50	117	—	"
29	220	—	15 to 1500VA
30	240	—	"
53	175	175	50 to 1500VA

Note: Output Current Rating RMS = VA Rating / # of Outputs / Rated VAC

CODE	Wire Lead-out (both stripped 6mm)
0	Magnet Wire, 200mm
1	Stranded, 350mm

CODE	Thermal Protection Options
0	None
1	Resetting Switch
2	One Shot Fuse

CODE	Mounting
0	Metal Disk, 2 Neo washers Bolt, Nut & Flat washer
1	None
2	Potted Center, drilled

* Price based on 115/230VAC input units. Includes metal disk mounting. No options. FOB Buffalo NY. US dollars. Call for quotes on higher volumes.

STANDARD POWER TRANSFORMERS SHIPPED WITHIN 5 DAYS

Medical Isolation

- To isolate equipment from line
- 100/120/220/240 VAC input
- 115/230 VAC output
- EN6065, VDE750, CSA601-1 UL2601 and UL544 approved
- Low leakage
- 100 to 12,500VA

P.C.B. Mount Toroidal Power

- Triple output (5V, +/-12 or +/-15V applications)
- Encapsulated in attractive black circuit board mount cases
- Universal inputs (100/120/220/240VAC)
- ULC recognized
- Low temperature rise
- Low radiated and acoustic noise
- 5 models 20 to 160VA

Toroidal Tube Output

- Designed by Menno Vanderveen
- Ultra wide bandwidth
- Low distortion
- Several standard models to choose from
- Includes standard and specialist range
- Super high quality factor (to 2,440,000)
- Encapsulated in attractive black cases
- 40 to 100 watts output
- Publications available
- Complementary power transformers

Audio Distribution

- For sound distribution systems
- 25 or 70 volt output
- 60 or 120 watts output
- 4 or 8 ohm
- Low leakage
- Compact

Warranty

- 5 years for materials and labour on standard transformers installed in the original equipment.

PLITRON
MANUFACTURING INC

e mail: techinfo@plitron.com

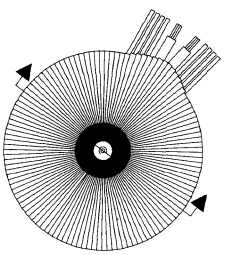
www.plitron.com 1-800-PLITRON

PLITRON 8, 601 Magnetic Dr. Toronto, Ontario, Canada M3J 3J2 http://www.plitron.com 1-800-PLITRON (1-800-754-8766) Tel. 416-667-9914 FAX 416-667-8928

PLITRON

CUSTOM TOROIDAL TRANSFORMERS

Power Toroidal Transformers



- Computer aided design solutions
- From 8VA to 18kVA
- Flexible dimensions, including: low profile - up to 500VA for single rack (1.75") applications
- Electrostatic or safety ground screens
- Magnetic shields
- Connectors
- Various mechanical mounting arrangements
- Designed to the world's safety approvals
- Full specifications provided

Three Phase Toroidal Transformers

- To 50kVA
- Discrete phases or packaged assemblies
- Packaging options include: Flange mount and NEMA enclosures.
- Low quiescent current draw

Power Conditioning Transformers

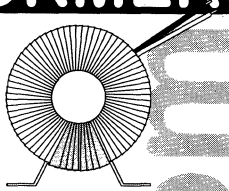
- Balanced output
- Common mode noise rejection
- Screens and shielding options
- Transient voltage surge suppresion

Audio Transformers

- Power transformers
- Low acoustic and magnetic noise designs
- Perfectly balanced secondaries
- High power density
- High B core material
- Matching transformers
- Output autoformers
- Tube output transformers

CUSTOM QUOTES WITHIN HOURS
PROTOTYPES WITHIN DAYS

Current Transformers



- High accuracy
- Single or mutiple core versions
- Various terminations
- Saddle bracket or encapsulated
- High isolation
- Customer specified current ratio and burden

Inductors

- To 150mH
- To 300A
- 1.75" to 18" diameter
- Multiple gapped cores
- Low leakage inductance

Medical Transformers

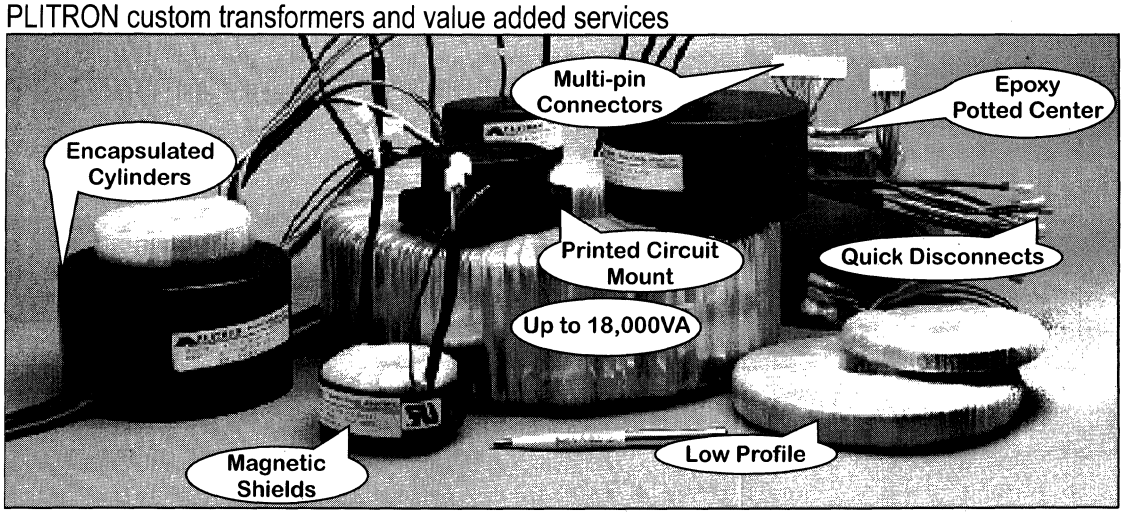
- Low leakage current
- Ground screens
- Thermal protection (fuses or switches)
- 8VA to 18 kVA
- EN6065, VDE750, CSA601-1 UL2601 and UL544
- Certificates of compliance
- Low radiated and acoustic noise
- Compact designs, flexible dimensions

Autoformers

- For step-up or step-down without isolation
- 30VA to 30kVA (per phase)
- Single or three phase
- ½ size of toroidal isolation transformer

www.plitron.com 1-800-PLITRON

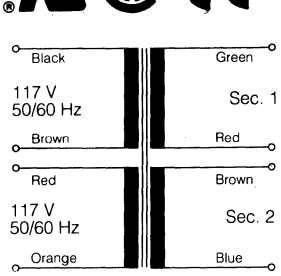
PLITRON custom transformers and value added services

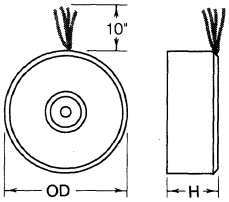


PLITRON 8, 601 Magnetic Dr. Toronto, Ontario, Canada M3J 3J2 http://www.plitron.com 1-800-PLITRON (1-800-754-8766) Tel. 416-667-9914 FAX 416-667-8928

POWERTRONIX

STANDARD TOROIDAL POWER TRANSFORMERS





Power (VA)	Dimensions (OD x H)	Weight (lbs)
18	2.4" x 1.4"	0.7
36	2.8" x 1.6"	1.1
60	3.2" x 1.7"	1.5
100	3.9" x 1.6"	2.6
155	4.4" x 1.6"	3.7
200	4.4" x 1.9"	4.2
325	4.4" x 2.6"	6.2
440	5.3" x 2.3"	7.5
585	5.3" x 2.8"	9.0
690	5.3" x 3.2"	10.3
800	6.3" x 2.5"	11.5
990	6.3" x 2.9"	13.2
1100	6.3" x 3.2"	15.4

DESCRIPTION:

POWERTRONIX Standard Toroidal Power Transformers are designed for step-down voltages or for use in transformer rectifier and filter circuits.

SAFETY APPROVALS:

UL 506 (File # E142730)
CSA 22.2, No. 66 (File # LR 78662)

SPECIFICATIONS:

Primary: 2 x 117 Volt. 50/60 Hz
Secondary: Dual windings, which can be connected in series or parallel
Power: 18-1,100 VA
Hi-pot: 4,000 VAC RMS
Mounting: One metal disk and two rubber gaskets included with each transformer.

Part Number AA-	Power (VA)	AC Output Series VCT @ AAC	DC Output with FWBR Series VDC @ ADC	DC Output with FWBR Parallel VDC @ ADC
50018-012	18	12 @ 1.5	13.2 @ 1.0	5.6 @ 2.0
50036-012	36	12 @ 2.9	13.4 @ 1.9	5.7 @ 3.7
50060-012	60	12 @ 5.0	13.6 @ 3.2	5.8 @ 5.9
50018-018	18	18 @ 1.0	21.0 @ 0.6	9.5 @ 1.3
50036-018	36	18 @ 1.9	20.8 @ 1.2	9.4 @ 2.5
50060-018	60	18 @ 3.3	21.4 @ 2.1	9.7 @ 3.9
50100-018	100	18 @ 5.6	21.4 @ 3.2	9.7 @ 6.4
50018-024	18	24 @ 0.8	28.4 @ 0.5	13.2 @ 1.0
50036-024	36	24 @ 1.5	28.6 @ 0.9	13.3 @ 1.9
50060-024	60	24 @ 2.5	29.0 @ 1.6	13.5 @ 3.0
50100-024	100	24 @ 4.2	29.4 @ 2.4	13.7 @ 4.8
50155-024	155	24 @ 6.5	30.0 @ 3.5	14.0 @ 7.0
50200-024	200	24 @ 8.3	29.6 @ 4.5	13.8 @ 9.0
50325-024	325	24@13.5	29.4 @ 7.2	13.6@14.3
50018-030	18	30 @ 0.6	36.0 @ 0.4	17.0 @ 0.8
50036-030	36	30 @ 1.2	36.4 @ 0.7	17.2 @ 1.5
50060-030	60	30 @ 2.0	36.8 @ 1.3	17.4 @ 2.4
50100-030	100	30 @ 3.3	37.4 @ 1.9	17.7 @ 3.8
50155-030	155	30 @ 5.2	37.6 @ 3.3	17.8 @ 6.1
50200-030	200	30 @ 6.7	37.6 @ 3.7	17.8 @ 7.3
50325-030	325	30@10.8	38.2 @ 5.7	18.1@11.4
50018-036	18	36 @ 0.5	43.4 @ 0.3	20.7 @ 0.6
50036-036	36	36 @ 1.0	44.0 @ 0.6	21.0 @ 1.2
50060-036	60	36 @ 1.7	44.6 @ 1.1	21.3 @ 2.0
50100-036	100	36 @ 2.8	45.0 @ 1.7	21.5 @ 3.3
50155-036	155	36 @ 4.3	46.0 @ 2.3	22.0 @ 4.5
50200-036	200	36 @ 5.5	45.8 @ 3.0	21.9 @ 6.0
50325-036	325	36 @ 9.0	46.0 @ 4.6	22.0 @ 9.2
50440-036	440	36@12.2	46.0 @ 6.1	22.0@12.3
50018-044	18	44 @ 0.4	53.4 @ 0.3	25.7 @ 0.5
50036-044	36	44 @ 0.8	54.2 @ 0.5	26.1 @ 1.0
50060-044	60	44 @ 1.4	55.0 @ 0.9	26.5 @ 1.7
50100-044	100	44 @ 2.3	55.2 @ 1.4	26.6 @ 2.7
50155-044	155	44 @ 3.5	56.2 @ 1.9	27.1 @ 3.7
50200-044	200	44 @ 4.5	56.6 @ 2.5	27.3 @ 4.9

Part Number AA-	Power (VA)	AC Output Series VCT @ AAC	DC Output with FWBR Series VDC @ ADC	DC Output with FWBR Parallel VDC @ ADC
50060-048	60	48 @ 1.3	60.2 @ 0.8	29.1 @ 1.5
50100-048	100	48 @ 2.1	60.8 @ 1.2	29.4 @ 2.4
50155-048	155	48 @ 3.2	61.2 @ 1.7	29.6 @ 3.4
50200-048	200	48 @ 4.2	61.4 @ 2.3	29.7 @ 4.6
50325-048	325	48 @ 6.8	62.0 @ 3.6	30.0 @ 7.1
50440-048	440	48 @ 9.2	62.2 @ 4.6	30.1 @ 9.2
50585-048	585	48@12.2	62.6 @ 6.0	30.3@11.8
50690-048	690	48@14.4	63.0 @ 7.0	30.5@14.0
50800-048	800	48@16.7	63.2 @ 7.4	30.6@14.9
50990-048	990	48@20.6	63.2 @ 9.7	30.2@19.5
51100-048	1100	48@22.9	62.4@10.7	30.2@21.5
50100-056	100	56 @ 1.8	71.2 @ 1.1	34.6 @ 2.1
50155-056	155	56 @ 2.8	72.0 @ 1.6	35.0 @ 3.1
50200-056	200	56 @ 3.6	72.4 @ 1.9	35.2 @ 3.8
50100-060	100	60 @ 1.7	76.6 @ 1.0	37.3 @ 1.9
50155-060	155	60 @ 2.6	77.2 @ 1.4	37.6 @ 2.8
50200-060	200	60 @ 3.3	77.2 @ 1.8	37.6 @ 3.5
50325-060	325	60 @ 5.4	78.0 @ 2.9	38.0 @ 5.8
50440-060	440	60 @ 7.3	78.6 @ 3.7	38.3 @ 7.3
50585-060	585	60 @ 9.7	78.6 @ 5.0	38.3 @ 9.8
50690-060	690	60@11.5	79.0 @ 5.5	38.5@11.0
50800-060	800	60@13.3	79.0 @ 6.3	38.5@12.6
50990-060	990	60@16.5	79.0 @ 7.8	38.5@15.5
50690-066	690	66@10.5	87.4 @ 5.1	42.7@10.2
50325-076	325	76 @ 4.3	99.6 @ 2.2	48.8 @ 4.5
50440-076	440	76 @ 5.8	100.0 @ 3.0	49.0 @ 5.8
50585-076	585	76 @ 7.7	100.4 @ 3.8	49.2 @ 7.7
50690-076	690	76 @ 9.1	100.8 @ 4.3	49.4 @ 8.6
50990-076	990	76@13.0	101.4 @ 6.1	49.7@12.1
51100-084	1100	84@13.0	112.2 @ 6.1	55.1@12.1
50990-096	990	96@10.3	128.2 @ 4.8	63.1 @ 9.5

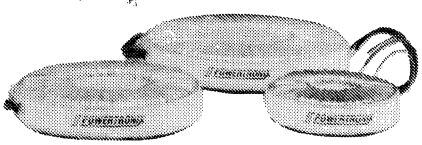
All data are typical values and subject to change without prior notice.

See our pages in Volume D, Section 4050

Powertronix • 1125 E. Hillsdale Blvd., Bldg. 108, Foster City, CA 94404
Tel: (650) 345-6800 • Fax: (650) 345-7240
e-mail: sales@powertronix.com • web site: www.powertronix.com

POWERTRONIX

LOW PROFILE TRANSFORMERS- 1.5" HIGH



SPECIFICATIONS

- **Power:** 18 VA-800VA
- **Frequency:** 47 Hz- 63Hz
- **Height:** 1.5"

Power (VA)	No-load loss (W)	Copper loss (W)	Dimensions Diameter x Height (inches)	Weight (lbs)
18	0.3	3.5	2.4" x 1.5"	0.7
36	0.4	7.0	2.8" x 1.5"	1.1
60	0.6	11.0	3.2" x 1.5"	1.5
100	0.8	17.9	3.9" x 1.5"	2.8
155	1.3	22.5	4.4" x 1.5"	3.7
230	2.1	25.0	5.3" x 1.5"	5.5
350	2.7	36.0	6.3" x 1.5"	7.5
650	4.0	43.0	7.9" x 1.5"	11.0
800	4.4	48.0	8.7" x 1.5"	12.1

UNREGULATED DC POWER SUPPLIES

SPECIFICATIONS

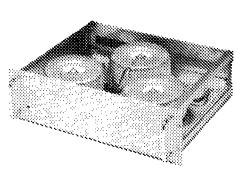
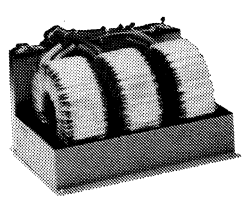
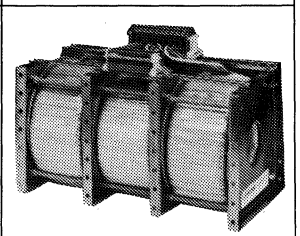
- **Input:** 115/230 Volt, 50/60 Hz
- **Output:** Floating fixed output voltage at full load rating.
- **Ripple:** Typically 3% Volt RMS

Model No.	Voltage Vdc	Current Adc	Size L x W x H	Weight (lbs)
PTX 1215	12	15	7.9" x 4.9" x 2.5"	8.4
PTX 2410	24	10	8.7" x 5.7" x 2.5"	9.7
PTX 2415	24	15	8.7" x 5.7" x 3.3"	13.2
PTX 2420	24	20	9.8" x 6.9" x 3.0"	15.4
PTX 4805	48	5	8.7" x 5.7" x 2.5"	9.7
PTX 4810	48	10	9.8" x 6.9" x 3.0"	15.4
PTX 4815	48	15	10.3" x 7.5" x 3.6"	17.8
PTX 6506	65	6	8.7" x 5.7" x 3.8"	13.2
PTX 6512	65	12	10.3" x 7.5" x 3.6"	18.5
PTX 12005	120	5	9.8" x 6.9" x 3.7"	17.5

3-PHASE TRANSFORMERS

SPECIFICATIONS

- **Power:** 3,000 VA-15,000 VA
- **Frequency:** 47 Hz- 63 Hz
- **Primary:** Customer specified
- **Secondary:** Customer specified
- **Efficiency:** 98%- 95%
- **Isolation:** 4,000 VRMS
- **Creepage:** Minimum 8mm
- **Temperature rise:** Customer specified
- **Voltage tolerance:** Better than 3%

RACK MOUNTED	POTTED IN AN L-BRACKET	ASSEMBLED WITH FLANGES
		

Power (KVA)	No-load loss (W)	Copper loss (W)	Dimensions L x W x H	Dimensions L x W x H	Dimensions L x W x H
3.0	15	159	19" x 14 x 5.2"	11.6" x 7" x 7"	11.6" x 7" x 8.4"
4.8	21	195	19" x 16 x 5.2"	11.6" x 8" x 8"	11.6" x 8" x 9.6"
6.6	27	230	19" x 16 x 5.2"	12.5" x 9" x 9"	12.5" x 9" x 10.6"
7.5	29	245	19" x 16 x 5.2"	13.1" x 9" x 9"	13.1" x 9" x 10.6"
9.6	39	290	19" x 16 x 5.2"	13.9" x 10" x 10"	13.9" x 10" x 11.5"
13.2	50	350		14.5" x 11" x 11"	14.5" x 11" x 13.2"
15.0	60	375		16" x 11" x 11"	15.7" x 11" x 13.2"

* A complete 3-phase transformer consists of three (3) transformer cores.

See our pages in Volume D, Section 4050

Powertronix • 1125 E. Hillsdale Blvd., Bldg. 108, Foster City, CA 94404
Tel: (650) 345-6800 • Fax: (650) 345-7240
e-mail: sales@powertronix.com • web site: www.powertronix.com

POWERTRONIX

MEDICAL TRANSFORMERS

SPECIFICATIONS

- **Power:** 100 VA-5,000 VA
- **Frequency:** 47 Hz- 63 Hz
- **Primary:** 2 x (0-100-120) Volt
- **Secondary:** 2 x 120 Volt
- **Isolation:** 4,000 VRMS
- **Creepage:** Minimum 8 mm
- **Leakage current:** Less than 50 µA
- **Voltage tolerance:** Better than 3%

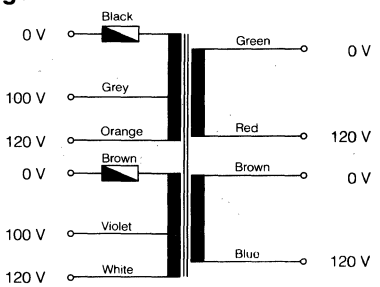
UL2601

Safety Approvals:

- UL 544 (File # E 151895)
- UL 2601 (File # E 151895)
- UL 506 (File # E 142730)
- CSA 22.2, No. 66 (File # LR 78662)

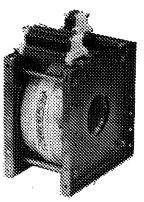
Built to:

- IEC 601-1
- VDE 750 Part 1
- CSA 22.2 No. 601.1-M90



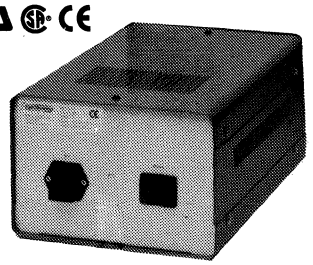
CENTER POTTED

FLANGE MOUNTED



Part Number	Power (VA)	No-load loss (W)	Copper loss (W)	Dimensions Diameter x Height (inches)	Weight (lbs)	Dimensions L x W x H (inches)	Weight (lbs)
M0100	100	1.0	20.0	4.0″ x 2.1″	2.9	4.0″ x 2.7″ x 5.0″	3.6
M0250	250	2.2	30.0	4.6″ x 3.0″	6.2	4.7″ x 3.8″ x 5.7″	7.3
M0500	500	4.0	43.0	5.6″ x 3.5″	10.5	5.7″ x 4.6″ x 6.8″	12.7
M0800	800	5.0	47.0	6.7″ x 3.2″	13.4	6.9″ x 3.9″ x 8.0″	16.0
M1000	1000	6.0	51.0	6.7″ x 3.6″	16.1	6.9″ x 4.4″ x 8.0″	18.3
M1200	1200	8.0	57.0	7.2″ x 3.7″	19.6	8.3″ x 4.6″ x 9.6″	22.2
M1500	1500	8.0	66.0	8.2″ x 3.5″	22.1	8.3″ x 4.6″ x 9.6″	26.5
M2000	2000	9.0	85.0	9.1″ x 3.6″	27.1	9.9″ x 4.7″ x 11.4″	31.5
M2500	2500	12.0	92.0	9.8″ x 3.6″	33.5	9.9″ x 4.7″ x 11.4″	37.9
M3000	3000	17.0	92.0	9.8″ x 4.5″	42.1	9.9″ x 5.6″ x 11.4″	46.5
M3500	3500	18.0	105.0	10.9″ x 3.8″	45.0	11.2″ x 5.3″ x 13.2″	51.6
M4000	4000	21.0	115.0	11.0″ x 4.5″	53.0	11.2″ x 5.8″ x 13.2″	59.6
M5000	5000	21.0	129.0	11.0″ x 5.0″	59.0	11.2″ x 5.9″ x 13.2″	65.6

MIU - MEDICAL ISOLATION UNIT



SPECIFICATIONS:

POWERTRONIX low impedance MIUs – Medical Isolation Units – provide protection from overload and short circuit conditions, they completely eliminate ground-loop problems and insulate connected equipment against potentially harmful leakage currents. POWERTRONIX MIUs are available in computer gray, metal enclosures, and they are provided with hospital grade receptacles.

A variety of voltage ratings, enclosures, connectors, and features (such as over-temperature protection, ground-fault interruption, and soft start) are available.

APPLICATIONS:

Powertronix MIUs are used with medical and dental instruments, EEG monitors, electro-surgical equipment, medical lasers, NMR equipment, scanners and ultrasonic devices.

SPECIFICATIONS

- **Input Voltage:** 120 V or 230 V
- **Output Voltage:** 120 V or 230 V
- **Power Range:** 500 VA – 5,000 VA
- **Frequency:** 47 Hz
- **Isolation:** 4,000 VRMS
- **Leakage current:** < 50 µA
- **Voltage tolerance:** 3%

Safety Approvals:

- UL 2601
- CSA 22.2, No. 66
- CE Marking

Built to:

- IEC 601.1
- VDE 750 Part 1
- CSA 22.2 No. 601.1-M90

Part Number	Power (VA)	Dimensions L x W x H	Weight (lbs)
MIU 0500	500	11″ x 8″ x 5.2″	12
MIU 1000	1000	11″ x 8″ x 5.2″	18
MIU 1500	1500	12″ x 11″ x 5.2″	24
MIU 2000	2000	12″ x 11″ x 5.2″	29
MIU 2500	2500	17″ x 11″ x 5.2″	36
MIU 3000	3000	17″ x 11″ x 5.2″	45
MIU 4000	4000	17″ x 11″ x 5.2″	56
MIU 5000	5000	17″ x 11″ x 5.2″	62

Call or Fax for Our Complete Catalog

See our pages in Volume D, Section 4050

Powertronix • 1125 E. Hillsdale Blvd., Bldg. 108, Foster City, CA 94404
Tel: (650) 345-6800 • Fax: (650) 345-7240
e-mail: sales@powertronix.com • web site: www.powertronix.com

POWERTRONIX

CUSTOM MADE TOROIDAL POWER TRANSFORMERS

DESCRIPTION:

POWERTRONIX Custom made Toroidal Power Transformers are designed and made according to customer specification.

MOUNTING:

- One metal disk and two rubber gaskets
- Center-potted with a thru-hole
- Cylindrically encapsulated
- Flange mounted

LEAD TERMINATIONS:

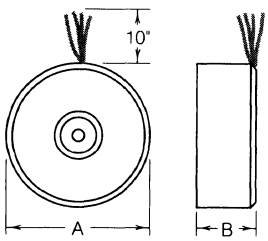
- Solid wires in a sleeving
- Stranded flexible wires
- Leads terminated with AMP, MOLEX, CORCOM or other customer specified terminals

SPECIFICATIONS:

- **Power:** 18 VA – 10,000 VA
- **Frequency:** 47 Hz – 2,000 Hz
- **Primary:** Customer specified
- **Secondary:** Customer specified
- **Efficiency:** 98% – 85%
- **Isolation:** 4,000 VRMS
- **Creepage:** Minimum 8 mm
- **Temperature rise:** Customer specified
- **Voltage tolerance:** Better than 3%

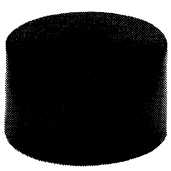
SAFETY APPROVALS:

- UL 506 (File # E 142730)
- UL 544 (File # E 151895)
- UL 2601(File # E 151895)
- CSA 22.2, No. 66 (File # LR 78662)

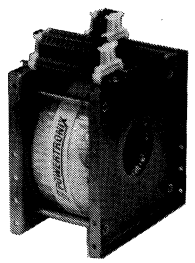


METAL DISK MOUNTED

CYLINDRICALLY ENCAPSULATED



FLANGE MOUNTED



Power (VA)	No-load loss (W)	Copper loss (W)	Dimensions A x B (inches)	Weight (lbs)	Dimensions A x B (inches)	Weight (lbs)	Dimensions L x W x H	Weight (lbs)
18	0.3	3.5	2.4" x 1.4"	0.7	2.6" x 1.6"	0.9		
36	0.4	7.0	2.8" x 1.5"	1.1	2.9" x 1.6"	1.2		
60	0.6	11.0	3.2" x 1.7"	1.5	3.4" x 1.7"	1.8		
70	0.7	13.5	3.2" x 1.8"	3.2	3.8" x 1.8"	2.4		
80	0.8	15.5	3.8" x 1.6"	2.6	4.1" x 1.8"	2.7	4.0" x 2.4" x 5.0"	2.7
100	0.8	17.9	3.9" x 1.8"	2.8	4.1" x 1.8"	2.9	4.0" x 2.5" x 5.0"	3.3
125	1.0	20.0	3.9" x 2.0"	2.9	4.1" x 2.0"	3.1	4.0" x 2.7" x 5.0"	3.5
155	1.3	22.5	4.4" x 1.6"	3.7	5.0 x 2.1"	4.1	4.7" x 2.6" x 5.7"	4.1
200	1.6	25.0	4.4" x 1.9"	4.2	5.0" x 2.1"	4.6	4.7" x 2.9" x 5.7"	4.6
250	2.1	25.0	4.4" x 2.4"	5.5	5.0" x 2.6"	5.9	4.7" x 3.4" x 5.7"	5.9
325	2.2	30.0	4.4" x 2.7"	6.2	5.5" x 2.7"	6.6	4.7" x3.7" x 5.7"	7.2
440	2.7	36.0	5.3" x 2.4"	7.5	5.8" x 3.5"	9.3	5.7" x 3.4" x 6.7"	9.3
585	3.3	39.0	5.3" x 2.8"	9.0	5.8" x 3.5"	9.9	5.7" x 3.8" x 6.7"	10.8
690	4.0	43.0	5.4" x 3.2"	11.0	6.0 x 3.4"	12.4	5.7" x 4.5" x 6.7"	12.8
800	4.4	48.0	6.3" x 2.5"	12.1			6.9" x 3.8" x 8.0"	13.9
990	5.1	53.0	6.4" x 3.0"	13.4			6.9" x 4.3" x 8.0"	15.2
1100	6.1	55.0	6.4" x 3.3"	15.6			6.9" x 4.6" x 8.0"	17.4
1300	6.3	63.0	7.9" x 2.6"	19.4			8.3" x 3.9" x 9.6"	22.0
1600	7.1	65.0	7.9" x 3.0"	23.1			8.3" x 4.3" x 9.6"	26.4
1900	8.2	69.0	7.9" x 3.3"	26.4			8.3" x 4.6" x 9.6"	28.6
2200	9.1	77.0	8.7" x 3.3"	28.6			8.9" x 4.6" x 10.4"	33.0
2500	9.7	82.0	8.7" x 3.5"	33.0			8.9" x 4.8" x 10.4"	37.4
2800	11.0	93.0	9.7" x 3.2"	35.2			9.8" x 4.9" x 11.4"	39.6
3200	13.0	97.0	9.7" x 3.5"	41.8			9.8" x 5.2" x 11.4"	46.2
3700	15.0	102.0	9.7" x 3.9"	46.2			9.8" x 5.6" x 11.4"	52.8
4400	17.0	117.0	10.8" x 3.7"	52.8			11.2" x 5.4" x 13.2"	61.6
5000	20.0	125.0	10.8" x 4.1"	61.6			11.2" x 5.8" x 13.2"	68.2
6300	27.0	140.0	12.4" x 4.7"	74.8			13.8" x 6.4" x 15.8"	81.4
8000	28.0	150.0	13.4" x 4.7"	88.0			13.8" x 6.8" x 15.8"	96.8
10000	30.0	160.0	13.4" x 5.9"	118.8			13.8" x 7.6" x 15.8"	127.6

All data are typical values and subject to change without prior notice

See our pages in Volume D, Section 4050

Powertronix • 1125 E. Hillsdale Blvd., Bldg. 108, Foster City, CA 94404
Tel: (650) 345-6800 • Fax: (650) 345-7240
e-mail: sales@powertronix.com • web site: www.powertronix.com

Custom Transformers and Magnetics

The Source for Prototypes Thru Production

INDUSTRIAL / MILITARY / AEROSPACE

We Offer All Of These Types

- 400 Hz
- Audiotransformers
- Autotransformers
- Bias & Bridging
- Cast Coil
- Choppers
- DC to DC Converters
- Data Bus Couplers
- Decade
- Differential
- Discriminators
- Drivers
- External Power Sources
- Ferroresonants
- Filament
- Flyback
- High Voltage
- Horizontal Sweep
- Hybrids
- IF's
- Input
- Instrument
- Interface & Coupling
- Interstage
- Inverters
- Isolation
- Isolation for LANs
- Line
- Magnetic Amplifiers
- Matching
- Microphone
- Mixers
- Modem Couplers
- Modulation
- Output
- Plate
- Power
- Power Distribution
- Pulse
- Ratio
- Rectifier
- RF
- Scott-T
- Servo
- Split Bobbin
- Surface Mount
- Switching Power
- Synchro Control
- Telephone Coupling
- Toroidals
- Transistor
- Voltage Dividing
- Voltage Regulating
- Wideband

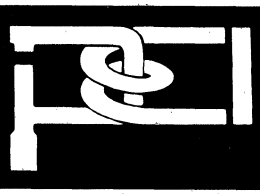
Capabilities

- MIL-T-27
- MIL-STD-2000
- MIL-I-45208
- Design to UL, CSA, etc...
- 100% Testing
- Thermal Shook Burn-in
- Dielectric to 60kVac
- Corona Free to 50kVac
- NC Machine Shop
- 20,000 Design in-House
- Milliwatts to 30kW 3 Phase
- Freq. Up to 250mHz
- All Temperature Classes

Precision Electronics since 1959, has been a source for a wide variety of custom magnetics for Military and Industrial applications.

- DRY • OPEN
- VANISHED
- EPOXY/RTV FILLED/MOLDED
- OIL/SILICONE FILLED
- HERMETICALLY SEALED
- LOW PROFILE
- TOROIDAL

Call for Engineering Assistance



PRECISION ELECTRONICS, INC.
1 DI TOMAS CT., COPIAGUE, N.Y. 11726
TEL: (516) 842-4900
FAX: (516) 842-4904
E-MAIL:3288@SSHARE.COM

400 HZ Military/Industrial Power Transformers 60 HZ

FREQUENCY 380-1000 Hz

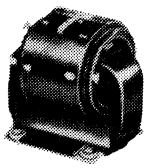


Fig.	Cat. No.	Sec. Volts	Sec. Amp.	Insul. (VRMS)	Pri. Volts	Size
2	4C1	6.3 CT	0.8	1500	115	SM3
2	4C2	6.3 CT	1.2	1500	115	SM2
2	4C3	6.3 CT	6.8	1500	110/115/120	2
3	4C4	6.3 6.3	4.9 2.7	1500	115	3
2	4C5	6.3 CT	7.2	1500	115	35
4	4C6	6.3 6.3 6.3	7 7 1.5	1500 1500 1500	120	35
5	4C7	6.3 CT 6.3 CT	7 7	1500 1500	120	4
4	4C8	6.3 6.3 6.3	13.7 2.9 0.3	1500 1500 1500	115	4
2	4C9	6.3 CT	12.3	1500	115	5
4	4C11	6.3 6.3 6.3	2.4 2.5 2.7	1500	115	3
2	4C26	6.3 CT	2	1500	115	SM1
2	4C27	6.3 CT	3	1500	115	1A
2	4C28	6.3 CT	5	1500	115	2
2	4C29	5 CT	3	2500	115	SM1
2	4C30	5 CT	6	2500	115	2
2	4C31	8.5 CT	12	1500	115	5
2	4C32	8.5 CT	23	1500	115	7
2	4C33	8.5 CT	35	1500	115	8
2	4C34	8.5 CT	45	1500	115	9
1	4C12	14.1	3	1500	115	3
2	4C35	21 CT	4.5	1500	115	5
2	4C13	21 CT	9	1500	115	7
2	4C36	21 CT	18	1500	115	9
2	4C10	20 CT	0.6	1500	115	SM1
2	4C37	21 CT	24	1500	115	10
2	4C38	24 CT	4	1500	115	5
2	4C39	24 CT	8	1500	115	7
2	4C40	24 CT	16	1500	115	9
2	4C41	24 CT	21	1500	115	10
1	4C14	26	0.5	1500	115	SM1
2	4C15	26 CT	1.5	1500	115	3
2	4C23	26 CT	3	1500	115	4
2	4C24	26 CT	5	1500	115	6
5	4C16	28 CT 6.3 CT	0.8 7	1500	115	3
2	4C42	41 CT	2.3	1500	115	5
2	4C43	41 CT	4.5	1500	115	7
2	4C44	41 CT	9	1500	115	9
2	4C45	41 CT	12	1500	115	10
2	4C46	48 CT	2	1500	115	5
2	4C47	48 CT	4	1500	115	7
2	4C48	48 CT	8	1500	115	9
2	4C49	48 CT	10	1500	115	10
2	4C25	52 CT	2	1500	115	5
2	4C17	52 CT	0.2	1500	115	SM1
2	4C18	90 CT	4.5	1500	115	9
1	4C19	115	.05	1500	115	SM2
1	4C21	115	2.8	1500	115	8
6	4C20	105/115/125	0.4	1500	105/115/125	2
6	4C50	105/115/125	1	1500	105/115/125	6
6	4C51	105/115/125	2.4	1500	105/115/125	8
6	4C52	105/115/125	3.2	1500	105/115/125	9
6	4C53	105/115/125	4	1500	105/115/125	10
1	4C22	334	.025	1500	115	SM1

FIG. 1

FIG. 2

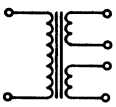


FIG. 3

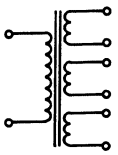


FIG. 4

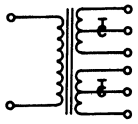


FIG. 5

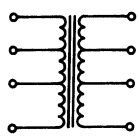
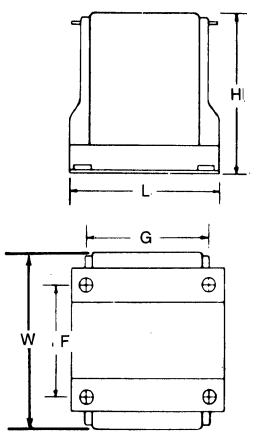


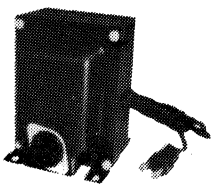
FIG. 6



SIZE	OVERALL DIMENSIONS (NOTE 4) L	W	H	MTG. DIMENSIONS F	G	APP. WT. (LBS)	MTG. METH.
SM 3	1.00	1.25	1.19	1.00	Note 1	.06	Note 1
SM 2	1.50	1.25	1.69	1.00	Note 1	.10	Note 1
SM 1	1.50	1.50	1.69	1.13	Note 1	.16	Note 1
1A	1.69	1.53	1.81	1.16	1.13	.25	Note 2
2	2.00	1.94	2.13	1.28	1.25	.40	Note 2
3	2.31	1.81	2.13	1.28	1.44	.45	Note 2
35	2.06	2.38	2.19	1.53	1.69	.70	Note 2
4	2.31	2.38	2.56	1.53	1.69	.90	Note 2
5	2.75	2.38	2.88	1.53	2.19	1.20	Note 2
6	2.75	2.63	3.13	1.53	2.19	1.50	Note 2
7	3.00	2.88	3.38	1.78	2.5	2.00	Note 2
8	3.38	2.88	3.38	1.78	2.5	2.50	Note 2
9	4.06	3.38	3.88	2.19	3.50	5.00	Note 3
10	4.50	3.94	3.94	2.75	3.13	6.00	Note 3

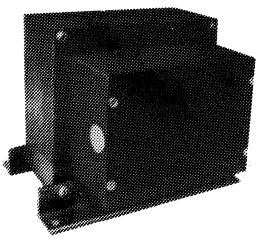
Note 1 — SM series are two hole mounting with holes on center line. #4-40 Pem nuts are fastened to the bracket.
Note 2 — #6-32 Pem nuts on bracket are standard.
Note 3 — #8-32 Pem nuts on bracket are standard.
Note 4 — Overall dimensions approximate; given for reference only
Note 5 — MTG dimensions tolerance ±.010

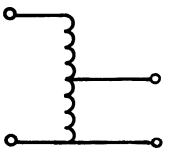
• Encapsulant: filled semi-rigid, cycloaliphatic epoxy resin.



Style A

Style B





ISOLATION TRANSFORMERS

PRIMARY: 120 Volts • 50/60 HZ • Line Cord and Plug*
SECONDARY: 120 Volts • Standard Female Receptacle
• Electrostatic Shield • UL Approved Cord and Plug.

Cat. No.	VA Watts	Style	DIMENSIONS L	W	H	Mounting Centers M1	M2	Appr. Wt.
S1-50	50	A	2 29/32	3 7/16	3 1/2	2 1/4	1 13/16	3
S1-100	100	A	3 7/32	3 7/8	3 7/8	2 1/2	2 3/16	5
S1-150	150	A	3 17/32	4 3/8	4 1/4	2 3/4	2 13/16	7
S1-220	220	A	3 27/32	4 5/8	4 5/8	3	3 1/16	9.5
S1-330	330	A	4 17/32	5 1/4	5 7/16	3 1/2	3 1/4	14.5
S1-500	500	A	4 17/32	6 1/4	5 7/16	3 1/2	4 1/4	21
S1-700	700	A	5 1/2	5 15/16	6 9/16	4 1/4	3 1/2	25
S1-1000	1000	A	5 1/2	6 15/16	6 9/16	4 1/4	4 1/2	35
S1-1500	1500	B	9	7 3/4	6 5/16	8 1/4	4 3/8	42
S1-2200	2200	B	9	9 3/8	6 5/16	8 1/4	6	65
S1-3300	3300	B	9	11 5/8	6 5/16	8 1/4	8 1/4	95

* Style A Only; Style B — Knockouts for Conduit Connectors.

STEP-DOWN ISOLATION TRANSFORMERS

PRIMARY: 240 Volts • 50/60 HZ • Line Cord and Plug*
SECONDARY: 120 Volts • Standard Female Receptacle
• Electrostatic Shield • UL Approved Cord and Plug.

Cat. No.	VA Watts	Style	DIMENSIONS L	W	H	Mounting Centers M1	M2	Appr. Wt.
S2-50	50	A	2 29/32	3 7/16	3 1/2	2 1/4	1 13/16	3
S2-100	100	A	3 7/32	3 7/8	3 7/8	2 1/2	2 3/16	5
S2-150	150	A	3 17/32	4 3/8	4 1/4	2 3/4	2 13/16	7
S2-220	220	A	3 27/32	4 5/8	4 5/8	3	3 1/16	9.5
S2-330	330	A	4 17/32	5 1/4	5 7/16	3 1/2	3 1/4	14.5
S2-500	500	A	4 17/32	6 1/4	5 7/16	3 1/2	4 1/4	21
S2-700	700	A	5 1/2	5 15/16	6 9/16	4 1/4	3 1/2	25
S2-1000	1000	A	5 1/2	6 15/16	6 9/16	4 1/4	4 1/2	35
S2-1500	1500	B	9	7 3/4	6 5/16	8 1/4	4 3/8	42
S2-2200	2200	B	9	9 3/8	6 5/16	8 1/4	6	65
S2-3300	3300	B	9	11 5/8	6 5/16	8 1/4	8 1/4	95

* Style A Only; Style B — Knockouts for Conduit Connectors.

STEP-DOWN AUTO TRANSFORMERS

PRIMARY: 240 Volts • 50/60 HZ • Line Cord and Plug*
SECONDARY: 120 Volts • Standard Female Receptacle
• UL Approved Cord and Plug.

Cat. No.	VA Watts	Style	DIMENSIONS L	W	H	Mounting Centers M1	M2	Appr. Wt.
SA-100	100	A	2 29/32	3 7/16	3 1/2	2 1/4	1 13/16	3
SA-150	150	A	2 29/32	3 3/4	3 1/2	2 1/4	2 1/8	4
SA-200	200	A	3 7/32	3 7/8	3 7/8	2 1/4	2 3/16	5
SA-300	300	A	3 17/32	4 3/8	4 1/4	2 3/4	2 13/16	7
SA-450	450	A	3 27/32	4 5/8	4 5/8	3	3 1/8	9 1/2
SA-650	650	A	4 17/32	5 1/4	5 7/16	3 1/2	3 1/4	14 1/2
SA-1000	1000	A	4 17/32	6 1/4	5 7/16	3 1/2	4 1/4	21
SA-1500	1500	A	5 1/2	5 15/16	6 9/16	4 1/4	3 1/2	25
SA-2000	2000	A	5 1/2	6 15/16	6 9/16	4 1/4	4 1/2	35
SA-3000	3000	B	9	7 3/4	6 5/16	8 1/4	4 3/8	42
SA-4500	4500	B	9	9 3/8	6 5/16	8 1/4	6	65
SA-6500	6500	B	9	11 5/8	6 5/16	8 1/4	8 1/4	95
SA-8000**	8000	B	10 5/8	9 5/8	8 1/4	9 5/8	6 1/8	90
SAB-5300†	5300	A	5 3/4	8 5/16	4	3 3/4	6 1/2	17.5

* Style A Only **60 HZ Only Style B — Knockouts for Conduit Connector
† Step-up/down Auto Transformer. Connections for 208/230 V or 230/208 V, 23 Amp 50/60 HZ

Call for Engineering Assistance

PRECISION ELECTRONICS, INC.
1 DI TOMAS CT., COPIAGUE, N.Y. 11726
TEL: (516) 842-4900
FAX: (516) 842-4904
E-MAIL: 3288@sshare.com

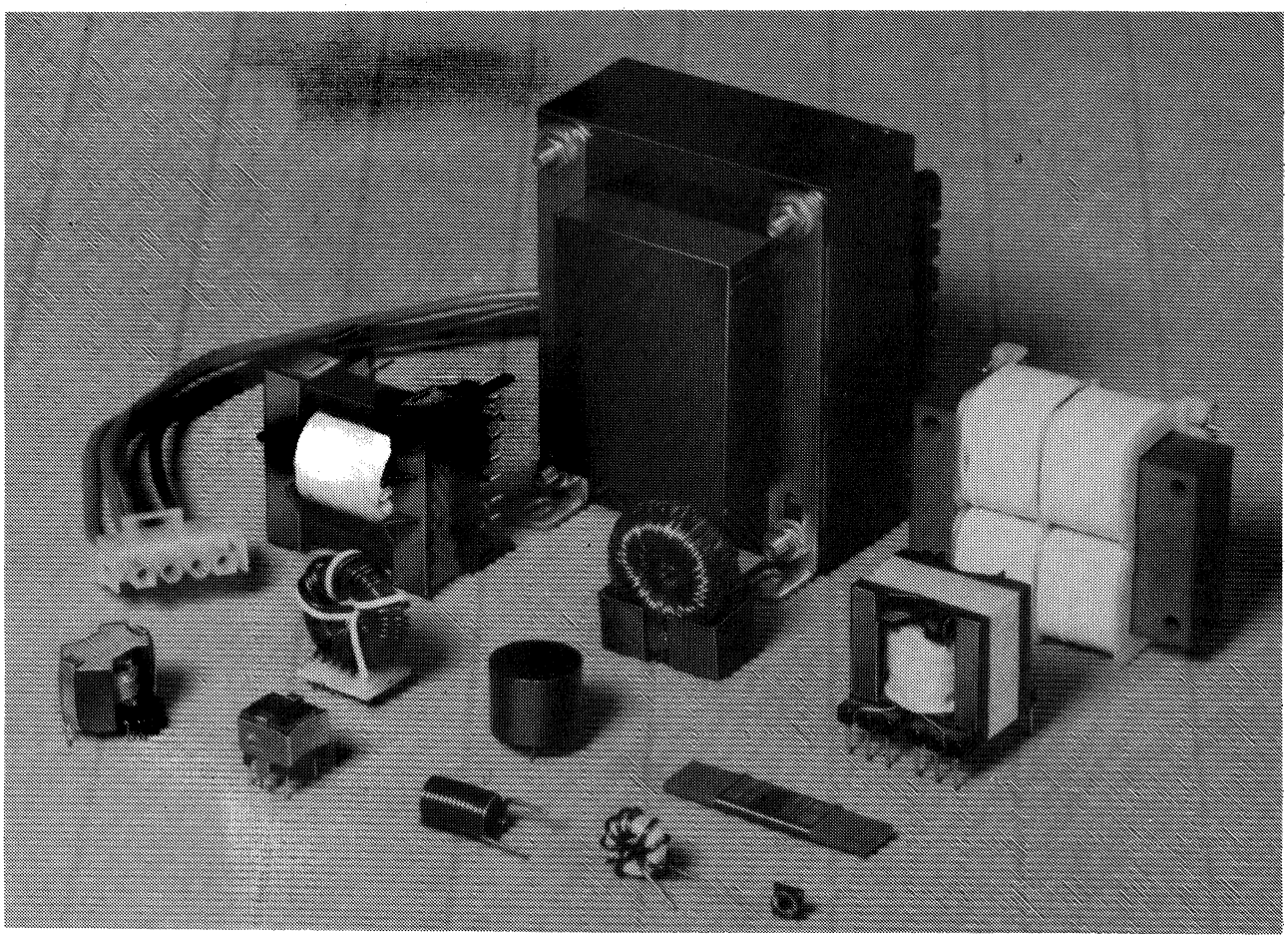
Precision Incorporated, *founded in 1964,*

has reliably delivered confidence with every order we produce.

Our commitment to quality and service continues to grow through:

We Build Confidence

- Applications Engineering Assistance
- Flexible delivery to meet your requirements
- Responsive Customer Service
- Quality to exacting specifications
- 28 + years experience in magnetic components
- Prototype through Production Support
- Products meeting the requirements of UL, CSA, IEC, VDE and Mil-T-27



We specialize in:

- Switching Power Supply Transformers & Inductors
- Driver Transformers
- Filter Inductors
- Common Mode Chokes
- Pulse Transformers
- Trigger Transformers
- Linear Transformers 50/60 Hz
- Low Profile Transformers and Inductors
- Balun Transformers
- Current Sense Transformers
- Signal Transformers
- Isolation Transformers
- Toroidal Inductors & Transformers
- Antenna Coils
- Air Core Inductors
- Surface Mount Components
- Your custom requirements

Buy confidence, not just another transformer. Call us today.

PI PRECISION INCORPORATED

1800 Freeway Blvd. • Minneapolis, MN 55430
800-749-3677 • Fax 612 / 561-9050

Low Profile PC Power Transformers

Low Profile - Low Price!

▲ Superior Design

- Three flange bobbin design.
- No electrostatic shield required.
- Anchor, insulating and crossover tapes.
- Two distinct, separate windings for each primary and secondary assure excellent HIPOT capability between these dual winding.
- Immersed in 100% solids epoxy resin to withstand most aqueous and solvent cleaning systems.

▲ 100% Final Tested

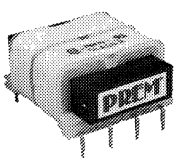
- Every single transformer is tested on automated panels for induced voltage (shorted turns), exciting current, open circuit voltage (turns ratio), polarity (phasing) and dielectric strength.

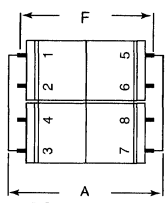
Note: Other primary and secondary voltages may be custom designed to your specifications. Since 12 terminals are available, tapped primaries or secondaries may also be utilized. (Only 8 terminals are available on the SPW-2100 series.)

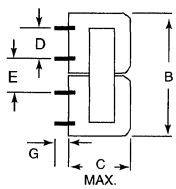
▲ VDE - Approved Low Profile Transformers are interchangeable with Non-VDE Units

- SPW-2100 and SPW-2300 have the same pin configuration as our SPW-100 and SPW-300, low profile models (and competitors parts).
- SPW-2400 is pin compatible with industry standard 24.0 VA low profile power transformers available from multiple sources.
- Bobbin and shroud material: UL94V0.
- Hipot rating: 4,500 VRMS from primaries to secondaries.
- Shrouded primaries.

Use Mastercard or Visa
BUY PREM DIRECT (815) 385-2700
MasterCard VISA
Fax: (815) 385-8578
E-Mail: sales@premmag.com
Visit our Website:
http://www.premmag.com

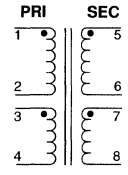






PIN DIMENSION
.020" X .041"
(.508 X 1.041)

SPW-050
2.5 VA
SPW-100
6.0 VA
SPW-150
9.0 VA
SPW-300
12.0 VA

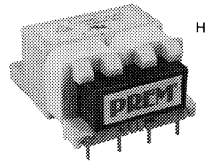


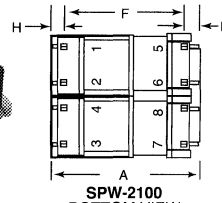
External connections:
Parallel 1-3, 2-4, 5-7, 6-8
Series 2-3, 6-7

• Indicates like polarity ( ) = mm

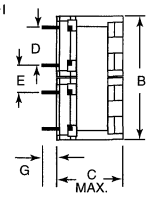
HIPOT rating: 1500 VRMS from primaries to secondaries

UL - #506, #1446
CSA - #22.2 No. 66 - 1956 General Purpose





SPW-2100
BOTTOM VIEW



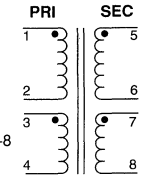
PIN DIMENSION
.025" SQ. (.635)

SPW-2100
6.0 VA

Note: Primary and secondary windings are designed to be used as one primary and one secondary winding with either parallel or series connection only.

• Indicates like polarity

( ) = mm



External connections:
Parallel 1-3, 2-4, 5-7, 6-8
Series 2-3, 6-7

HIPOT rating: 4500 VRMS from primaries to secondaries

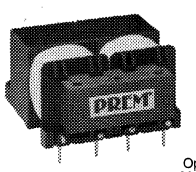
UL - #1950, #1585 (Class II, III), #1446
CSA - #22.2 No. 234M90
IEC - #950
VDE - #0805 (EN 60950)

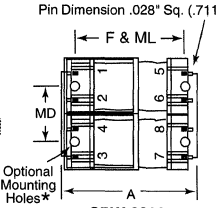
PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

Low Profile PC Power Transformers

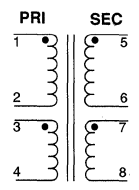
PREM	SPW-050	SPW-100	SPW-150	SPW-300	SPW-2100	SPW-2300	SPW-2400
VA	2.5	6.0	9.0	12.0	6.0	12.0	24.0
A	1.875" (47.63)	1.875" (47.63)	1.875" (47.63)	2.500" (63.50)	1.950" (49.53)	2.500" (63.50)	2.870" (72.90)
B	1.562" (39.69)	1.562" (39.69)	1.562" (39.69)	2.000" (50.80)	1.562" (39.69)	2.000" (50.80)	2.250" (57.15)
C	.660" (16.76)	.850" (21.59)	1.080" (27.43)	1.065" (27.05)	.890" (22.61)	1.065" (27.05)	1.300" (33.02)
D	.375" (9.53)	.375" (9.53)	.375" (9.53)	.500" (12.70)	.375" (9.53)	.500" (12.70)	0.600" (15.24)
E	.375" (9.53)	.375" (9.53)	.375" (9.53)	.500" (12.70)	.375" (9.53)	.500" (12.70)	0.530" (13.46)
F	1.600" (40.64)	1.600" (40.64)	1.600" (40.64)	2.00" (50.80)	1.600" (40.64)	2.00" (50.80)	1.900" (48.26)
G	.200" (5.08)	.200" (5.08)	.200" (5.08)	.200" (5.08)	.200" (5.08)	.200" (5.08)	0.200" (5.08)
H	•	•	•	•	.210" (5.33)	•	•
I	•	•	•	•	.140" (3.56)	•	•
MD	•	•	•	•	•	1.000" (25.4)	•
ML	•	•	•	•	•	2.000" (50.80)	2.410" (61.21)
Screw Size	•	•	•	•	•	#4	#4

( )= mm



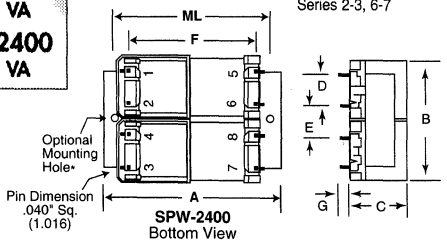


SPW-2300
BOTTOM VIEW



External connections:
Parallel 1-3, 2-4, 5-7, 6-8
Series 2-3, 6-7

SPW-2300
12.0 VA
SPW-2400
24.0 VA



SPW-2400
Bottom View

Note: Primary and secondary windings are designed to be used as one primary and one secondary winding with either parallel or series connection only.

*** Refer to technical bulletin #214** • Indicates like polarity
HIPOT rating: 4500 VRMS from primaries to secondaries.

Safety Agency Approvals SPW-2300

UL - #1950, #1585 (Class II, III), #1446
IEC - #950
VDE- #0805 (EN 60950)

Safety Agency Approvals SPW-2400

UL - #1950, #1585 (Class II, III), #1446
CSA - #22.2 No. 234M90
IEC - #950
VDE - #0805 (EN 60950)

( ) = mm

VA	PART NUMBERS 115V/230 Dual Primaries		Secondary	
	DOMESTIC (U.S./ CANADA)	V.D.E. APPROVED	PARALLEL	SERIES
2.5	SPW-050	SPW-3050**	5V @ 500 mA	10V CT @ 250 mA
	SPW-051	SPW-3051**	6.3V @ 400 mA	12.6V CT @ 200 mA
	SPW-052	SPW-3052**	8V @ 300 mA	16V CT @ 150mA
	SPW-053	SPW-3053**	10V @ 250 mA	20V CT @ 125 mA
	SPW-054	SPW-3054**	12V @ 200 mA	24V CT @ 100 mA
	SPW-055	SPW-3055**	17V @ 150 mA	34V CT @ 75 mA
	SPW-056	SPW-3056**	20V @ 120 mA	40V CT @ 60 mA
	SPW-057	SPW-3057**	28V @ 90 mA	56V CT @ 45 mA
	SPW-058	SPW-3058* **	44V @ 56 mA	88V CT @ 28 mA
	SPW-059	SPW-3059* **	60V @ 40 mA	120V CT @ 20 mA
	SPW-060	SPW-3060* **	115V @ 20 mA	230V CT @ 10 mA
	SPW-061	SPW-3061**	15V @ 170 mA	30V CT @ 85 mA
6.0	SPW-100	SPW-2100	5V @ 1.2A	10V CT @ 600 mA
	SPW-101	SPW-2101	6.3V @ 900 mA	12.6V CT @ 450 mA
	SPW-102	SPW-2102	8V @ 700 mA	16V CT @ 350 mA
	SPW-103	SPW-2103	10V @ 600 mA	20V CT @ 300 mA
	SPW-104	SPW-2104	12V @ 500 mA	24V CT @ 250 mA
	SPW-105	SPW-2105	17V @ 340 mA	34V CT @ 170 mA
	SPW-106	SPW-2106	20V @ 300 mA	40 V CT @ 150 mA
	SPW-107	SPW-2107	28V @ 200 mA	56V CT @ 100 mA
	SPW-108	SPW-2108*	44V @ 130 mA	88V CT @ 65 mA
	SPW-109	SPW-2109*	60V @ 100 mA	120V CT @ 50 mA
	SPW-110	SPW-2110*	115V @ 50 mA	230V CT @ 25 mA
	SPW-111	SPW-2111	15V @ 400 mA	30V CT @ 200 mA
9.0	SPW-150	†	5V @ 1.80A	10V CT @ 900 mA
	SPW-151	†	6.3V @ 1.43A	12.6V CT @ 715 mA
	SPW-152	†	8V @ 1.125A	16V CT @ 562 mA
	SPW-153	†	10V @ 900 mA	20V CT @ 450 mA
	SPW-154	†	12V @ 750 mA	24V CT @ 375 mA
	SPW-155	†	17V @ 530 mA	34V CT @ 265 mA
	SPW-156	†	20V @ 450 mA	40V CT @ 225 mA
	SPW-157	†	28V @ 322 mA	56V CT @ 161 mA
	SPW-158	†	44V @ 204 mA	88V CT @ 102 mA
	SPW-159	†	60V @ 150 mA	120V CT @ 75 mA
	SPW-160	†	115V @ 78 mA	230V CT @ 39 mA
	SPW-161	†	15V @ 600 mA	30V CT @ 300 mA
12.0	SPW-300	SPW-2300	5V @ 2.4A	10V CT @ 1.2A
	SPW-301	SPW-2301	6.3V @ 1.8A	12.6V CT @ 900 mA
	SPW-302	SPW-2302	8V @ 1.4A	16V CT @ 700 mA
	SPW-303	SPW-2303	10V @ 1.2A	20V CT @ 600 mA
	SPW-304	SPW-2304	12V @ 1.0A	24V CT @ 500 mA
	SPW-305	SPW-2305	17V @ 680 mA	34V CT @ 340 mA
	SPW-306	SPW-2306	20V @ 600 mA	40V CT @ 300 mA
	SPW-307	SPW-2307	28V @ 400 mA	56V CT @ 200 mA
	SPW-308	SPW-2308*	44V @ 260 mA	88V CT @ 130 mA
	SPW-309	SPW-2309*	60V @ 200 mA	120V CT @ 100 mA
	SPW-310	SPW-2310*	115V @ 100 mA	230V CT @ 50 mA
	SPW-311	SPW-2311	15V @ 800 mA	30V CT @ 400 mA
24.0	SPW-2400	SPW-2400	5V @ 4.80A	10V CT @ 2.4 A
	SPW-2401	SPW-2401	6.3V @ 3.80A	12.6V CT @ 1.9A
	SPW-2402	SPW-2402	8V @ 3.0A	16V CT @ 1.5A
	SPW-2403	SPW-2403	10V @ 2.4A	20V CT @ 1.2A
	SPW-2404	SPW-2404	12V @ 2.0A	24V CT @ 1.0A
	SPW-2405	SPW-2405	17V @ 1.40A	34V CT @ 700 mA
	SPW-2406	SPW-2406	20V @ 1.2A	40V CT @ 600 mA
	SPW-2407	SPW-2407	28V @ 850 mA	56V CT @ 425 mA
	SPW-2408*	SPW-2408*	44V @ 540 mA	88V CT @ 270 mA
	SPW-2409*	SPW-2409*	60V @ 400 mA	120V CT @ 200 mA
	SPW-2410*	SPW-2410*	115V @ 200 mA	230V CT @ 100 mA
	SPW-2411	SPW-2411	15V @ 1.6 A	30V CT @ 800 mA

*Voltage ratings cannot be approved under UL 1585 ** See I² Series page for dimensional data † Call factory for latest information

PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

International Series Power Transformers

Perhaps the Most Approved Transformers in the World!

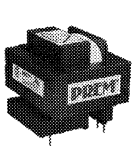
▲ Superior Design

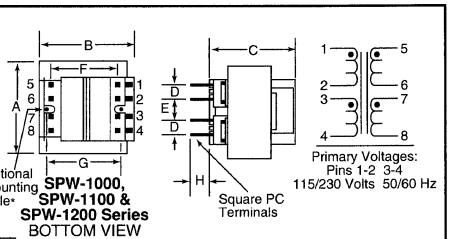
- Shrouded primaries/three flange bobbins
- No electrostatic shield required.
- Immersed in 100% solids epoxy to withstand most aqueous and solvent cleaning systems.
- Anchor, insulating and crossover tapes, and shrouded primaries.
- Two distinct, separate windings for each primary and secondary assure excellent HIPOT capability between these dual windings.
- Bobbin and shroud material - UL94V0.

▲ 100% Final Tested

- Every transformer is tested on automated panels for induced voltage (shorted turns), exciting current, open circuit voltage (turns ratio), polarity (phasing) and dielectric strength.
- 4500 VRMS dielectric strength (HIPOT) pri - sec

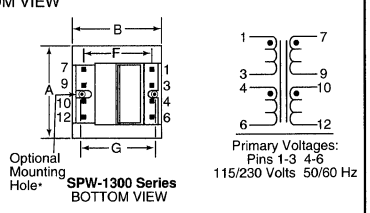
VA	Part No.	Secondary RMS Rating	
		Parallel	Series
2.5	SPW-1000	5V @ 500 mA	10V CT @ 250 mA
	SPW-1001	6.3V @ 400 mA	12.6V CT @ 200 mA
	SPW-1002	8V @ 300 mA	16V CT @ 150 mA
	SPW-1003	10V @ 240 mA	20V CT @ 120 mA
	SPW-1004	12V @ 200 mA	24V CT @ 100 mA
	SPW-1005	14V @ 180 mA	28V CT @ 90 mA
	SPW-1006	18V @ 140 mA	36V CT @ 70 mA
5.0	SPW-1100	5V @ 1.0A	10V CT @ 500 mA
	SPW-1101	6.3V @ 800 mA	12.6V CT @ 400 mA
	SPW-1102	8V @ 620 mA	16V CT @ 310 mA
	SPW-1103	10V @ 500 mA	20V CT @ 250 mA
	SPW-1104	12V @ 420 mA	24V CT @ 210 mA
	SPW-1105	14V @ 360 mA	28V CT @ 180 mA
	SPW-1106	18V @ 280 mA	36V CT @ 140 mA
10.0	SPW-1200	5V @ 2.0A	10V CT @ 1.0A
	SPW-1201	6.3V @ 1.6A	12.6V CT @ 800 mA
	SPW-1202	8V @ 1.25A	16V CT @ 620 mA
	SPW-1203	10V @ 1.0A	20V CT @ 500 mA
	SPW-1204	12V @ 840 mA	24V CT @ 420 mA
	SPW-1205	14V @ 720 mA	28V CT @ 360 mA
	SPW-1206	18V @ 560 mA	36V CT @ 280 mA
20.0	SPW-1300	5V @ 4.0A	10V CT @ 2.0A
	SPW-1301	6.3V @ 3.2A	12.6V CT @ 1.6A
	SPW-1302	8V @ 2.5A	16V CT @ 1.25A
	SPW-1303	10V @ 2.0A	20V CT @ 1.0A
	SPW-1304	12V @ 1.66A	24V CT @ 830mA
	SPW-1305	14V @ 1.44A	28V CT @ 720 mA
	SPW-1306	18V @ 1.12A	36V CT @ 560 mA





SPW-1000, SPW-1100 & SPW-1200 Series
BOTTOM VIEW

SPW-1000
2.5 VA
SPW-1100
5.0 VA
SPW-1200
10.0 VA
SPW-1300
20.0 VA



SPW-1300 Series
BOTTOM VIEW

* Refer to technical bulletin #214
• Indicates like polarity

Note: Primary and secondary windings are designed to be used as one primary and one secondary winding with either parallel or series connection only.

UL - #1950, #1585 Class II, III. #1446
CSA - #22.2 No. 66 - 1988 General Purpose
IEC - #950
VDE - #0805, EN 60950

PREM	SPW-1000	SPW-1100	SPW-1200	SPW-1300
VA	2.5	5.0	10.0	20.0
A	1.625" (41.28)	1.625" (41.28)	1.875" (47.63)	2.250" (57.15)
B	1.440" (36.58)	1.440" (36.58)	1.585" (40.26)	1.875" (47.63)
C	1.125" (28.58)	1.375" (34.93)	1.375" (34.93)	1.625" (41.28)
D	0.200" (5.08)	0.200" (5.08)	0.200" (5.08)	0.400" (10.16)
E	0.250" (6.35)	0.400" (10.16)	0.400" (10.16)	0.400" (10.16)
F	1.000" (25.40)	1.000" (25.40)	1.140" (28.96)	1.460" (37.08)
G	1.062" (26.97)	1.062" (26.97)	1.250" (31.75)	1.500" (38.10)
Screw Size	#4	#4	#4	#4
H	0.187"min. (4.75)	0.187"min. (4.75)	0.187"min. (4.75)	0.187"min (4.75)
Pin Size	0.025"sq. (.635 sq.)	0.025"sq. (.635 sq.)	0.036"sq. (.914 sq.)	0.036"sq. (.914 sq.)

( ) = mm

24 Hour Shipment on Small Quantities!
BUY PREM DIRECT (815) 385-2700
Fax: (815) 385-8578
E-Mail: sales@premmag.com
Visit our Website: http://www.premmag.com

PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

I² Series = International • Interchangeable
(Pin-out compatible for CE applications)

The I² Series International • Interchangeable

Specifically designed to offer an interchangeable standard series of international market transformers. These have the same pin-out and performance as existing domestic U.S. transformers.

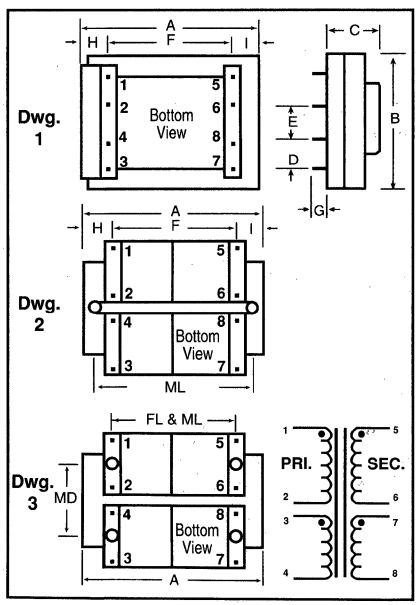
- Pin-out compatible parts to industry standard transformers for CE mark applicaitons
- Higher level of safety agency approval
- Increased safety

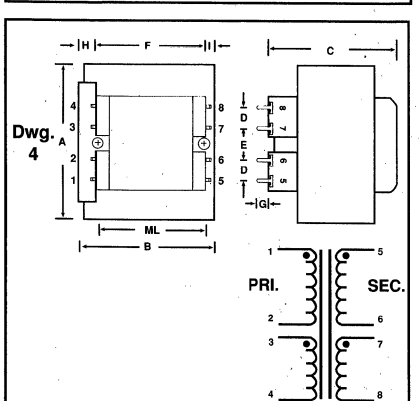
VA	I² Series SPW #	Domestic/U.S. SPW #	
2.5	SPW-3050	SPW-050	Refer to SPW-050 Series page for electrical parameters
	SPW-3051	SPW-051	
	SPW-3052	SPW-052	
	SPW-3053	SPW-053	
	SPW-3054	SPW-054	
	SPW-3055	SPW-055	
	SPW-3056	SPW-056	
	SPW-3057	SPW-057	
	SPW-3058*	SPW-058	
	SPW-3059*	SPW-059	
	SPW-3060*	SPW-060	
	SPW-3061	SPW-061	

VA	I² Series SPW #	Domestic/U.S. SPW #	
6.0	SPW-2100	SPW-100	Refer to SPW-100 Series page for electrical parameters
	SPW-2101	SPW-101	
	SPW-2102	SPW-102	
	SPW-2103	SPW-103	
	SPW-2104	SPW-104	
	SPW-2105	SPW-105	
	SPW-2106	SPW-106	
	SPW-2107	SPW-107	
	SPW-2108*	SPW-108	
	SPW-2109*	SPW-109	
	SPW-2110*	SPW-110	
	SPW-2111	SPW-111	

VA	I² Series SPW #	Domestic/U.S. SPW #	
12.0	SPW-2300	SPW-300	Refer to SPW-300 Series page for electrical parameters
	SPW-2301	SPW-301	
	SPW-2302	SPW-302	
	SPW-2303	SPW-303	
	SPW-2304	SPW-304	
	SPW-2305	SPW-305	
	SPW-2306	SPW-306	
	SPW-2307	SPW-307	
	SPW-2308*	SPW-308	
	SPW-2309*	SPW-309	
	SPW-2310*	SPW-310	
	SPW-2311	SPW-311	

VA	I² Series SPW #	Domestic/U.S. Parts	
24.0	SPW-2400	Signal LP Style or Tamura PF Style or Hammend 229C Style	Refer to SPW-2400 Series page for electrical parameters
	SPW-2401		
	SPW-2402		
	SPW-2403		
	SPW-2404		
	SPW-2405		
	SPW-2406		
	SPW-2407		
	SPW-2408*		
	SPW-2409*		
	SPW-2410*		
	SPW-2411		





Note: Primary and secondary windings are designed to be used as one primary and one secondary winding with either parallel or series connection only.

Approvals received by I²

VDE - 0805 (EN60950)
UL - #1950 (IEC950)
UL - 1585 Class II, III
CSA - 22.2#234M90 (See Note)
Note: except SPW-2300 Series

VA	I² Series SPW #	Domestic/U.S. SPW #	
12.0	SPW-3600	SPW-600-D	Refer to SPW-600-D Series page for electrical parameters
	SPW-3601	SPW-601-D	
	SPW-3602	SPW-602-D	
	SPW-3603	SPW-603-D	
	SPW-3604	SPW-604-D	
	SPW-3605	SPW-605-D	
	SPW-3606	SPW-606-D	
	SPW-3607	SPW-607-D	
	SPW-3608	SPW-608-D	
	SPW-3609*	SPW-609-D	

24 Hour Shipment on Small Quantities!
BUY PREM DIRECT (815) 385-2700
Fax: (815) 385-8578
E-Mail: sales@premmag.com
Visit our Website: http://www.premmag.com

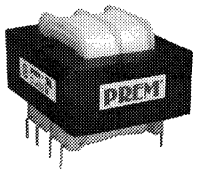
PREM	SPW-3050	SPW-2100	SPW-2300	SPW-2400	SPW-3600
VA	2.5	6.0	12.0	24.0	12.0
DWG #	1	2	3	2	4
A	2.030" (51.56)	1.950" (49.53)	2.500" (63.50)	2.870" (72.90)	1.875" (47.63)
B	1.510" (38.35)	1.562" (39.67)	2.000" (50.80)	2.250" (57.15)	1.600" (40.64)
C	0.720" (18.28)	0.890" (22.61)	1.065" (27.05)	1.30" (33.02)	1.630" (41.40)
D	0.375" (9.52)	0.375" (9.52)	0.500" (12.70)	0.600" (15.24)	0.300" (7.62)
E	0.375" (9.52)	0.375" (9.52)	0.500" (12.70)	0.530" (13.46)	0.400" (10.16)
F	1.600" (40.64)	1.600" (40.64)	2.000" (50.80)	1.900" (48.26)	1.410" (35.81)
G	0.200" (5.08)	0.200" (5.08)	0.200" (5.08)	0.200" (5.08)	0.250" (6.35)
H	0.230" (5.84)	0.210" (5.33)	•	•	0.110" (2.79)
I	0.200" (5.08)	0.140 (3.56)	•	•	0.080" (2.03)
MD	•	•	1.000" (25.4)	•	•
ML	•	•	2.000" (50.80)	2.410" (61.21)	1.250" (31.75)
Screw Size	•	•	#4	#4	#4

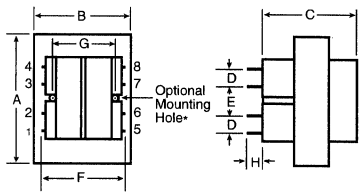
( ) = mm All dimensions reference

*Voltage ratings cannot be approved under UL 1585

PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

Power Transformers



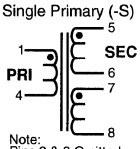


PIN DIMENSION
.020 X .041 (.508 X 1.041)

SPW-350 to SPW-620 Series
1.1 to 36 VA

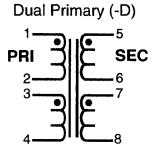
Bottom View

Single Primary (-S)



Note: Pins 2 & 3 Omitted

Dual Primary (-D)



• Indicates like polarity ( ) = mm

*** Refer to technical bulletin #214**
HIPOT rating: 2500 VRMS from primaries to secondaries

UL - #506, #1446
CSA - #22.2 No. 66 - 1956 General Purpose

Note: Other primary and secondary voltages may be custom-designed to your specifications.

PREM	SPW-350	SPW-400	SPW-500	SPW-600	SPW-610	SPW-620
VA	1.1	2.4	6.0	12.0	20.0	36.0
A	1.375" (34.93)	1.375" (34.93)	1.625" (41.28)	1.875" (47.63)	2.250" (57.15)	2.625" (66.68)
B	1.125" (28.58)	1.125" (28.58)	1.312" (33.32)	1.562" (39.69)	1.875" (47.63)	2.187" (55.55)
C	.9370" (23.81)	1.187" (30.15)	1.290" (32.77)	1.437" (36.51)	1.410" (35.81)	1.562" (39.69)
D	.2500" (6.35)	.2500" (6.35)	.2500" (6.35)	.3000" (7.62)	.3000" (7.62)	.4000" (10.16)
E	.2500" (6.35)	.2500" (6.35)	.3500" (8.89)	.4000" (10.16)	.4000" (10.16)	.4000" (10.16)
F	1.200" (30.48)	1.200" (30.48)	1.270" (32.26)	1.410" (35.81)	1.600" (40.64)	1.850" (46.99)
G	N/A	N/A	1.062" (26.99)	1.250" (31.75)	1.500" (38.10)	NOTE
Screw Size	N/A	N/A	#4	#4	#4	#6
H	.2000" (5.08)	.2000" (5.08)	.2000" (5.08)	.2000" (5.08)	.2000" (5.08)	.1870" (4.75)

*Voltage ratings cannot be approved under UL 1585 ( ) = mm

*** See I² Series page for dimensional data*

Note: 4 corner mounting holes on 2.187" (55.55mm) x 1.750" (44.45mm) centers. For additional information, see technical bulletin #214.

† Call factory for latest information

Note: Primary and secondary windings are designed to be used as one primary and one secondary winding with either parallel or series connection only.

VA	Part Number			Secondary	
	Single 115V 6 pin	Dual 115/230V 8 pin	V.D.E. Approved	Parallel	Series
1.1	SPW-350-S	SPW-350-D	†	5V @ 220 mA	10V CT @ 110 mA
	SPW-351-S	SPW-351-D	†	6.3V @ 180 mA	12.6V CT @ 90 mA
	SPW-352-S	SPW-352-D	†	8V @ 140 mA	16V CT @ 70 mA
	SPW-353-S	SPW-353-D	†	10V @ 110 mA	20V CT @ 55 mA
	SPW-354-S	SPW-354-D	†	12V @ 90 mA	24V CT @ 45 mA
	SPW-355-S	SPW-355-D	†	14V @ 80 mA	28V CT @ 40 mA
	SPW-356-S	SPW-356-D	†	18V @ 60 mA	36V CT @ 30 mA
	SPW-357-S	SPW-357-D	†	24V @ 46 mA	48V CT @ 23 mA
	SPW-358-S	SPW-358-D	†	28V @ 40 mA	56V CT @ 20 mA
	SPW-359-S	SPW-359-D	†	60V @ 20 mA	120V CT @ 10 mA
2.4	SPW-400-S	SPW-400-D	†	5V @ 500 mA	10V CT @ 250 mA
	SPW-401-S	SPW-401-D	†	6.3V @ 400 mA	12.6V CT @ 200 mA
	SPW-402-S	SPW-402-D	†	8V @ 300 mA	16V CT @ 150 mA
	SPW-403-S	SPW-403-D	†	10V @ 240 mA	20V CT @ 120 mA
	SPW-404-S	SPW-404-D	†	12V @ 200 mA	24V CT @ 100 mA
	SPW-405-S	SPW-405-D	†	14V @ 170 mA	28V CT @ 85 mA
	SPW-406-S	SPW-406-D	†	18V @ 130 mA	36V CT @ 65 mA
	SPW-407-S	SPW-407-D	†	24V @ 100 mA	48V CT @ 50 mA
	SPW-408-S	SPW-408-D	†	28V @ 90 mA	56V CT @ 45 mA
	SPW-409-S	SPW-409-D	†	60V @ 40 mA	120V CT @ 20 mA
6.0	SPW-500-S	SPW-500-D	†	5V @ 1.2A	10V CT @ 600 mA
	SPW-501-S	SPW-501-D	†	6.3V @ 1.0A	12.6V CT @ 500 mA
	SPW-502-S	SPW-502-D	†	8V @ 800 mA	16V CT @ 400 mA
	SPW-503-S	SPW-503-D	†	10V @ 600 mA	20V CT @ 300 mA
	SPW-504-S	SPW-504-D	†	12V @ 500 mA	24V CT @ 250 mA
	SPW-505-S	SPW-505-D	†	14V @ 400 mA	28V CT @ 200 mA
	SPW-506-S	SPW-506-D	†	18V @ 340 mA	36V CT @ 170 mA
	SPW-507-S	SPW-507-D	†	24V @ 250 mA	48V CT @ 125 mA
	SPW-508-S	SPW-508-D	†	28V @ 220 mA	56V CT @ 110 mA
	SPW-509-S	SPW-509-D	†	60V @ 100 mA	120V CT @ 50 mA
12.0	SPW-600-S	SPW-600-D	SPW-3600**	5V @ 2.4A	10V CT @ 1.2A
	SPW-601-S	SPW-601-D	SPW-3601**	6.3V @ 2.0A	12.6V CT @ 1.0A
	SPW-602-S	SPW-602-D	SPW-3602**	8V @ 1.6A	16V CT @ 800 mA
	SPW-603-S	SPW-603-D	SPW-3603**	10V @ 1.2A	20V CT @ 600 mA
	SPW-604-S	SPW-604-D	SPW-3604**	12V @ 1.0A	24V CT @ 500 mA
	SPW-605-S	SPW-605-D	SPW-3605**	14V @ 850 mA	28V CT @ 420 mA
	SPW-606-S	SPW-606-D	SPW-3606**	18V @ 700 mA	36V CT @ 350 mA
	SPW-607-S	SPW-607-D	SPW-3607**	24V @ 500 mA	48V CT @ 250 mA
	SPW-608-S	SPW-608-D	SPW-3608**	28V @ 440 mA	56V CT @ 220 mA
	SPW-609-S	SPW-609-D	SPW-3609* **	60V @ 200 mA	120V CT @ 100 mA
20.0	SPW-610-S	SPW-610-D	†	5V @ 4.0A	10V CT @ 2.0A
	SPW-611-S	SPW-611-D	†	6.3V @ 3.2A	12.6V CT @ 1.6A
	SPW-612-S	SPW-612-D	†	8V @ 2.5A	16V CT @ 1.25A
	SPW-613-S	SPW-613-D	†	10V @ 2.0A	20V CT @ 1.0A
	SPW-614-S	SPW-614-D	†	12V @ 1.6A	24V CT @ 800 mA
	SPW-615-S	SPW-615-D	†	14V @ 1.4A	28V CT @ 700 mA
	SPW-616-S	SPW-616-D	†	18V @ 1.1A	36V CT @ 550 mA
	SPW-617-S	SPW-617-D	†	24V @ 800 mA	48V CT @ 400 mA
	SPW-618-S	SPW-618-D	†	28V @ 700 mA	56V CT @ 350 mA
	SPW-619-S	SPW-619-D	†	60V @ 320 mA	120V CT @ 160 mA
36.0	SPW-620-S	SPW-620-D	†	5V @ 7.2A	10V CT @ 3.6A
	SPW-621-S	SPW-621-D	†	6.3V @ 5.7A	12.6V CT @ 2.85A
	SPW-622-S	SPW-622-D	†	8V @ 4.5A	16V CT @ 2.25A
	SPW-623-S	SPW-623-D	†	10V @ 3.6A	20V CT @ 1.8A
	SPW-624-S	SPW-624-D	†	12V @ 3.0A	24V CT @ 1.5A
	SPW-625-S	SPW-625-D	†	14V @ 2.6A	28V CT @ 1.3A
	SPW-626-S	SPW-626-D	†	18V @ 2.0A	36V CT @ 1.0A
	SPW-627-S	SPW-627-D	†	24V @ 1.5A	48V CT @ 750 mA
	SPW-628-S	SPW-628-D	†	28V @ 1.3A	56V CT @ 650 mA
	SPW-629-S	SPW-629-D	†	60V @ 600 mA	120V CT @ 300 mA

Call Us Anytime for Technical Assistance!
BUY PREM DIRECT (815) 385-2700
Fax: (815) 385-8578
E-Mail: sales@premmag.com
Visit our Website: http://www.premmag.com

PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

Telephony

British Standards Institute (BSI) Approved Telephone Transformers for Safety Critical Applications

Other manufacturers may offer to design for BSI, but our new series of telephone interconnect transformers is already approved by the British Standard Institute (BSI). These high isolation transformers meet safety critical components classifications.

▲ Superior Design

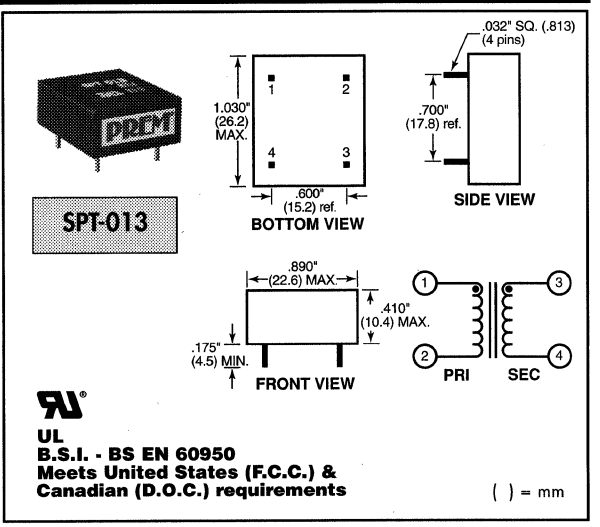
- Designed for voice and data applications in the European market.
- Also meets Canadian (DOC) and United States (FCC) requirements.
- All Prem components are 100% final tested before shipping.

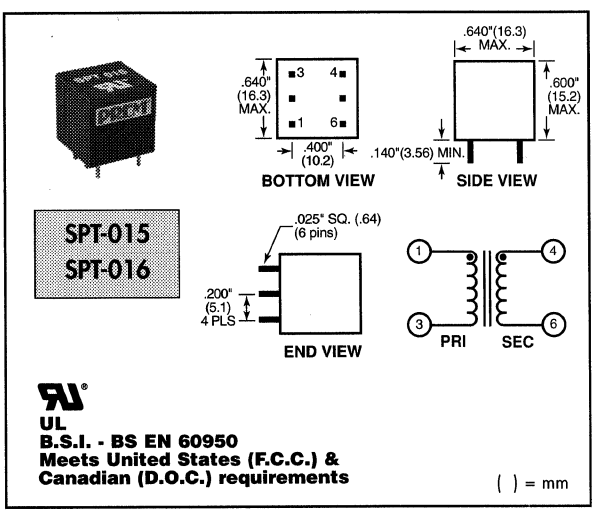
▲ Specifications

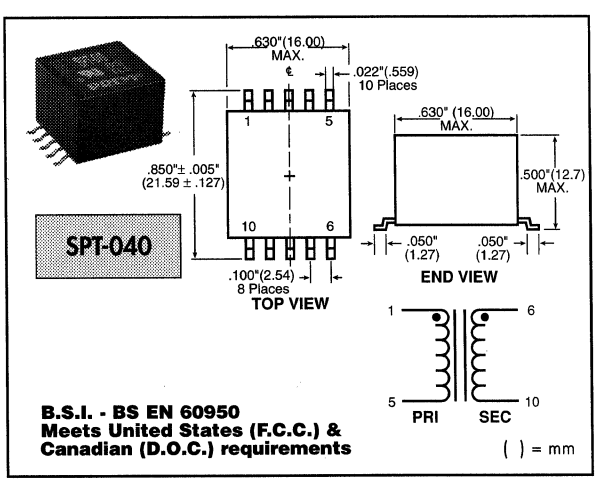
- UL 94 VO Materials
- Designed for dry circuits
- Impedance ratios of 600Ω: 600Ω
- Hipot ratings are 3,750 VRMS
- Designed for safety critical component specifications
- Utilizes reinforced insulation
- Rated for maximum working voltage of 250 volts.
- Pin outs are symmetrical and can be rotated 180° without changing electrical performance.
- Insulation resistance > 100MΩ @ 500 V.D.C.

PREM		SPT-013	SPT-015	SPT-016	SPT-040
IMPEDANCE (Ω)	PRIMARY	600	600	600	600
	SECONDARY	600	600	600	600
TURNS RATIO ± 2%		1:1	1:1	1:1	1:1
MAXIMUM DC UNBALANCE		0mA	0mA	0mA	0mA
INS. LOSS REF @ 1KHz		1.2dB	1.3dB	1.1dB	.8dB
RETURN LOSS MIN. 200 Hz. - 4 KHz.		14.0dB	14.0dB	14.0dB	18dB
T.H.D. @ 0dBm 300Hz (TYP.)		-60dB	-60dB	-70dB	-53dB
T.H.D. @ -10dBm 600Hz		-72dB Max.	-72dB Max.	-78dB Max.	-70dB Max.
RESISTANCE ± 10%	PRIMARY	58.0Ω	70.0Ω	70.0Ω	35.6Ω
	SECONDARY	58.0Ω	70.0Ω	70.0Ω	35.6Ω
FREQUENCY RESPONSE 200-4KHz		±0.25dB	±0.25dB	±0.25dB	±0.3dB
MEETS LONGITUDINAL BALANCE PART 68 & IEEE 455		YES	YES	YES	YES
DIELECTRIC STRENGTH PRI-SEC- CORE 1 MINUTE MINIMUM		3750 VAC	3750 VAC	3750 VAC	3750 VAC

All tests performed w/600Ω load on secondary.







PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

Telephony

British Standard Institute (BSI) Approved Transformers for Voice/Data/PCMCIA Modem Applications

▲ Safety Agency

- SPT-032, SPT-034, SPT-046, SPT-047, SPT-048, SPT-049 and SPT-050 meet United States (FCC) and Canadian (DOC) standards
- Certified to BSI (British Standards Institute) standard BS EN 60950.

▲ Specifications

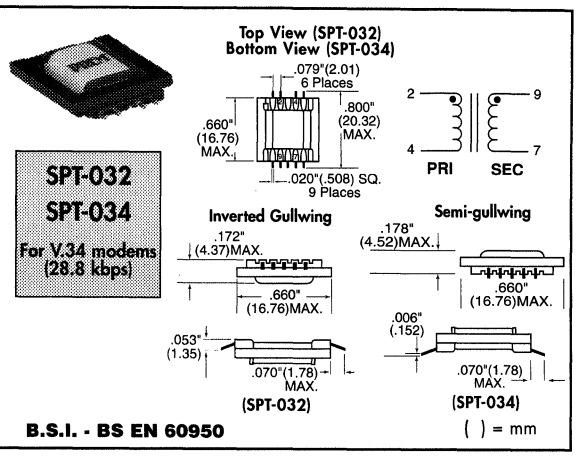
- Rated for maximum working voltage of 250 Volts.
- Designed for dry (no DC) circuits.
- Impedance ratios of 600Ω to 600Ω.
- Hipot rating is 1500 VRMS for 1 minute minimum.
- Utilizes supplementary insulations.

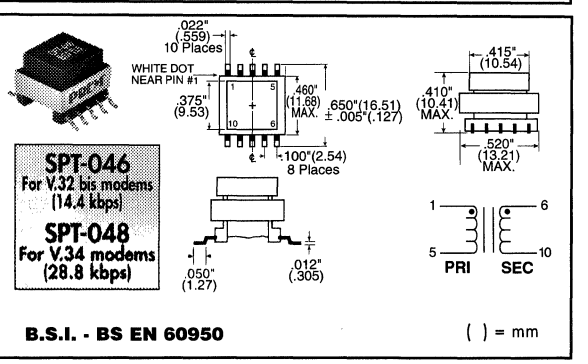
▲ Configuration

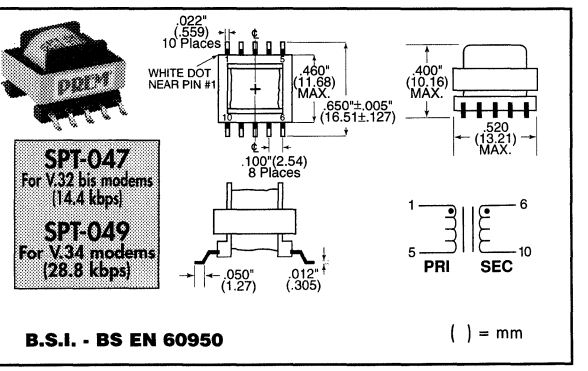
- Gull-wing lead style (except SPT-050) and small package dimensions.
- Designed for automated pick and place assembly equipment.
- Shipped in JEDEC style anti-static, non-sloughing trays designed to maintain lead coplanarity.
- SPT-046 and SPT-047 have a cap so they can be placed by a vacuum-tipped pickup head on some automated SMT assembly equipment.
- Two lead styles available: SPT-032 & SPT-034. The extremely low profile SPT-032 has an inverted gull-wing form so it can be placed within a square hole in the printed circuit board for further height savings.

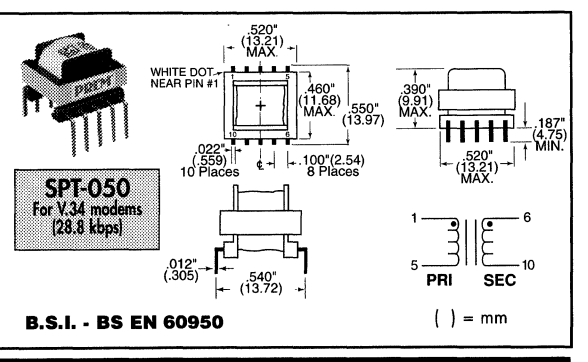
PREM®		SPT-032[1]	SPT-034[1]	SPT-046[2]	SPT-047[2]	SPT-048[3]	SPT-049[3]	SPT-050[3]
Suitable for Modem Speeds up to and including:		V.34	V.34	V.32bis	V.32bis	V.34	V.34	V.34
IMPEDANCE (Ω)	PRI	600	600	600	600	600	600	600
	SEC	600	600	600	600	600	600	600
TURNS RATIO ± 2%		1:1	1:1	1:1	1:1	1:1	1:1	1:1
MAXIMUM DC UNBALANCE		0mA	0mA	0mA	0mA	0mA	0mA	0mA
INS. LOSS REF @ 1KHz		3.3dB	3.3dB	2.0dB	2.0dB	3.15dB	3.15dB	3.15dB
RETURN LOSS MIN. @ 300Hz -3500Hz		25dB	25dB	18dB	18dB	15dB	15dB	15dB
T.H.D. @ 0dBm 300Hz (TYP.)		-60dB	-60dB	-60dB	-60dB	-60dB	-60dB	-60dB
T.H.D. @ -10dBm 600Hz		-82dB Max.	-82dB Max.	-76dB Typ.	-76dB Typ.	-82dB Typ.	-82dB Typ.	-82dB Typ.
DC RESISTANCE ± 10%	PRI	155Ω	155Ω	92.5Ω	92.5Ω	128.6Ω	128.6Ω	128.6Ω
	SEC	159Ω	159Ω	126.7Ω	126.7Ω	176.0Ω	176.0Ω	176.0Ω
FREQUENCY RESPONSE @200-4000Hz		±0.2dB	±0.2dB	±0.3dB	±0.3dB	±0.3dB	±0.3dB	±0.3dB
MEETS LONGITUDINAL BAL. FCC PART 68 & IEEE 455		YES	YES	YES	YES	YES	YES	YES
DIELECTRIC STRENGTH 1 MINUTE MIN.		1500 Vac	1500 Vac	1500 Vac	1500 Vac	1500 Vac	1500 Vac	1500Vac

1- Resistive load of 294 ohms was used to reflect 600 ohms on all test parameters.
2- Resistive load of 400 ohms was used to reflect 600 ohms on all test parameters.
3- Resistive load of 310 ohms was used to reflect 600 ohms on all test parameters.









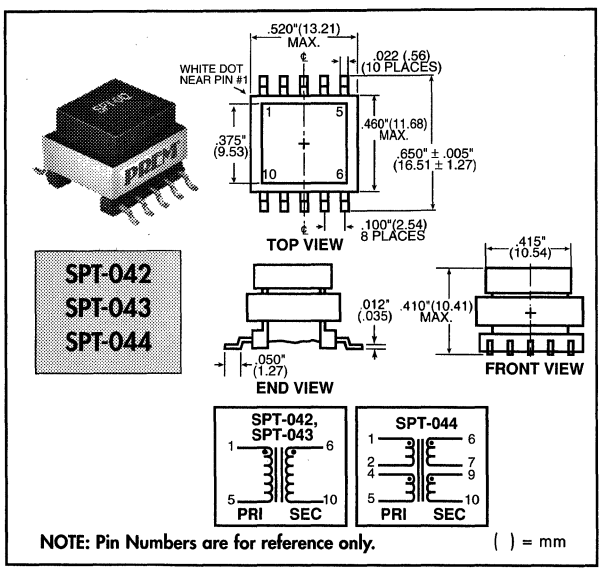
PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

Telephony

New Telephone Interconnect Transformers for Surface Mount Technology (SMT) Applications

▲ Specifications

- SPT-042, SPT-043 and SPT-044 meet United States (FCC) and Canadian (DOC) standards.
- Designed for dry (no DC) circuits.
- Impedance ratios of 600Ω to 600Ω.
- Hipot rating for the SPT-042, 043 and 044 are rated at 1500 Vrms.



▲ Configuration

- "Gull-wing" lead style and small package dimensions
- Designed for automated pick and place assembly equipment
- Shipped in JEDEC style anti-static, non-sloughing trays especially designed to maintain lead coplanarity.

PREM		SPT-042	SPT-043	SPT-044
IMPEDANCE (Ω)	PRIMARY	600	600	600split
	SECONDARY	600	600	600split
TURNS RATIO ± 2%		1:1	1:1	1:1
MAXIMUM DC UNBALANCE		0mA	0mA	0mA
INS. LOSS REF @ 1KHz		1.2dB	1.0dB	1.0dB
RETURN LOSS MINIMUM		20dB[1]	20dB[2]	20dB[2]
T.H.D.	@ 0dBm 300Hz (TYP.)	-50dB	-58dB	-58dB
	@ -10dBm 600Hz	-64dB Max.	-72dB Typ	-72dB Typ.
RESISTANCE ± 10%	PRIMARY	56.0Ω	56.0Ω	56.0Ω
	SECONDARY	73.0Ω	73.0Ω	73.0Ω
FREQUENCY RESPONSE 200-4KHz		±0.3dB	±0.3dB	±0.3dB
MEETS LONGITUDINAL BAL. PART 68 & IEEE 455		YES	YES	YES
DIELECTRIC STRENGTH PRI-SEC - CORE		1500 VAC	1500 VAC	1500 VAC

1 = 300Hz - 3.5KHz 2 = 300Hz - 4KHz
All tests performed w/600Ω load on secondary

Custom Designed CRT Display Magnetics

Prem Magnetics custom designs fixed linearity coils, variable linearity coils, pincushion coils, width coils, horizontal drive and oscillator coils for use in CRT display applications. Prem's engineers have vast experience in designing and manufacturing economical magnetic devices for display circuits.

- Pin Cushion Coils
- Variable Linearity Coils
- Width Coils
- Horizontal Oscillators
- Horizontal Driver Transformers
- Dynamic Linearity Coils
- Parabolic Variable Linearity Coils

Custom designs available for your specific application.

PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

Telephony

High Crosstalk Attenuation Voice and Data Telecom Transformers

▲ Safety Agency

- Meets United States (F.C.C.) and Canadian (D.O.C.) requirements.
- UL component recognized

▲ Specifications

- High Crosstalk attenuation
- Low Profile
- Impedance ratios of 600Ω: 600Ω
- Hipot - 1500 VRMS
- Ideal for multiple rack applications

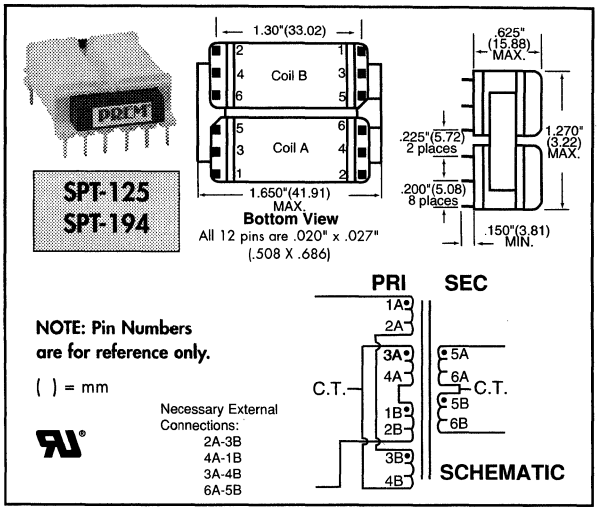
Notes: 1. All units are symmetrical and can be rotated 180° without changing the pin-out or electrical performance.

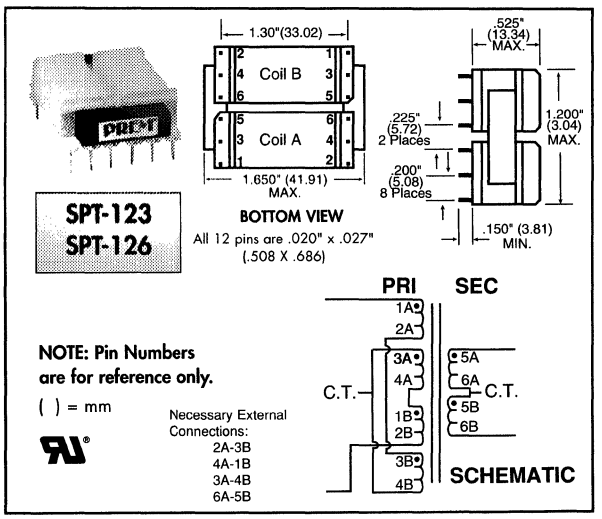
2. Longitudinal balance connections for SPT-101 and SPT-195: (1A-2B) with 2A-1B and 6A-5B tied and floating, 600 Ω load with any secondary terminal grounded.

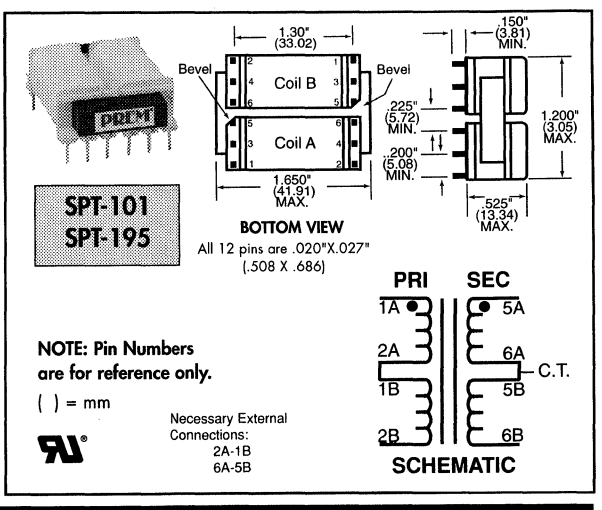
PREM		SPT-101	SPT-123	SPT-125	SPT-126	SPT-194	SPT-195
IMPEDANCE (Ω)	PRI	600	600	600	600	600	600
	SEC	600	600	600	600	600	600
TURNS RATIO ± 2%		1:1	1:1	1:1	1:1	1:1	1:1
MAXIMUM DC UNBALANCE		90mA	90mA	90mA	80mA	90mA	80mA
INS. LOSS REF @ 1KHz		1.80dB	1.85dB	1.35dB	2.00dB	1.40dB	2.10dB
RETURN LOSS MIN. @ 300Hz		11.0dB	12.0dB	13.0dB	11.5dB	12.0dB	11.0dB
T.H.D. @ 0dBm 300Hz (TYP.)		-65dB	-65dB	-65dB	-53dB	-53dB	-53dB
RESISTANCE ± 10%	PRI	95Ω	95Ω	80Ω	95Ω	80Ω	95Ω
	SEC	180Ω	180Ω	100Ω	180Ω	100Ω	180Ω
FREQ. RESPONSE @300-3.5KHz		±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB
DIELECTRIC STRENGTH PRI-SEC-CORE		1500 VAC	1500 VAC	1500 VAC	1500 VAC	1500 VAC	1500 VAC
LONGITUDINAL BAL. MEETS FCC PART 68.310 (a)		Yes Note #2	Yes	Yes	Yes	Yes	Yes Note #2
ALTERNATE PART		SPT-195	SPT-126	SPT-194	SPT-123	SPT-125	SPT-101

Transformers in shading are economy versions.
All tests performed with 600Ω load on secondary with DC on primary.

Call Us Anytime for Technical Assistance!
BUY PREM DIRECT (815) 385-2700
Fax: (815) 385-8578
E-Mail: sales@premmag.com
Visit our Website: http://www.premmag.com







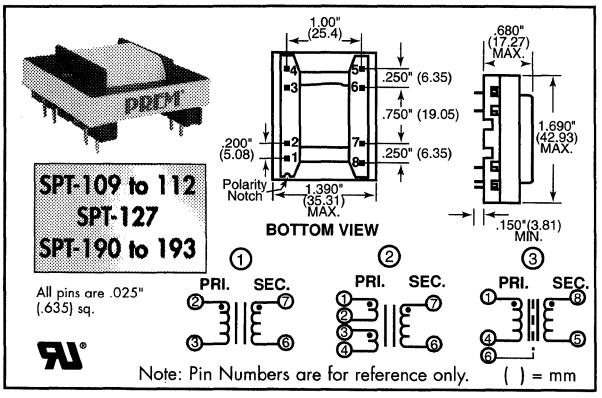
PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

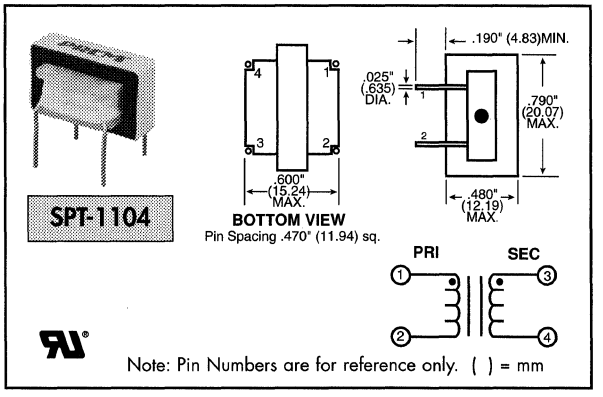
Voice and Data Telephony

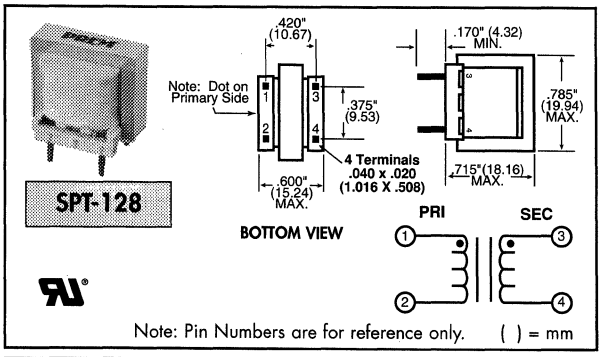
PREM		SPT-109	SPT-110	SPT-111	SPT-112	SPT-127	SPT-128	SPT-190	SPT-191	SPT-192	SPT-193	SPT-1104†	SPT-2106
IMPEDANCE (Ω)	PRIMARY	600	600	900	900	600	600	600	600	900	900	600	600
	SECONDARY	600	600	600	600	600	600	600	600	600	600	600	600
TURNS RATIO ± 2%		1:1	1:1.127	1:.8168	1:.942	1:1	1:1	1:1	1:1.127	1:.8168	1:.942	1:1.028	1:1.0523
MAXIMUM DC UNBAL.ANCE		80mA	80mA	80mA	80mA	120mA	0mA	80mA	80mA	80mA	80mA	0mA	0mA
INS. LOSS REF @ 1KHz		1.15dB	1.15dB	1.55dB	1.20dB	1.30dB	1.00dB	1.20dB	1.30dB	1.60dB	1.30dB	1.00dB	1.25dB
RETURN LOSS MIN. @ 300Hz		11.5dB	14.5dB	11.0dB	12.5dB	11.0dB	14.5dB	11.0dB	12.5dB	10.5dB	11.0dB	23.0dB	21.0dB
T.H.D. @ 0dBm 300Hz (TYP.)		-65dB	-65dB	-65dB	-65dB	-65dB	-55dB	-53dB	-53dB	-53dB	-53dB	-59dB	-59dB
RESISTANCE ± 10%	PRIMARY	60Ω	67Ω	76Ω	83Ω	62Ω	35Ω	60Ω	67Ω	76Ω	83Ω	39Ω	49Ω
	SECONDARY	72Ω	75.5Ω	92Ω	126Ω	100Ω	35Ω	72Ω	75.5Ω	92Ω	126Ω	50Ω	65Ω
FREQUENCY RESPONSE 300-3.5KHz		±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.25dB
DIELECTRIC STRENGTH PRI-SEC-CORE		1500 VAC	1500 VAC	1500 VAC	1500 VAC	2400 VDC	1500 VAC	1500 VAC	1500 VAC	1500 VAC	1500 VAC	1500 VAC	1500 VAC
LONGITUDINAL BALANCE MEETS FCC PART 68.310 (a)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
REFER TO SCHEMATIC NUMBER		1	2	1	2	3	•	1	2	1	2	•	•
ECHO RETURN LOSS MINIMUM		•	•	•	•	•	20.5dB	•	•	•	•	26.0dB	25.0dB
ALTERNATE PART		SPT-190	SPT-191	SPT-192	SPT-193	•	•	SPT-109	SPT-110	SPT-111	SPT-112	•	•

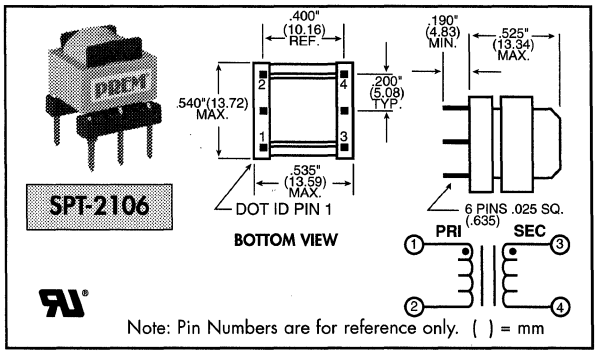
† impedance matching: ±10% over entire frequency range

All tests performed with 600Ω on secondary with DC on primary
Transformers in shading are economy versions.









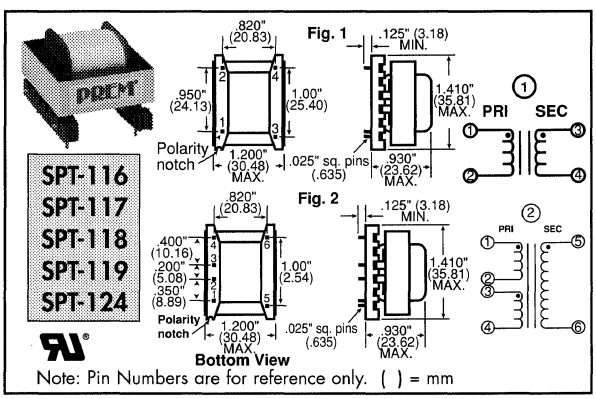
PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

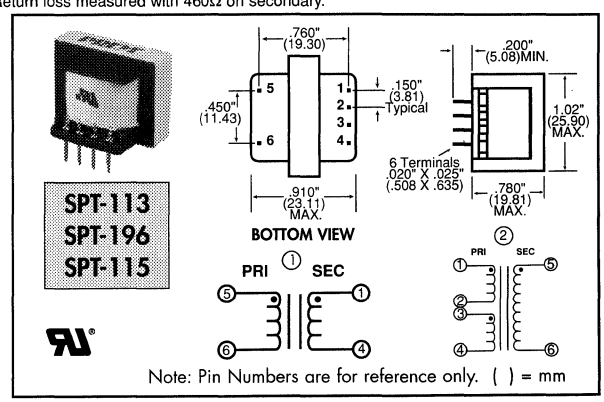
Voice and Data Telephony

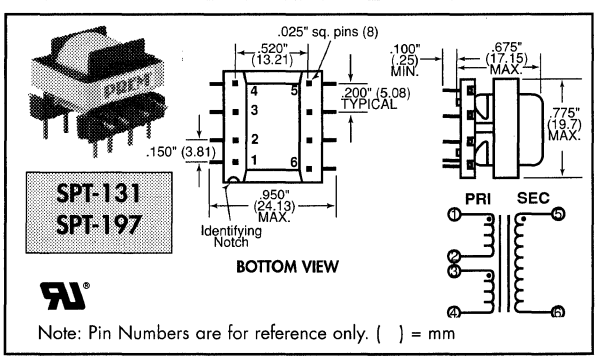
PREM		SPT-113	SPT-115	SPT-116	SPT-117	SPT-118	SPT-119	SPT-124	SPT-131	SPT-196	SPT-197	SPT-2104†	SPT-2105
IMPEDANCE (Ω)	PRIMARY	600	600	600	600	900	900	600	600	600	600	600	600
	SECONDARY	600	600	600	600	600	600	600	600	600	600	600	600
TURNS RATIO ± 2%		1:1	1:1	1:1	1:1.125	1:.8163	1:.946	1:1	1:1	1:1	1:1	1:1.037	1:1
MAXIMUM DC UNBALANCE		50mA	60mA	80mA	80mA	80mA	80mA	80mA	0mA	50mA	0mA	0mA	80mA
INS. LOSS REF @ 1KHz		1.25dB	1.30dB	1.20dB	1.25dB	1.50dB	1.55dB	1.20dB	1.00dB	1.30dB	1.15dB	.90dB	2.30dB
RETURN LOSS MINIMUM @ 300Hz		12.5dB**	10.5dB	13.0dB	16.0dB	9.5dB	12.0dB	13.0dB	18.0dB	11.0dB***	12.5dB	23.0dB	6.0dB
T.H.D. @ 0dBm 300Hz (TYP.)		-59dB	-53dB	-53dB	-59dB	-53dB	-53dB	-53dB	-57dB	-53dB	-53dB	-59dB	-55dB
RESISTANCE ± 10%	PRIMARY	75Ω	63Ω	66.2Ω	76Ω	82.8Ω	90Ω	66Ω	24.5Ω	75Ω	24.5Ω	36Ω	180Ω
	SECONDARY	76Ω	88Ω	82.2Ω	86Ω	85.4Ω	110Ω	82Ω	31Ω	76Ω	31Ω	50Ω	75Ω
FREQUENCY RESPONSE @300-3.5KHz		±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.55dB	±0.5dB	*
DIELECTRIC STRENGTH Vrms PRI-SEC-CORE		1500 VAC	1500 VAC	1500 VAC	1500 VAC	1500 VAC	1500 VAC	1500 VAC	1500 VAC	1500 VAC	1500 VAC	1500 VAC	1500 VAC
LONGITUDINAL BALANCE MEETS FCC PART 68.310 (a)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
REFER TO FIGURE NUMBER		•	•	1	2	1	2	2	•	•	•	•	•
REFER TO SCHEMATIC #		2	1	1	2	1	2	2	•	2	•	•	•
ECHO RETURN LOSS MIN.		•	•	•	•	•	•	•	•	•	•	26.0dB	9.0dB
ALTERNATE PART		SPT-196	•	•	•	•	•	•	SPT-197	SPT-113	SPT-131	•	•

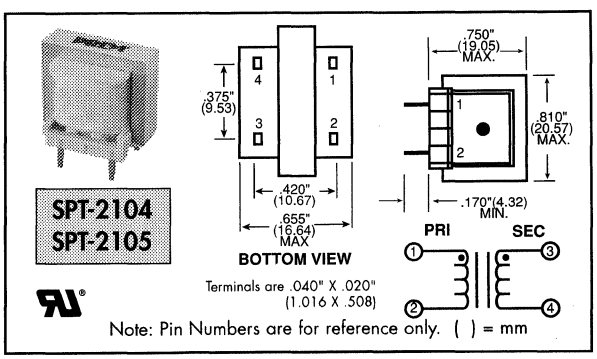
All tests performed with 600Ω on secondary with DC on primary
Transformers in shading are economy versions.

* 300-600Hz ± 3.0dB, 600Hz - 3.5KHz ± 1.0dB; † impedance matching: ±10% over entire frequency range; ** Return loss measured with 422Ω on secondary
*** Return loss measured with 460Ω on secondary.









PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

Telephony

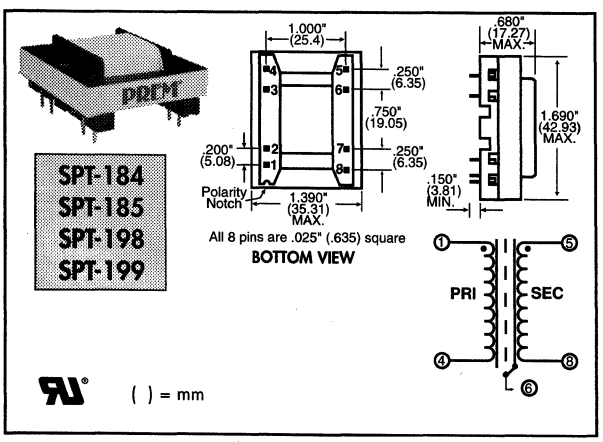
PREM		SPT-172	SPT-184	SPT-185	SPT-186	SPT-187	SPT-188	SPT-189	SPT-198	SPT-199	SPT-1105	SPT-1106	SPT-1107
IMPEDANCE (Ω)	PRIMARY	600	600	600	600	600	600	600	600	600	600	600	600
	SECONDARY	600	600	600	600	600	600	600	600	600	600	600	600
TURNS RATIO ± 2%		1:1	1:1	1:1.1036	1:1	1:1.08	1:1	1:1	1:1	1:1.1036	1:1.045	1:1	1:1.08
MAXIMUM DC UNBALANCE		50mA	120mA	120mA	70mA	70mA	70mA	60mA	120mA	120mA	80mA	70mA	70mA
INS. LOSS REF @ 1KHz		1.50dB	1.30dB	1.30dB	1.20dB	1.20dB	1.30dB	2.00dB	1.50dB	1.50dB	1.30dB	1.30dB	1.30dB
RETURN LOSS MIN. @ 300Hz		11.5dB	10.0dB	11.0dB	10.0dB	11.0dB	12.0dB	12.0dB	9.0dB	10.0dB	9.5dB	8.5dB	10.0dB
ECHO RETURN LOSS MINIMUM		16.5dB	15.0dB	18.0dB	16.5dB	19.0dB	16.0dB	16.5dB	12.5dB	14.5dB	17.0dB	15.0dB	18.0dB
T.H.D. @ 0dBm 300Hz (TYP.)		-50dB	-55dB	-55dB	-53dB	-65dB	-59dB	-53dB	-53dB	-53dB	-50dB	-53dB	-53dB
RESISTANCE ± 10%	PRIMARY	73Ω	63.5Ω	57.5Ω	66Ω	66Ω	70Ω	75Ω	63.5Ω	57.5Ω	62.4Ω	66Ω	66Ω
	SECONDARY	103Ω	99Ω	99Ω	66Ω	72Ω	81Ω	80Ω	99Ω	99Ω	60.1Ω	66Ω	72Ω
FREQUENCY RESPONSE @300-3.5KHz		±.5dB	±0.5dB	±0.5dB	±0.6dB	±0.5dB	±0.5dB	±0.5dB	±1.0dB	±1.0dB	±1.0dB	±1.0dB	±1.0dB
DIELECTRIC STRENGTH PRI-SEC-CORE		1500 VAC	2200VDC	2200VDC	2200VDC	2200VDC	1500VAC	1500VAC	2200VDC	2200VDC	1500VAC	2200VDC	2200VDC
INSULATION RESISTANCE @ 500 V.D.C.		•	>100MΩ	>100MΩ	>100MΩ	>100MΩ	•	•	>100MΩ	>100MΩ	•	>100MΩ	>100MΩ
LONGITUDINAL BALANCE MEETS FCC PART 68.310 (a)		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
REFER TO SCHEMATIC NUMBER		•	•	•	1	1	2	3	•	•	2	1	1
ALTERNATE PART		•	SPT-198	SPT-199	SPT-1106	SPT-1107	•	•	SPT-184	SPT-185	•	SPT-186	SPT-187

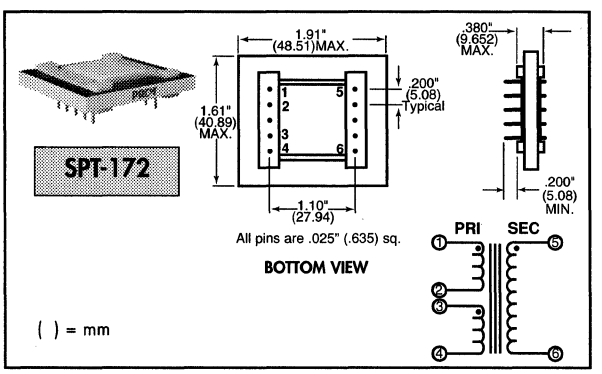
Transformers in shading are economy versions.

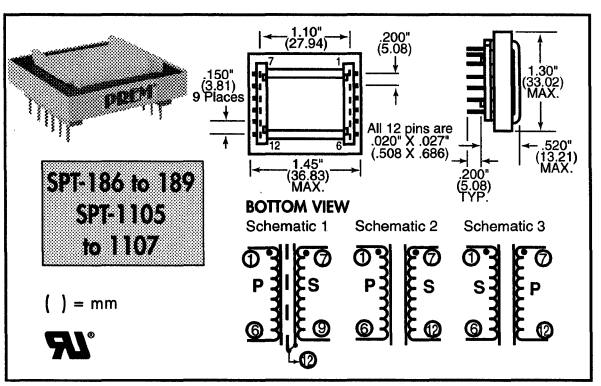
All tests performed with 600Ω on secondary with DC on primary

Notes: 1. Static shield screens constructed with solid copper foil. Ends overlap > .197" (5mm)
2. Pin numbers are for reference only.

Very Low Profile Coupling Transformers







PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

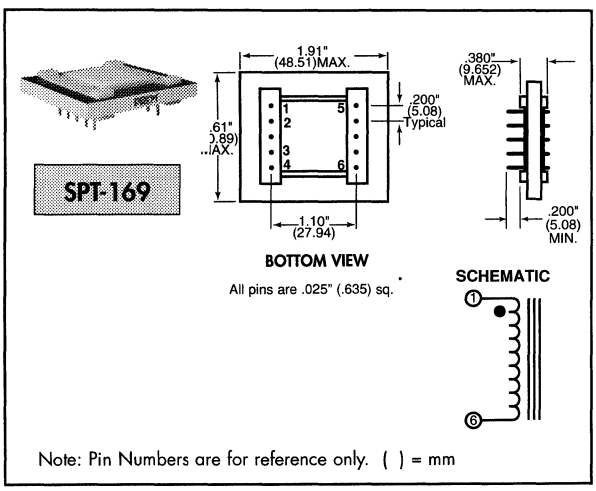
Telephony

Single Hybrid Transformers and Feed Bridge Inductors
Operating Level -45 to +7dBm

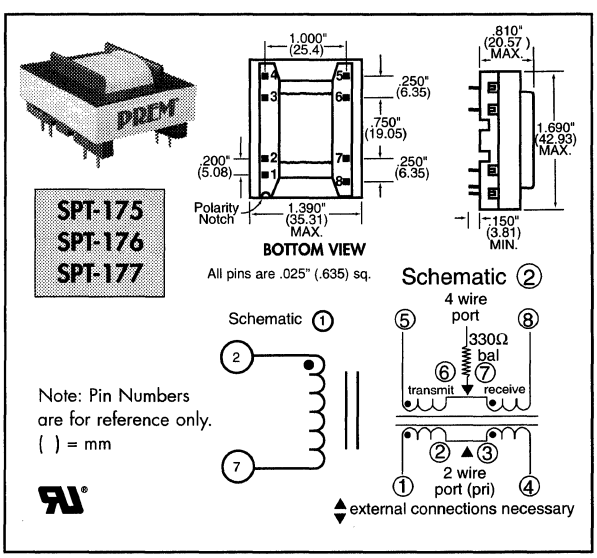
PREM		SPT-176	SPT-177	SPT-180	SPT-181	SPT-182	SPT-183
IMPEDANCE (Ω)	PRIMARY	600	900	600	900	600	900
	SECONDARY	600/600	600/600	600/600	600/600	600/600	600/600
TURNS RATIO ± 2%		1:1.429	1:1.158	1:1.60	1:1.257	1:1.160	1:1.257
MAXIMUM DC UNBALANCE		120mA	120mA	0mA	0mA	50mA	50mA
HYBRID LOSS		4.5dB	4.5dB	4.5dB	4.5dB	4.5dB	4.5dB
PRIMARY RETURN LOSS	300Hz	>11dB	>10dB	>20dB	>20dB	>14dB	>12dB
	1KHz	>22dB**	>21dB**	>25dB	>25dB	>23dB	>20dB
	4KHz	•	•	>28dB	>28dB	>28dB	>26dB
T.H.D. @ 0dBm 300Hz (TYP.)		-50dB	-50dB	-65dB	-65dB	-64dB	-64dB
RESISTANCE ± 10%	PRIMARY	38.53Ω	47.55Ω	74.0Ω	120.0Ω	74.0Ω	120.0Ω
	SECONDARY	63.84Ω	65.62Ω	138.0Ω	137.0Ω	138.0Ω	137.0Ω
FREQUENCY RESPONSE @300-3.5KHz		±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB	±0.5dB
TRANS-HYBRID BALANCE	300Hz	>15dB	>14dB	>25dB	>23dB	>18dB	>17dB
	1KHz	>31dB**	>28dB**	>34dB	>32dB	>28dB	>27dB
LONGITUDINAL BALANCE W/600 Ω LOAD		60dB	60dB	60dB	60dB	60dB	60dB
DIELECTRIC STRENGTH PRI-SEC-CORE		1500VAC	1500VAC	1500VAC	1500VAC	1500VAC	1500VAC
SCHEMATIC NUMBER		2	2	2	2	2	2

* Can be connected as a dual-hybrid for higher performance...Contact Prem sales dept.
** .012μf capacitor across 5-8 for optimum transhybrid balance and primary return loss

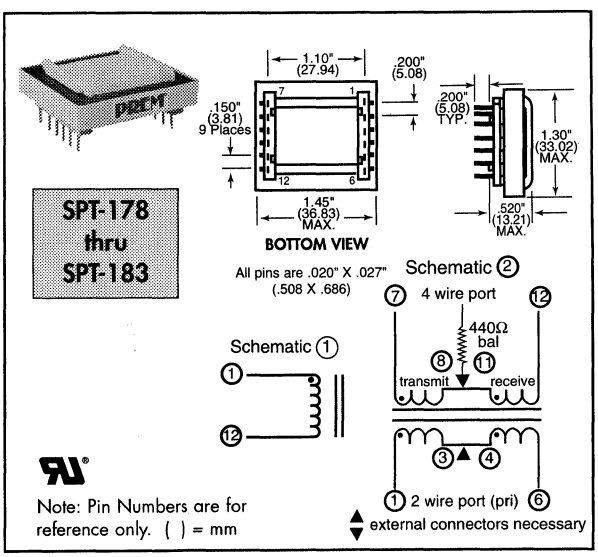
PREM	SPT-169	SPT-175	SPT-178	SPT-179
MINIMUM INDUCTANCE AT RATED DC CURRENT	.9 Hy @ 0dc .75 Hy @ 80ma .60 Hy @ 120ma	1.7 Hy @ 0dc 1.5 Hy @ 80ma 1.3 Hy @ 120ma	.95 Hy @ 0dc .90 Hy @ 50ma .88 Hy @ 75ma. .85 Hy @ 100ma	1.4 Hy @ 0dc 1.3 Hy @ 50ma 1.2 Hy @ 90ma
DIELECTRIC STRENGTH Vrms WINDING-CORE	1500 VAC	1500 VAC	1500 VAC	1500 VAC
RESISTANCE ± 15%	114Ω	95Ω	88Ω	142Ω
SCHEMATIC NUMBER	•	1	1	1



Note: Pin Numbers are for reference only. ( ) = mm



Note: Pin Numbers are for reference only. ( ) = mm



Note: Pin Numbers are for reference only. ( ) = mm

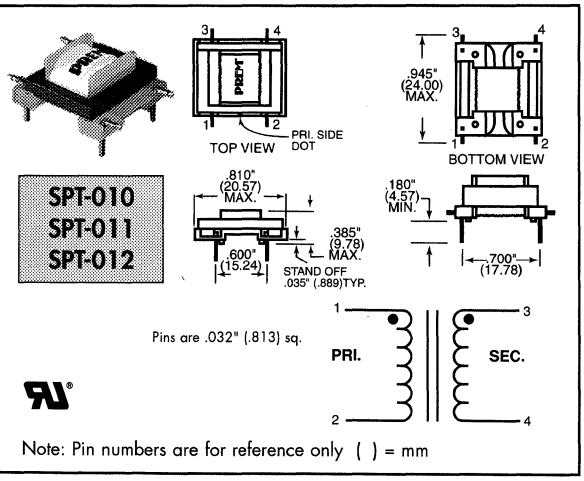
PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

Telephony

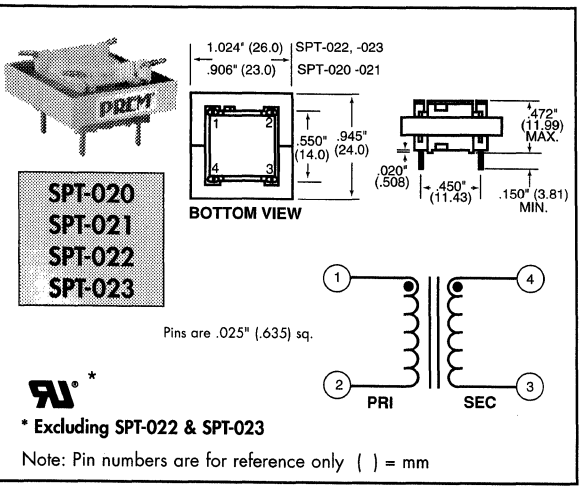
New Sub-Miniature Voice/Data Coupling Transformers

▲ Ideal for applications requiring minimal use of pc board area and very low above-board height.

- SPT-010, SPT-011, SPT-022 and SPT-023 are dry (0DC) 600Ω:600Ω coupling transformers with excellent performance for voice and data applications.
- SPT-012, SPT-020 and SPT-021 are designed for data applications only



Note: Pin numbers are for reference only ( ) = mm



* Excluding SPT-022 & SPT-023

Note: Pin numbers are for reference only ( ) = mm

PREM		SPT-010	SPT-011	SPT-012	SPT-020	SPT-021	SPT-022	SPT-023
IMPEDANCE (Ω)	PRI	600	600	600	600	600	600	600
	SEC	600	600	600	600	600	600	600
TURNS RATIO ± 2%		1:1.0428	1:1.100	1:1	1:1	1:1	1:1	1:1
MAXIMUM DC UNBALANCE		0	0	30mA	100mA	100mA	0	0
INS. LOSS REF @ 1KHz		1.5dB ref.	1.3dB ref.	2.0dB ±.5dB	2.5dB max.*	2.0dB ±.5dB	2.25dB max.	2.25dB max.
RETURN LOSS MINIMUM		18.5dB[1]	25.0dB[1]	16.0dB[2]	15.0dB[2]	16.0dB[2]	20.0dB[3]	20.0dB[3]
ECHO RETURN LOSS MIN.		23.5dB	28.0dB	15.0dB	12.0dB	13.0dB	29.0dB	29.0dB
T.H.D. (TYP.)		-53dB[4]	-55dB[4]	-58dB[5]	-58dB[5]	-58dB[5]	-76dB[6]	-82dB[6]
RESISTANCE ± 10%	PRI	59.3Ω	62.5Ω	108.0Ω	108.0Ω	108.0Ω	108.0Ω	108.0Ω
	SEC	74.4Ω	84.5Ω	131.3Ω	120.0Ω	120.0Ω	120.0Ω	120.0Ω
FREQUENCY RESPONSE		±0.5dB 300-3.5Khz	±0.25dB 300-3.5Khz	±2.0dB 300 - 600Hz ±.65dB 600 - 3.5KHz	±2.5dB 300 - 600Hz ±1.0dB 600 - 3.5KHz	±2.5dB 300 - 600Hz ±.65dB 600 - 3.5KHz	±0.25dB 200 - 4.0 KHz	±0.25dB 200 - 4.0 KHz
DIELECTRIC STRENGTH PRI-SEC-CORE		1500VAC	1500VAC	1500VAC	1500VAC	1500VAC	1500VAC	1500VAC
LONGITUDINAL BAL. MEETS FCC PART 68.310 (a) w/600 Ω load		YES	YES	YES	YES	YES	YES	YES

TEST CONDITIONS:
- SPT-010 & SPT-011 tested @ 0mA DC with secondary load of 600Ω.
- SPT-012, SPT-020, and SPT-021 tested @ rated DC with secondary load of 470Ω.
- SPT-022 and SPT-023 tested @ 0mA DC with secondary load of 374Ω.

* SPT-020 insertion loss measured with secondary load of 600Ω and 30 mA DC in primary.

NOTES:
1 = 300 Hz
2 = 1800 Hz
3 = 300 Hz-3Khz
4 = THD @ 0 dBm; 300Hz
5 = THD @ 0 dbm; 1 Khz
6 = THD @ -10 dBm; 600 Hz

Call Us Anytime for Technical Assistance!
BUY PREM DIRECT
MasterCard **(815) 385-2700** VISA
Fax: (815) 385-8578
E-Mail: sales@premmag.com
Visit our Website:
http://www.premmag.com

PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

Telephony

Low Profile Coupling Transformers

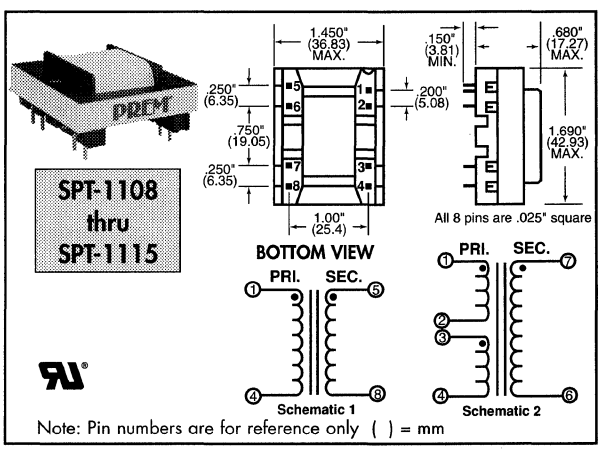
▲ Voice and Data Transformers for Telephone Interconnect Systems

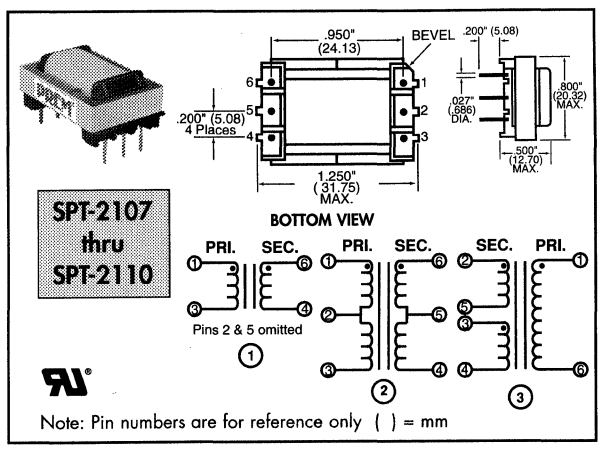
- Units below are Telecom Australia Approved, Approval #RA-87/117 (SPT-1108 thru SPT-1115).
- Units below include very low profile condensed board space coupling and hybrid* transformers.

Call Us Anytime for Technical Assistance!
BUY PREM DIRECT
MasterCard **(815) 385-2700** VISA
Fax: (815) 385-8578
E-Mail: sales@premmag.com
Visit our Website:
http://www.premmag.com

PREM		SPT-1108	SPT-1109	SPT-1110	SPT-1111	SPT-1112	SPT-1113	SPT-1114	SPT-1115	SPT-2107	SPT-2108	SPT-2109	SPT-2110
IMPEDANCE (Ω)	PRIMARY	600	600	600	600	600	600	600	600	600	600	600	600
	SECONDARY	600	600	600	600	600	600	600	600	600	600	600	600/600
TURNS RATIO ± 2%		1:1	1:1	1:1	1:1	1:1	1:1	1:1	1:1	1:1.04	1:1.04	1:1.04	1:1.41
MAXIMUM DC UNBALANCE		120mA	120mA	80mA	80mA	80mA	80mA	120mA	120mA	90mA	90mA	90mA	50mA
INS. LOSS REF @ 1KHz		1.30dB	1.40dB	1.20dB	1.30dB	1.20dB	1.30dB	1.30dB	1.40dB	1.70dB	1.70dB	1.70dB	1.60dB
RETURN LOSS MINIMUM		10.0dB[1]	9.0dB[1]	11.0dB[1]	10.0dB[1]	11.0dB[1]	10.0dB[1]	10.0dB[1]	9.0dB[1]	14.0dB[2]	14.0dB[2]	14.0dB[2]	14.0dB[3] @ 1KHz
ECHO RETURN LOSS MINIMUM		14.0dB	12.5dB	16.0dB	15.0dB	16.0dB	15.0dB	14.0dB	12.5dB	•	•	•	•
T.H.D. @ 0dBm 300Hz (TYP.)		-59dB	-53dB	-59dB	-53dB	-59dB	-53dB	-59dB	-53dB	-50dB	-50dB	-50dB	-50dB
RESISTANCE ± 10%	PRIMARY	66Ω	66Ω	67Ω	67Ω	67Ω	67Ω	66Ω	66Ω	75Ω	75Ω	75Ω	75Ω
	SECONDARY	105Ω	105Ω	80Ω	80Ω	80Ω	80Ω	105Ω	105Ω	100Ω	100Ω	100Ω	170Ω
FREQUENCY RESPONSE	@300- 3.5KHz	±0.5dB	±1.0dB	±0.5dB	±1.0dB	±0.5dB	±1.0dB	±0.5dB	±1.0dB	±2.5dB	±2.5dB	±2.5dB	+.3dB -1.6dB
	@500-3.5KHz	•	•	•	•	•	•	•	•	±1.3dB	±1.3dB	±1.3dB	+.3dB -.7dB
DIELECTRIC STRENGTH Vrms PRI-SEC-CORE		3750VAC†	3750VAC†	3750VAC†	3750VAC†	3750VAC†	3750VAC†	3750VAC†	3750VAC†	1500VAC	1500VAC	1500VAC	1500VAC
LONGITUDINAL BALANCE MEETS FCC PART 68.310 (a)		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
SCHEMATIC NUMBER		1	1	2	2	1	1	2	2	1	2	3	3

Secondary Load 600Ω W/DC PRI † = one minute min. 1= @ 300Hz 2= @ 1800 Hz 3= @ 1000 Hz *SPT-2110





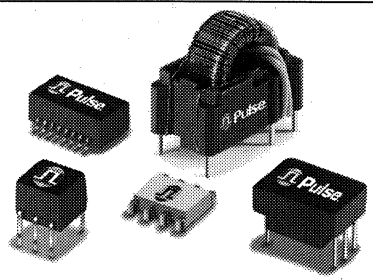
PREM® Magnetics Incorporated
3521 North Chapel Hill Road • McHenry, IL 60050
Tel: 815-385-2700 • Fax: 815-385-8578
E-Mail: sales@premmag.com • Website: http://www.premmag.com

Transformers

Pulse
A TECHNITROL COMPANY

Pulse continues to expand its transformer product line with surface mount and through hole packages. To accelerate your design development, many of the transformer's performance characteristics are already matched to the leading digital telecommunication and data communication transceiver ICs for wide and local area networking applications. Pulse also offers a wide array of transformers for use in switching power supplies and DC/DC converter applications.

For information on other Pulse products, refer to *Section 1800 - Coils, Chokes & Inductors* and *Section 2750 - Filters, RF & Signal.*



Telecommunications

T1/E1/CEPT/ISDN-PRI SINGLE & DUAL TRANSFORMERS

Part Number	Turns Ratio	Primary Inductance (mH min)	Package L/W/H (in.)*	Data Sheet
THT - SINGLE TRANSFORMERS				
1.5 KV Isolation Standard Temperature Range				
PE-64931	1:1:1 (1:2CS)	1.20	.350 / .500 / .250	T608
PE-64933	1CT:3CT	1.20	.350 / .500 / .250	T608
PE-64934	1:1	1.20	.350 / .500 / .250	T608
PE-64936	1CT:1	1.20	.350 / .500 / .250	T608
PE-64937	1:1.36	1.20	.350 / .500 / .250	T608
PE-64940	1:1:1.58	0.30	.350 / .500 / .250	T608
PE-64941	1:1:2	0.80	.350 / .500 / .250	T608
PE-64942	1:1:2.62	0.80	.350 / .500 / .250	T608
PE-64943	1CT:2CT	1.20	.350 / .500 / .250	T608
PE-65351	1:2CT	1.20	.350 / .500 / .250	T608
PE-65363	1:4CT	0.50	.350 / .500 / .250	T608
PE-65379	1:1.14CT	1.20	.350 / .500 / .250	T608
PE-65388	1:1.15CT	1.50	.350 / .500 / .250	T608
PE-65389	1:1:1.266	1.50	.350 / .500 / .250	T608
PE-65415	1CT:2CT	1.20	.350 / .500 / .250	T608
PE-65558	1:2.3CT	1.20	.350 / .500 / .250	T608
PE-65586	1:1.36CT	1.20	.350 / .500 / .250	T608
PE-65755	1CT:1CT	1.20	.350 / .500 / .250	T608
PE-68644	1CT:1	0.70	.350 / .500 / .250	T608
PE-68645	1:1.36CT	0.70	.350 / .500 / .250	T608
T1054	1:1.5CT	1.20	.350 / .500 / .250	T608
1.5 KV Isolation Extended Temperature Range				
PE-68664	1:1/1.26	1.50	.350 / .500 / .250	T608
PE-65340	1:1.36	1.20	.350 / .500 / .250	T608
PE-65770	1:1.15CT	1.50	.350 / .500 / .250	T608
PE-65771	1CT:2CT	1.20	.350 / .500 / .250	T608
PE-65778	1CT:1CT	1.20	.350 / .500 / .250	T608
PE-68600	1CT:3CT	1.20	.350 / .500 / .250	T608
3.0 KV ISOLATION REINFORCED INSULATION PER IEC 950				
THT - SINGLE TRANSFORMERS				
PE-65830	1:1:1.58	0.80	.558 / .558 / .400	T608
PE-65831	1:1:2	0.80	.558 / .558 / .400	T608
PE-65832	1:1.36CT	1.20	.558 / .558 / .400	T608
PE-65833	1CT:2CT	1.20	.558 / .558 / .400	T608
PE-65834	1:1	1.20	.558 / .558 / .400	T608
PE-65835*	1CT:2CT	1.20	.558 / .558 / .400	T608
PE-65836	1CT:3CT:1	.600	.558 / .558 / .400	T608
PE-65837	1:1.08:1.36	1.50	.558 / .558 / .400	T608
PE-65838	1:1.14	1.50	.558 / .558 / .400	T608
PE-65839	1:1:1.266	1.50	.558 / .558 / .400	T608
PE-68646	1:1.58:2	1.50	.558 / .558 / .400	T608
PE-68788	1CT:1.41CT	0.80	.558 / .558 / .400	T608

Part Number	Turns Ratio	Primary Inductance (mH min)	Package L/W/H (in.)*	Data Sheet
THT - DUAL TRANSFORMERS				
1.5 KV Isolation Extended Temperature Range				
PE-68618	1CT:1CT & 1CT:3CT:.25	1.20 & 0.60	1.000 / .390 / .290	T608
PE-64950	1CT:1CT & 1CT:3CT:1	1.20 & 0.60	1.000 / .390 / .290	T608
PE-65567	1:1.15CT & 1:2CT	1.50 & 1.20	.800 / .390 / .290	T608
PE-65568	1:1:1.266 & 1:2CT	1.50 & 1.20	.800 / .390 / .290	T608
PE-65774	1CT:2CT & 1:1.36CT	1.20 & 1.20	.800 / .390 / .290	T608

NOTE: *To make a 1CT:1 ratio from a 1CT:2CT ratio, use only one-half the 2CT winding.*

**L/W/H is measured on surface mount parts tip to tip (height includes the wash area).*

***For additional extended temperature range products, contact Applications Engineering at Pulse USA.*

Part Number	Turns Ratio	Primary Inductance (mH min)	Package L/W/H (in.)*	Data Sheet
THT - DUAL TRANSFORMERS				
1.5 KV Isolation Standard Temperature Range				
PE-64951	1:2CT & 1:2CT	1.20 & 1.20	0.80 / 0.39 / 0.25	T608
PE-64952	1:2CT & 1:1.36CT	1.20 & 1.20	0.80 / 0.39 / 0.25	T608
PE-64953	1:2CT & 1:2CT	2.00 & 2.00	0.80 / 0.39 / 0.25	T608
PE-64954	1CT:2CT & 1:1	1.20 & 1.20	0.80 / 0.39 / 0.25	T608
PE-64955	1.58:2CT & 1.58:1	0.80 & 0.80	0.80 / 0.39 / 0.25	T608
PE-64956	2:2CT & 2:1	0.80 & 0.80	0.80 / 0.39 / 0.25	T608
PE-64957	2.62:2CT & 2.62:1	1.20 & 1.20	0.80 / 0.39 / 0.25	T608
PE-65565	1:1.15CT & 1:2CT	1.50 & 1.20	0.80 / 0.39 / 0.29	T608
PE-65566	1:1:1.266 & 1:2CT	1.50 & 1.20	0.80 / 0.39 / 0.29	T608
SMT - DUAL TRANSFORMERS				
1.5 KV Isolation Standard Temperature Range – Small Package**				
PE-65861	1CT:2CT & 1CT:2CT	1.20 & 1.20	.505 / .375/ .245	T608
PE-65862	1CT:2CT & 1:1.36CT	1.20 & 1.20	.505 / .375/ .245	T608
PE-65865	1:1.15CT & 1CT:2CT	1.20 & 1.20	.505 / .375/ .245	T608
PE-65866	1:1/1.26 & 1CT:2CT	1.20 & 1.20	.505 / .375/ .245	T608
PE-65870	1CT:1.15CT & 1CT:1.15CT	1.20 & 1.20	.505 / .375/ .245	T608
PE-68678	1CT:1CT & 1CT:2CT	1.20 & 1.20	.505 / .375/ .245	T608
PE-68786	1CT:1.41CT & 1CT:1.41CT	1.00 & 1.00	.505 / .375/ .245	T608
T1023	1CT:1.41CT & 1CT:1.41CT	1.00 & 1.00	.505 / .375/ .245	T608
1.5 KV Isolation Standard Temperature Range				
PE-68861	1CT:2CT & 1CT:2CT	1.20 & 1.20	.680 / .600 / .340	T608
PE-68862	1CT:2CT & 1:1.36CT	1.20 & 1.20	.680 / .600 / .340	T608
PE-68863	1:2CT & 1:1.14CT	1.20 & 1.20	.680 / .600 / .340	T608
PE-68864	1CT:2CT & 1:1	1.20 & 1.20	.680 / .600 / .340	T608
PE-68865	1:1.15CT & 1CT:2CT	1.50 & 1.20	.680 / .600 / .340	T608
PE-68866	1:1/1.26 & 1:2CT	1.50 & 1.20	.680 / .600 / .340	T608
PE-68869	1CT:2CT & 1:1.08CT	1.20 & 1.20	.680 / .600 / .340	T608
PE-68836	1:1/1.26 & 1:1/1.26	1.50 & 1.50	.680 / .600 / .340	T608
1.5 KV Isolation Extended Temperature Range				
PE-68822	1CT:2CT: & 1:1.36CT	1.60 & 1.60	.680 / .600 / .340	T608
PE-68825	1:1.15CT: & 1CT:2CT	1.60 & 1.60	.680 / .600 / .340	T608
PE-68826	1:1/1.26 & 1:2CT	1.20 & 1.20	.680 / .600 / .340	T608
PE-68827	1:2CT & 2:1	1.60 & 1.60	.680 / .600 / .340	T608
PE-68828	1CT:1CT & 1CT:1CT	1.20 & 1.20	.680 / .600 / .340	T608
PE-68841	1CT:2CT & 1CT:2CT	1.20 & 1.20	.680 / .600 / .340	T608
PE-68874	1CT:1.15CT & 1CT:1.15CT	1.20 & 1.20	.680 / .600 / .340	T608
PE-68877	1CT:1CT & 1CT:2CT	1.20 & 1.20	.680 / .600 / .340	T608
PE-68881	1CT:2.3CT & 1CT:2CT	1.20 & 1.20	.680 / .600 / .340	T608
PE-68882	1:1.15CT: & 1CT:1CT	1.60 & 1.60	.680 / .600 / .340	T608
PE-68884	1CT:1.36CT & 1CT:1.36CT	1.20 & 1.20	.680 / .600 / .340	T608
PE-68887	1CT:1.41CT & 1CT:1.41CT	1.20 & 1.20	.680 / .600 / .340	T608
3.0 KV ISOLATION STANDARD TEMPERATURE RANGE				
T1030	1CT:1CT & 1CT:1CT	1.20 & 1.20	.950 / .745 / .395	T617
T1031	1CT:1CT & 1CT::2CT	1.20 & 1.20	.950 / .745 / .395	T617
T1032	1CT:1.15CT & 1CT:1CT	1.60 & 1.60	.950 / .745 / .395	T617
T1033	1CT:1.15CT & 1CT:1.15CT	1.20 & 1.20	.950 / .745 / .395	T617
T1034	1CT:1.15CT & 1CT:2CT	1.50 & 1.20	.950 / .745 / .395	T617
T1035	1CS:1CS & 1CS:1.36CS	1.20 & 1.20	.950 / .745 / .395	T617
T1038	1CT:1CT & 1CT:1.36CT	1.20 & 1.20	.950 / .745 / .395	T617
T1036	1CT:1.36CT & 1CT:1.36CT	1.20 & 1.20	.950 / .745 / .395	T617
T1037	1CT:1.41CT & 1CT:1.41CT	1.20 & 1.20	.950 / .745 / .395	T617
T1080	1CT:1.41CT & 1CT:1.41CT	1.20 & 1.20	.950 / .745 / .395	T617
T1039	1CT:2CT & 1CT:1.08CT	1.20 & 1.20	.950 / .745 / .395	T617
T1043	1CT:2CT & 1CT:1.14CT	1.20 & 1.20	.950 / .745 / .395	T617
T1044	1CT:2CT & 1CT:1.36CT	1.20 & 1.20	.950 / .745 / .395	T617
T1045	1CT:2CT & 1CT:2CT	1.20 & 1.20	.950 / .745 / .395	T617
T1046	1CT:2CT & 2CT:1CT	1.60 & 1.60	.950 / .745 / .395	T617
T1047	1CT:2.3CT & 1CT:2CT	1.20 & 1.20	.950 / .745 / .395	T617
T1049	1CT:1/1.26 & 1CT:2CT	1.50 & 1.20	.950 / .745 / .395	T617
T1050	1CT:1.31CT & 2.62CT:1CT	1.20 & 1.20	.950 / .745 / .395	T617
T1051	1CT:1.26CT & 1.58CT:1CT	0.80 & 0.80	.950 / .745 / .395	T617

12220 WORLD TRADE DRIVE • SAN DIEGO, CA 92128 • TEL: 619/674/8100 • FAX: 619/674/8262 • QUICK-FACTS: 619/674/9672 • WEB: http://www.pulseeng.com

Transformers

Pulse
A TECHNITROL COMPANY

Telecommunications

T1/E1/CEPT/ISDN-PRI TRANSFORMERS

Part Number	Turns Ratio	Primary Inductance (mH min)	Package L/W/H (in.)	Data Sheet
SMT - QUAD TRANSFORMERS				
1.5 KV ISOLATION STANDARD TEMPERATURE RANGE				
T1001	1:1 & 1:1.36	1.20 & 1.20	1.000 / .425 / .295	T615
T1005	1:1.267 & 1:1.58	1.20 & 1.20	1.000 / .425 / .295	T615
T1006	1:1 & 1:1.2	1.20 & 1.20	1.000 / .425 / .295	T615
T1007	1:1.15	1.20 & 1.20	1.000 / .425 / .295	T615
T1008	1:1.364 & 1:2	1.20 & 1.20	1.000 / .425 / .295	T615
T1009	1:1 & 1:1.265	1.20 & 1.20	1.000 / .425 / .295	T615
T1010	1:1.36CT	1.20 & 1.20	1.000 / .425 / .295	T615
T1016	1:1.15 & 1:2	1.20 & 1.20	1.000 / .425 / .295	T615
T1017	1:2.3 & 1:2	1.20 & 1.20	1.000 / .425 / .295	T615
SMT - OCTAL TRANSFORMERS (8 TRANSFORMER PACKAGE)				
1.5 KV ISOLATION STANDARD TEMPERATURE RANGE				
	TRANSMIT / RECEIVE			
T1063	1:1.36 / 1:1.36CT	1.20 & 1.20	1.125 / .640 / .230	T620
T1064	1:1.14 / 1:1.14CT	1.20 & 1.20	1.125 / .640 / .230	T620
T1065	1:2CT / 1:2CT	1.20 & 1.20	1.125 / .640 / .230	T620
T1066	1:2 / 1:2CT	1.20 & 1.20	1.125 / .640 / .230	T620
T1067	1:1.36CT / 1:2CT	1.20 & 1.20	1.125 / .640 / .230	T620
T1068	1:2CT / 1:1CT	1.20 & 1.20	1.125 / .640 / .230	T620
T1069	1CT:1.41 / 1CT:1.41	1.20 & 1.20	1.125 / .640 / .230	T620
T1070	1:1.15 / 1:2CT	1.20 & 1.20	1.125 / .640 / .230	T620
T1071	1:1/1.26 / 1:2CT	1.20 & 1.20	1.125 / .640 / .230	T620
T1072	1:1.15 / 1:1.15	1.20 & 1.20	1.125 / .640 / .230	T620
T1073	1:2 / 1:2	1.20 & 1.20	1.125 / .640 / .230	T620

T3/DS3/E3/STS-1 SINGLE TRANSFORMERS

Part Number	Turns Ratio	Primary Inductance OCL (µH min)	Package L/W/H (in.)****	Data Sheet
THT				
PE-68629	1:1	40	.350 / .500/ .250	T606
PE-65966	1:1	40	.300 / 280 / .250	T606
PE-65663	1:1	40	.300 / .400 / .250	T606
PE-65969	1:2CT	19	.300 / .280 / .250	T606
PE-65664	1:2CT	35	.300 / .400 / .250	T606
PE-68630	1:2CT	19	.350 / .500 / .250	T606
PE-65779	1:4CT	200	.300 / .400 / .250	T606
PE-65856	1:1.73CT	50	.300 / .280 / .250	T606
SMT*				
PE-65967	1:1	40	.300 / .390 / .250	T606
PE-65662	1:1	45	.300 / .420 / .200	T606
PE-65968	1:2CT	19	.300 / .390 / .250	T606
PE-65661	1:2CT	35	.300 / .420 / .200	T606

ISDN U-INTERFACE TRANSFORMERS

Part Number 1.5-2.0 KV	2.5 KV	3 KV	Turns Ratio	OCL Line Side (mH)	Package L/W/H (in.)****	Data Sheet
THT						
PE-65575**	—	PE-68669**	1.65:1	13.0-18.0	1.100 / .750 / .430	T603
PE-65578	—	—	1.32:1	7.0 - 8.3	1.100 / .750 / .430	T603
PE-65579	—	—	2.00:1	25.5-28.5	1.100 / .950 / .450	T603
PE-65581	—	—	1.50:1	14.2-15.8	1.100 / .950 / .450	T603
PE-65583	PE-68631	—	1.50:1	25.6-28.4	1.100 / .950 / .450	T603
PE-65584	PE-68681	—	1.50:1	25.6-28.4	1.100 / .950 / .450	T603
PE-68628	PE-68668	—	1.25:1	26.5-29.5	1.100 / .950 / .450	T603
T4008	—	—	1.5:1	73.0-98.0	1.050 / .900 / 10.50	T616
T4019	—	—	1.25:1	26.5-29.5	.765 / .595 /.346	T618

Part Number	Turns Ratio	OCL Line Side (mH)	Package L/W/H (in.)****	Data Sheet
SMT***				
T4001	1.25:1	26.5 - 30.0	.760 / .870 / .500	T614
T4002	1.65:1	15.0 - 18.0	.760 / .870 / .500	T614
T4004	1.50:1	25.6 - 28.4	.760 / .870 / .500	T614
T4006	1.50:1	14.2 - 15.8	.760 / .870 / .500	T614

ECHELON® AND DIGITAL AUDIO SINGLE TRANSFORMERS

Part Number	Turns Ratio	Primary Inductance OCL (mH min)	Package L/W/H (in.)****	Data Sheet
THT				
PE-65948	1CT:1CT	3.5 - 6.5	.350 / .500 / .250	T602
PE-65612	1:1	2.5	.350 / .500 / .250	T601
SMT				
PE-65848	1CT:1CT	3.5 - 6.5	.480 / .600 / .340	T602
PE-65812	1:1	2.5	.480 / .600 / .340	T601

ISDN S-INTERFACE SINGLE & DUAL TRANSFORMERS

Part Number	Turns Ratio	Primary Inductance OCL (µH min)	Package L/W/H (in.)****	Data Sheet
SMT – SINGLE				
1.5 KV ISOLATION, PCMCIA TYPE 2				
T5002	1:1	22	.492 / .670 / .167	T631
T5003	1:2	22	.492 / .670 / .167	T631
T5004	1:2.5	22	.492 / .670 / .167	T631
SMT – SINGLE				
1.5 KV ISOLATION				
T5020	1:2	22	.550 / .760 / .390	T633
T5021	1:1	22	.550 / .760 / .390	T633
T5022	1:2.5	22	.550 / .760 / .390	T633
T5023	1:2	22	.550 / .760 / .390	T633
THT – SINGLE				
2.0 KV ISOLATION				
PE-64993	1:1	22	.560 / .560 / .400	T604
PE-64994	1:1.8	22	.560 / .560 / .400	T604
PE-64995	1:2	22	.560 / .560 / .400	T604
PE-64996	1:2.5	22	.560 / .560 / .400	T604
PE-64998	1:2.5	22	.560 / .560 / .400	T604
PE-64999	1:2	22	.560 / .560 / .400	T604
THT – DUAL				
2.0 KV ISOLATION				
PE-65492	1:1 & 1:2	22	.920 / .560 / .400	T604
PE-65493	1:1 & 1:1	22	.920 / .560 / .400	T604
PE-65495	1:2 & 1:2	22	.920 / .560 / .400	T604
PE-65498	1:2.5 & 1:2.5	22	.920 / .560 / .400	T604
PE-65499	1:2 & 1:2	22	.920 / .560 / .400	T604
SMT – DUAL				
2.0 KV ISOLATION				
PE-65792	1:1 & 1:2	22	.950 / .720 / .390	T604
PE-65793	1:1 & 1:1	22	.950 / .720 / .390	T604
PE-65795	1:2 & 1:2	22	.950 / .720 / .390	T604
PE-65798	1:2.5 & 1:2.5	22	.950 / .720 / .390	T604
PE-65799	1:2 & 1:2	22	.950 / .720 / .390	T604
2.0 KV ISOLATION, LOW PROFILE				
T5005	1:2.5 & 1:2.5	22	.950 / .720 / .295	T613
T5006	1:2 & 1:2	22	.950 / .720 / .295	T613
T5007	1:2 & 1:2	22	.950 / .720 / .295	T613
T5008	1:1 & 1:1	22	.950 / .720 / .295	T613
T5009	1:1 & 1:2	22	.950 / .720 / .295	T613
T5010	1:1.8 & 1:1.8	22	.950 / .720 / .295	T613
THT – SINGLE				
3.0 KV ISOLATION REINFORCED INSULATION PER IEC 950				
PE-68992	1:2CT	22	.750 / .750 / .500	T604
PE-68993	1:1	22	.750 / .750 / .500	T604
PE-68995	1:2	22	.750 / .750 / .500	T604
PE-68998	1:2.5	22	.750 / .750 / .500	T604
PE-68999	1:2	22	.750 / .750 / .500	T604
T5035	1CT:2CT	30	.578 / .648 / .565	T636
SMT – SINGLE				
3.0 KV ISOLATION REINFORCED INSULATION PER IEC 950				
T5024	1:2	22	.550 / .760 / .420	T633
T5025	1:1	22	.550 / .760 / .420	T633
T5026	1:2.5	22	.550 / .760 / .420	T633

ISDN S-INTERFACE MODULES (TRANSFORMERS & CHOKES)

Part Number	Turns Ratio	Transformer Primary Inductance OCL (mH MIN)	Choke OCL (mH MIN)	Package L/W/H (in.)	Data Sheet
THT					
T5011	1CT:1CT	30	4.70	1.150 / .420 / .590	T632
T5012	1CT:2CT	30	4.70	1.150 / .420 / .590	T632
T5013	1CT:2.5CT	30	4.70	1.150 / .420 / .590	T632
T5015	1:2CT	30	4.70	1.150 / .420 / .590	T632
SMT					
T5034	1CT:2CT	30	4.70	1.170 / .660 / .320	T635
T5037	1CT:2.5CT	30	4.70	1.170 / .660 / .320	T635
T5038	1CT:2CT	30	0.47	1.170 / .660 / .320	T635

**For extended temperature applications, contact Applications Engineering at Pulse.*
***Echo Cancellation Hybrid units PE-36005 and PE-36005W are also available.*
****Reduced package size available. Contact Applications Engineering.*
*****Package: L/W/H is measured on surface mount parts tip to tip (height includes wash area).*

SMT– *Surface Mount Package* THT – *Through Hole Package*

12220 WORLD TRADE DRIVE • SAN DIEGO, CA 92128 • TEL: 619/674/8100 • FAX: 619/674/8262 • QUICK-FACTS: 619/674/9672 • WEB: http://www.pulseeng.com

Transformers

Pulse
A TECHNITROL COMPANY

HDSL Transformers

Matched to Brooktree's BT8952, BT8921, BT8960, BT8970

Part Number	Matched to Brooktree	Application (2 pair)	Turns Ratio Chip-Line (±3%)	Inductance Line Side (mH ±6%)	Data Sheet
THT					
PE-68621	BT8952	784 Kbps	2CT:1:1	3.0	B901
PE-68622	BT8952	1168 Kbps	2CT:1:1	2.0	B901
PE-69300	BT8921/BT8970	784 Kbps	1CT:1:1	3.0	B901
PE-69301	BT8921/BT8970	1168 Kbps	1CT:1:1	2.0	B901
B1001	BT8960	416 Kbps	1CT:1:1	3.5*	B901
B1002	BT8960	288 Kbps	1CT:1:1	5.0*	B901
B1004	BT8960	160 Kbps	1CT:1:1	8.0*	B901
SMT					
B1006	BT8921/BT8970	1168 Kpbs	1CT:1:1	2.0	B901
B1007	BT8921/BT8970	784 Kpbs	1CT:1:1	3.0	B901

Matched to Level One's SK70704

Part Number	Matched to Level One	Application (2 pair)	Turns Ratio Chip-Line (±3%)	Inductance Line Side (mH ±6%)	Data Sheet
THT					
PE-68614	SK70704	784 Kbps	1CT:1.8CTS	2.75	B901
PE-68650	SK70704	1168 Kbps	1CT:1.8CTS	2.06	B901

*(mH ±10%)

NOTE: Package size is 1.05"/26,67 cm (L), .950"/24,13 cm (W), .500"/12,70 cm (H).

ADSL Transformers

Matched to Globespan's ADSL Chipset

Part Number	Application*	Isolation Voltage (Vrms)	Turns Ratio Chip-Line	Inductance Chip-Side (µH±10%)	Data Sheet
THT					
B2002	CO	1500	1.4:1.4:1:1	940	B903
B2006	CPE	1500	1:1:1:1	410	B903
B2007	CO	3000	1.4:1.4:1:1	940	B903
B2008	CPE	3000	1:1:1:1	410	B903
SMT					
B2011	CO	3000	1.4:1.4:1:1	940	B903
B2012	CPE	3000	1:1:1:1	410	B903

SMT – *Surface Mount* THT – *Through Hole PackagePackage*

***NOTE:** CO – *Central Office,* CPE – *Customer Premise Equipment.*

Matched to Analog Devices' AD20msp910 ADSL CHIPSET

Part Number	Application*	Isolation Voltage (Vrms)	Turns Ratio Chip-Line	Inductance Chip-Side (mH ±10%)	Data Sheet
THT					
B2031	CO/CPE	1500	1:1	5	B906
SMT					
B2032	CO/CPE	1500	1:1	5	B906

ADSL POTS LOW PASS FILTERS FOR CPE & CO

Part Number	Line/POTS Port Impedance	POTS Pass Band, Ripple (200-4000 Hz)	Return Loss in Passband (dB MIN)	POTS Loop Currents (mA DC)	Data Sheet
B2039	600 Ω **CPE**	±0.5 dB	20	100	B905
B2040	900 Ω **CO**	±0.5 dB	20	100	B905

NOTE: Compatible with all ADSL coding schemes. Compact package, includes connectors for ease of installation. Customized multiport line cards available for central office applications.

10Base-T and Ethernet

10BASE-T TRANSFORMERS

Part Number	Turns Ratio	Primary Inductance OCL (µH min)	Package L/W/H (in.)***	Data Sheet
Surface Mount				
PE-65454**	1:√2 & 1:1	140	.330 / .340 / .098	EC100
E5017*	1CT:1CT & 1CT:1CT	200	.500 / .370 / .200	EC100
PE-65726	1CT:1CT & 1CT:1CT	200	.500 / .370 / .200	EC100
23Z114SM	1CT:1CT & 1CT:1CT	200	.450 / .360 / .215	EC100
PE-68048*	1CT:√2CT & 1CT:1CT	110	.500 / .370 / .200	EC100
PE-65745	1CT:√2CT & 1CT:1CT	140	.500 / .370 / .200	EC100
23Z128SM	1CT:√2CT & 1CT:1CT	200	.450 / .360 / .215	EC100
23Z356SM*	1CT:√2CT & 1CT:1CT	200	.450 / .360 / .215	EC100
23Z435SM*	2CT:1CT & 1CT:1CT	100	.450 / .360 / .215	EC100
PE-68052*	2CT:1CT & 1CT:1CT	140	.500 / .370 / .200	EC100
E4001*	1CT:2CT & 1CT:1CT	112	.500 / .370 / .200	EC100
PE-68041	1CT:2CT & 1CT:1CT	112	.500 / .370 / .200	EC100
23Z467SM*	1CT:2CT & 1CT:1CT	140	.450 / .360 / .215	EC100
PE-68023*	1CT:2CT & 1CT:1CT	200	.500 / .370 / .200	EC100
PE-68042	2√2CT:1 & 1:1	200	.780 / .420 / .200	EC100
PE-68810	1:1 (4x) (RX)	140	.500 / .370 / .200	EC100
PE-68820	1:√2 (4x) (TX)	140	.500 / .370 / .200	EC100
Through Hole				
23Z435*	2CT:1CT & 1CT:1CT	80	.800 / .340 / .250	EC100
PE-68007	1:1 (4x) (RX)	140	.800 / .300 / .220	EC100
PE-68008	1:√2/2 (4x) (TX)	140	.800 / .300 / .220	EC100
23Z128	1CT:√2CT & 1CT:1CT	140	.800 / .340 / .250	EC100
PE-65263	1CT:1CT & 1CT:1CT	200	.800 / .300 / .220	EC100

ETHERNET TRANSFORMERS

Part Number	Turns Ratio	Primary Inductance OCL (µH ± 20%)	Package (in.) L/W/H (in.)***	Data Sheet
Surface Mount				
E6002	1:1	50	.500 / .370 / .200	EC100
PE-65723	1:1	75	.500 / .370 / .200	EC100
23Z90SM	1:1	75	.450 / .360 / .215	EC100
PE-68801**	1:1	75	.530 / .340 / .094	EC100
PE-65728	1:1	100	.500 / .370 / .200	EC100
23Z91SM	1:1	100	.450 / .360 / .215	EC100
PE-65727	1:1	150	.500 / .370 / .200	EC100
PE-65733	1:1	350	.500 / .370 / .200	EC100
23Z108SM	1:1	350	.450 / .360 / .215	EC100
Through Hole				
PE-64102	1:1	75	.800 / .300 / .220	EC100
PE-64107	1:1	75	1.000 / .385 / .200	EC100
PE-64502	1:1	75	.800 / .300 / .220	EC100
PE-64103	1:1	100	.800 / .300 / .220	EC100
PE-64108	1:1	100	1.000 / .385 / .200	EC100
PE-64503	1:1	100	.800 / .300 / .220	EC100
PE-64104	1:1	150	.800 / .300 / .220	EC100
PE-64109	1:1	150	1.000 / .385 / .200	EC100

***Includes Common Mode Choke(s)**

**** PCMCIA Package**

*****Package:** L/W/H is measured on surface mount parts tip to tip (height includes wash area).

12220 WORLD TRADE DRIVE • SAN DIEGO, CA 92128 • TEL: 619/674/8100 • FAX: 619/674/8262 • QUICK-FACTS: 619/674/9672 • WEB: http://www.pulseeng.com

Transformers

Pulse — A TECHNITROL COMPANY

Token Ring

SINGLE TRANSFORMERS

Part Number	Turns Ratio	Primary Inductance OCL (µH Min)	Package L/W/H (in.)***	Data Sheet
SINGLE THT TRANSFORMERS				
23Z111	1:1:1.22:1.22	100 ±20%	.450 / .340 / .230	EC200
PE-65871	1:1:1:1	500	.500 / .500 / .265	EC200
PE-63838-001	1:1:2:2	500	.500 / .500 / .370	EC200
PE-67537	1:1:2:2	900	.400 / .400 / .300	EC200
SINGLE SMT TRANSFORMERS				
23Z116SM	1:1:1:1	75 ±30%	.230 / .360 / .215	EC200
23Z110SM	1:1:2:2	75 ±30%	.230 / .360 / .215	EC200
23Z111SM	1.22:1.22:1:1	100 ±20%	.230 / .360 / .215	EC200
23Z354SM	.5:.5:1.22:1.22	75 ±30%	.230 / .360 / .215	EC200

DUAL TRANSFORMERS

Part Number	Turns Ratio	Primary Inductance OCL (µH Min)	Package L/W/H (in.)***	Data Sheet
DUAL THT TRANSFORMERS				
PE-64974-001	1:1:1:1	2600	1.000 / .385 / .295	EC200
23Z806	1:1:1:1 ±3%	750	.800 / .340 / .250	EC200
PE-67541	1:1:1:1	1200	1.000 / .385 / .295	EC200
DUAL SMT TRANSFORMERS				
PE-65738	1:1	50	.500 / .370 / .200	EC200
23Z126SM	1:1:1:1 ±3%	75 ±30%	.450 / .360 / .215	EC200
23Z112SM	1:1:2:2	75 ±30%	.450 / .360 / .215	EC200
PE-65737	1:1.21:1:1.21	273	.500 / .370 / .200	EC200
PE-65736	1:1:1:1	75	.500 / .370 / .200	EC200
23Z807SM	1:1:2:2 ±3%	225 ±30%	.600 / .420 / .215	EC200
23Z133SM	1:1:1.22:1.22 ±5%	250 ±30%	.450 / .360 / .215	EC200
PE-67562	1:1:2CT(dual)	710	.500 / .375 / .245	EC200

Power Products

GATE DRIVE TRANSFORMERS

Part Number	Turns Ratio	Primary Inductance (µH min)	Leakage Inductance (nH max)	Package L/W/H (in.)	Data Sheet
500 KHz - THT					
PE-64972	1:1:1	70	180	.500 / .700 / .420	PC502
PE-64973	1:1	70	180	.500 / .700 / .420	PC502
LOW PROFILE – SMT					
PE-68386	1:1	1200*	480	.265/ .340 / .098	PC502
MOSFET - THT					
PE-63385	1:1	1500	4.0	1.09 / 1.08 / 1.20	PC502
PE-63387	1:1:1	1500	4.0	1.09 / 1.08 / 1.20	PC502
PE-63386	1:1.5	1500	4.0	1.09 / 1.08 / 1.20	PC502
PE-63388	1:1.5:1.5	1500	4.0	1.09 / 1.08 / 1.20	PC502
OFFLINE - THT					
P0584	1:1:1	450	0.5	.810 / .580 / .750	P515[1]
P0585	1:1:1:1	450	3.0	.810 / .580 / .750	P515[1]

1. Preliminary data sheet.

*(µH ± 30%)

CURRENT SENSE TRANSFORMERS

Part Number	Secondary Turns	Secondary Inductance	Ipeak (Amps)	Package L/W/H (in.)**	Data Sheet
TRANSFORMER WITH 2 - 1T PRIMARIES – THT					
PE-64487	100	20.0 µH	20	.900 / .700 / .700	PC502
PE-64488	200	80.0 µH	20	.900 / .700 / .700	PC502
PE-64517	50CT	5.0 µH	20	.900 / .700 / .700	PC502
PE-64518	100CT	20.0 µH	20	.900 / .700 / .700	PC502
PE-64519	200CT	80.0 µH	20	.900 / .700 / .700	PC502
TRANSFORMER WITH 1T PRIMARY – THT					
PE-63586	50	5.0 µH	20	.900 / .700 / .700	PC502
PE-63587	100	20.0 µH	20	.900 / .700 / .700	PC502
PE-63588	200	80.0 µH	20	.900 / .700 / .700	PC502
PE-63618	100CT	20.0 µH	20	.900 / .700 / .700	PC502
PE-63619	200CT	80.0 µH	20	.900 / .700 / .700	PC502
PE-63691	300CT	180.0 µH	20	.900 / .700 / .700	PC502
PE-67050	50	5.0 µH	35	.750 / .565 / .750	PC502
PE-67100	100	20.0 µH	37	.750 / .565 / .750	PC502
PE-67200	200	80.0 µH	38	.750 / .565 / .750	PC502
PE-67300	300	180.0 µH	37	.750 / .565 / .750	PC502
500 KHz – THT					
PE-64976	10	150.0 mH	20	.550 / .325 / .580	PC502
PE-64977	20	600.0 mH	20	.550 / .325 / .580	PC502
PE-64978	50	4000.0 mH	20	.550 / .325 / .580	PC502

Part Number	Primary Turns	Primary Inductance	Ipeak (Amps)	Package L/W/H (in.)**	Data Sheet
P0581	200	76 µH	34	.810 / .580 / .750	P516[1]
P0582	100	19 µH	35	.810 / .580 / .750	P516[1]
P0583	50	5 µH	36	.810 / .580 / .750	P516[1]
SMT					
PE-68210	50	3.8 µH	15.3	.575 / .495 / .280	PC502
PE-68280	100	14.8 µH	16.3	.575 / .495 / .280	PC502
PE-68383	200	59.2 µH	16.4	.575 / .495 / .280	PC502

1. Preliminary data sheet.

FLYBACK TRANSFORMERS

Approved for National Semiconductor's Simple Switcher™

Part Number	Turns Ratio	Primary Inductance (µH min)	Package L/W/H (in.)	Data Sheet
NATIONAL PART NUMBERS LM2577 – THT				
PE-65300	1:2 CT	100	1.05 / .800 / 0.81	PC502
PE-65301	1:1 CT	200	1.05 / 1.15 / 0.80	PC502
PE-65302	1:1 CT	400	1.425 / 1.20 / 1.15	PC502

Part Number*	Turns Ratio	Primary Inductance (µH nom)	Package L/W/H (in.)**	Data Sheet
NATIONAL PART NUMBERS LM2585 & LM2587 – SMT				
PE-68411	1:1	22	1.040 / .920 / 0.470	PC502
PE-68412	1:2.5:2.5	22	1.040 / .920 / 0.470	PC502
PE-68413	1:0.5:1.15:1.15	66	1.040 / .920 / 0.470	PC502
PE-68414	1:1.2:1.2	65	1.040 / .920 / 0.470	PC502
PE-68421	1:0.8:0.8	85	.970 / 1.070 / .700	PC502
PE-68422	1:0.35:0.8:0.8	85	.970 / 1.070 / .700	PC502

Part Number	Turns Ratio	Primary Inductance (µH min ±25%)	Package L/W/H (in.)	Data Sheet
FOR LT®1171 – THT				
PE-68488	1:1:1:1	36	.850 / .900 / .500	PC502

DC/DC CONVERTER TRANSFORMERS

Part Number*	Input Voltage (Vin)	Output Voltage (Vout)	Package L/W/H (in.)**	Data Sheet
SMT				
PE-68279	11.5 to 12.5	9 V nom	.550 / .453 / .253	PC502
PE-68283	4.75 to 5.25	9 V nom	.550 / .453 / .253	PC502

PGF SWITCHMODE POWER TRANSFORMERS

Part Number*	Input Voltage	Output Power	Primary Inductance (nom)	Package L/W/H (in.)**	Data Sheet
HIGH POWER, LOW PROFILE, HIGH FREQUENCY – SMT					
PE-68471	18-72 V_{DC}	130 W	45 µH	1.175 / 1.075 / 0.340	PC502
PE-68472	18-72 V_{DC}	140 W	45 µH	1.175 / 1.075 / 0.340	PC502

** Add "T" suffix to surface mount part number to indicate Tape & Reel packaging.*

***L/W/H is measured on surface mount parts tip to tip (height includes the wash area).*

12220 WORLD TRADE DRIVE • SAN DIEGO, CA 92128 • TEL: 619/674/8100 • FAX: 619/674/8262 • QUICK-FACTS: 619/674/9672 • WEB: http://www.pulseeng.com

CUSTOM POWER TRANSFORMERS

Quality Transformer Corporation is engaged in the design and manufacture of a standard line of single phase and three phase transformers as well as custom transformers, inductors and toroidal transformers. QTC offers 70 years of experienced management and engineering personnel to satisfy any magnetic requirement of customers and provide the most cost effective solutions. QTC designs and manufactures to applicable military, UL, CSA, VDE, CE and commercial specifications.

- Up to 25 KVA
- 25 HZ to 2 MHZ
- Voltages to 15 KV
- Single and Three Phase
- Isolation
- Auto-Tap
- Inverter
- Ferroresonant

• TOROIDAL TRANSFORMERS • POWER, AUDIO & FILTER CHOKES
• HIGH FREQUENCY TRANSFORMERS • HIGH VOLTAGE TRANSFORMERS
• MAGNETIC AMPLIFIERS / SATURABLE REACTORS

FILE E111339: UL and CSA Insulation System Recognition.

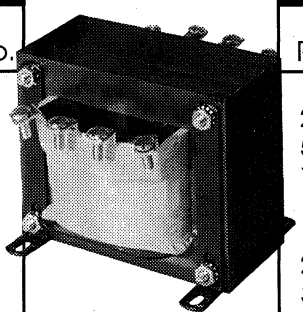
Class B (130° C) DV-130 Class H (180° C) DV-180-A

STANDARD MACHINE TOOL AND CONTROL TRANSFORMERS

FILE E169029: UL and CSA Recognized Transformers.

SERIES 2100
1 phase, 50/60 HZ, Class H (180°C)

Primary: 230/460 VAC Secondary: 115 VAC		Primary: 230/460 VAC Secondary: 15/230VAC	
VA RATING	QTC Cat. No.	VA RATING	QTC Cat. No.
100	2100	250	2120
250	2101	500	2121
500	2102	750	2122
750	2103	1 KVA	2123
1 KVA	2104	2KVA	2124
2 KVA	2105	3 KVA	2125
3 KVA	2106	4 KVA	2126
4 KVA	2107	5 KVA	2127
5 KVA	2108	6 KVA	2128
6 KVA	2109	7.5 KVA	2129
7.5 KVA	2110	10 KVA	2130
10 KVA	2111		

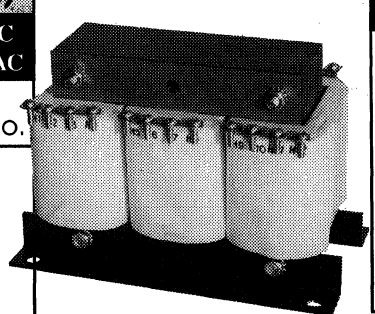


SERIES 2200
1 phase, 50/60 HZ, Class B (130°C)

Primary: 230/460 VAC Secondary: 115 VAC		Primary: 230/460 VAC Secondary: 15/230VAC	
VA RATING	QTC Cat. No.	VA RATING	QTC Cat. No.
100	2200	250	2220
250	2201	500	2221
500	2202	750	2222
750	2203	1 KVA	2223
1 KVA	2204	1.5 KVA	2224
1.5 KVA	2205	2KVA	2225
2 KVA	2206	3 KVA	2226
3 KVA	2207	4 KVA	2227
4 KVA	2208	5 KVA	2228
5 KVA	2209		

SERIES 2300
3 phase, 50/60 HZ, Class H (130°C)

Primary: 230/460 VAC Secondary: 115 VAC		Primary: 230/460 VAC Secondary: 15/230VAC	
VA RATING	QTC Cat. No.	VA RATING	QTC Cat. No.
250	2300	250	2320
500	2301	500	2321
1 KVA	2302	1 KVA	2322
2 KVA	2303	2 KVA	2323
3 KVA	2304	3 KVA	2324
4 KVA	2305	4 KVA	2325
5 KVA	2306	5 KVA	2326
7.5 KVA	2307	7.5 KVA	2327



OPTIONS:

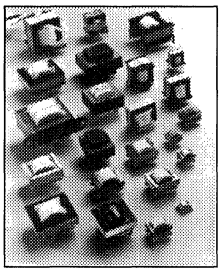
- Lead Wires
- Environmental Coatings
- Terminal Blocks
- NEMA Enclosures
- Any Voltage Variations Required

Quality Transformer Corp.
160 East Aurora St., Waterbury CT 06708
Web Site: WWW.qtran.com E-mail: tony@qtran.com
Phone: (203) 757-5757
Fax: (203) 596-8041

CUSTOM DESIGNED TRANSFORMERS

SINCE 1955

For Over 40 YEARS SHIPPED WORLDWIDE



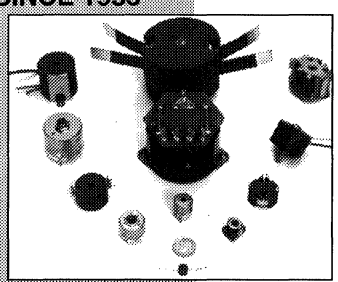
TYPICAL APPLICATIONS

Power Supplies, Test Equipment, Communications, Consumer, Military, Audio, Robotics, Motor Controllers, Automotive.

- 20Hz to 1 MHz up to 1000 Watts-Ferrite
- 50/60Hz up to 150VA - Laminated
- Power, Pulse, Gate & Base Drive, Current,
- Flyback, Forward converter, Push Pull
- Full and Half bridge, Resonant, Isolation,
- Ballast & Audio
- All Ferrite Shapes, Powdered Iron, Laminated & Toroidal

CUSTOM POT CORES

SINCE 1955



Renco has manufactured millions of pot core assemblies since 1955, in the smallest (704) series), the largest (7042 Series), and every size in between.

Renco is thoroughly experienced with all standard cores and hardware such as; Philips Components, Siemens, TDK, Magnetics Inc., Etc. We stock all the popular bobbins including printed circuit types.

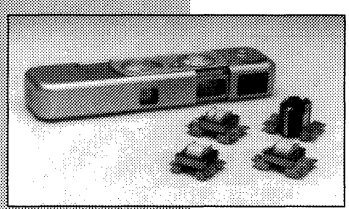
Let us assist you with your upcoming pot core designs. We have a fully independent sample and prototype department. Prototypes are usually shipped within 10 days or less.

Send us your existing specifications and designs for pot cores, inductors and transformers. Renco will promptly respond with very competitive prices. We have a reputation for keeping our delivery promises. Try Us!

NEW CUSTOM SURFACE MOUNT TRANSFORMERS RL5750

SINCE 1955

High Frequency, low loss core materials ALL IN STOCK!
Proven Design Packages
Fully Tooled for Automatic Test



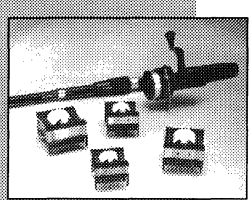
The RL-5750 Series consists of four low profile surface mount package styles. All are constructed with high temperature UL 94V-O material allowing compatibility with harsh surface mount environments.

FEATURES:

- 12 Terminals
- High Current Capability
- Frequencies up to 250 KHz
- Meets UL 94V-O
- Class B, 130°C Insulation System
- Optional Cap Available for Pick & Place

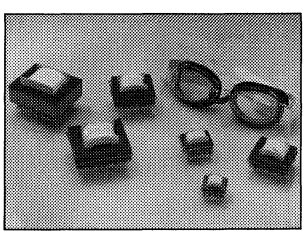
FERRITE CORE TRANSFORMERS RL2600 & RL1287

SINCE 1955



RL-2600 High efficiency switch-mode transformers meet European safety standards

- 30 Watts to 500 Watts
- Frequecncy 1 KHz to 500KHz
- Voltage range 5V to 2500V
- 5 Package sizes, 13 to 20 PCB mount pins.
- Optimized high frequency core and bobbin package



RL-1287 Custom power supply transformers

- 7 Watts to 900 Watts
- Frequency 1KHz to 500KHz
- Voltage range 5V to 2500V
- 6 Package sizes, 8 to 14 PCB mount pins
- Low cost industrial standard packages

TRANSFORMERS

SINCE 1955

RENCO ELECTRONICS, INC. 60 E Jefryn Boulevard Deer Park, NY 11729 USA

1-516-586-5566 • TOLL-FREE ENGINEERING HOT LINE 1-800-645-5828

NEW WEB SITE http://www.rencousa.com

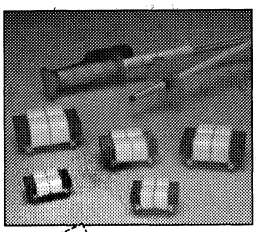
FAX DIRECT FOR FREE SAMPLES: 1-516-586-5562

TRANSFORMERS

FLAT/TRAN™ TRANSFORMERS PCB PLUG-IN RL2230 54 Values

SINCE 1955

For Over 40 YEARS SHIPPED WORLDWIDE



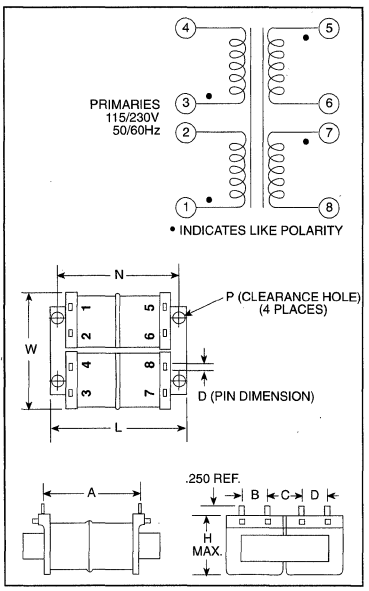
- Power 2VA to 48VA
- 115 or 230 Volt, 50/60Hz
- 5 Sizes
- Low EMI (electromagnetic interference)

This series of rugged low profile transformers is specifically designed for convenient pc board mounting. The low overall height permits close spacing of adjacent pc boards to obtain maximum system density.

UL APPROVED FOR USA & CANADA

Using nonconcentric side-by-side windings reduces the inter-winding capacitance and eliminates the need for electrostatic shielding. Semi-toroidal hum bucking construction results in balanced windings reducing EMI. Dual primary windings permit designs for 115/230VAC, 50/60Hz applications. The two independent secondary windings offer the flexibility of series, parallel or two isolated outputs.

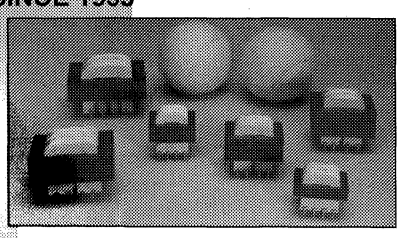
These transformers are HIPOT tested at 1500 Volts RMS and are manufactured to Class B 130ºC insulation. All transformers are designed to meet UL and CSA specifications.



Size	A	B	C	L	W	H	N	D	P	Oz.
2	1.600	0.375	0.375	1.87	1.56	0.650	-	.041 x .020	N/A	5
6	1.600	0.375	0.375	1.87	1.56	0.850	-	.041 x .020	N/A	7
12	2.000	0.500	0.500	2.50	2.00	1.065	-	.041 x .020	N/A	15
24	1.900	0.600	0.530	2.87	2.25	1.250	2.41	.041 Sq.	CLEARANCE HOLE FOR #6 SCREW	11
28	2.180	0.600	0.660	3.12	2.50	1.375	2.62	.041 Sq.	CLEARANCE HOLE FOR #4 SCREW	21

DUAL/TRAN™ TRANSFORMERS PCB PLUG-IN RL2240 42 Values

SINCE 1955

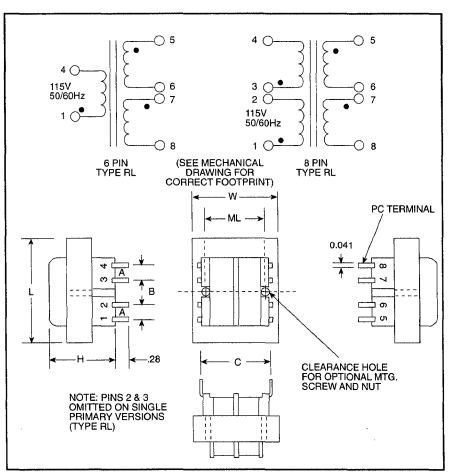


- Power 1.1 VA to 36 VA
- 115 or 230 V, 50/60 Hz
- 6 sizes
- Low Interwinding Capacitance

The advanced design and manufacturing techniques of using split bobbins and nonconcentric winding of the primary and secondary results in low interwinding capacitive coupling and eliminates the need for electrostatic shielding. It also avoids crossover of primary and secondary leads.

These transformers can be used in a wide variety of applications since they can be supplied with single 115VAC or dual 115/230VAC primaries for 50/60Hz operation. Their split secondary windings allow them to be hooked-up in a series, in parallel or they can be used as independent and isolated outputs.

The RL2240 Series is HIPOT tested at 2500VAC and are manufactured to Class B 130º insulation. All transformers are designed to meet UL and CSA specifications.



UL APPROVED FOR USA & CANADA

Size	VA	L	W	H	ML	A	B	C	Optional Mfg. Screw Nut*	Lbs.
2	1.1	1-3/8	1-1/8	15/16	–	.250	.250	1.200	None	0.17
3	2.4	1-3/8	1-1/8	1-3/16	–	.250	.250	1.200	None	0.25
4	6.0	1-5/8	1-5/16	1-15/16	1-1/16	.250	.350	1.280	4-40 x 1-3/8 Nylon	0.44
5	12.0	1-7/8	1-9/16	1-7/16	1-1/4	.300	.400	1.410	4-40 x 1-3/8 Nylon	0.70
6	20.0	2-1/4	1-7/8	1-7/16	1-1/2	.300	.400	1.600	4-40 x 1-3/8 Nylon	0.80
7	36.0	2-5/8	2-3/16	1-9/16	†	.400	.400	1.850	†	1.10

SINCE 1955

RENCO ELECTRONICS, INC. 60 E Jefryn Boulevard Deer Park, NY 11729 USA

1-516-586-5566 • TOLL-FREE ENGINEERING HOT LINE 1-800-645-5828

NEW WEB SITE http://www.rencousa.com

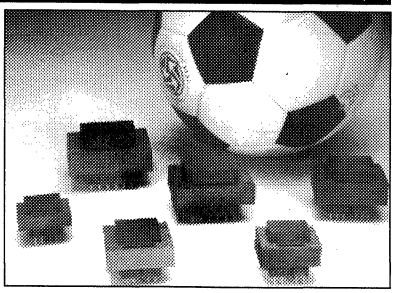
FAX DIRECT FOR FREE SAMPLES: 1-516-586-5562

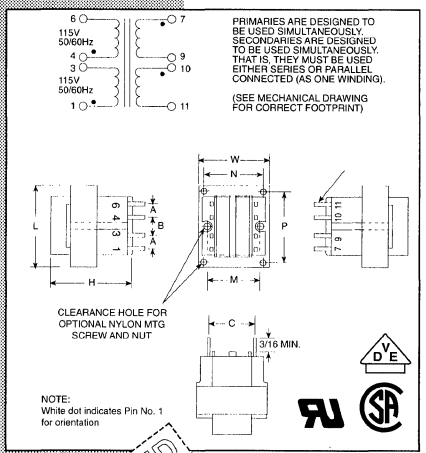
ALL/TRAN™ TRANSFORMERS PCB PLUG-IN RL2250 42 Values

SINCE 1955

For Over 40 YEARS SHIPPED WORLDWIDE

- Power 2.5 VA to56 VA
- 115 or 230V, 50/60 Hz
- 6 Sizes
- High Primary to Secondary Isolation





This series of transformers is specifically manufactured to meet or exceed UL, CSA, VDE and IEC specifications. These transformers incorporate advanced dual bobbin nonconcentric design that reduces interwinding capacitance and eliminates the need for electrostatic shielding. Since the windings are balanced no primary circulating currents are present. Use of high temperature, high stability materials results in excellent interwinding insulation and insulation between windings and core.

NOW IEC 950 APPROVED

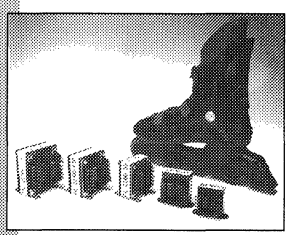
Slots in the bobbin flanges eliminate lead crossovers and the need for insulting pads resulting in improved lead termination. This series is PC plug-in mount in power ranges from 2.5 to 56 Volt/Amps. The transformers are HIPOT tested at 4000 Volts RMS and are manufactured to CLass B 130º insulation.

UL APPROVED FOR USA & CANADA

	Dimensions						Pin	Mfg.			Mfg. Screw		
VA	L	W	H	A	B	C	Dimensions	M	N	P	Size	Quantity	Lbs.
2.5	1-5/8	1-5/16	1-1/8	.22	.250	1.000	0.025SQ	1-1/16	–	–	#4	2	0.25
5.0	1-5/8	1-5/16	1-3/8	.22	.400	1.000	0.025SQ	1-1/16	–	–	#4	2	0.37
10.0	1-7/8	1-9/16	1-3/8	.22	.400	1.140	0.038SQ	1-1/4	–	–	#4	2	0.53
20.0	2-1/4	1-7/8	1-5/8	.400	.400	1.460	0.038SQ	1-1/2	–	–	#4	2	0.90
30.0	2-5/8	2-3/16	1-9/16	.550	.275	1.680	0.045SQ	–	1-3/4	2-3/16	#6	4	1.15
56.0	3	2-1/2	1-13/16	.600	.300	1.900	0.045SQ	–	2	2-1/2	#6	4	1.70

RL2260 POWER TRANSFORMERS 40 Values

SINCE 1955

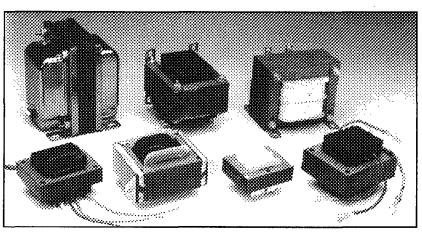


RL-2260 50/60 Hz POWER TRANSFORMERS

- Fully shrouded designs, manufactured to meet UL, CSA, VDE, & IEC.
- Available in output ratings from 25 to 175 VA.
- Outputs from 5-230VAC, 0.76-35A; Inquire about customs
- 5 easy mounting package sizes; Quick-connect/solder terminals
- UL94VO insulation system; 4000Vrms test

CUSTOM LAMINATED TRANSFORMERS

SINCE 1955



50/60 Hz and 400Hz Power Up To 200VA

TYPICAL APPLICATIONS

- Safety Isolation
- Step UP/Step Down
- Linear Power Supplies
- Battery Chargers
- Line Voltage Applications
- Audio & Ballast

TRANSFORMERS

SINCE 1955

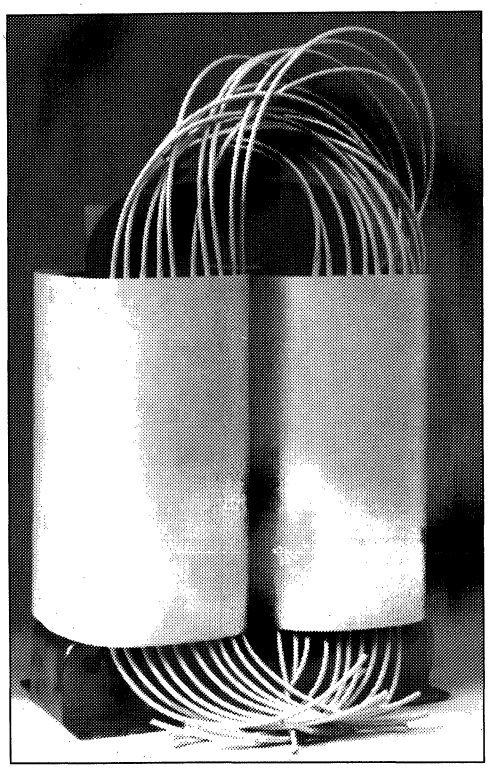
RENCO ELECTRONICS, INC. 60 E Jefryn Boulevard Deer Park, NY 11729 USA

1-516-586-5566 • TOLL-FREE ENGINEERING HOT LINE 1-800-645-5828

NEW WEB SITE http://www.rencousa.com

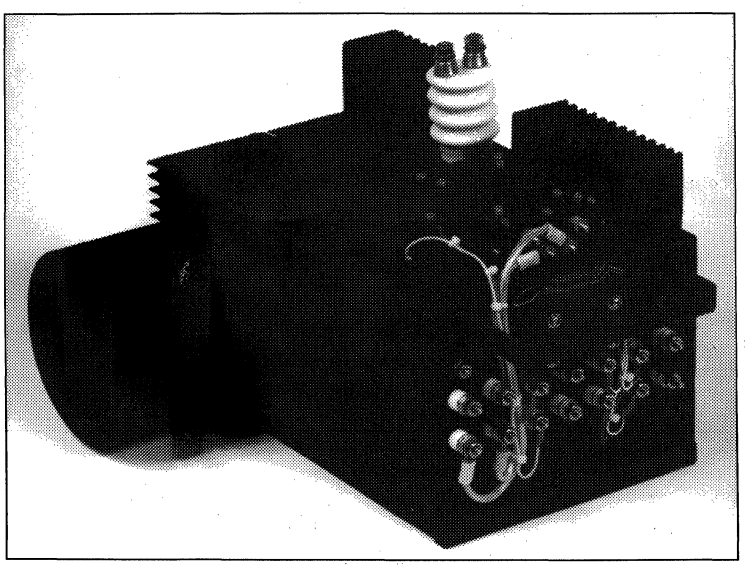
FAX DIRECT FOR FREE SAMPLES: 1-516-586-5562

RFI Corporation



PRECISION MAGNETIC COMPONENTS

- High voltage isolation transformers
- Step up & step down power transformers
- Filament transformers
- D.C. reactors
- Charging reactors
- Three phase transformers
- Medium & high frequency power transformers
- Inverter transformers
- Impulse (fast rise time) transformers
- Pulse transformers
- Current transformers
- Pulse forming networks
- Pulse packages



MODULATORS

- Line pulse modulators
- Hard tube modulators
- Magnetic modulators
- Solid state modulators

RFI Corporation

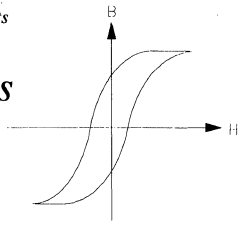
A DEL GLOBAL TECHNOLOGIES CORPORATION

100 Pine Aire Drive, Bay Shore, Long Island, New York 11706 • Phone 516-231-6400 • FAX: 516-231-6465
Visit our Website at http://www.rficorp.com E-Mail us at info@rficorp.com

Rhombus Industries Inc.

Transformers & Magnetic Products

Telecom Transformers & SMPS Magnetics



Founded in 1970, Rhombus Industries Incorporated is a leading designer and manufacturer of quality transformers and magnetic products. At our headquarters in Huntington Beach, California we have complete process capabilities, as well as engineering, research and development, and sales staff.

Our dedicated employees look forward to proving to you that Rhombus offers the price, delivery and application support advantages to address your critical needs.

Full-Line Catalogs Available upon Request

Telecommunications
ISDN
T1 / CEPT
HDSL

Pulse Transformers
General Purpose
Impedance Matching
Isolation
SCR Trigger

LAN Products
Ethernet • StarLan
10Base-T • Token Ring

Audio Transformers
Modem Couplers
Telephone Coupling
Voiceband Repeat Coils
Voice / Data • Dry / Wet
Hybrids

Switched Mode Magnetics
Chokes - Common Mode
& Differential Mode
Output Inductors
Drive Transformers
Current Sense Transformer

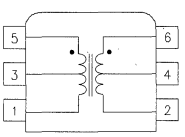
Inductors
Toroidal • Radial Lead
Chokes • Air Coils

RF Filters
10Base-T
Signal Line • High Q

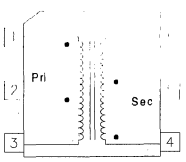
Power Magnetics
50/60 Hz • 400 Hz
Low Profile
Smoothing Chokes
Line Chokes
1 Watt to 1 kW

- *Off-the-Shelf Variety of Schematics & Geometries*
- *Open Case, Epoxy Encapsulated, and Transfer Molded Packages*
- *Thru-hole & SMD Versions*
- *Samples Shipped in One week at No Cost for most products*

T1/CEPT Transformers
T-102XX Series
Also Duals & SMD

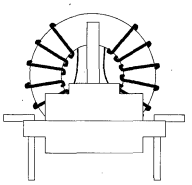


ISDN-S Transformers
T-1040X Series
Also Duals & SMD

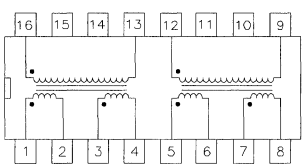


EE Style SMD Inductors

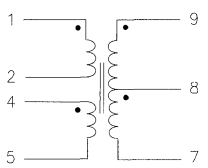
Common Mode Toroidal Inductors



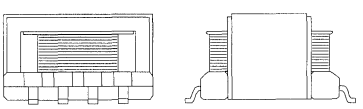
ISDN-S Dual Transformers
T-1050X Series



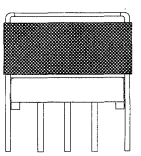
ISDN-U Transformers



ER Style SMD Inductors



EP Style Inductors & Transformers



Services & Capabilities

Standard Product Line
Broad range of Magnetic Products as listed in our various catalogs.

Custom Designs
Leaders in development, we welcome designs customized to your specific requirements.

Coil Winding
Rhombus Industries provides this service with the option of either customer, or Rhombus supplied raw materials.

Expedited Turn-around
For Critical needs Rhombus provides faster than standard lead times, from our prototype floor.

Additional Engineering Capabilities
Various Packaging Options:
High Density, Auto-Insertable, SMT

Cross Referencing
Rhombus can cross reference your current supplier part numbers.

In-House Design & Tooling Capabilities
Mechanical Engineering
Precision Tooling and Machining
Manufacturing & Test equipment
Software Development

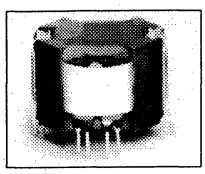
Extensive In-House Environmental and Electrical Test Facilities
Thermal Shock, and Life Test
Humidity / Temperature Testing
Electrical Parameter Characterization
Screening and Sorting

For Information on our Delay Line Products refer to Section 2350

Rhombus Industries Inc., 15801 Chemical Lane, Huntington Beach, CA 92649-1595
Phone: (714) 898-0960 • FAX: (714) 896-0971 • www.rhombus-ind.com • email: sales@rhombus-ind.com

SCHOTT CORPORATION TRANSFORMERS & INDUCTORS

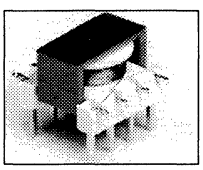
HDSL Transformer Cross-Reference



Schott Transformers are designed to optimize performance with the manufacturers' chip set specifications. Extremely low harmonic distortion permits echo cancelling at maximum loop length and noise level. Low insertion loss enables maximum loop length between central office and remote applications.

Chip Manufacturer	Chip Designation	Application Data Rate (Kbps)	Inductance (mhy)	Turns Ratio Chip – Line	DC Current Capacity (ma)	Return Loss (db @ midband)	Dielectric Strength (VAC)	Configuration/ Schematic	Transformer Part Number
Brooktree	Bt8952	784	3.0	2:1:1	160	22	2500	EP17/1	67137860
Brooktree	Bt8952	1168	2.0	2:1:1	160	22	2500	EP17/1	67141280
Brooktree	Bt8952	784	3.0	1CT:1CT	50	22	1500	RM5/4	67148180
Brooktree	Bt8952	1168	2.0	1CT:1CT	50	22	1500	RM5/4	67148200
Brooktree	Bt8952	784	3.0	2CT:1:1	160	20	1500	23x11PC/2	29332
Brooktree	Bt8952	1168	2.0	2CT:1:1	160	16	1500	23x11PC/2	67146790
Brooktree	Bt8921 & Bt8970	784	3.0	1:1:1	160	21	2500	EP17/1	29330
Brooktree	Bt8921 & Bt8970	1168	2.0	1:1:1	160	17	2500	EP17/1	29331
Brooktree	Bt8921 & Bt8970	784	3.0	1:2CT	45	22	1500	RM5/5	67148190
Brooktree	Bt8921 & Bt8970	1168	2.0	1:2CT	45	22	1500	RM5/5	67148210
Brooktree	Bt8921 & Bt8970	784	3.0	1CT:1:1	220	20	2000	23x11PC/2	30513
Brooktree	Bt8921 & Bt8970	1168	2.0	1CT:1:1	220	20	2000	23x11PC/2	30514
Level One	LXK70206	784	2.75	1:1:1.8:1.8	90	20	2500	23x11PC/3	29386
Level One	LXK70207	1168	2.05	1:1:1.8:1.8	100	18	2000	23x11PC/3	29387
Metalink	MTHxx40	all	3.6	1:1.15:1.15	60	17	2000	EFD20	30665

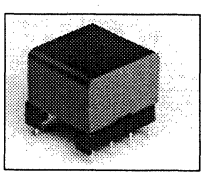
T1/E1 Transformer Cross-Reference



Schott Corporation works closely with all manufacturers to design transformers which meet and even exceed strict requirements for quality and reliability.

Chip Manufacturer	Chip Designation	Application	Transmit Part No.	Receive Part No.
Crystal	6154, 6158, 61535	T1	67129300	67129300
	61535A, 6158A, 61574A, 61575	T1	67129310	67129300
		PCM-30	67129320	67129300
		PCM-30	67133310	67129300
	6152, 6154, 6159	T1	67130240	67129300
Level One	LXT 300, LXT 301, LXT 305	T1	67127370	67127370
	LXT 304A, LXT 305A	T1	67129310	67127370
		E1	67129320	67127370
		DSX	67118160	67127370
	LXT 310, LXT 311	T1	67130850	67130840
	LXT 312, LXT 313, LXT 315, LXT 316	T1/E1	67125350	67130840
	LXT 318, LXT 319	E1	67127370	67130840
	LXT 332	T1/E1	24857	67127370

ISDN Transformer Cross-Reference



Schott transformers are available to satisfy U.S. and European standards for performance and safety.

Schott Corporation transformers, inductors and other magnetic components are available in both standard and custom models, in many variations of mounting style, height, insulation system, DC current capacity and other features.

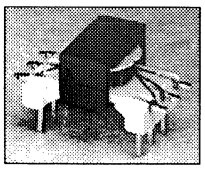
Chip Manufacturer	Chip Design	Interface	Transformer Part No.	Note
Level One	LX500	U Interface	67127360	1:1:1
		U Interface	67140610	1:0.8:0.8
		U Interface	67140620	1:0.9:0.9
		U Interface	67140630	1:1.1:1.1
		U Interface	67140640	1:1.25:1.25
		U Interface	67140650	1:1.35:1.35
		U Interface	67140660	1:1.5:1.5
National	TP 3420	S&T Interface	67128780	
	TP 3410	U Interface	67128640	
		U Interface	67137810	
		U Interface	67141470	Low Amp, Low Profile
		U Interface	67140820	Low Profile
		U Interface	67143740	1.5mm Creepage
Siemens	PEB 2080, PEB 2085	S&T Interface	67128780	
	PEB 2086	S&T Interface	67141000	Zero DC Current
	PEB 2091-B	U Interface	67122420	
	PEB 2091-C	U Interface	67125380	
	PEB 20901, PEB 20902	U Interface	67127490	4B3T Code
	PEB 2095	U Interface	67130600	Zero DC Current
		U Interface	67130870	100 mA DC Current

TRANSFORMERS & INDUCTORS

SCHOTT CORPORATION

Digital/Audio Interface Transformers

Transformer Part Number	Turns Ratio	Inductance (µH)	Leakage Inductance (µH)	Interwinding Capacitance (pF)	Configuration
67125450	1:1	225	<0.3	<15	T Case
67128990	1:1	225	<0.4	<15	ER9.5 – 6 Pin THD T Case Replacement
29398	1:1	225	<0.4	<15	ER9.5 – 8 Pin SMD
67129600	1:1	225	<0.7	<2	ER9.5 – 6 Pin THD Electrostatic Shield
67137640	1:1.22	225	<0.7	<2	ER9.5 – 6 Pin THD Shield
67146420	1:3	225	<0.4	15	ER9.5 – 6 Pin THD for Higher Voltage
27353	1:1	225	<0.7	<2	ER9.5 – 8 Pin SMD



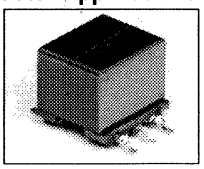
Designed to meet Crystal Semiconductor's strict standards for impedance, wave form, balance, and dielectric strength.

National Semiconductor Simple Switcher Cross-Reference

LM 259# Inductor Applications

LM 259#*	Inductance (µH)	Saturating Current (Amps)	Thru-Hole Part No.	Surface Mount Part No.
L12	68	.70	67143990	67144360
L13	47	.80	67144000	67144380
L15	22	1.30	67148350	67148460
L16	15	1.60	67148360	67148470
L19	150	.63	67144050	67144430
L20	100	.76	67144060	67144440
L21	68	.95	67144070	67144450
L22	47	1.15	67144080	67144460
L23	33	1.37	67144090	67144470
L29	100	1.50	67144130	67144510
L34	15	4.00	67148400	67148790
L39	47	3.70	67144210	N/A
L40	33	3.60	67144220	67148290

* LM259 numbers are referenced in National Semiconductor's application notes.

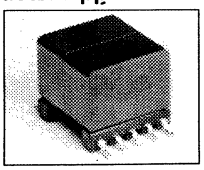


Excellent self-shielding characteristics for EMI sensitive applications. Low DCR for cooler running parts with less ripple. Gapped-core design produces stable inductance with varying DC current.

LM 258# Inductor Applications

LM 258#	Inductance (µH)	Saturating Current (Amps)	Thru-Hole Part Number	Thru-Hole Model	Surface Mount Part Number	Surface Mount Model
L1	19	1.50	67146500	EP10 THD	67146530	EP10 SMD
L2	19	2.30	67146510	EP13 THD	67146540	EP13 SMD
L3	17	4.90	67146520	EP17 THD		
L4*	22	5.50	67147460	23x11PC THD		
L5*	33	5.50	67147450	23x11PC THD		
L6*	47	5.50	67147440	23x18PC THD		
L7*	68	5.50	67147430	23x18PC THD		
L8*	100	5.50	67147420	30x19PC THD		
L9*	150	5.50	67147410	30x19PC THD		

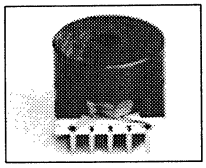
* These units are not referenced in National Semiconductor's application notes, but are specified in National's *Switchers Made Simple 4.2* software.



Premium transformers and inductors designed for use with National Semiconductor's Simple Switcher in DC/DC applications.

LM 258# Transformer Applications

LM 258# Reference	Turns Ratio	Inductance (µH)	Leakage Inductance (µH)	Interwinding Capacitance (pF)	Configuration	Transformer Part Number
T10	1:0.625	22	<0.40	<100	23x11PC	67140850
T2	1:2.5:2.5	22	<0.25	<110	23x11PC	67140860
T8*	1:0.625	25	<0.40	<100	23x11PC	67140870
T9*	1:0.375	25	<0.50	<90	23x11PC	67140880
T5	1:0.5:1.14:1.14	66	<0.45	<120	23x11PC	67140890
T6	1:1.21:1.21	66	<0.60	<135	23x11PC	67140900
T3	1:0.8:0.8	85	<1.20	<400	23x18PC	67140920
T4	1:0.8CT:0.35	85	<1.20	<400	23x18PC	67140930
T1	1:1	22	<0.20	<90	23x11PC	67141450
T7*	1:1	47	<0.50	<60	23x11PC	26606



These transformers and inductors are especially well suited for difficult applications requiring low EMI, stable inductance, and low output ripple.

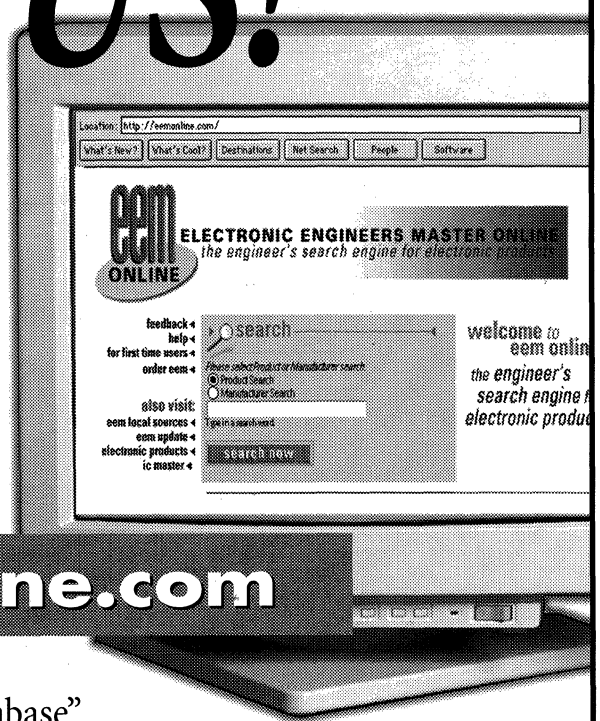
TEL: (612) 475-1173 • Fax: (612) 475-1786 • WEB Site: www.schottcorp.com • e-mail: salesd@schottcorp.com
1000 Parkers Lake Road • Wayzata, Minnesota 55391 U.S.A.

SCHOTT CORPORATION

© 1997 Schott Corporation "Schott" is a trade name of Schott Corporation. All other trademarks and trade names are the property of their respective holders.

When you're looking for electronic products

. . . *TRY US!*



The Engineer's search engine for electronic products!

http://eemonline.com

- "Easy, well-organized index of the EEM database"
  means... **Easy search of multiple products & companies**
- "New, improved interface and faster database now available"
  means... **Faster search times and less time online**
- "EEM Online is available 24 hours a day, 7 days a week"
  means... **Round-the-clock solutions to your design needs**
- Gives detailed company information & links to a manufacturer's website & email
  means... **You can retrieve more detailed information, if necessary.**

EEM Online—your search engine for electronic products.

Hearst Business Communications, Inc./UTP Division
645 Stewart Avenue, Garden City, NY 11530 • Tel: 516.227.1300 • FAX: 516.227.1901

CUSTOM ENGINEERED TRANSFORMERS

for: DIGITAL AUDIO, HIGH VOLTAGE, ELECTRONIC BALLASTS, SWITCHMODE

PRODUCTS

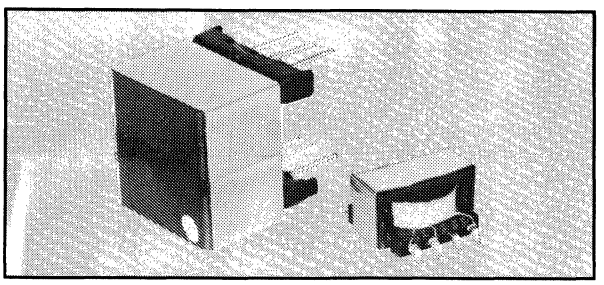
• Digital Audio - AES/EBU - SPDIF - DVD - 96 kHz • Surface Mount
• Electronic Ballast Transformers and Ignitors • High Frequency/High Voltage/Pulse
• Switchmode Magnetics • Medical Electronics

SERVICES

• R&D and Design for Custom Transformers and Inductors
• Electronic Ballasts and Switchmode Designs • Prototypes, Second Source

World's Best Digital Audio AES/EBU and DVD Transformers - 96kHz

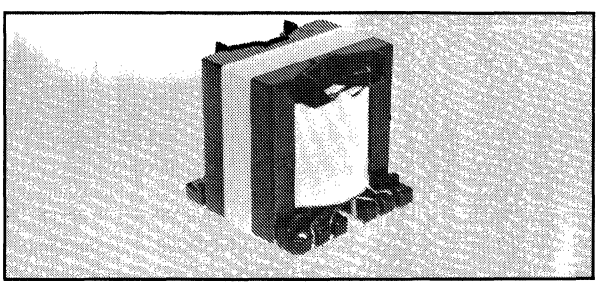
- Fast rise - Low jitter - to 1.6NS
- Super Low C to 1PF for Highest CMRR
- Wideband - 700Hz to 200MHz
- Shielded for Improved EMI Compliance
- 1:1, 2:1, 1.2:1 and Custom - Centertap
- Surface Mount (SO-8) and Thruhole
- Ultralow Pulse Aberration - Linear Phase
- Stocked in Depth for Fast Delivery



AES/EBU - DVD to 200MHz - 1PF

Electronic Ballast / Switchmode Power Supply Transformers and Inductors

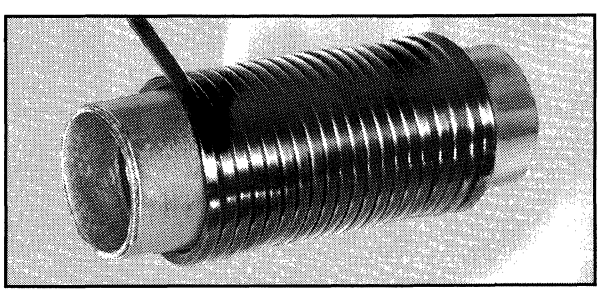
- Electronic Ballasts, Inductors and Transformers
- Arc Lamp Ignitors
- Compact - Low Profile - Special Shapes
- High Isolation - Multiple Shielded - Low Noise
- Special Shapes, Windings and Insulation
- AC/HF Output - Pulse
- Custom Design Only



SWITCHMODE POWER 600W - 100KHz 2" Sq.

High Voltage Power to 50KV - Pulse or Continuous - Arc Lamp Ignitors

- HID and Xenon Lamp Ignitors and Ballasts
- Custom Design Only
- Miniature HV for Night Vision, CRT, PMT
- Special Impregnation / Encapsulation
- High Frequency - 60Hz - Pulse
- Avionics - Medical - Instrumentation



HIGH VOLTAGE PULSE 35KV 30A 200NS

Please call us with your custom transformer requirements for a quick quote!

SCIENTIFIC CONVERSION

42 TRUMAN • NOVATO, CALIFORNIA 94947

Phone: 415 • 892 • 2323 Fax: 415 • 892 • 2321

Universal Switching Power Supply

Standard & Custom Designs. Any Spec...Any Time.

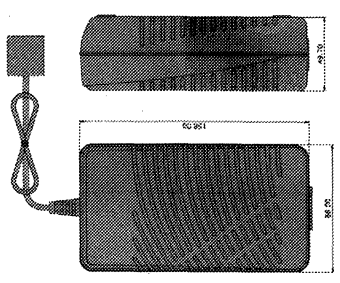
General Features

- Constant voltage output.
- UL/CSA/GS approved.
- Regulated, low ripple.
- Light weight efficiency.
- Impact resistant thermoplastic enclosure.
- Wall plug-in, dual cord available.

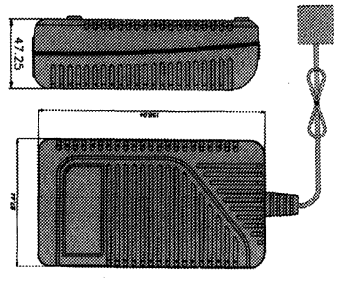
General Specifications

- Input voltages: 90VAC – 264VAC.
- Input frequency: 47 – 63 Hz.
- Max. input current: 1.2A rms for 115VAC, 0.6A rms for 230VAC.
- Inrush current: 25A max. at 115VAC cold start, 50A max. at 230VAC cold start.
- Efficiency: 70% min. at full load.
- Switching frequency: 50 KHz.
- Over voltage protection: At 110–130% of rated voltage.
- Over current protection: Fold back current limiting, automatic recovery.
- Operating temperature: 0°C – 40°C.
- Storage temperature: –40°C – 80°C.
- Temperature coefficient: 0.03% per °C for all output.
- Humidity: 5 – 90% storage, 10 – 80% operation.
- Hold-up time: 15 m/sec. min. at full load.
- Transient response: 5% max. on main output for a 50% load change from nominal load.
- EMI: Meets conduction limits of FCC class B rules and VDE 0871 class B rules.
- Safety requirements: Meets UL 1012, 1950; CSA 22.2 No. 22, 1402C level 3; IEC 950 (EN 60905) & IEC 380; CEE part 1 and part 2P.
- Dielectric withstanding voltage: 3750VAC for 1 minute.
- Insulation resistance: 100 ohms min. between input/output and input/ground.

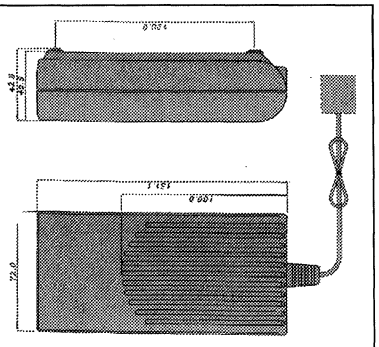
Model #	Output	Load Min.	Load Rated	Ripple & Noise (p - p)	Load Regulation
25W Series					
USPS2501	5.0V	0	5.0A	100mV	± 4%
USPS2502	9.5V	0	2.5A	95mV	± 4%
USPS2503	12.0V	0	2.0A	120mV	± 4%
USPS2504	16.0V	0	1.5A	160mV	± 4%
USPS2505	24.0V	0	1.0A	240mV	± 4%
USPS2506	48.0V	0	0.5A	200mV	± 4%
USPS2521	5.0V	0	2.5A	50mV	± 3%
	12.0V	0	1.0A	120mV	± 3%
USPS2522	5.0V	0	2.5A	50mV	± 3%
	15.0V	0	0.8A	150mV	± 3%
USPS2523	5.0V	0	2.5A	50mV	± 3%
	24.0V	0	0.5A	240mV	± 3%
USPS2601	12.5V	0	2.0A	150mV	± 3%
30W Series					
USPS3001	12.0V	0	2.50A	120mV	± 4%
USPS3002	15.0V	0	2.00A	150mV	± 4%
USPS3003	24.0V	0	1.25A	200mV	± 4%
USPS3004	5.0V	0	6.00A	50mV	± 4%
USPS3005	5.0V	0	3.00A	50mV	± 4%
	12.0V	0	1.20A	120mV	± 5%
USPS3006	16.0V	0	1.90A	160mV	± 4%
USPS3007	48.0V	0	0.63A	240mV	± 4%
USPS3008	5.0V	0	3.00A	50mV	± 4%
	12.0V	0	1.00A	120mV	± 5%
	–12.0V	0	0.30A	120mV	± 5%
40W Series					
USPS4001	5.0V	0	3.00A	50mV	± 3%
	12.0V	0	1.80A	120mV	± 5%
	–12.0V	0	0.30A	120mV	± 5%
USPS4002	16.5V	0	2.50A	150mV	± 3%
USPS4003	18.0V	0	2.30A	150mV	± 3%
USPS4004	24.0V	0	1.70A	200mV	± 3%
USPS4005	12.0V	0	3.40A	120mV	± 3%
USPS4006	5.0V	0	6.00A	50mV	± 3%
	24.0V	0	1.00A	240mV	± 5%
USPS4007	5.0V	0	3.00A	50mV	± 3%
	12.0V	0	1.00A	120mV	± 5%
	24.0V	0	0.50A	240mV	± 5%
USPS4008	48.0V	0	0.85A	240mV	± 5%



25W Series



30W Series



40W Series

SHOGYO
Any spec...any time.

For complete specifications, samples & technical assistance:
Tel: (516) 349–5200 Fax: (516) 349–7744 E-mail: info@shogyo.com
Visit our web site: http://www.shogyo.com
Shogyo International Corporation
45 Executive Drive • Plainview, NY 11803

Wall Plug-In & Desktop Transformer/Adaptors

Standard & Custom Designs. Any Spec...Any Time.

General Features

- UL/CSA/GS approved.
- Applications up to 16W.
- Light weight.
- Fully isolated output.
- Short circuit/over-current protection.
- Regulated, low ripple.
- Optional output cords and connectors.
- One year warranty.

General Specifications

- Input voltages: 105VAC – 129VAC or 220V AC – 240VAC.
- Input frequency: 57 – 63 Hz.
- Voltage regulation: ±5%.
- Ripple voltage: 50 mV p-p at full load.
- Dielectric strength: 1500 VRMS.
- Overload protection: Thermal shutdown.
- Storage temperature: -20°C – 85°C.
- Operating temperature: 0°C – 40°C.
- Humidity: 10% – 90%.
- Burn-in: 8 hrs.
- Input: American/European. 2 or 3 prong.

Wall Plug-In Output Ratings

Model #	Output #1	Output #2	Output #3	Safety UL	Safety CSA
LPS-013	12VDC, 300mA	-12VDC, 300mA		•	•
LPS-014	5VDC, 700mA			•	•
LPS-015	6VDC, 600mA			•	•
LPS-016	8VDC, 500mA			•	•
LPS-017	9VDC, 500mA			•	•
LPS-018	12VDC, 400mA			•	•
LPS-019	24VDC, 250mA			•	•
LPS-028	12VDC, 300mA	-12VDC, 100mA			
LPS-038	5VDC, 900mA	- 5VDC, 100mA			
LPS-040	27VDC, 5mA	9VDC, 530mA	-5VDC, 5mA		
LPS-070	12VDC, 200mA	5VDC, 300mA			
LPS-142	5VDC, 700mA	12VDC, 20mA	-12VDC, 20mA	•	

Desktop Plug-In Output Ratings

Model #	Output #1	Output #2	Output #3	Safety UL	Safety CSA	Safety TUV	FIG
LPS-001	5VDC, 2.00A			•	•		A
LPS-002	9VDC, 1.00A			•	•		A
LPS-003	5VDC, 1.00A	12VDC, 0.2A	-12VDC, 0.2A	•	•	•	A
LPS-003A	5VDC, 1.00A	9VDC, 0.2A	-9VDC, 0.2A	•	•		A
LPS-004	5VDC, 1.50A	12VDC, 0.2A	-12VDC, 0.2A	•	•		A
LPS-005	5VDC, 2.00A	12VDC, 0.2A	-12VDC, 0.2A	•	•		A
LPS-006	24VDC, 0.50A						B
LPS-008	5VDC, 0.60A	12VDC, 0.2A	-12VDC, 0.2A				A
LPS-012	8VDC, 2.00A			•	•		A
LPS-036	5VDC, 1.00A	12VDC, 1.0A					A
LPS-049	8VDC, 0.85A	12VDC, 0.2A	-12VDC, 0.2A				A
LPS-057	5VDC, 0.50A	12VDC, 0.2A					B

E82456 LR52082 506677 S9152637 S9152638

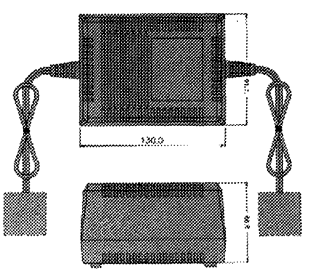


Fig. A

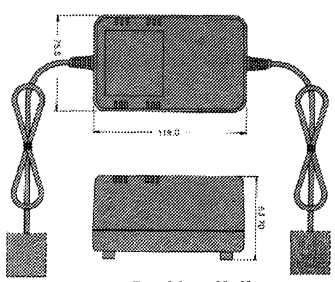


Fig. B

Desktop Units

SHOGYO
Any spec...any time.

For complete specifications, samples & technical assistance:
Tel: (516) 349-5200 Fax: (516) 349-7744 E-mail: info@shogyo.com
Visit our web site: http://www.shogyo.com
Shogyo International Corporation
45 Executive Drive • Plainview, NY 11803

Wall Plug-In Transformers/Adaptors

Standard & Custom Designs. Any Spec...Any Time.

Agency Approval Codes:

A UL listed file E82456.
B CSA certified file LR52082.
C ETL listed #506677
D SAA certified # SECV V920103
E GS license # S9152637, S9152638

Series 41: AC Output cont.

Model #	Output	Approvals
A411208	12.0VAC, 800mA	A
A411209	12.0VAC, 900mA	A
A411210	12.0VAC, 1000mA	A
A4113038	13.0VAC, 380mA	A
A411502	15.0VAC, 200mA	A
A411503	15.0VAC, 300mA	A E
A411504	15.0VAC, 400mA	A E
A411505	15.0VAC, 500mA	A
A411506	15.0VAC, 600mA	A
A411507	15.0VAC, 700mA	A
A411508	15.0VAC, 800mA	A
A411604	16.0VAC, 400mA	A
A411802	18.0VAC, 200mA	A
A411803	18.0VAC, 300mA	A B
A411804	18.0VAC, 400mA	A
A411805	18.0VAC, 500mA	A
A411806	18.0VAC, 600mA	A
A412002	20.0VAC, 200mA	A
A412003	20.0VAC, 300mA	A
A412004	20.0VAC, 400mA	A B
A412005	20.0VAC, 500mA	A
A412006	20.0VAC, 600mA	A
A412202	22.0VAC, 200mA	A
A412203	22.0VAC, 300mA	A
A412204	22.0VAC, 400mA	A
A412205	22.0VAC, 500mA	A
A412402	24.0VAC, 200mA	A
A412403	24.0VAC, 300mA	A
A412404	24.0VAC, 400mA	A
A412405	24.0VAC, 500mA	A
A412702	27.0VAC, 200mA	A
A412703	27.0VAC, 300mA	A
A412704	27.0VAC, 400mA	A

Series 48: DC Output

480609	6.0VDC, 900mA	A
480610	6.0VDC, 1000mA	A
480611	6.0VDC, 1100mA	A
480708	7.5VDC, 800mA	A
480709	7.5VDC, 900mA	A
480710	7.5VDC, 1000mA	A
480711	7.5VDC, 1100mA	A
480808	8.0VDC, 800mA	A
480811	8.0VDC, 1100mA	A
480906	9.0VDC, 600mA	A
480907	9.0VDC, 700mA	A B
480908	9.0VDC, 800mA	A C E
480909	9.0VDC, 900mA	A
480910	9.0VDC, 1000mA	A B E
480911	9.0VDC, 1100mA	A
481006	10.0VDC, 600mA	A
481009	10.0VDC, 900mA	A
481205	12.0VDC, 500mA	A B
481206	12.0VDC, 600mA	A
481207	12.0VDC, 700mA	A
481208	12.0VDC, 800mA	A B E
481209	12.0VDC, 900mA	A
481210	12.0VDC, 1000mA	A B
481211	12.0VDC, 1100mA	A
481306	13.0VDC, 600mA	A
481307	13.0VDC, 700mA	A
481308	13.0VDC, 800mA	A
481309	13.0VDC, 900mA	A
481310	13.0VDC, 1000mA	A
481504	15.0VDC, 400mA	A
481505	15.0VDC, 500mA	A
481506	15.0VDC, 600mA	A B E
481507	15.0VDC, 700mA	A B
481508	15.0VDC, 800mA	A
481509	15.0VDC, 900mA	A B
481604	16.0VDC, 400mA	A
481605	16.0VDC, 500mA	A
481606	16.0VDC, 600mA	A
481607	16.0VDC, 700mA	A
481608	16.0VDC, 800mA	A
481609	16.0VDC, 900mA	A
481803	18.0VDC, 300mA	A
481804	18.0VDC, 400mA	A
481805	18.0VDC, 500mA	A B
481806	18.0VDC, 600mA	A
481807	18.0VDC, 700mA	A
481808	18.0VDC, 800mA	A B
482004	20.0VDC, 400mA	A
482005	20.0VDC, 500mA	A
482006	20.0VDC, 600mA	A
482007	20.0VDC, 700mA	A
482103	21.0VDC, 300mA	A
482104	21.0VDC, 400mA	A
482105	21.0VDC, 500mA	A
482106	21.0VDC, 600mA	A
482403	24.0VDC, 300mA	A
482404	24.0VDC, 400mA	A
482405	24.0VDC, 500mA	A
482406	24.0VDC, 600mA	A
484802–5003CT	48.0VDC, 250mA	

Series 48: AC Output

A480610	6.0VAC, 1000mA	A
A480612	6.0VAC, 1200mA	A
A480614	6.0VAC, 1400mA	A
A480615	6.0VAC, 1500mA	A
A480620	6.0VAC, 2000mA	A
A480625	6.0VAC, 2500mA	A
A480630	6.0VAC, 3000mA	A
A480710	7.0VAC, 1000mA	A
A480712	7.0VAC, 1200mA	A
A480714	7.0VAC, 1400mA	A
A480715	7.0VAC, 1500mA	A B
A480720	7.0VAC, 2000mA	A
A480725	7.0VAC, 2500mA	A
A480809	8.0VAC, 900mA	A
A480810	8.0VAC, 1000mA	A
A480812	8.0VAC, 1200mA	A
A480814	8.0VAC, 1400mA	A
A480815	8.0VAC, 1500mA	A
A480817	8.0VAC, 1700mA	A
A480820	8.0VAC, 2000mA	A
A480824	8.0VAC, 2400mA	A
A480908	9.0VAC, 800mA	A E
A480910	9.0VAC, 1000mA	A B E
A480912	9.0VAC, 1200mA	A B
A480913	9.0VAC, 1300mA	A
A480914	9.0VAC, 1400mA	A
A480915	9.0VAC, 1500mA	A
A480917	9.0VAC, 1700mA	A
A480920	9.0VAC, 2000mA	A
A481008	10.0VAC, 800mA	A
A481009	10.0VAC, 900mA	A
A481010	10.0VAC, 1000mA	A
A481012	10.0VAC, 1200mA	A
A481014	10.0VAC, 1400mA	A
A481016	10.0VAC, 1600mA	A
A481018	10.0VAC, 1800mA	A
A481206	12.0VAC, 600mA	A E
A481208	12.0VAC, 800mA	A E
A481210	12.0VAC, 1000mA	A E
A481212	12.0VAC, 1200mA	A
A481214	12.0VAC, 1400mA	A
A481215	12.0VAC, 1500mA	A
A481216	12.0VAC, 1600mA	A
A481308	13.0VAC, 800mA	A
A4813038	13.0VAC, 380mA	A
A4814038	14.0VAC, 380mA	A
A481505	15.0VAC, 500mA	A
A481506	15.0VAC, 600mA	A
A481507	15.0VAC, 700mA	A
A481508	15.0VAC, 800mA	A
A481509	15.0VAC, 900mA	A
A481510	15.0VAC, 1000mA	A
A481512	15.0VAC, 1200mA	A
A481605	16.0VAC, 500mA	A
A481606	16.0VAC, 600mA	A
A481607	16.0VAC, 700mA	A
A481608	16.0VAC, 800mA	A
A481609	16.0VAC, 900mA	A
A481610	16.0VAC, 1000mA	A
A481612	16.0VAC, 1200mA	A
A481804	18.0VAC, 400mA	A
A481805	18.0VAC, 500mA	A
A481806	18.0VAC, 600mA	A
A481807	18.0VAC, 700mA	A
A481808	18.0VAC, 800mA	A
A481809	18.0VAC, 900mA	A
A481810	18.0VAC, 1000mA	A
A482004	20.0VAC, 400mA	A E
A482005	20.0VAC, 500mA	A
A482006	20.0VAC, 600mA	A
A482007	20.0VAC, 700mA	A
A482008	20.0VAC, 800mA	A
A482009	20.0VAC, 900mA	A B
A482204	22.0VAC, 400mA	A
A482205	22.0VAC, 500mA	A
A482206	22.0VAC, 600mA	A
A482207	22.0VAC, 700mA	A
A482208	22.0VAC, 800mA	A
A482209	22.0VAC, 900mA	A
A482403	24.0VAC, 300mA	A
A482404	24.0VAC, 400mA	A
A482405	24.0VAC, 500mA	A
A482406	24.0VAC, 600mA	A B
A482407	24.0VAC, 700mA	A
A482408	24.0VAC, 800mA	A
A482703	27.0VAC, 300mA	A
A482704	27.0VAC, 400mA	A
A482705	27.0VAC, 500mA	A
A482706	27.0VAC, 600mA	A
A482707	27.0VAC, 700mA	A

Series 57: AC Output

A571325	12.6VAC, 2500mA	A
A571216	12.0VAC, 1600mA	E
A571610	16.0VAC, 1000mA	E
A571811	18.0VAC, 1100mA	E

Series 57: DC Output

574802–R03CT	48.0VDC, 200mA	A
571210	12.0VDC, 1000mA	E
571509	15.0VDC, 900mA	E
571510	15.0VDC, 1000mA	E

Pre-Heat Ballast
Suitable for 13 watt lamps.

Model #	Line Voltage	Current	Approval
BL-4813P	118VAC, 60Hz	300mA	A B

SHOGYO
Any spec...any time.

For complete specifications, samples & technical assistance:
Tel: (516) 349-5200 Fax: (516) 349-7744 E-mail: info@shogyo.com
Visit our web site: http://www.shogyo.com
Shogyo International Corporation
45 Executive Drive • Plainview, NY 11803

Wall Plug-In Transformers/Adaptors

Standard & Custom Designs. Any Spec...Any Time.

Agency Approval Codes:

A UL listed file E82456.
B CSA certified file LR52082.
C ETL listed #506677
D SAA certified # SECV V920103
E GS license # S9152637, S9152638

Series 35: DC Output

Model #	Output	Approvals
350301	3.0VDC, 100mA	A B
350302	3.0VDC, 200mA	A B
350303	3.0VDC, 300mA	A
350304	3.0VDC, 400mA	A B
350305	3.0VDC, 500mA	A
350401	4.5VDC, 100mA	A B
3504011	4.5VDC, 110mA	A
350402	4.5VDC, 200mA	A B
350403	4.5VCD, 300mA	A
350404	4.5VDC, 500mA	A
350405	4.5VDC, 500mA	A
350480–15002N0	4.8VDC, 150mA	A
350601	6.0VDC, 100mA	A
3506015	6.0VDC, 150mA	A
350602	6.0VDC, 200mA	A B
350603	6.0VDC, 300mA	A
350604	6.0VDC, 400mA	A
350605	6.0VDC, 500mA	A B
350701	7.2VDC, 100mA	A B
350720–15002N0	7.2VDC, 150mA	A
350702	7.2VDC, 200mA	A
350703	7.2VDC, 300mA	A
350704	7.2VDC, 400mA	A B
350705	7.2VDC, 500mA	A
350802	8.0VDC, 200mA	
350803	8.0VDC, 300mA	A
350901	9.0VDC, 100mA	A
3509B–1002CO	9.0VDC, 120mA	A
350902	9.0VDC, 200mA	A B
350903	9.0VDC, 300mA	A B C
351201	12.0VDC, 100mA	A
351202	12.0VDC, 200mA	A B
35120250	12.0VDC, 250mA	A B
351501	15.0VDC, 100mA	A
351502	15.0VDC, 200mA	A
351601	16.0VDC, 100mA	A B
351801	18.0VDC, 100mA	A
352101	21.0VDC, 100mA	A
352401	24.0VDC, 100mA	A

Series 35: AC Output

A350401	4.0VAC, 100mA	A
A350402	4.0VAC, 200mA	A
A350403	4.0VAC, 300mA	A
A350404	4.0VAC, 400mA	A
A350405	4.0VAC, 500mA	A
A350406	4.0VAC, 600mA	A
A350407	4.0VAC, 700mA	A
A350408	4.0VAC, 800mA	A
A350409	4.0VAC, 900mA	A
A350501	5.0VAC, 100mA	A
A350502	5.0VAC, 200mA	A
A350503	5.0VAC, 300mA	A
A350504	5.0VAC, 400mA	A
A350505	5.0VAC, 500mA	A
A350506	5.0VAC, 600mA	A
A350507	5.0VAC, 700mA	A
A350601	6.0VAC, 100mA	A
A350602	6.0VAC, 200mA	A
A350603	6.0VAC, 300mA	A
A350604	6.0VAC, 400mA	A
A350605	6.0VAC, 500mA	A
A350606	6.0VAC, 600mA	A
A350607	6.0VAC, 700mA	A
A350701	7.0VAC, 100mA	A
A350702	7.0VAC, 200mA	A
A350703	7.0VAC, 300mA	A
A350704	7.0VAC, 400mA	A
A350705	7.0VAC, 500mA	A
A350801	8.0VAC, 100mA	A
A350802	8.0VAC, 200mA	A
A350803	8.0VAC, 300mA	A
A350804	8.0VAC, 400mA	A
A350805	8.0VAC, 500mA	A
A350901	9.0VAC, 100mA	A
A350902	9.0VAC, 200mA	A
A350903	9.0VAC, 300mA	A
A350904	9.0VAC, 400mA	A
A351001	10.0VAC, 100mA	A
A351002	10.0VAC, 200mA	A
A351003	10.0VAC, 300mA	A
A351004	10.0VAC, 400mA	A
A351101	11.0VAC, 100mA	A
A351201	12.0VAC, 100mA	A B
A351202	12.0VAC, 200mA	A
A351203	12.0VAC, 300mA	A
A351204	12.0VAC, 400mA	A
A351501	15.0VAC, 100mA	A
A351502	15.0VAC, 200mA	A
A351503	15.0VAC, 300mA	A
A351504	15.0VAC, 400mA	A
A351601	16.0VAC, 100mA	A
A351602	16.0VAC, 200mA	A
A351603	16.0VAC, 300mA	A
A351801	18.0VAC, 100mA	A
A351802	18.0VAC, 200mA	A
A352001	20.0VAC, 100mA	A
A352002	20.0VAC, 200mA	A
A352201	22.0VAC, 100mA	A
A352202	22.0VAC, 200mA	A
A352401	24.0VAC, 100mA	A
A352402	24.0VAC, 200mA	A
A352701	27.0VAC, 100mA	A

Series 41: DC Output

410405	4.5VDC, 500mA	A
410406	4.5VDC, 600mA	A
410407	4.5VDC, 700mA	A
410408	4.5VDC, 800mA	A B
410408–002NO	4.5VDC, 800mA	
410409	4.5VDC, 900mA	A
410410	4.5VDC, 1000mA	A
410506–002NO	5.0VDC, 600mA	B
410603	6.0VDC, 300mA	E
410605	6.0VDC, 500mA	A E
410606	6.0VDC, 600mA	A
410607	6.0VDC, 700mA	A B
410608	6.0VDC, 800mA	A B
410609	6.0VDC, 900mA	A
410610	6.0VDC, 1000mA	A
410704	7.0VDC, 400mA	E
410704–002NO	7.2VDC, 400mA	A
410701–002NO	7.5VDC, 100mA	A
410705	7.5VDC, 500mA	A
410706	7.5VDC, 600mA	A
410707	7.5VDC, 700mA	A
410708	7.5VDC, 800mA	A
410903	9.0VDC, 300mA	A B D E
410904	9.0VDC, 400mA	A
410905	9.0VDC, 500mA	A B C E
410906	9.0VDC, 600mA	A B
411005	10.5VDC, 450mA	A
AD101505	11.0VDC, 150mA –12.0VDC, 50mA	A B
411103	11.0VDC, 300mA	A B
411201	12.0VDC, 100mA	A
411203	12.0VDC, 300mA	A B D E
411204	12.0VDC, 400mA	A B
411205	12.0VDC, 500mA	A B C E
4114036	14.0VDC, 360mA	A B
411502	15.0VDC, 200mA	A
411503	15.0VDC, 300mA	A B E
411504	15.0VDC, 400mA	A
411602	16.0VDC, 200mA	A
411603	16.0VDC, 300mA	A B
411802	18.0VDC, 200mA	A
411803	18.0VDC, 300mA	A B
412101	21.0VDC, 100mA	A
412102	21.0VDC, 200mA	A
412401	24.0VDC, 100mA	A
412402	24.0VDC, 200mA	A

Series 41: AC Output

A410408	4.0VAC, 800mA	A
A410409	4.0VAC, 900mA	A
A410410	4.0VAC, 1000mA	A
A410506	5.0VAC, 600mA	A
A410507	5.0VAC, 700mA	A
A410508	5.0VAC, 800mA	A
A410509	5.0VAC, 900mA	A
A410510	5.0VAC, 1000mA	A
A410605	6.0VAC, 500mA	A
A410606	6.0VAC, 600mA	A
A410607	6.0VAC, 700mA	A
A410608	6.0VAC, 800mA	A
A410609	6.0VAC, 900mA	A
A410610	6.0VAC, 1000mA	
A410612	6.0VAC, 1200mA	A
A410705	7.0VAC, 500mA	A
A410706	7.0VAC, 600mA	A
A410707	7.0VAC, 700mA	A
A410708	7.0VAC, 800mA	A
A410709	7.0VAC, 900mA	A
A410710	7.0VAC, 1000mA	A
A410804	8.0VAC, 400mA	A
A410805	8.0VAC, 500mA	A
A410806	8.0VAC, 600mA	A
A410807	8.0VAC, 700mA	A
A410808	8.0VAC, 800mA	A
A410809	8.0VAC, 900mA	A
A410810	8.0VAC, 1000mA	A
A4108507	8.5VAC, 700mA	A B
A4108510	8.5VAC, 1000mA	A B
A410904	9.0VAC, 400mA	A
A410905	9.0VAC, 500mA	A E
A410906	9.0VAC, 600mA	A
A410907	9.0VAC, 700mA	A
A410908	9.0VAC, 800mA	A
A410909	9.0VAC, 900mA	A
A410910	9.0VAC, 1000mA	A
A411003	10.0VAC, 300mA	A
A411004	10.0VAC, 400mA	A
A411005	10.0VAC, 500mA	A B
A411006	10.0VAC, 600mA	A
A411007	10.0VAC, 700mA	A
A411008	10.0VAC, 800mA	A
A411009	10.0VAC, 900mA	A
A411010	10.0VAC, 1000mA	A
A411203	12.0VAC, 300mA	A B E
A411204	12.0VAC, 400mA	A
A411205	12.0VAC, 500mA	A B E
A411206	12.0VAC, 600mA	A
A411207	12.0VAC, 700mA	A

SHOGYO
Any spec...any time.

For complete specifications, samples & technical assistance:
Tel: (516) 349–5200 Fax: (516) 349–7744 E-mail: info@shogyo.com
Visit our web site: http://www.shogyo.com
Shogyo International Corporation
45 Executive Drive • Plainview, NY 11803

The Signal Way of Doing Business...
(Often imitated, but *NEVER* equalled)

At Signal Transformer, we are committed to providing the highest grade magnetics for customers who demand total reliability, on-time delivery and competitive pricing. Year after year, independent brand preference studies conducted by leading electronic trade journals, have shown that engineers and buyers consistently vote Signal as the No. 1 preferred source for magnetics.

For almost 40 years, we've led the magnetics industry with innovation, creativity, and reliability by:

- Pioneering and perfecting direct sales of off-the-shelf transformers and chokes to the user.
- Maintaining the largest inventories—over 1,000 different chokes and transformers in ranges from 1 VA to 10 KVA, available off the shelf for PRONTO shipment.
- Offering customized J.I.T. programs.
- Providing annual contract programs with the most competitive volume pricing.
- Obtaining the latest safety agency certifications including UL, CSA, VDE, IEC, EN.

Delivery Speed Without Equal

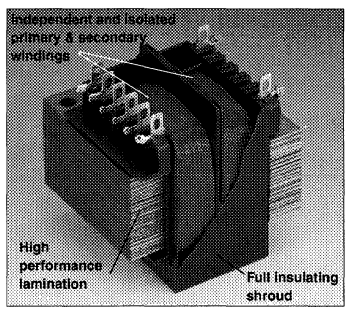
PRONTO℠ 24-Hour Shipment

Our PRONTO shipment program is simple. We ship off-the-shelf products within 24 hours, and, in most cases the same day! We are able to make this commitment because we match computerized inventory production schedules with industry requirements. Larger production orders are comfortably scheduled to meet J.I.T. or any delivery scheduling.

In fact, each year over 20,000 orders are shipped to satisfied customers, on-time, every time.

Design and Construction Without Equal

Because we pride ourselves in listening to what our customers say, we at Signal have always been able to develop innovative, quality products that meet changing requirements. Our success is built on continuously addressing all current major concerns i.e., flammability, high temperature materials, and design criteria such as:



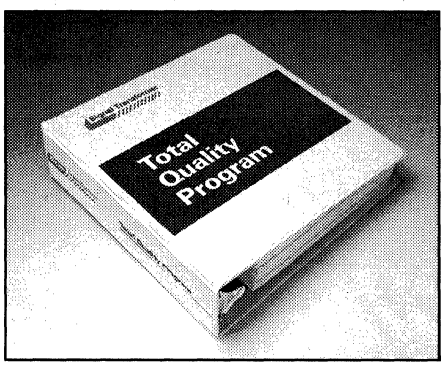
Typical example cross section: Model A41

- Smaller size and weight *(For example, see our MPI, HPI & M4L series)*
- Better performance through improved volumetric efficiency *(For example, see our M4L series)*
- Higher isolation while eliminating crossovers of primary and secondary leads *(For example, see our 14A series)*
- Superior suppression of radiated magnetic field *(For example, see our IF series)*

Technical Support Without Equal

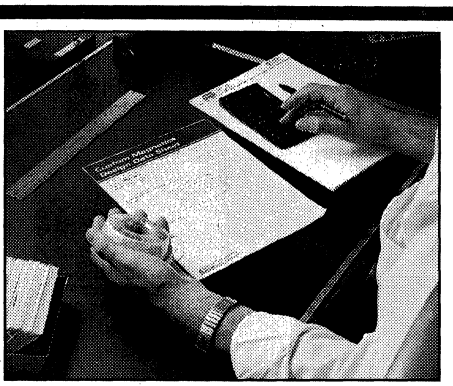
With one of the industry's largest staff of application engineers, supported by the latest CAD/CAM equipment, our engineering team responds quickly to your specific application needs, custom requirements, and your quotation requests. Please don't hesitate to call, write, fax, or e-mail us at our Internet or MHS hub. Call for details or e-mail to info@signal.mhs.compuserve.com.

© Copyright 1994 by Signal Transformer Co., Inc., Inwood, NY. All International Rights Reserved.
All specifications subject to change without notice. Consult factory for latest specifications.
Printed in U.S.A.—Catalog ST-5



Quality Assurance Without Equal

Through years of extensive magnetics manufacturing experience, Signal has developed a unique, world-class Total Quality Program. This program embodies the latest state-of-the-art manufacturing processes and monitoring systems from first article inspection through 100% electrical testing for key performance and safety parameters.



Custom Design Without Equal

At Signal, we've designed thousands of custom products, and may have already solved your problem. If not, we will! To make it easy to identify your specific requirements, we've included a Custom Magnetics Design Data Sheet in our catalog, as well as on our Website. Our design engineering team welcomes the opportunity to be of service.

Terms and Conditions:

How to Order
Simply call 516-239-5777 and ask to speak to one of our customer service representatives waiting to answer your inquiry. If you wish you may fax your order to our 24-hour fax line (516-239-7208) or mail your purchase order to 500 Bayview Avenue, Inwood, New York, 11096. If faxing or mailing your order, please be certain to include your phone number so you can be reached if there are any questions concerning your order.

Terms of Sale
Net 30 days to firms with acceptable D&B rating. Unrated firms, please submit name of your bank and 3 major trade references. Other methods are: C.O.D. for any of our stock transformers, cash in advance for non-stock or custom transformers. We also accept MasterCard, Visa, and American Express, which saves the additional C.O.D. charges.

Prices
Prices are published on our price sheet and are subject to change without notice.

Extra Charges
All non-stock and custom transformer orders are subject to a set-up charge.

Freight Policy
Orders are shipped FOB (point of origin). All UPS shipments are prepaid and freight charges will be added to your invoice. All other carriers are shipped freight collect unless we are otherwise instructed.

Damaged Shipment
Transformers shipped are carefully packed in compliance with carrier requirements. Claims for loss or damage in transit must be made with the carrier by the customer within 15 days of delivery. All shipments should be unpacked and inspected immediately upon receipt. If damage does not become apparent until shipment is unpacked, make a request within 72 hours for inspection by the carrier's agent and file with the carrier. Any evidence of damage to packaging must be noted on the freight bill or carrier's receipt and signed by the carrier's agent. Failure to do this will result in the carrier refusing to honor the claim.

Return Policy
You will find that the quality products purchased from Signal Transformer have been manufactured to give you the high level of quality you expect. Our goal has always been to make sure you are completely satisfied every time you do business with us. If a qualified reason exists, a Return Material Authorization will be given to you promptly and a replacement order will be processed immediately at the time of your call.

Warranty
Signal products are warranted to be free of defects in materials and workmanship when operated within specified operating conditions. Contact Signal for specific warranty, terms and conditions.

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Signal Transformer

Selector Chart

This selector chart was created to assist you in finding the corresponding page for the transformer needed for your application.

How to use:
- Select type of unit required, i.e., printed circuit, chassis mount, etc.
- Select power range (more than one family may be available).
- Select voltage range (AC or DC voltage).
- Select agency approvals necessary, i.e., UL, CSA, VDE, UL1585, Class 2.
- Identify family and turn to corresponding page number.

Printed Circuit Mount

Power Range (VA)	Secondary Voltage Range	Agency Approvals	Family	EEM Page #
2.5–10	5V–36VCT	UL, CSA, VDE	14A-R	A-2356
20–56	5V–36VCT	UL, CSA, VDE	14A	A-2357
20–56	5VDC & ± 12VDC or ± 15VDC	UL, CSA, VDE	14A Triple Output	A-2358
2–30	5V–230VCT	UL, CSA, VDE	IF	A-2354-2355
2.5–18 ***NEW!***	5V–230VCT	CSA, TUV	Low Profile Int'l	A-2353
2–48	5V–230VCT	UL, CSA	LP	A-2359
6–12	5VDC & ± 12VDC or ± 15VDC	UL, CSA	MPL Triple Output	A-2363
1.1–36	5V–120VCT	UL, CSA	ST/DST	A-2360
1.0–24	5V–120VCT	UL, CSA	PC/DPC	A-2361
10–24	5VDC & ± 12VDC or ± 15VDC	UL, CSA	MPC/DMPC Triple Output	A-2362
2.5–50	12V–24V	UL 1585, Class 2	CL2	A-2364

Supplemental Magnetics

Inductance	Current	Family	EEM Page #
.12–100mH	1.0–200AMPS	Chokes	A-2371

Signal Transformer

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Selector Chart

This selector chart was created to assist you in finding the corresponding page for the transformer needed for your application.

How to use:
- Select type of unit required, i.e., printed circuit, chassis mount, etc.
- Select power range (more than one family may be available).
- Select voltage range (AC or DC voltage).
- Select agency approvals necessary, i.e., UL, CSA, VDE, UL1585, Class 2.
- Identify family and turn to corresponding page number.

Chassis Mount

Power Range (VA)	Secondary Voltage Range	Agency Approvals	Family	EEM Page #
200–900	5V–230VCT	UL, CSA, TUV	MPI	A-2350
1250–3500	115V–230V	UL, CSA, VDE, TUV	HPI	A-2348
300–1000	115V	UL, CSA, VDE	M4L	A-2349
25–175	5V–230VCT	UL, CSA, VDE	A41	A-2351
25–80	5VDC & ± 12VDC or ± 15VDC	UL, CSA, VDE	A41 Triple Output	A-2352
2.4–100	10VCT–120VCT	UL, CSA	241/DP241	A-2366
30–100	5VDC & ± 12VDC or ± 15VDC	UL, CSA	MT/DMT Triple Output	A-2367
25–80	12V–24V	UL 1585, Class 2	CL2	A-2365

Supplemental Magnetics

Power Range (VA)	Secondary Voltage Range	Family	EEM Page #
10–2800	5VCT–80VCT	Rectifier Power	A-2368-2370
250–10,000	104V–240V	Power Isolation	A-2372-2373
100–2000	115V–230V	Auto Transformers	A-2374

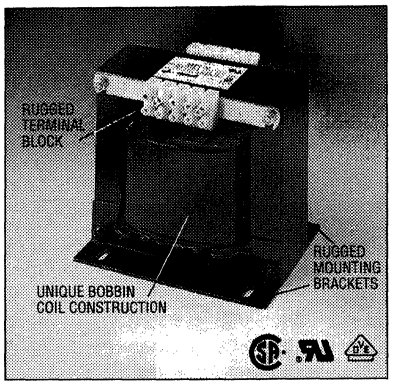
CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Signal Transformer

High Power International Transformers

BUY DIRECT
Tel: (516) 239-5777
FAX: (516) 239-7208

Greater Performance in Less Space and Weight



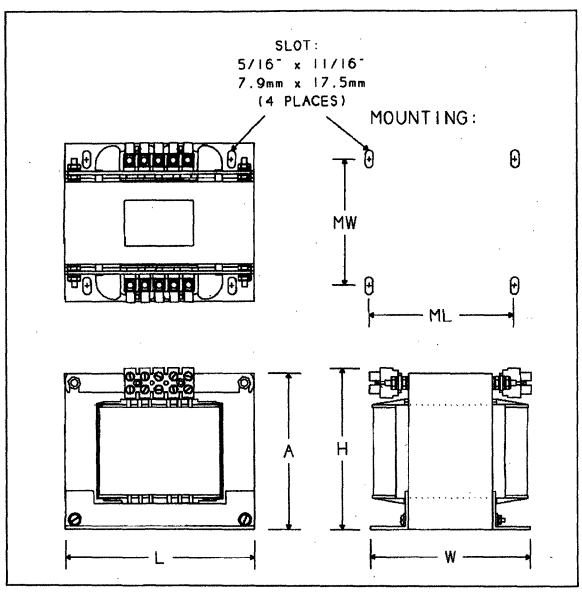
Signal's HPI transformers feature unique coil construction that complies with international safety standards and results in a smaller and lighter transformer.

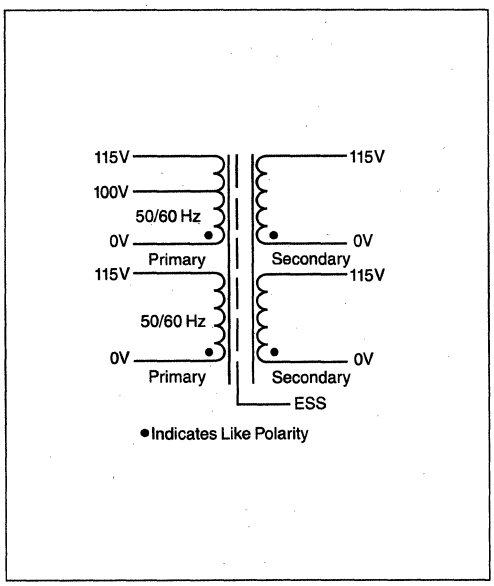
General Specifications

- **Power** – 1250 VA to 3500 VA
- **Dielectric Strength** – 4000VRMS Hipot
- **Primaries** – Dual/tapped primaries (100V, 115V, 215V, 230V - 50/60 Hz)
- **Secondaries** – Series or parallel secondaries (115V or 230V)
- **Electrostatic Shield** – 5 mils thick copper foil
- **Terminals** – Screw type barrier strip on size 20, 27 & 35 - screw type on 12,15 & 17
- **Leakage** – Leakage current meets medical applications
- **Insulation** – Class H insulation (180°C)
- **Flammability** – Bobbin material meets UL 94V0

Agency Standards

- UL recognized to UL 506 (File #E63829)
- CSA certified to C22.2 #66 (File #LR 51265)
- VDE certified to VDE 0550 (File #2994)
- TUV certified to IEC 950 (Lic #R9373110.2)





Part No.	VA (Size)	Secondary RMS Rating		Mechanical Dimensions						
		Series	Parallel	L	W	H	A	ML	MW	Wgt
*HPI-12	1250	230V @ 5.4A	115V @ 10.9A	7.06" 179.3mm	5.04" 128.0mm	6.06" 153.9mm	6.03" 153.2mm	5.50" 139.7mm	3.69" 93.7mm	31.0 lbs 14.07 kg
*HPI-15	1500	230V @ 6.5A	115V @ 13.0A	7.06" 179.3mm	5.43" 137.9mm	6.06" 153.9mm	6.03" 153.2mm	5.50" 139.7mm	4.03" 103.0mm	35.75 lbs 16.23 kg
*HPI-17	1750	230V @ 7.6A	115V @ 15.2A	7.06" 179.3mm	5.83" 148.1mm	6.06" 153.9mm	6.03" 153.2mm	5.50" 139.7mm	4.48" 113.3mm	41.50 lbs 18.84 kg
HPI-20	2000	230V @ 8.7A	115V @ 17.4A	7.50" 190.5mm	5.60" 142.2mm	6.56" 166.6mm	6.25" 158.8mm	5.75" 146.1mm	4.35" 110.5mm	41.3 lbs 18.71 kg
HPI-27	2750	230V @ 12.0A	115V @ 24.0A	7.50" 190.5mm	6.23" 158.2mm	6.56" 166.6mm	6.25" 158.8mm	5.75" 146.1mm	4.98" 126.5mm	48.0 lbs 21.77 kg
HPI-35	3500	230V @ 15.2A	115V @ 30.4A	7.50" 190.5mm	7.33" 186.2mm	6.56" 166.6mm	6.25" 158.8mm	5.75" 146.1mm	6.06" 154.4mm	62.4 lbs 28.30 kg

*Agency certification pending — Built to meet standards above.

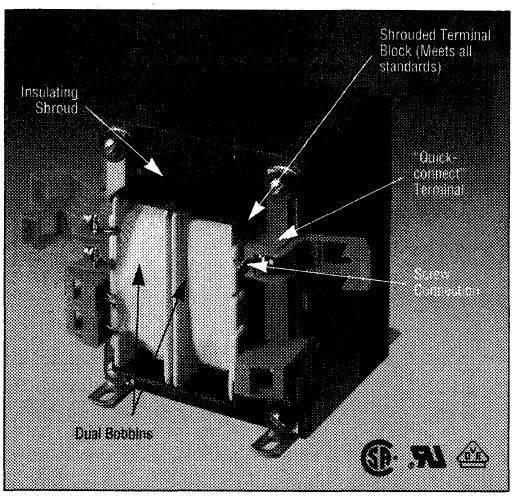
Signal Transformer

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

More-4-Less™ International Transformers

BUY DIRECT
24 HOUR
PROMPT
SHIPMENT
Tel: (516) 239-5777
FAX: (516) 239-7208

Greater Performance in Less Space



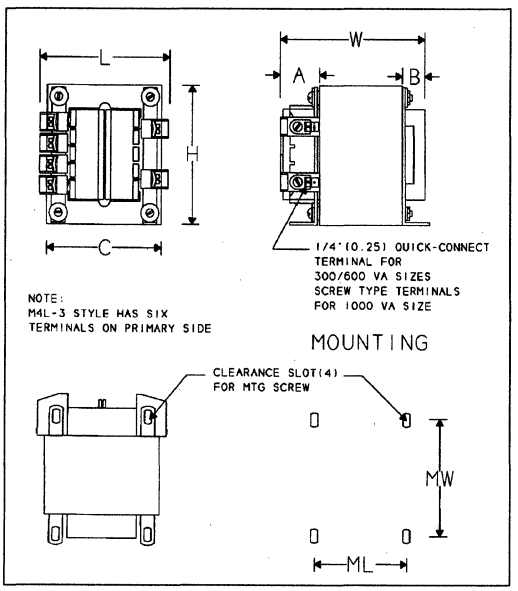
Signal's M4L transformers are designed using low loss steel, high temperature magnet wire plus high temperature bobbins and shroud. These unique design features result in a smaller and lighter transformer for comparable power sizes.

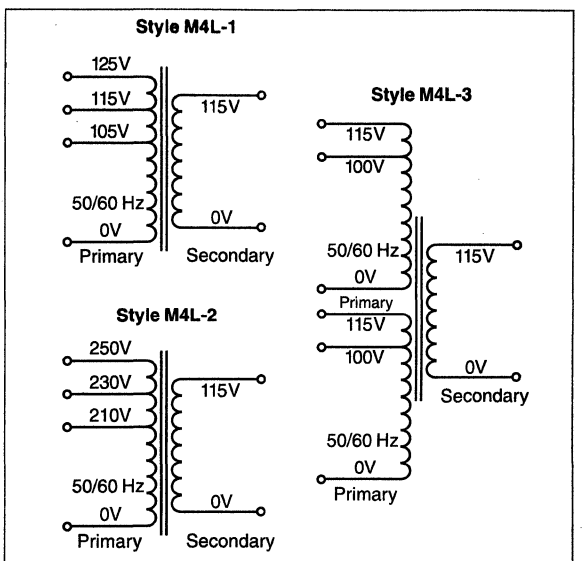
General Specifications

- **Power** – 300 VA to 1000 VA
- **Dielectric Strength** – 4000VRMS Hipot
- **Primaries** – Style M4L-1 (105V, 115V, 125V - 50/60 Hz)
  Style M4L-2 (210V, 230V, 250V - 50/60 Hz)
  Style M4L-3 (100V, 115V, 200V, 230V - 50/60 Hz)
- **Secondary** – Single secondary (115V)
- **Terminals** – Quick-connect/screw type terminals
- **Leakage** – Leakage current to meet UL 544
- **Insulation** – Class F insulation (155°C)
- **Flammability** – Bobbin and shroud material meet UL 94V0

Agency Standards

- UL recognized to UL 506 (File #E63829)
- UL recognized to UL 544 (File #E63829)
- CSA certified to C22.2 #66 (File #LR 51265)
- VDE certified to VDE 0805 / EN 60950 (File #1447)
- VDE certified to IEC 950





Part Number 115V Nominal	Part Number 230V Nominal	Part Number 100-115/200-230V Nominal	VA (Size)	Secondary RMS Rating	L	W	H	A	B	C	Mtg. Dim. ML	Mtg. Dim. MW	Mtg. Screw	Wgt
M4L-1-3	M4L-2-3	M4L-3-3	300	115V @ 2.6A	3.50″ 88.9mm	3.87″ 98.4mm	3.75″ 95.3mm	1.12″ 28.6mm	.62″ 15.9mm	3.12″ 79.4mm	2.50″ 63.5mm	3.12″ 79.4mm	#10	7.0 lbs 3.18 kg
M4L-1-6	M4L-2-6	M4L-3-6	600	115V @ 5.2A	3.87″ 98.4mm	4.93″ 125.4mm	4.50″ 114.3mm	1.18″ 30.2mm	.75″ 19.1mm	3.75″ 95.3mm	3.00″ 76.2mm	4.06″ 103.2mm	#10	14.3 lbs 6.49 kg
M4L-1-10	M4L-2-10	M4L-3-10	1000	115V @ 8.7A	5.37″ 136.5mm	5.87″ 149.2mm	5.25″ 133.4mm	1.50″ 38.1mm	.87″ 22.2mm	4.37″ 111.1mm	3.50″ 88.9mm	4.68″ 119.1mm	1/4	22.0 lbs 10.0 kg

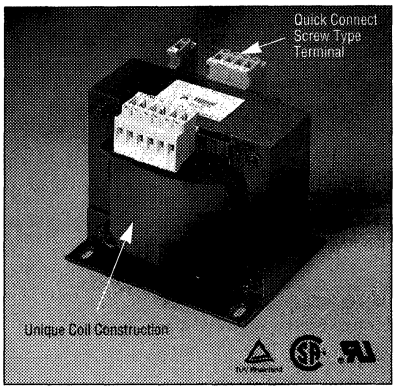
CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Signal Transformer

Multi-Purpose International Transformers

BUY DIRECT
24 HR
PRONTO SHIPMENT
Tel: (516) 239-5777
FAX: (516) 239-7208

High Performance with Greater Volumetric Efficiency



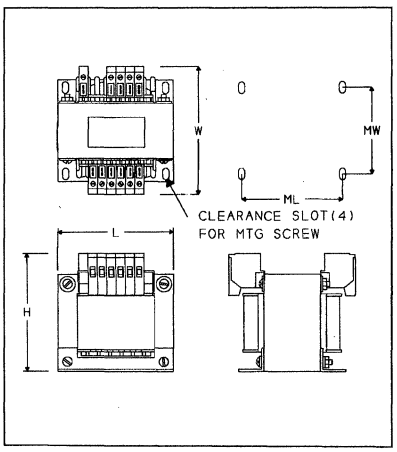
Signal's MPI transformers feature higher volumetric efficiency for improved performance compared to conventional 50/60 Hz transformers. They also incorporate international safety features which make them ideal for worldwide applications.

General Specifications

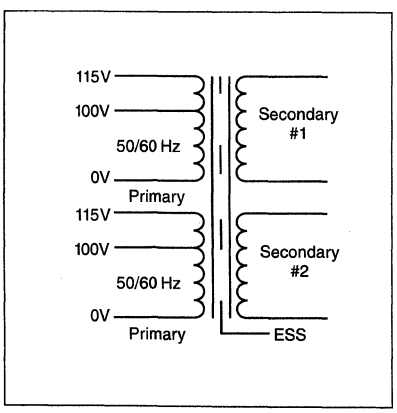
- **Power** – 200 VA to 900 VA
- **Dielectric Strength** – 4000VRMS Hipot
- **Primaries** – Dual/tapped primaries (100V, 115V, 200V, 215V, 230V - 50/60 Hz)
- **Secondaries** – Series or parallel secondaries
- **Electrostatic Shield** – 5 mils thick copper foil
- **Terminals** – Quick-connect/screw type terminals
- **Leakage** – Leakage current meets medical applications
- **Insulation** – Class F insulation (155°C)

Agency Standards

- UL recognized to UL 506 (File #E63829)
- CSA certified to C22.2 #66 (File #LR 51265)
- TUV certified to IEC #742 (Lic #R9679308 and R9671075)



Part No.	SECONDARY Series	SECONDARY Parallel	Part No.	SECONDARY Series	SECONDARY Parallel
MPI-200-10	10VCT @ 20.0A	5V @ 40.0A	MPI-200-28	28VCT @ 7.1A	14V @ 14.2A
MPI-250-10	10VCT @ 25.0A	5V @ 50.0A	MPI-250-28	28VCT @ 8.9A	14V @ 17.9A
MPI-300-10	10VCT @ 30.0A	5V @ 60.0A	MPI-300-28	28VCT @ 10.7A	14V @ 21.4A
MPI-400-10	10VCT @ 40.0A	5V @ 80.0A	MPI-400-28	28VCT @ 14.3A	14V @ 28.6A
MPI-650-10	10VCT @ 65.0A	5V @ 130.0A	MPI-650-28	28VCT @ 23.2A	14V @ 46.4A
MPI-900-10	10VCT @ 90.0A	5V @ 180.0A	MPI-900-28	28VCT @ 32.1A	14V @ 64.2A
MPI-200-12	12VCT @ 16.7A	6V @ 33.3A	MPI-200-36	36VCT @ 5.6A	18V @ 11.2A
MPI-250-12	12VCT @ 20.8A	6V @ 41.7A	MPI-250-36	36VCT @ 6.9A	18V @ 13.8A
MPI-300-12	12VCT @ 25.0A	6V @ 50.0A	MPI-300-36	36VCT @ 8.3A	18V @ 16.7A
MPI-400-12	12VCT @ 33.3A	6V @ 66.6A	MPI-400-36	36VCT @ 11.1A	18V @ 22.2A
MPI-650-12	12VCT @ 54.2A	6V @ 108.4A	MPI-650-36	36VCT @ 18.1A	18V @ 36.2A
MPI-900-12	12VCT @ 75.0A	6V @ 150.0A	MPI-900-36	36VCT @ 25.0A	18V @ 50.0A
MPI-200-16	16VCT @ 12.5A	8V @ 25.0A	MPI-200-40	40VCT @ 5.0A	20V @ 10.0A
MPI-250-16	16VCT @ 15.6A	8V @ 31.2A	MPI-250-40	40VCT @ 6.3A	20V @ 12.6A
MPI-300-16	16VCT @ 18.8A	8V @ 37.6A	MPI-300-40	40VCT @ 7.5A	20V @ 15.0A
MPI-400-16	16VCT @ 25.0A	8V @ 50.0A	MPI-400-40	40VCT @ 10.0A	20V @ 20.0A
MPI-650-16	16VCT @ 40.6A	8V @ 81.2A	MPI-650-40	40VCT @ 16.3A	20V @ 32.6A
MPI-900-16	16VCT @ 56.3A	8V @ 112.5A	MPI-900-40	40VCT @ 22.5A	20V @ 45.0A
MPI-200-20	20VCT @ 10.0A	10V @ 20.0A	MPI-200-48	48VCT @ 4.2A	24V @ 8.3A
MPI-250-20	20VCT @ 12.5A	10V @ 25.0A	MPI-250-48	48VCT @ 5.2A	24V @ 10.4A
MPI-300-20	20VCT @ 15.0A	10V @ 30.0A	MPI-300-48	48VCT @ 6.3A	24V @ 12.6A
MPI-400-20	20VCT @ 20.0A	10V @ 40.0A	MPI-400-48	48VCT @ 8.3A	24V @ 16.7A
MPI-650-20	20VCT @ 32.5A	10V @ 65.0A	MPI-650-48	48VCT @ 13.5A	24V @ 27.1A
MPI-900-20	20VCT @ 45.0A	10V @ 90.0A	MPI-900-48	48VCT @ 18.8A	24V @ 37.5A
MPI-200-24	24VCT @ 8.3A	12V @ 16.7A	MPI-200-230	230VCT @ 0.87A	115V @ 1.7A
MPI-250-24	24VCT @ 10.4A	12V @ 20.8A	MPI-250-230	230VCT @ 1.1A	115V @ 2.2A
MPI-300-24	24VCT @ 12.5A	12V @ 25.0A	MPI-300-230	230VCT @ 1.3A	115V @ 2.6A
MPI-400-24	24VCT @ 16.7A	12V @ 33.3A	MPI-400-230	230VCT @ 1.7A	115V @ 3.4A
MPI-650-24	24VCT @ 27.1A	12V @ 54.2A	MPI-650-230	230VCT @ 2.8A	115V @ 5.6A
MPI-900-24	24VCT @ 37.5A	12V @ 75.0A	MPI-900-230	230VCT @ 3.9A	115V @ 7.8A



VA (Size)	L	W	H	ML	MW	Wgt
200	3.750″ 95.3mm	4.203″ 106.6mm	3.720″ 94.5mm	3.250″ 82.6mm	2.800″ 71.1mm	6.22 lbs 2.82 kg
250	4.125″ 104.8mm	3.896″ 99.0mm	4.000″ 101.6mm	3.625″ 92.1mm	2.601″ 66.1mm	6.76 lbs 3.07 kg
300	4.125″ 104.8mm	4.223″ 107.3mm	4.000″ 101.6mm	3.625″ 92.1mm	2.915″ 74.0mm	7.80 lbs 3.54 kg
400	4.125″ 104.8mm	4.805″ 122.0mm	4.000″ 101.6mm	3.625″ 92.1mm	3.505″ 89.0mm	9.62 lbs 4.46 kg
650	5.250″ 133.3mm	4.430″ 112.5mm	4.800″ 121.9mm	4.500″ 114.3mm	3.415″ 86.7mm	14.83 lbs 6.73 kg
900	5.250″ 133.3mm	5.197″ 132.0mm	4.800″ 121.9mm	4.500″ 114.3mm	4.205″ 106.8mm	19.84 lbs 9.01 kg

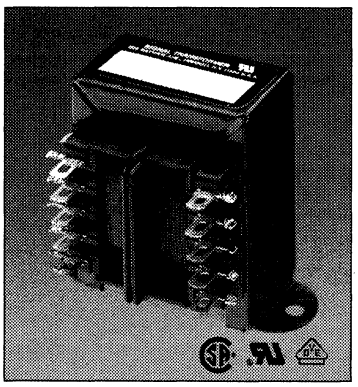
Signal Transformer

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

All-4-One™ International Transformers Chassis Mount

BUY DIRECT
24 HR PROMPT
Tel: (516) 239-5777
FAX: (516) 239-7208

International Standards at Lower Cost and Better Performance



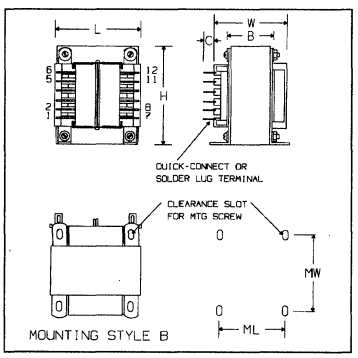
Signal's A41 transformers provide the high isolation, creepage and clearance necessary to comply with international safety standards.

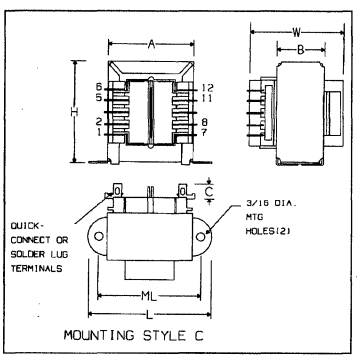
General Specifications

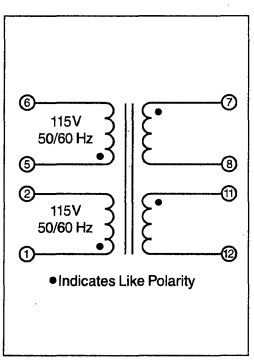
- **Power** – 25 VA to 175 VA
- **Dielectric Strength** – 4000VRMS Hipot
- **Primaries** – Dual primaries (115/230 V - 50/60 Hz)
- **Secondaries** – Series or parallel secondaries
- **Electrostatic Shield** – Not necessary, dual bobbin construction
- **Terminals** – Solder lug / quick-connect type terminals
- **Leakage** – Leakage current to meet UL 544
- **Insulation** – Class F insulation (155°C)
- **Flammability** – Bobbin and shroud material meet UL 94V0

Agency Standards

- UL recognized to UL 506 (File #E63829)
- CSA certified to C22.2 #66 (File #LR 51265)
- VDE certified to VDE 0805 / EN 60950 (File #1448)
- VDE certified to IEC 950







Part No.	VA (Size)	Secondary RMS Rating	
		Series	Parallel
A41-25-10	25	10VCT @ 2.5A	5V @ 5.0A
A41-43-10	43	10VCT @ 4.3A	5V @ 8.6A
A41-80-10	80	10VCT @ 8.0A	5V @ 16.0A
A41-130-10	130	10VCT @ 13.0A	5V @ 26.0A
A41-175-10	175	10VCT @ 17.5A	5V @ 35.0A
A41-25-12	25	12.6VCT @ 2.0A	6.3V @ 4.0A
A41-43-12	43	12.6VCT @ 3.4A	6.3V @ 6.8A
A41-80-12	80	12.6VCT @ 6.3A	6.3V @ 12.6A
A41-130-12	130	12.6VCT @ 10.3A	6.3V @ 20.6A
A41-175-12	175	12.6VCT @ 14.0A	6.3V @ 28.0A
A41-25-16	25	16VCT @ 1.6A	8V @ 3.2A
A41-43-16	43	16VCT @ 2.7A	8V @ 5.4A
A41-80-16	80	16VCT @ 5.0A	8V @ 10.0A
A41-130-16	130	16VCT @ 8.1A	8V @ 16.2A
A41-175-16	175	16VCT @ 11.0A	8V @ 22.0A
A41-25-20	25	20VCT @ 1.25A	10V @ 2.5A
A41-43-20	43	20VCT @ 2.2A	10V @ 4.4A
A41-80-20	80	20VCT @ 4.0A	10V @ 8.0A
A41-130-20	130	20VCT @ 6.5A	10V @ 13.0A
A41-175-20	175	20VCT @ 8.8A	10V @ 17.6A
A41-25-24	25	24VCT @ 1.0A	12V @ 2.0A
A41-43-24	43	24VCT @ 1.8A	12V @ 3.6A
A41-80-24	80	24VCT @ 3.3A	12V @ 6.6A
A41-130-24	130	24VCT @ 5.4A	12V @ 10.8A
A41-175-24	175	24VCT @ 7.3A	12V @ 14.6A
A41-25-28	25	28VCT @ 0.9A	14V @ 1.86A
A41-43-28	43	28VCT @ 1.5A	14V @ 3.0A
A41-80-28	80	28VCT @ 2.8A	14V @ 5.6A
A41-130-28	130	28VCT @ 4.6A	14V @ 9.2A
A41-175-28	175	28VCT @ 6.25A	14V @ 12.5A
A41-25-36	25	36VCT @ 0.7A	18V @ 1.4A
A41-43-36	43	36VCT @ 1.2A	18V @ 2.4A
A41-80-36	80	36VCT @ 2.2A	18V @ 4.4A
A41-130-36	130	36VCT @ 3.6A	18V @ 7.2A
A41-175-36	175	36VCT @ 4.8A	18V @ 9.6A
A41-25-230	25	230VCT @ 0.11A	115V @ 0.22A
A41-43-230	43	230VCT @ 0.19A	115V @ 0.38A
A41-80-230	80	230VCT @ 0.35A	115V @ 0.7A
A41-130-230	130	230VCT @ 0.57A	115V @ 1.14A
A41-175-230	175	230VCT @ 0.76A	115V @ 1.52A

VA (Size)	Dimensions L	W	H	A	B	C	Terminals	Mtg. Style	Mtg. Dim. ML	MW	Mtg. Screw	Wgt
25	2.81″ 71.4mm	1.87″ 47.6mm	2.31″ 58.7mm	2.00″ 50.8mm	1.12″ 28.6mm	.31″ 7.9mm	.187″ 4.75mm	C	2.37″ 60.3mm	– –	#6	1.25 lbs 0.57 kg
43	3.12″ 79.4mm	2.06″ 52.3mm	2.68″ 68.2mm	2.25″ 57.2mm	1.12″ 28.6mm	.31″ 7.9mm	.187″ 4.75mm	C	2.81″ 71.4mm	– –	#6	1.6 lbs 0.73 kg
80	2.50″ 63.5mm	2.37″ 60.3mm	3.00″ 76.2mm	– –	1.37″ 35.0mm	.31″ 7.9mm	.187″ 4.75mm	B	2.00″ 50.8mm	2.18″ 55.5mm	#6	2.8 lbs 1.27 kg
130	2.81″ 71.4mm	2.87″ 73.0mm	3.37″ 85.7mm	– –	1.62″ 41.3mm	.37″ 9.5mm	0.25″ 6.35mm	B	2.25″ 57.2mm	2.50″ 63.5mm	#8	4.1 lbs 1.86 kg
175	3.12″ 79.4mm	2.87″ 73.0mm	3.75″ 95.3mm	– –	1.62″ 41.3mm	.37″ 9.5mm	0.25″ 6.35mm	B	2.50″ 63.5mm	2.50″ 63.5mm	#8	5.5 lbs 2.49 kg

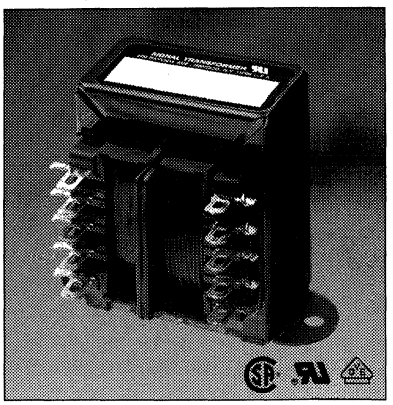
CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Signal Transformer

All-4-One™ International Triple Output Transformers • Chassis Mount

BUY DIRECT
PRONTO
Tel: (516) 239-5777
FAX: (516) 239-7208

For 5 VDC and ±12 VDC or ±15 VDC Regulated Power Supplies Which Require International Safety Certification



Signal's A41 triple output transformers have chassis mount capability plus all of the performance features of our split bobbin A41 series.

General Specifications

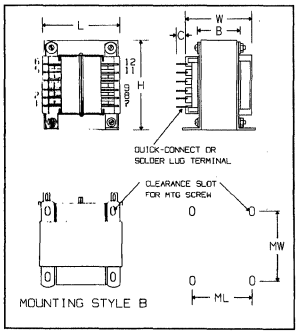
- **Power** — 25 VA to 80 VA
- **Dielectric Strength** – 4000VRMS Hipot
- **Primaries** – Dual primaries (115/230 V - 50/60 Hz)
  Input range (100V to 130V or 200V to 260V - 50/60 Hz)
- **Secondaries** – Dual complementary outputs (5 VDC with ±12 VDC or 5 VDC with ±15 VDC)
- **Electrostatic Shield** – Not necessary, split bobbin construction
- **Terminals** – Solder lug/quick-connect type terminals
- **Insulation** – Class F insulation (155°C)
- **Flammability** – Bobbin and shroud material meet UL 94V0

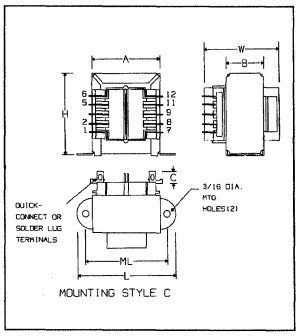
Agency Standards

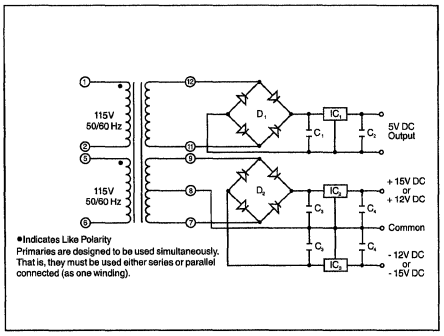
- UL recognized to UL 506 (File #E63829)
- CSA certified to C22.2 #66 (File #LR 51265)
- VDE certified to VDE 0805 / EN 60950 (File #4362)
- VDE certified to IEC 950

Part Number	VA (Size)	DC Output		Suggested Components					C_2 C_4 See Note ①	
		Regulator I	Regulator II	C_1	C_3	IC1③	IC2③	IC3③	D1④	D2④
A41-25-512	25	5V @ 1.25A	±12V @ 150mA	4.1 KMFD @ 15 VDC	600 MFD @ 50 VDC	LM-323K-5	LM-340K-12	LM-320K-12	PE20	PF20
A41-25-515	25	5V @ 1.25A	±15V @ 130mA			LM-323K-5	LM-340K-15	LM-320K-15	PE20	PF20
A41-43-512	43	5V @ 2A	±12V @ 300mA	8 KMFD @ 15 VDC	1.1 KMFD @ 50 VDC	LM-323K-5	LM-340K-12	LM-320K-12	PE20	PF20
A41-43-515	43	5V @ 2A	±15V @ 250mA			LM-323K-5	LM-340K-15	LM-320K-15	PE20	PF20
A41-80-512	80	5V @ 3.5A	±12V @ 600mA	10 KMFD @ 15 VDC	2.1 KMFD @ 50 VDC	LM-338②	LM-340K-12	LM-320K-12	PP20	PF20
A41-80-515	80	5V @ 3.5A	±15V @ 500mA			LM-338②	LM-340K-15	LM-320K-15	PP20	PF20

Note ①: Output capacitors C_2 and C_4 are required to stabilize regulators. Values can be 1MFD min. tantalum or 10MFD min. electrolytic, 20V min.
Note ②: LM-338 is an adjustable regulator and MFR's specifications (National Semiconductor) should be consulted for values of external components.
Note ③: All ICs are National Semiconductor types.
Note ④: All bridges are EDI types.







VA (Size)	Dimensions L	W	H	A	B	C	Terminal	Mtg. Style	Mtg. Dim. ML	MW	Mtg. Screw	Wgt
25	2.81″ 71.4mm	1.87″ 47.6mm	2.31″ 58.7mm	2.00″ 50.8mm	1.12″ 28.6mm	0.31″ 7.9mm	0.187″ 4.75mm	C	2.37″ 60.3mm	– –	#6	1.25 lbs 0.57 kg
43	3.12″ 79.4mm	2.06″ 52.3mm	2.68″ 68.2mm	2.25″ 57.2mm	1.12″ 28.6mm	0.31″ 7.9mm	0.187″ 4.75mm	C	2.81″ 71.4mm	– –	#6	1.6 lbs 0.73 kg
80	2.50″ 63.5mm	2.37″ 60.3mm	3.00″ 76.2mm	– –	1.37″ 34.9mm	0.31″ 7.9mm	0.187″ 4.75mm	B	2.00″ 50.8mm	2.18″ 55.5mm	#6	2.8 lbs 1.27 kg

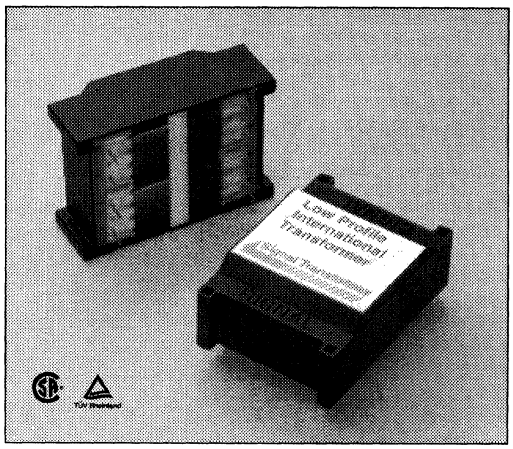
Signal Transformer

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Low Profile International Transformers Printed Circuit Mount

BUY DIRECT
Tel: (516) 239-5777
FAX: (516) 239-7208

Direct Plug-in Replacement for Industry Standard Pin Configuration on Low Profile Transformers.



New Features and Benefits - *ALL AT NO ADDITIONAL COST*

- **Hermetically Sealed** – For wave soldering processes
- **Rigid Pin Construction** – For easier board insertion and higher reliability
- **Mounting Holes Provided** – For greater resistance to shock and vibration
- **Improved Electrical Characteristics** – i.e., regulation, temperature rise, efficiency, etc.

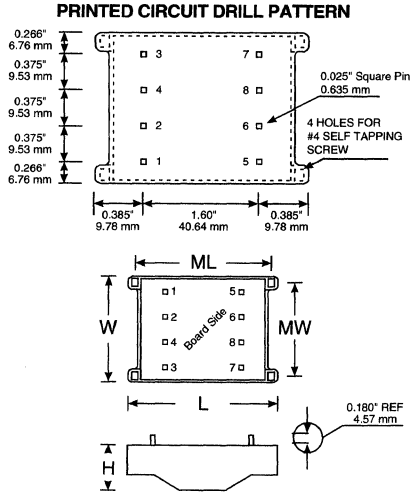
General Specifications

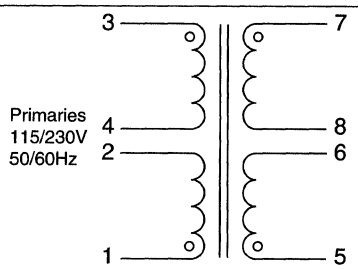
- **Power** – 2 VA to 18 VA
- **Dielectric Strength** – 4000VRMS Hipot
- **Primaries** – Dual primaries (115/230V - 50/60 Hz)
- **Secondaries** – Series or parallel secondaries
- **Electrostatic Shield** – Not necessary, split bobbin construction
- **Magnetic Field** – Reduced magnetic radiation
- **Height** – .72 to 1.08 inches high
- **Insulation** – Class B insulation (130°C)

Agency Standards

- CSA-NRTL/C – C22.2 #66 1988 / UL 506
- TUV-EN60950 / IEC 950

PRINTED CIRCUIT DRILL PATTERN





Part No.	VA (Size)	Secondary RMS Rating	
		Series	Parallel
10-250-LPI	2	10VCT @ 250mA	5V @ 500mA
12-200-LPI	2	12.6VCT @ 200mA	6.3V @ 400mA
16-150-LPI	2	16VCT @ 150mA	8V @ 300mA
20-125-LPI	2	20VCT @ 125mA	10V @ 250mA
24-100-LPI	2	24VCT @ 100mA	12V @ 200mA
30-85-LPI	2	30VCT @ 85mA	15V @ 170mA
34-75-LPI	2	34VCT @ 75mA	17V @ 150mA
40-60-LPI	2	40VCT @ 60mA	20V @ 120mA
56-45-LPI	2	56VCT @ 45mA	28V @ 90mA
230-10-LPI	2	230VCT @ 10mA	115V @ 20mA
10-600-LPI	6	10VCT @ 600mA	5V @ 1.2A
12-450-LPI	6	12.6VCT @ 450mA	6.3V @ 900mA
16-350-LPI	6	16VCT @ 350mA	8V @ 700mA
20-300-LPI	6	20VCT @ 300mA	10V @ 600mA
24-250-LPI	6	24VCT @ 250mA	12V @ 500mA
30-200-LPI	6	30VCT @ 200mA	15V @ 400mA
34-170-LPI	6	34VCT @ 170mA	17V @ 340mA
40-150-LPI	6	40VCT @ 150mA	20V @ 300mA
56-100-LPI	6	56VCT @ 100mA	28V @ 200mA
230-25-LPI	6	230VCT @ 25mA	115V @ 50mA
10-900-LPI	9	10VCT @ 900mA	5V @ 1.8A
12-725-LPI	9	12.6VCT @ 725mA	6.3V @ 1.45A
16-560-LPI	9	16VCT @ 560mA	8V @ 1.12A
20-450-LPI	9	20VCT @ 450mA	10V @ 900mA
24-375-LPI	9	24VCT @ 375mA	12V @ 750mA
30-300-LPI	9	30VCT @ 300mA	15V @ 600mA
34-265-LPI	9	34VCT @ 265mA	17V @ 530mA
40-225-LPI	9	40VCT @ 225mA	20V @ 450mA
56-160-LPI	9	56VCT @ 160mA	28V @ 320mA
230-40-LPI	9	230VCT @ 40mA	115V @ 80mA
	12	Pending	
	12		
	18		
	18		

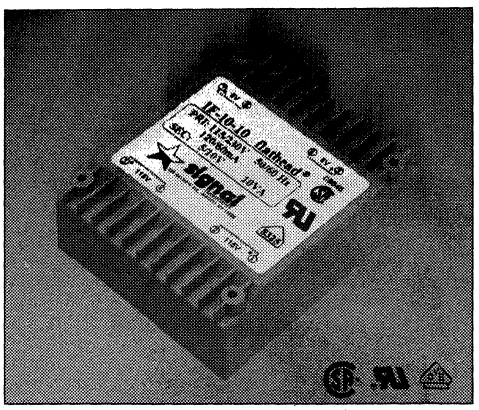
VA (Size)	L	W	H	ML	MW	Wgt.
2.5	2.370" 60.2mm	1.658" 42.1mm	0.720" 18.3mm	2.19" 55.6mm	1.50" 38.1mm	0.276 lb 0.125kg
6	2.370" 60.2mm	1.658" 42.1mm	0.895" 22.7mm	2.19" 55.6mm	1.50" 38.1mm	0.390 lb 0.177kg
9	2.370 60.2mm	1.658" 42.1mm	1.080" 27.4mm	2.19" 55.6mm	1.50" 38.1mm	0.510 lb 0.231 kg
12	Pending					
18						

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Signal Transformer

International Flathead™ Low Profile Transformers • Printed Circuit Mount

For Critical Height and International Safety Requirements



Signal's IF transformers utilize unique insulating techniques, including full encapsulation to meet international safety requirements. These transformers are ideal for low power applications where minimum height is required.

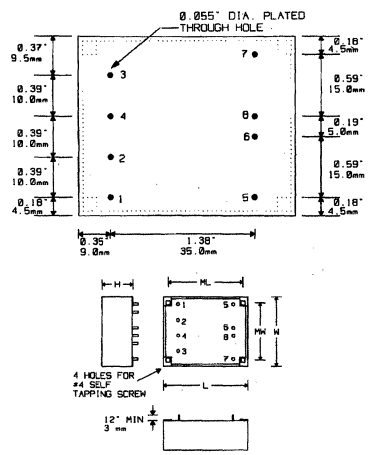
General Specifications

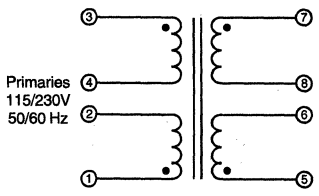
- **Power** – 2 VA to 30 VA
- **Dielectric Strength** – 4000VRMS Hipot
- **Primaries** – Dual primaries (115/230 V - 50/60 Hz)
- **Secondaries** – Series or parallel secondaries
- **Electrostatic Shield** – Not necessary, split bobbin construction
- **Magnetic Field** – Reduced magnetic radiation
- **Height** – .69 to 1.39 inches (17.5 to 35.3mm) high
- **Insulation** – Class B insulation (130°C)

Agency Standards

- UL recognized to UL 506 (File #E63829)
- CSA certified to C22.2 #66 (File #LR 51265)
- VDE certified to VDE 0805 / EN 60950 (File #8325)
- VDE certified to IEC 950

PRINTED CIRCUIT DRILL PATTERN





Part No.	VA (Size)	Secondary RMS Rating	
		Series	Parallel
IF-2-10	2	10VCT @ 200mA	5V @ 400mA
IF-2-12	2	12VCT @ 170mA	6V @ 340mA
IF-2-16	2	16VCT @ 125mA	8V @ 250mA
IF-2-20	2	20VCT @ 100mA	10V @ 200mA
IF-2-24	2	24VCT @ 85mA	12V @ 170mA
IF-2-30	2	30VCT @ 70mA	15V @ 140mA
IF-2-34	2	34VCT @ 60mA	17V @ 120mA
IF-2-40	2	40VCT @ 50mA	20V @ 100mA
IF-2-56	2	56VCT @ 40mA	28V @ 80mA
IF-2-230	2	230VCT @ 9mA	115V @ 18mA
IF-4-10	4	10VCT @ 400mA	5V @ 800mA
IF-4-12	4	12VCT @ 335mA	6V @ 670mA
IF-4-16	4	16VCT @ 250mA	8V @ 500mA
IF-4-20	4	20VCT @ 200mA	10V @ 400mA
IF-4-24	4	24VCT @ 170mA	12V @ 340mA
IF-4-30	4	30VCT @ 135mA	15V @ 270mA
IF-4-34	4	34VCT @ 120mA	17V @ 240mA
IF-4-40	4	40VCT @ 100mA	20V @ 200mA
IF-4-56	4	56VCT @ 70mA	28V @ 140mA
IF-4-230	4	230VCT @ 18mA	115V @ 36mA
IF-6-10	6	10VCT @ 600mA	5V @ 1.20A
IF-6-12	6	12VCT @ 500mA	6V @ 1.00A
IF-6-16	6	16VCT @ 375mA	8V @ 750mA
IF-6-20	6	20VCT @ 300mA	10V @ 600mA
IF-6-24	6	24VCT @ 250mA	12V @ 500mA
IF-6-30	6	30VCT @ 200mA	15V @ 400mA
IF-6-34	6	34VCT @ 180mA	17V @ 360mA
IF-6-40	6	40VCT @ 150mA	20V @ 300mA
IF-6-56	6	56VCT @ 110mA	28V @ 220mA
IF-6-230	6	230VCT @ 25mA	115V @ 50mA

VA (Size)	L	W	H	ML	MW	Wgt
2	2.09″ 53.0mm	1.73″ 44.0mm	0.69″ 17.6mm	1.87″ 47.5mm	1.48″ 37.5mm	4.6 oz. 0.13 kg
4	2.09″ 53.0mm	1.73″ 44.0mm	0.77″ 19.6mm	1.87″ 47.5mm	1.48″ 37.5mm	5.4 oz. 0.15 kg
6	2.09″ 53.0mm	1.73″ 44.0mm	0.89″ 22.6mm	1.87″ 47.5mm	1.48″ 37.5mm	6.9 oz. 0.20 kg

Signal Transformer

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208

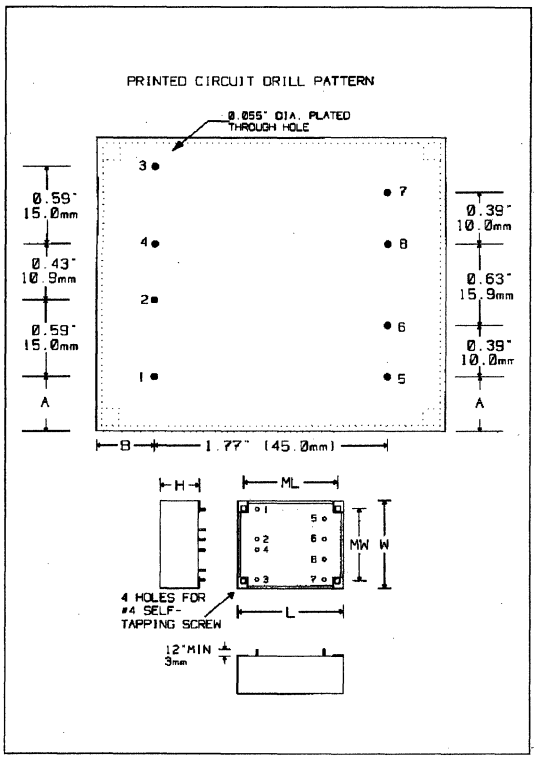
Website: http://www.signaltransformer.com

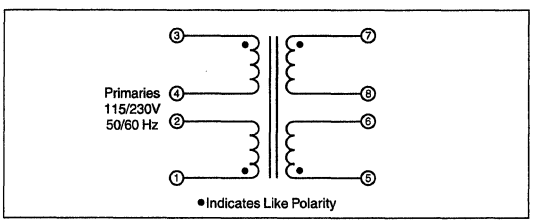
500 Bayview Avenue, Inwood, New York 11096

International Flathead™ Low Profile Transformers • Printed Circuit Mount

BUY DIRECT
Tel: (516) 239-5777
FAX: (516) 239-7208

For Critical Height and International Safety Requirements (continued)





Part No.	VA (Size)	Secondary RMS Rating	
		Series	Parallel
IF-10-10	10	10VCT @ 1.00A	5V @ 2.00A
IF-10-12	10	12VCT @ 835mA	6V @ 1.67A
IF-10-16	10	16VCT @ 625mA	8V @ 1.25A
IF-10-20	10	20VCT @ 500mA	10V @ 1.00A
IF-10-24	10	24VCT @ 420mA	12V @ 840mA
IF-10-30	10	30VCT @ 335mA	15V @ 670mA
IF-10-34	10	34VCT @ 300mA	17V @ 600mA
IF-10-40	10	40VCT @ 250mA	20V @ 500mA
IF-10-56	10	56VCT @ 180mA	28V @ 360mA
IF-10-230	10	230VCT @ 45mA	115V @ 90mA
IF-14-10	14	10VCT @ 1.40A	5V @ 2.80A
IF-14-12	14	12VCT @ 1.20A	6V @ 2.40A
IF-14-16	14	16VCT @ 875mA	8V @ 1.75A
IF-14-20	14	20VCT @ 700mA	10V @ 1.40A
IF-14-24	14	24VCT @ 600mA	12V @ 1.20A
IF-14-30	14	30VCT @ 470mA	15V @ 940mA
IF-14-34	14	34VCT @ 415mA	17V @ 830mA
IF-14-40	14	40VCT @ 350mA	20V @ 700mA
IF-14-56	14	56VCT @ 250mA	28V @ 500mA
IF-14-230	14	230VCT @ 60mA	115V @ 120mA
IF-18-10	18	10VCT @ 1.80A	5V @ 3.60A
IF-18-12	18	12VCT @ 1.50A	6V @ 3.00A
IF-18-16	18	16VCT @ 1.15A	8V @ 2.30A
IF-18-20	18	20VCT @ 900mA	10V @ 1.80A
IF-18-24	18	24VCT @ 750mA	12V @ 1.50A
IF-18-30	18	30VCT @ 600mA	15V @ 1.20A
IF-18-34	18	34VCT @ 530mA	17V @ 1.06A
IF-18-40	18	40VCT @ 450mA	20V @ 900mA
IF-18-56	18	56VCT @ 320mA	28V @ 640mA
IF-18-230	18	230VCT @ 80mA	115V @ 160mA
IF-24-10	24	10VCT @ 2.40A	5V @ 4.80A
IF-24-12	24	12VCT @ 2.00A	6V @ 4.00A
IF-24-16	24	16VCT @ 1.50A	8V @ 3.00A
IF-24-20	24	20VCT @ 1.20A	10V @ 2.40A
IF-24-24	24	24VCT @ 1.00A	12V @ 2.00A
IF-24-30	24	30VCT @ 800mA	15V @ 1.60A
IF-24-34	24	34VCT @ 700mA	17V @ 1.40A
IF-24-40	24	40VCT @ 600mA	20V @ 1.20A
IF-24-56	24	56VCT @ 430mA	28V @ 860mA
IF-24-230	24	230VCT @ 105mA	115V @ 210mA
IF-30-10	30	10VCT @ 3.00A	5V @ 6.00A
IF-30-12	30	12VCT @ 2.50A	6V @ 5.00A
IF-30-16	30	16VCT @ 1.90A	8V @ 3.80A
IF-30-20	30	20VCT @ 1.50A	10V @ 3.00A
IF-30-24	30	24VCT @ 1.25A	12V @ 2.50A
IF-30-30	30	30VCT @ 1.00A	15V @ 2.00A
IF-30-34	30	34VCT @ 900mA	17V @ 1.80A
IF-30-40	30	40VCT @ 750mA	20V @ 1.50A
IF-30-56	30	56VCT @ 550mA	28V @ 1.10A
IF-30-230	30	230VCT @ 130mA	115V @ 260mA

VA (Size)	L	W	H	ML	MW	A	B	Wgt
10	2.66" 67.6mm	2.24" 57.0mm	0.89" 22.6mm	2.46" 62.5mm	1.97" 50.0mm	0.42" 10.6mm	0.45" 11.3mm	10.3 oz 0.29 kg
14	2.66" 67.6mm	2.24" 57.0mm	0.96" 24.3mm	2.46" 62.5mm	1.97" 50.0mm	0.42" 10.6mm	0.45" 11.3mm	11.9 oz 0.34 kg
18	2.66" 67.6mm	2.24" 57.0mm	1.09" 27.6mm	2.46" 62.5mm	1.97" 50.0mm	0.42" 10.6mm	0.45" 11.3mm	14.1 oz 0.40 kg
24	2.68" 68.0mm	2.26" 57.5mm	1.23" 31.3mm	2.46" 62.5mm	1.97" 50.0mm	0.43" 10.9mm	0.46" 11.5mm	16.5 oz 0.47 kg
30	2.68" 68.0mm	2.26" 57.5mm	1.39" 35.3mm	2.46" 62.5mm	1.97" 50.0mm	0.43" 10.9mm	0.46" 11.5mm	19.7 oz 0.58 kg

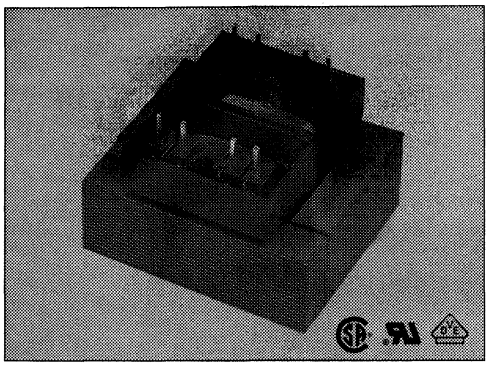
CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Signal Transformer

One-4-All™ International Transformers Printed Circuit Mount

BUY DIRECT
24 HOUR
PRONTO™
SHIPMENT
Tel: (516) 239-5777
FAX: (516) 239-7208

International Standards at Lower Cost and Better Performance



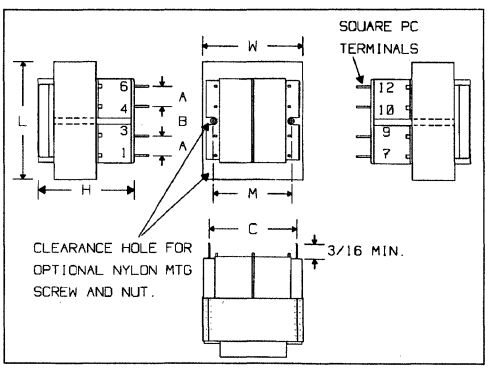
Signal's 14A transformers are used in low power applications and provide the high isolation, creepage and clearance necessary to comply with international safety standards.

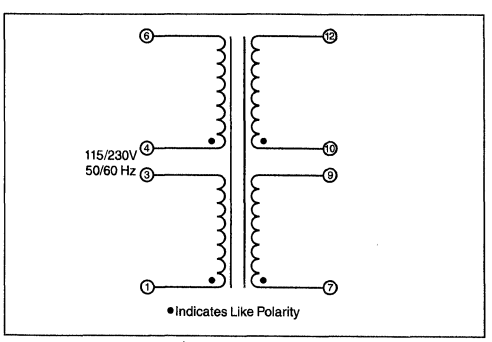
General Specifications

- **Power** – 2.5 VA to 10 VA
- **Dielectric Strength** – 4000VRMS Hipot
- **Primaries** – Dual primaries (115/230V - 50/60 Hz)
- **Secondaries** – Series or parallel secondaries
- **Electrostatic Shield** – Not necessary, split or dual bobbin construction
- **Insulation** – Class F insulation (155°C)
- **Flammability** – Bobbin and wrap around shroud material meet UL 94V0

Agency Standards

- UL recognized to UL 506 (File #E63829)
- CSA certified to C22.2 #66 (File #LR 51265)
- VDE certified to VDE 0805 / EN 60950 (File #1446)
- VDE certified to IEC 950





Part No.	VA (Size)	Secondary RMS Rating	
		Series	Parallel
14A-2.5R-10	2.5	10VCT @ 0.25A	5V @ 0.50A
14A-5.0R-10	5.0	10VCT @ 0.50A	5V @ 1.00A
14A-10R-10	10.0	10VCT @ 1.00A	5V @ 2.00A
14A-2.5R-12	2.5	12.6VCT @ 0.20A	6.3V @ 0.40A
14A-5.0R-12	5.0	12.6VCT @ 0.40A	6.3V @ 0.80A
14A-10R-12	10.0	12.6VCT @ 0.80A	6.3V @ 1.60A
14A-2.5R-16	2.5	16VCT @ 0.15A	8V @ 0.30A
14A-5.0R-16	5.0	16VCT @ 0.31A	8V @ 0.62A
14A-10R-16	10.0	16VCT @ 0.62A	8V @ 1.25A
14A-2.5R-20	2.5	20VCT @ 0.12A	10V @ 0.24A
14A-5.0R-20	5.0	20VCT @ 0.25A	10V @ 0.50A
14A-10R-20	10.0	20VCT @ 0.50A	10V @ 1.00A
14A-2.5R-24	2.5	24VCT @ 0.10A	12V @ 0.20A
14A-5.0R-24	5.0	24VCT @ 0.21A	12V @ 0.42A
14A-10R-24	10.0	24VCT @ 0.42A	12V @ 0.84A
14A-2.5R-28	2.5	28VCT @ 0.09A	14V @ 0.18A
14A-5.0R-28	5.0	28VCT @ 0.18A	14V @ 0.36A
14A-10R-28	10.0	28VCT @ 0.36A	14V @ 0.72A
14A-2.5R-36	2.5	36VCT @ 0.07A	18V @ 0.14A
14A-5.0R-36	5.0	36VCT @ 0.14A	18V @ 0.28A
14A-10R-36	10.0	36VCT @ 0.28A	18V @ 0.56A

VA (Size)	Dimensions						Sq. Pin Dimensions	Mtg. Dim.	Mtg. Screw		Wgt
	L	W	H	A	B	C		M	Size	Qty	
2.5	1.62″ 41.3mm	1.43″* 36.5mm	1.12″ 28.6mm	0.200″ 5.08mm	0.250″ 6.35mm	1.000″ 25.4mm	0.025″ 0.635mm	1.06″ 26.9mm	#4	2	0.25 lb 0.113 kg
5.0	1.62″ 41.3mm	1.43″ 36.5mm	1.37″ 34.9mm	0.200″ 5.08mm	0.400″ 10.16mm	1.000″ 25.4mm	0.025″ 0.635mm	1.06″ 26.9mm	#4	2	0.37 lb 0.168 kg
10.0	1.87″ 47.6mm	1.56″ 39.7mm	1.37″ 34.9mm	0.200″ 5.08mm	0.400″ 10.16mm	1.140″ 29.0mm	0.038″ 0.965mm	1.25″ 31.7mm	#4	2	0.53 lb 0.240 kg

***NOTE:** Previously this dimension was 1.31″; now it is 1.43″.

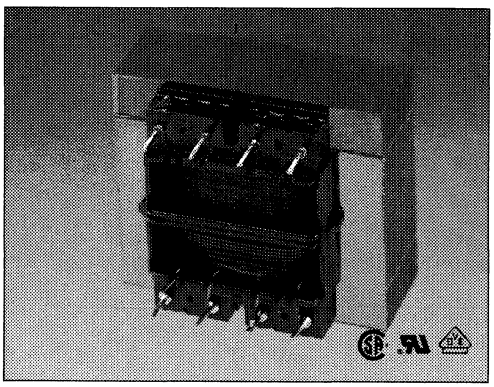
Signal Transformer

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

One-4-All™ International Transformers Printed Circuit Mount

BUY DIRECT
24 HOUR
PROTO
EXPRESS
Tel: (516) 239-5777
FAX: (516) 239-7208

International Standards at Lower Cost and Better Performance



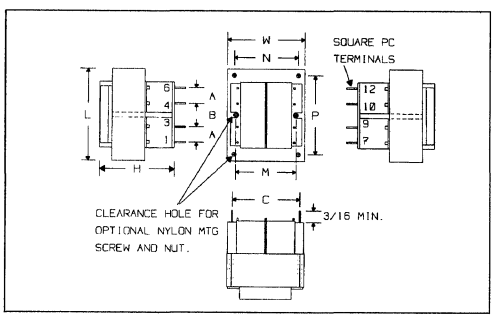
Signal's 14A transformers are used in low power applications and provide the high isolation, creepage and clearance necessary to comply with international safety standards.

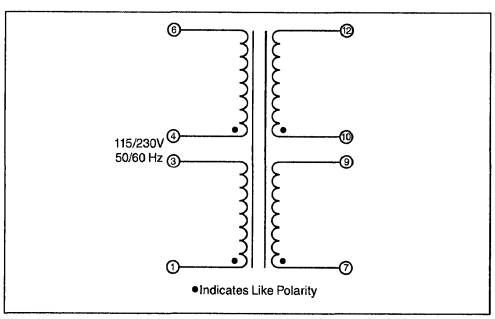
General Specifications

- **Power** – 20 VA to 56 VA
- **Dielectric Strength** – 4000VRMS Hipot
- **Primaries** – Dual primaries (115/230V - 50/60 Hz)
- **Secondaries** – Series or parallel secondaries
- **Electrostatic Shield** – Not necessary, split or dual bobbin construction
- **Insulation** – Class F insulation (155°C)
- **Flammability** – Bobbin and wrap around shroud material meet UL 94V0

Agency Standards

- UL recognized to UL 506 (File #E63829)
- CSA certified to C22.2 #66 (File #LR 51265)
- VDE certified to VDE 0805 / EN 60950 (File #1446)
- VDE certified to IEC 950





Part No.	VA (Size)	Secondary RMS Rating	
		Series	Parallel
14A-20-10	20	10VCT @ 2.0A	5V @ 4.0A
14A-30-10	30	10VCT @ 3.0A	5V @ 6.0A
14A-56-10	56	10VCT @ 5.6A	5V @ 11.2A
14A-20-12	20	12.6VCT @ 1.6A	6.3V @ 3.2A
14A-30-12	30	12.6VCT @ 2.4A	6.3V @ 4.8A
14A-56-12	56	12.6VCT @ 4.4A	6.3V @ 8.8A
14A-20-16	20	16VCT @ 1.25A	8V @ 2.5A
14A-30-16	30	16VCT @ 1.9A	8V @ 3.8A
14A-56-16	56	16VCT @ 3.5A	8V @ 7.0A
14A-20-20	20	20VCT @ 1.0A	10V @ 2.0A
14A-30-20	30	20VCT @ 1.5A	10V @ 3.0A
14A-56-20	56	20VCT @ 2.8A	10V @ 5.6A
14A-20-24	20	24VCT @ 0.83A	12V @ 1.66A
14A-30-24	30	24VCT @ 1.25A	12V @ 2.50A
14A-56-24	56	24VCT @ 2.33 A	12V @ 4.66A
14A-20-28	20	28VCT @ 0.72A	14V @ 1.44A
14A-30-28	30	28VCT @ 1.06A	14V @ 2.12A
14A-56-28	56	28VCT @ 2.0A	14V @ 4.0A
14A-20-36	20	36VCT @ 0.56A	18V @ 1.12A
14A-30-36	30	36VCT @ 0.82A	18V @ 1.64A
14A-56-36	56	36VCT @ 1.56A	18V @ 3.12A

VA (Size)	Dimensions						Sq. Pin Dimensions	Mtg. Dim.			Mtg. Screw		Wgt
	L	W	H	A	B	C		M	N	P	Size	Qty	
20	2.25″ 57.2mm	1.87″ 47.6mm	1.62″ 41.3mm	0.400″ 10.2mm	0.400″ 10.2mm	1.460″ 37.1mm	0.038″ 0.97mm	1.50″ 38.1mm	–	–	#4	2	0.90 lb 0.41 kg
30	2.62″ 66.7mm	2.18″ 55.5mm	1.56″ 39.7mm	0.550″ 13.9mm	0.275″ 7.0mm	1.680″ 42.7mm	0.045″ 1.14 mm	–	1.75″ 44.4mm	2.18″ 55.5mm	#6	4	1.15 lbs 0.52 kg
56	3.00″ 76.2mm	2.50″ 63.5mm	1.81″ 46.0mm	0.600″ 15.2mm	0.300″ 7.6mm	1.900″ 48.3mm	0.045″ 1.14mm	–	2.00″ 50.8mm	2.50″ 63.5mm	#6	4	1.70 lbs 0.77 kg

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Signal Transformer

One-4-All™ International Triple Output Transformers • Printed Circuit Mount

BUY DIRECT
Tel: (516) 239-5777
FAX: (516) 239-7208

For 5 VDC and ±12 VDC or ±15 VDC Regulated Power Supplies Which Require International Safety Certification

Signal's 14A triple output transformers have pc board mount capability plus all of the performance features of our split bobbin 14A series.

General Specifications

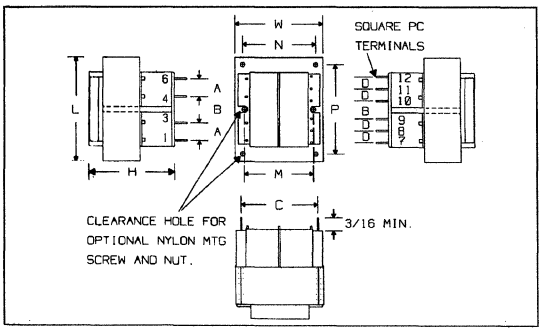
- **Power** — 20 VA to 56 VA
- **Dielectric Strength** – 4000VRMS Hipot
- **Primaries** – Dual primaries (115/230V - 50/60 Hz) Input range (100V to 130V or 200V to 260V - 50/60 Hz)
- **Secondaries** – Dual complementary outputs (5 VDC with ±12 VDC or 5 VDC with ±15 VDC)
- **Electrostatic Shield** – Not necessary, split bobbin construction
- **Insulation** – Class F insulation (155°C)
- **Flammability Rating** – Bobbin and shroud material meet UL 94V0

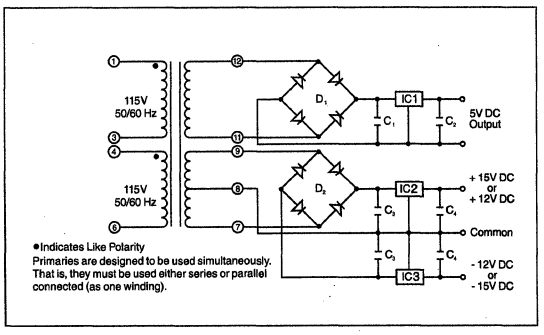
Agency Standards

- UL recognized to UL 506 (File #E63829)
- CSA certified to C22.2 #66 (File #LR 51265)
- VDE certified to VDE 0805 / EN 60950 (File #4361)
- VDE certified to IEC 950

Part Number	VA (Size)	DC Output		Suggested Components						C_2 C_4 See Note ①
		Regulator I	Regulator II	C_1	C_3	IC1③	IC2②	IC3③	D1④	D2④
14A-20-512	20	5V @ 750mA	±12V @ 200mA	2.3 KMFD @ 50 VDC	600 MFD @ 50 VDC	LM-323K-5	LM-340K-12	LM-320K-12	PE20	PF20
14A-20-515	20	5V @ 750mA	±15V @ 175mA			LM-323K-5	LM-340K-15	LM-320K-15	PE20	PF20
14A-30-512	30	5V @ 1.25A	±12V @ 250mA	4.1 KMFD @ 50 VDC	1 KMFD @ 50 VDC	LM-323K-5	LM-340K-12	LM-320K-12	PE20	PF20
14A-30-515	30	5V @ 1.25A	±15V @ 200mA	15 VDC	600 MFD @ 50 VDC	LM-323K-5	LM-340K-15	LM-320K-15	PE20	PF20
14A-56-512	56	5V @ 3A	±12V @ 300mA	10.0 KMFD @ 15 VDC	1.1 KMFD @ 50 VDC	LM-338②	LM-340K-12	LM-320K-12	PP20	PF20
14A-56-515	56	5V @ 3A	±15V @ 250mA			LM-338②	LM-340K-15	LM-320K-15	PP20	PF20

Note ①: Output capacitors C_2 and C_4 are required to stabilize regulators. Values can be 1MFD min. tantalum or 10MFD min. electrolytic, 20V min.
Note ②: LM-338 is an adjustable regulator and MFR's specifications (National Semiconductor) should be consulted for values of external components.
Note ③: All ICs are National Semiconductor types.
Note ④: All bridges are EDI types.





VA (Size)	Dimensions							Sq.Pin Dimensions	Mtg. Dim.			Mtg. Screw		Wgt
	L	W	H	A	B	C	D		M	N	P	Size	Qty	
20	2.25″ 57.2mm	1.87″ 47.6mm	1.62″ 41.3mm	0.400″ 10.2mm	0.400″ 10.2mm	1.460″ 37.1mm	0.200″ 5.1mm	0.038″ 0.97mm	1.50″ 38.1mm	– –	–	#4	2	0.90 lb 0.41 kg
30	2.62″ 66.7mm	2.18″ 55.5mm	1.56″ 39.7mm	0.550″ 13.9mm	0.275″ 7.0mm	1.680″ 42.7mm	0.275″ 7.0mm	0.045″ 1.14 mm	– –	1.75″ 44.5mm	2.18″ 55.4mm	#6	4	1.15 lbs 0.52 kg
56	3.00″ 76.2mm	2.50″ 63.5mm	1.81″ 46.0mm	0.600″ 15.2mm	0.300″ 7.6mm	1.900″ 48.3mm	0.300″ 7.6mm	0.045″ 1.14mm	– –	2.00″ 50.8mm	2.50″ 63.5mm	#6	4	1.70 lbs 0.77 kg

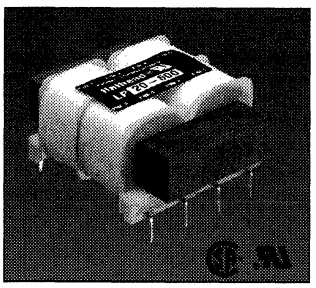
Signal Transformer

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Flathead™ Low Profile Transformers Printed Circuit Mount

BUY DIRECT
Tel: (516) 239 5777
FAX: (516) 239 7208

For Low Power and Critical Height Applications



Signal's LP transformers use hum-bucking (semi toroidal) construction that minimizes radiated magnetic fields. These transformers are ideal for critical low height pc board applications.

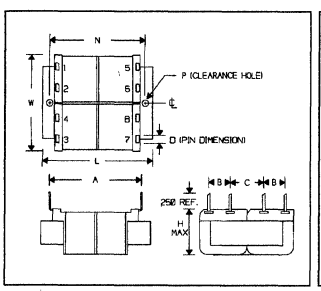
General Specifications

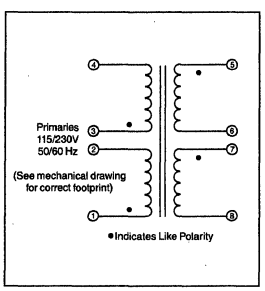
- **Power** – 2 VA to 48 VA
- **Dielectric Strength** – 1500VRMS Hipot
- **Primaries** – Dual primaries (115V/230V - 50/60 Hz)
- **Secondaries** – Series or parallel secondaries
- **Electrostatic Shield** – Not necessary, split bobbin construction
- **Magnetic Field** – Reduced magnetic radiation
- **Height** – .65 to 1.375 inches high
- **Insulation** – Class B insulation (130°C)

Agency Standards

- UL recognized to UL 506 (File #E63829)
- CSA certified to C22.2 #66 (File #LR 51265)

Part No.	VA (Size)	Secondary RMS Rating	
		Series	Parallel
LP-10-250	2	10VCT @ 250mA	5V @ 500mA
LP-10-600	6	10VCT @ 600mA	5V @ 1.2A
LP-10-1200	12	10VCT @ 1200mA	5V @ 2.4A
LP-10-2400	24	10VCT @ 2.40A	5V @ 4.80A
LP-10-4800	48	10VCT @ 4.80A	5V @ 9.60A
LP-12-200	2	12.6VCT @ 200mA	6.3V @ 400mA
LP-12-450	6	12.6VCT @ 450mA	6.3V @ 900mA
LP-12-900	12	12.6VCT @ 900mA	6.3V @ 1.8A
LP-12-1900	24	12.6VCT @ 1.90A	6.3V @ 3.80A
LP-12-3800	48	12.6VCT @ 3.80A	6.3V @ 7.60A
LP-16-150	2	16VCT @ 150mA	8V @ 300mA
LP-16-350	6	16VCT @ 350mA	8V @ 700mA
LP-16-700	12	16VCT @ 700mA	8V @ 1.4A
LP-16-1500	24	16VCT @ 1.50A	8V @ 3.00A
LP-16-3000	48	16VCT @ 3.00A	8V @ 6.00A
LP-20-125	2	20VCT @ 125mA	10V @ 250mA
LP-20-300	6	20VCT @ 300mA	10V @ 600mA
LP-20-600	12	20VCT @ 600mA	10V @ 1.2A
LP-20-1200	24	20VCT @ 1.20A	10V @ 2.40A
LP-20-2400	48	20VCT @ 2.40A	10V @ 4.80A
LP-24-100	2	24VCT @ 100mA	12V @ 200mA
LP-24-250	6	24VCT @ 250mA	12V @ 500mA
LP-24-500	12	24VCT @ 500mA	12V @ 1A
LP-24-1000	24	24VCT @ 1.00A	12V @ 2.00A
LP-24-2000	48	24VCT @ 2.00A	12V @ 4.00A
LP-30-85	2	30VCT @ 85mA	15V @ 170mA
LP-30-200	6	30VCT @ 200mA	15V @ 400mA
LP-30-400	12	30VCT @ 400mA	15V @ 800mA
LP-30-800	24	30VCT @ 800mA	15V @ 1.60A
LP-30-1600	48	30VCT @ 1.60A	15V @ 3.20A
LP-34-75	2	34VCT @ 75mA	17V @ 150mA
LP-34-170	6	34VCT @ 170mA	17V @ 340mA
LP-34-340	12	34VCT @ 340mA	17V @ 680mA
LP-34-700	24	34VCT @ 700mA	17V @ 1.40A
LP-34-1400	48	34VCT @ 1.40A	17V @ 2.80A
LP-40-60	2	40VCT @ 60mA	20V @ 120mA
LP-40-150	6	40VCT @ 150mA	20V @ 300mA
LP-40-300	12	40VCT @ 300mA	20V @ 600mA
LP-40-600	24	40VCT @ 600mA	20V @ 1.20A
LP-40-1200	48	40VCT @ 1.20A	20V @ 2.40A
LP-56-45	2	56VCT @ 45mA	28V @ 90mA
LP-56-100	6	56VCT @ 100mA	28V @ 200mA
LP-56-200	12	56VCT @ 200mA	28V @ 400mA
LP-56-425	24	56VCT @ 425mA	28V @ 850mA
LP-56-850	48	56VCT @ 850mA	28V @ 1.70A
LP-88-28	2	88VCT @ 28mA	44V @ 56mA
LP-88-65	6	88VCT @ 65mA	44V @ 130mA
LP-88-130	12	88VCT @ 130mA	44V @ 260mA
LP-120-20	2	120VCT @ 20mA	60V @ 40mA
LP-120-50	6	120VCT @ 50mA	60V @ 100mA
LP-120-100	12	120VCT @ 100mA	60V @ 200mA
LP-230-10	2	230VCT @ 10mA	115V @ 20mA
LP-230-25	6	230VCT @ 25mA	115V @ 50mA
LP-230-50	12	230VCT @ 50mA	115V @ 100mA





VA (Size)	A	B	C	L	W	H	N	D	P	Wgt
2	1.600″ 40.6mm	0.375″ 9.5mm	0.375″ 9.5mm	1.87″ 47.5mm	1.56″ 39.6mm	0.650″ 16.5mm	– –	.041 x .020″ 1.04 x 0.51mm	–	5 oz 0.14 kg
6	1.600″ 40.6mm	0.375″ 9.5mm	0.375″ 9.5mm	1.87″ 47.5mm	1.56″ 39.6mm	0.650″ 21.6mm	– –	.041 x .020″ 1.04 x 0.51mm	–	7 oz 0.20 kg
12	2.000″ 50.8mm	0.500″ 12.7mm	0.500″ 12.7mm	2.50″ 63.5mm	2.00″ 50.8mm	1.065″ 27.1mm	– –	.041 x .020″ 1.04 x 0.51mm	–	11 oz 0.31 kg
24	1.900″ 48.3mm	0.600″ 15.2mm	0.530″ 13.5mm	2.87″ 72.9mm	2.25″ 57.2mm	1.250″ 31.8mm	2.41″ 61.2mm	.041(SQ pin) 1.04SQmm	Clearance Hole for #4 Screw	15 oz 0.43 kg
48	2.180″ 55.4mm	0.600″ 15.2mm	0.660″ 16.8mm	3.12″ 79.2mm	2.50″ 63.5mm	1.375″ 34.9mm	2.62″ 66.5mm	.041(SQ pin) 1.04SQmm	Clearance Hole for #6 Screw	21 oz 0.60 kg

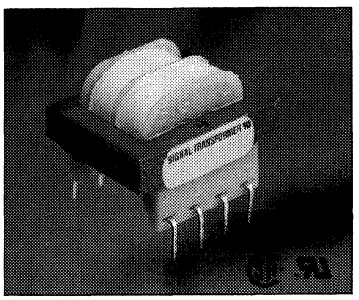
CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Signal Transformer

Split/Tran™ Low Power Transformers

BUY DIRECT
Tel: (516) 239-5777
FAX: (516) 239-7208

Printed Circuit Mount — Split Bobbin with High Isolation



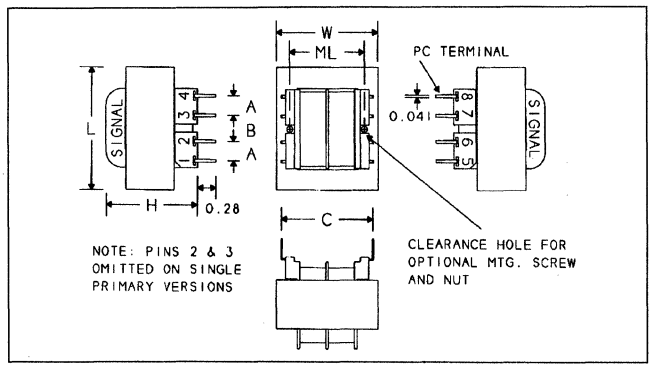
Signal's ST and DST transformers use a split bobbin that provides superior isolation and low capacitive coupling.

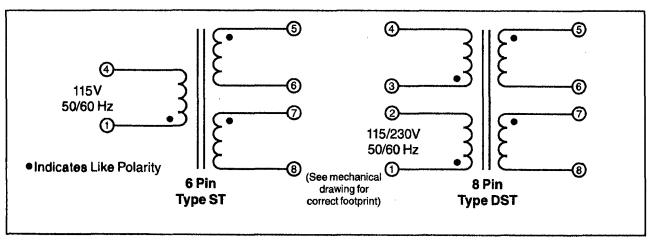
General Specifications

- **Power** – 1.1 VA to 36 VA
- **Dielectric Strength** – 2500VRMS Hipot
- **Primaries** – Single or dual primaries (115V or 115/230V - 50/60 Hz)
- **Secondaries** – Series or parallel secondaries
- **Electrostatic Shield** – Not necessary, split bobbin construction
- **Insulation** – Class B insulation (130°C)
- **Mounting Hardware** – See chart

Agency Standards

- UL recognized to UL 506 (File #E63829)
- CSA certified to C22.2 #66 (File #LR 51265)





Size	VA	L	W	H	ML	A	B	C	Optional Mtg. Screw & Nut*	Wgt
2	1.1	1.37″ 34.9mm	1.12″ 28.6mm	.93″ 23.8mm	— —	.250″ 6.4mm	.250″ 6.4mm	1.200″ 30.5mm	None	0.17 lb 0.08 kg
3	2.4	1.37″ 34.9mm	1.12″ 28.6mm	1.18″ 30.1mm	— —	.250″ 6.4mm	.250″ 6.4mm	1.200″ 30.5mm	None	0.25 lb 0.11 kg
4	6	1.62″ 41.3mm	1.31″ 33.3mm	1.31″ 33.3mm	1.06″ 26.9mm	.250″ 6.4mm	.350″ 8.9mm	1.280″ 32.5mm	4-40 x 1.37 Nylon 4-40 x 34.9mm	0.44 lb 0.20 kg
5	12	1.87″ 47.6mm	1.56″ 39.7mm	1.43″ 36.5mm	1.25″ 31.8mm	.300″ 7.6mm	.400″ 10.2mm	1.410″ 35.8mm	4-40 x 1.37 Nylon 4-40 x 34.9mm	0.70 lb 0.32 kg
6	20	2.25″ 57.2mm	1.87″ 47.6mm	1.43″ 36.5mm	1.50″ 38.1mm	.300″ 7.6mm	.400″ 10.2mm	1.600″ 40.6mm	4-40 x 1.37 Nylon 4-40 x 34.9mm	0.80 lb 0.36 kg
7	36	2.62″ 66.7mm	2.18″ 55.5mm	1.56″ 39.7mm	† †	.400 10.2mm	.400 10.2mm	1.850″ 47.0mm	† †	1.1 lbs 0.50 kg

*Available from Signal: Part No. ST-MS (Screw) & Part No. ST-MN (Nut).
† Size 7 has 4 mtg. holes on 2.18 x 1.75 centers for a #6 screw. Need not be nylon.

Part Number		Secondary RMS Rating	
Single 115V 6 Pin	Dual 115/230V 8 Pin	Series	Parallel
ST-2-10	DST-2-10	10VCT @ 0.11A	5V @ 0.22A
ST-3-10	DST-3-10	10VCT @ 0.25A	5V @ 0.5A
ST-4-10	DST-4-10	10VCT @ 0.6A	5A @ 1.2A
ST-5-10	DST-5-10	10VCT @ 1.2A	5V @ 2.4A
ST-6-10	DST-6-10	10VCT @ 2.0A	5V @ 4.0A
ST-7-10	DST-7-10	10VCT @ 3.6A	5V @ 7.2A
ST-2-12	DST-2-12	12.6VCT @ 0.09A	6.3V @ 0.18A
ST-3-12	DST-3-12	12.6VCT @ 0.2A	6.3V @ 0.4A
ST-4-12	DST-4-12	12.6VCT @ 0.5A	6.3V @ 1.0A
ST-5-12	DST-5-12	12.6VCT @ 1.0A	6.3V @ 2.0A
ST-6-12	DST-6-12	12.6VCT @ 1.6A	6.3V @ 3.2A
ST-7-12	DST-7-12	12.6VCT @ 2.85A	6.3V @ 5.7A
ST-2-16	DST-2-16	16VCT @ 0.07A	8V @ 0.14A
ST-3-16	DST-3-16	16VCT @ 0.15A	8V @ 0.3A
ST-4-16	DST-4-16	16VCT @ 0.4A	8V @ 0.8A
ST-5-16	DST-5-16	16VCT @ 0.8A	8V @ 1.6A
ST-6-16	DST-6-16	16VCT @ 1.25A	8V @ 2.5A
ST-7-16	DST-7-16	16VCT @ 2.25A	8V @ 4.5A
ST-2-20	DST-2-20	20VCT @ 0.055A	10V @ 0.11A
ST-3-20	DST-3-20	20VCT @ 0.12A	10V @ 0.24A
ST-4-20	DST-4-20	20VCT @ 0.3A	10V @ 0.6A
ST-5-20	DST-5-20	20VCT @ 0.6A	10V @ 1.2A
ST-6-20	DST-6-20	20VCT @ 1.0A	10V @ 2.0A
ST-7-20	DST-7-20	20VCT @ 1.8A	10V @ 3.6A
ST-2-24	DST-2-24	24VCT @ 0.045A	12V @ 0.09A
ST-3-24	DST-3-24	24VCT @ 0.1A	12V @ 0.2A
ST-4-24	DST-4-24	24VCT @ 0.25A	12V @ 0.5A
ST-5-24	DST-5-24	24VCT @ 0.5A	12V @ 1.0A
ST-6-24	DST-6-24	24VCT @ 0.8A	12V @ 1.6A
ST-7-24	DST-7-24	24VCT @ 1.5A	12V @ 3.0A
ST-2-28	DST-2-28	28VCT @ 0.04A	14V @ 0.08A
ST-3-28	DST-3-28	28VCT @ 0.085A	14V @ 0.17A
ST-4-28	DST-4-28	28VCT @ 0.2A	14V @ 0.4A
ST-5-28	DST-5-28	28VCT @ 0.42A	14V @ 0.84A
ST-6-28	DST-6-28	28VCT @ 0.7A	14V @ 1.4A
ST-7-28	DST-7-28	28VCT @ 1.3A	14V @ 2.6A
ST-2-36	DST-2-36	36VCT @ 0.03A	18V @ 0.06A
ST-3-36	DST-3-36	36VCT @ 0.065A	18V @ 0.13A
ST-4-36	DST-4-36	36VCT @ 0.17A	18V @ 0.34A
ST-5-36	DST-5-36	36VCT @ 0.35A	18V @ 0.7A
ST-6-36	DST-6-36	36VCT @ 0.55A	18V @ 1.1A
ST-7-36	DST-7-36	36VCT @ 1.0A	18V @ 2.0A
ST-2-48	DST-2-48	48VCT @ 0.023A	24V @ 0.046A
ST-3-48	DST-3-48	48VCT @ 0.05A	24V @ 0.1A
ST-4-48	DST-4-48	48VCT @ 0.125A	24V @ 0.25A
ST-5-48	DST-5-48	48VCT @ 0.25A	24V @ 0.5A
ST-6-48	DST-6-48	48VCT @ 0.4A	24V @ 0.8A
ST-7-48	DST-7-48	48VCT @ 0.75A	24V @ 1.5A
ST-2-56	DST-2-56	56VCT @ 0.02A	28V @ 0.04A
ST-3-56	DST-3-56	56VCT @ 0.045A	28V @ 0.09A
ST-4-56	DST-4-56	56VCT @ 0.11A	28V @ 0.22A
ST-5-56	DST-5-56	56VCT @ 0.22A	28V @ 0.44A
ST-6-56	DST-6-56	56VCT @ 0.35A	28V @ 0.7A
ST-7-56	DST-7-56	56VCT @ 0.65A	28V @ 1.3A
ST-2-120	DST-2-120	120VCT @ 0.01A	60V @ 0.02A
ST-3-120	DST-3-120	120VCT @ 0.02A	60V @ 0.04A
ST-4-120	DST-4-120	120VCT @ 0.05A	60V @ 0.1A
ST-5-120	DST-5-120	120VCT @ 0.1A	60V @ 0.2A
ST-6-120	DST-6-120	120VCT @ 0.16A	60V @ 0.32A
ST-7-120	DST-7-120	120VCT @ 0.3A	60V @ 0.6A

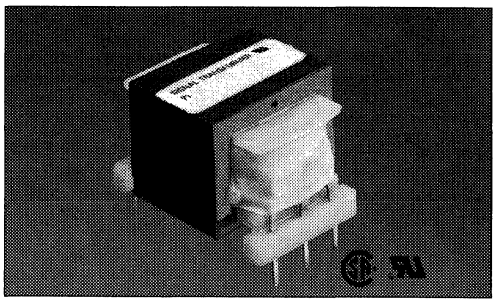
Signal Transformer

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Printed Circuit Power Transformers
Printed Circuit Mount

BUY DIRECT
24 HOUR
PHOTO
SUPPLY
Tel: (516) 239-5777
FAX: (516) 239-7208

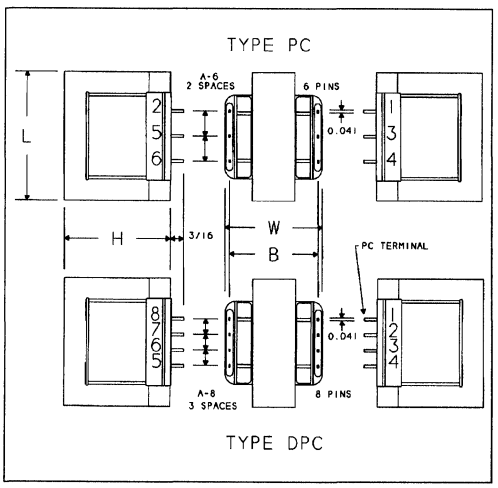
Miniature Low Power Transformers

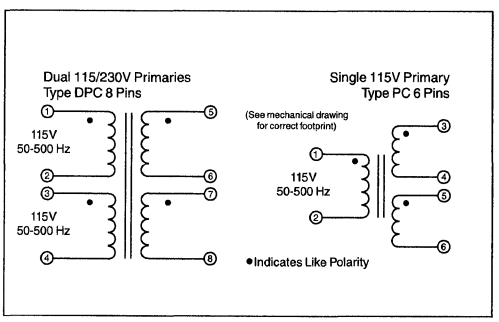


Signal's PC low power transformers are designed to operate between 50 and 500 Hz without any degradation in output voltage.

General Specifications
- **Power** – 1.0 VA to 24 VA
- **Dielectric Strength** – 1500VRMS Hipot
- **Primaries** – Single or dual primaries (115V or 115/230V - 50-500 Hz)
- **Secondaries** – Series or parallel secondaries
- **Insulation** – Class B insulation (130°C)
- **Mounting Brackets** – See chart

Agency Standards
- UL recognized to UL 506 (File #E63829)
- CSA certified to C22.2 #66 (File #LR 51265)





Primary 50/500 Hz		VA	Secondary RMS Rating	
Single 115V (6 Pin)	Dual 115/230V (8 Pin)	(Size)	Series	Parallel
PC-10-90	DPC-10-90	1.0	10VCT @ 90mA	5V @ 180mA
PC-10-120	DPC-10-120	1.2	10VCT @ 120mA	5V @ 240mA
PC-10-440	DPC-10-440	4.4	10VCT @ 440mA	5V @ 880mA
PC-10-1000	DPC-10-1000	10.0	10VCT @ 1.0A	5V @ 2.0A
PC-10-2400	DPC-10-2400	24.0	10VCT @ 2.4A	5V @ 4.8A
PC-12-70	DPC-12-70	1.0	12.6VCT @ 70mA	6.3V @ 140mA
PC-12-100	DPC-12-100	1.2	12.6VCT @ 100mA	6.3V @ 200mA
PC-12-350	DPC-12-350	4.4	12.6VCT @ 350mA	6.3V @ 700mA
PC-12-800	DPC-12-800	10.0	12.6VCT @ 800mA	6.3V @ 1.6A
PC-12-2000	DPC-12-2000	24.0	12.6VCT @ 2.0A	6.3V @ 4.0A
PC-16-55	DPC-16-55	1.0	16VCT @ 55mA	8V @110mA
PC-16-75	DPC-16-75	1.2	16VCT @ 75mA	8V @ 150mA
PC-16-260	DPC-16-260	4.4	16VCT @ 260mA	8V @ 520mA
PC-16-640	DPC-16-640	10.0	16VCT @ 640mA	8V @ 1.28A
PC-16-1500	DPC-16-1500	24.0	16VCT @ 1.50A	8V @ 3.0A
PC-20-45	DPC-20-45	1.0	20VCT @ 45mA	10V @ 90mA
PC-20-60	DPC-20-60	1.2	20VCT @ 60mA	10V @ 120mA
PC-20-220	DPC-20-220	4.4	20VCT @ 220mA	10V @ 440mA
PC-20-500	DPC-20-500	10.0	20VCT @ 500mA	10V @ 1.0A
PC-20-1200	DPC-20-1200	24.0	20VCT @ 1.20A	10V @ 2.40A
PC-24-35	DPC-24-35	1.0	24VCT @ 35mA	12V @ 70mA
PC-24-50	DPC-24-50	1.2	24VCT @ 50mA	12V @ 100mA
PC-24-180	DPC-24-180	4.4	24VCT @ 180mA	12V @ 360mA
PC-24-450	DPC-24-450	10.0	24VCT @ 450mA	12V @ 900mA
PC-24-1000	DPC-24-1000	24.0	24VCT @ 1.0A	12V @ 2.0A
PC-28-30	DPC-28-30	1.0	28VCT @ 30mA	14V @ 60mA
PC-28-40	DPC-28-40	1.2	28VCT @ 40mA	14V @ 80mA
PC-28-160	DPC-28-160	4.4	28VCT @ 160mA	14V @ 320mA
PC-28-360	DPC-28-360	10.0	28VCT @ 360mA	14V @ 720mA
PC-28-800	DPC-28-800	24.0	28VCT @ 800mA	14V @ 1.60A
PC-34-25	DPC-34-25	1.0	34VCT @ 25mA	17V @ 50mA
PC-34-35	DPC-34-35	1.2	34VCT @ 35mA	17V @ 70mA
PC-34-125	DPC-34-125	4.4	34VCT @ 125mA	17V @ 250mA
PC-34-300	DPC-34-300	10.0	34VCT @ 300mA	17V @ 600mA
PC-34-700	DPC-34-700	24.0	34VCT @ 700mA	17V @ 1.40A
PC-40-20	DPC-40-20	1.0	40VCT @ 20mA	20V @ 40mA
PC-40-30	DPC-40-30	1.2	40VCT @ 30mA	20V @ 60mA
PC-40-110	DPC-40-110	4.4	40VCT @ 110mA	20V @ 220mA
PC-40-250	DPC-40-250	10.0	40VCT @ 250mA	20V @ 500mA
PC-40-600	DPC-40-600	24.0	40VCT @ 600mA	20V @ 1.20A
PC-56-15	DPC-56-15	1.0	56VCT @ 15mA	28V @ 30mA
PC-56-20	DPC-56-20	1.2	56VCT @ 20mA	28V @ 40mA
PC-56-80	DPC-56-80	4.4	56VCT @ 80mA	28V @ 160mA
PC-56-180	DPC-56-180	10.0	56VCT @ 180mA	28V @ 360mA
PC-56-420	DPC-56-420	24.0	56VCT @ 420mA	28V @ 840mA
PC-120-8	DPC-120-8	1.0	120VCT @ 8mA	60V @ 16mA
PC-120-10	DPC-120-10	1.2	120VCT @ 10mA	60V @ 20mA
PC-120-35	DPC-120-35	4.4	120VCT @ 35mA	60V @ 70mA
PC-120-85	DPC-120-85	10.0	120VCT @ 85mA	60V @ 170mA
PC-120-200	DPC-120-200	24.0	120VCT @ 200mA	60V @ 400mA

See Table EEM page A-2375 for method of determining RMS secondary current ratings.

VA (Size)	L	W	H	A-6 (6 Pin)	A-8 (8 Pin)	B	Wgt	OPTIONAL BRACKET* No.	MW	MD
1.0	1.00″ 25.4mm	1.37″ 34.92mm	0.83″ 21.08mm	0.250″ 6.35mm	0.200″ 5.08mm	1.230″ 31.2mm	2.5 oz 0.07 kg	– –	– –	– –
1.2	1.37″ 34.9mm	1.12″ 28.6mm	1.18″ 30.15mm	0.312″ 7.92mm	0.200″ 5.08mm	1.030″ 26.2mm	3 oz 0.08 kg	– –	– –	– –
4.4	1.62″ 41.3mm	1.25″ 31.8mm	1.37″ 34.92mm	0.400″ 10.16mm	0.250″ 6.35mm	1.130″ 28.7mm	5 oz 0.14 kg	– –	– –	– –
10.0	1.87″ 47.6mm	1.43″ 36.5mm	1.62″ 41.27mm	0.400″ 10.16mm	0.250″ 6.35mm	1.330″ 33.7mm	9 oz 0.23 kg	10-BR	1.64″ 41.7mm	1.12″ 28.6mm
24.0	1.62″ 41.3mm	2.25″ 57.2mm	1.37″ 34.93mm	0.400″ 10.16mm	0.250″ 6.35mm	2.130″ 54.1mm	12 oz 0.34 kg	24-BR	1.37″ 34.9mm	2.00″ 50.8mm

*An optional "Slide On" Mounting Bracket is available for sizes 10 & 24. The brackets do not use up any extra "Floor Space" but add 1/32″ to the height of the transformer.

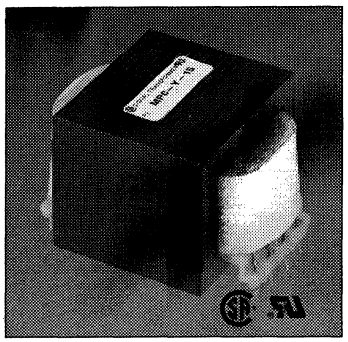
CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Signal Transformer

Printed Circuit Triple Output Transformers
Printed Circuit Mount

BUY DIRECT
Tel: (516) 239-5777
FAX: (516) 239-7208

For 5 VDC and ±12 VDC or ±15 VDC Regulated Power Supplies



Signal's MPC, DMPC and MPL transformers have all of the performance features of our PC and LP series.

MPC and DMPC Series

General Specifications

- **Power** – 10 VA and 24 VA
- **Dielectric Strength** – 1500VRMS Hipot
- **Primaries** – Single or dual primaries (115V or 115/230V nominal - 50-500 Hz) Input range (100V to 130V or 200V to 260V - 50/60 Hz)
- **Secondaries** – Dual complementary outputs (5 VDC with ±12 VDC or 5 VDC with ±15 VDC)
- **Insulation** – Class B insulation (130°C)
- **Brackets** – Available for 10 & 24 VA sizes (PN 10-BR & 24-BR)

Agency Standards

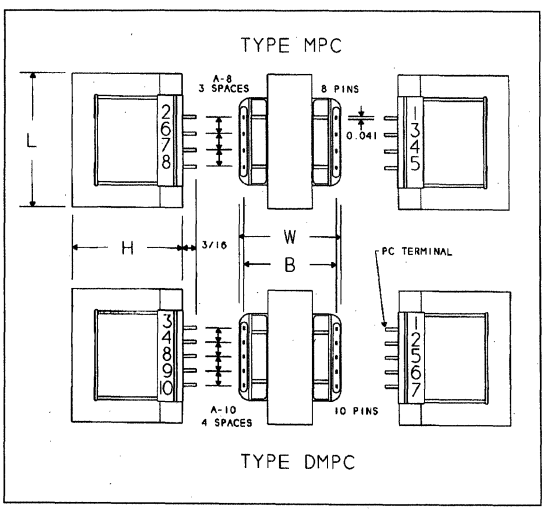
- UL recognized to UL 506 (File #E63829)
- CSA certified to C22.2 #66 (File #LR 51265)

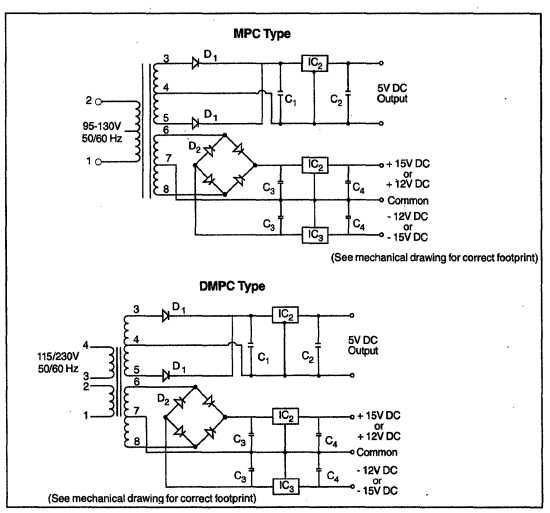
MPC & DMPC TYPES

Part Number Primary 50/60 Hz		DC Output		Size	Suggested Components							
115V (8 Pin)	115/230V (10) Pin	Regulator I	Regulator II		C_1	C_2	C_3	C_4	D_1(2)	D_2(4)	IC_1*	IC_2*
MPC-X-12	DMPC-X-12	5 VDC 360mA	±12 VDC 60mA	X	2100MFD 30V	2.7MFD 20V	250MFD 50V	10MFD 20V	1N4001	1N4002	LM341P-5.0	LM326N
MPC-X-15	DMPC-X-15	5 VDC 360mA	±15 VDC 50mA	X	2100MFD 30V	2.7MFD 20V	250MFD 50V	10MFD 20V	1N4001	1N4002	LM341P-5.0	LM325N
MPC-Y-12	DMPC-Y-12	5 VDC 835mA	±12 VDC 150mA	Y	4000MFD 20V	2.7MFD 20V	1000MFD 50V	2.7MFD 20V	1N4001	1N4002	LM340K-5.0	LM326N
MPC-Y-15	DMPC-Y-15	5 VDC 835mA	±15 VDC 130mA	Y	4000MFD 20V	2.7MFD 20V	1000MFD 50V	2.7MFD 20V	1N4001	1N4002	LM340K-5.0	LM325N

*National Semiconductor

(Size)	L	W	H	A-8 (8 Pin)	A-10 (10 Pin)	B	Wgt	Optional Bracket No.	MW	MD
X	1.87″ 47.6mm	1.43″ 36.5mm	1.62″ 41.3mm	.250″ 6.4mm	.200″ 5.1mm	1.300″ 33.0mm	.56 lbs .25 kg	10-BR	1.64″ 41.6mm	1.12″ 28.6mm
Y	1.62″ 41.3mm	2.25″ 57.2mm	1.37″ 34.9mm	.250″ 6.4mm	.200″ 5.1mm	2.100″ 53.3mm	.75 lbs 34 kg	24-BR	1.37″ 34.9mm	2.00 50.8mm





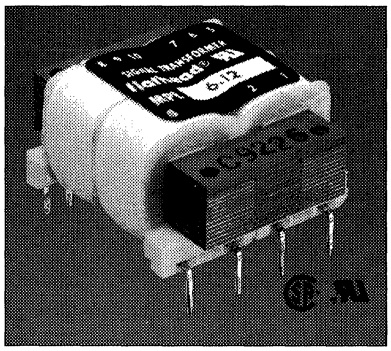
Signal Transformer

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Printed Circuit Triple Output Transformers
Low Profile Printed Circuit Mount

BUY DIRECT
Tel: (516) 239-5777
FAX: (516) 239-7208

For 5 VDC and ±12 VDC or ±15 VDC Regulated Power Supplies



MPL Series

General Specifications

- **Power** – 6 VA and 12 VA
- **Dielectric Strength** – 1500VRMS Hipot
- **Primaries** – Dual primaries (115/230V nominal - 50/60 Hz)
  Input range (100V to 130V or 200V to 260V - 50/60 Hz)
- **Secondaries** – Dual complementary outputs (5 VDC with ±12 VDC or 5 VDC with ±15 VDC)
- **Electrostatic Shield** – Not necessary, split bobbin construction
- **Magnetic Field** – Reduced magnetic radiation
- **Height** – .85 and 1.065 inches high
- **Insulation** – Class B insulation (130°C)

Agency Standards

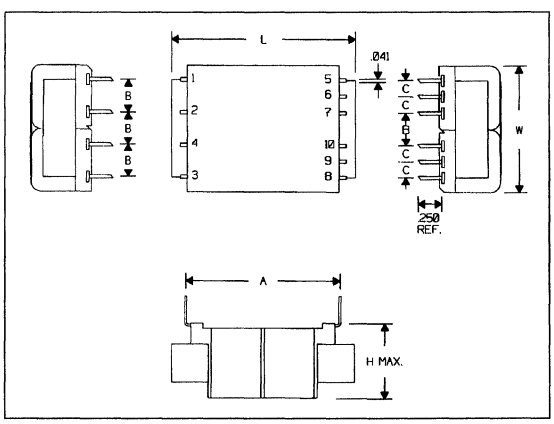
- UL recognized to UL 506 (File #E63829)
- CSA certified to C22.2 #66 (File #LR 51265)

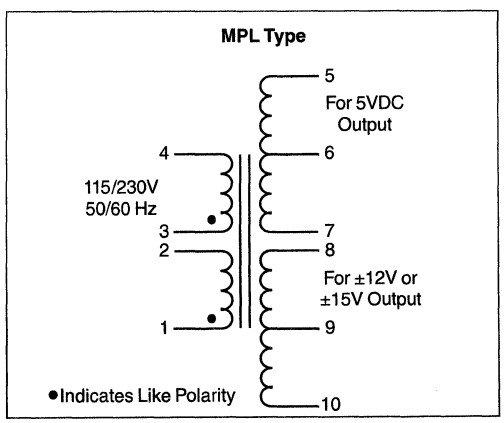
MPL TYPES (Dual 115/230V Primary is Standard)

Part Number Primary 50/60 Hz	DC Output		VA (Size)	Suggested Components							
	Regulator I	Regulator II		C_1	C_2	C_3	C_4	D_1(2)	D_2(4)	IC_1*	IC_2*
MPL-6-12	5 VDC 135mA	±12 VDC 40mA	6	1000MFD 20V	2.7MFD 20V	150MFD 50V	10MFD 20V	1N4001	1N4002	LM342P-5.0	LM326N
MPL-6-15	5 VDC 135mA	±15 VDC 35mA	6	1000MFD 20V	2.7MFD 20V	150MFD 50V	10MFD 20V	1N4001	1N4002	LM342P-5.0	LM325N
MPL-12-12	5 VDC 270mA	±12 VDC 85mA	12	2100MFD 30V	2.7MFD 20V	250MFD 50V	10MFD 20V	1N4001	1N4002	LM341P-5.0	LM326N
MPL-12-15	5 VDC 270mA	±15 VDC 70mA	12	2100MFD 30V	2.7MFD 20V	250MFD 50V	10MFD 20V	1N4001	1N4002	LM341P-5.0	LM325N

*National Semiconductor

VA (Size)	L	W	H	A	B	C	Wgt
6	1.87″ 47.6mm	1.56″ 39.7mm	0.850″ 21.6mm	1.600″ 40.6mm	0.375″ 9.5mm	0.187″ 4.7mm	0.43 lb 0.20 kg
12	2.50″ 63.5mm	2.00″ 50.8mm	1.065″ 27.1mm	2.000″ 50.8mm	0.500″ 12.7mm	0.250″ 6.4mm	0.68 lb 0.31kg





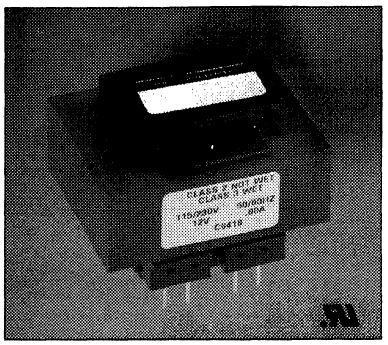
CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Signal Transformer

Class 2 Transformers Printed Circuit

BUY DIRECT
Tel: (516) 239-5777
FAX: (516) 239-7208

Inherently or Non-inherently Limited



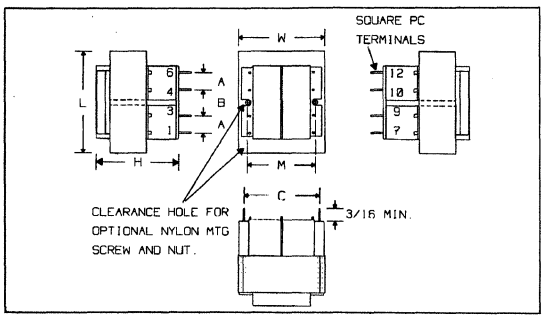
Signal's CL2 transformers are available in printed circuit and chassis mount versions. They are supplied as inherently or non-inherently limited units that are UL 1585 recognized.

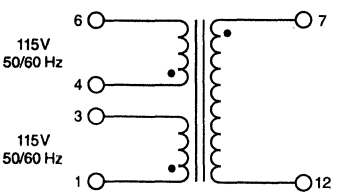
General Specifications

- **Power** – 2.5 VA to 50 VA
- **Dielectric Strength** – 4000VRMS Hipot
- **Primaries** – Dual primaries (115/230V - 50/60 Hz)
- **Secondary** – Single secondary
- **Class 2 Rating** – Inherently or non-inherently limited
  See secondary fuse requirements in tables below
- **Electrostatic Shield** – Not necessary, split or dual bobbin construction
- **Insulation** – Class F insulation (155°C)
- **Flammability Rating** – Bobbin and shroud material meet UL 94V0

Agency Standards

- UL recognized to UL 1585 Class 2 (File #E116583)





Primaries are designed to be used simultaneously. That is, they must be used either series or parallel connected (as one winding).

(See mechanical drawing for correct footprint)

Part No.	Secondary RMS Rating	Secondary Fuse Reqd.
CL2-2.5-12	12V @ .20A	N/A*
CL2-2.5-24	24V @ .10A	N/A*
CL2-5.0-12	12V @ .42A	N/A*
CL2-5.0-24	24V @ .20A	N/A*
CL2-10-12	12V @ .83A	N/A*
CL2-10-24	24V @ .42A	N/A*
CL2-20-12	12V @ 1.66A	N/A*
CL2-20-24	24V @ .833A	N/A*
CL2-30-12	12V @ 2.50A	3.0A**
CL2-30-24	24V @ 1.25A	1.75A**
CL2-50-12	12V @ 4.20A	5.0A**
CL2-50-24	24V @ 2.10A	2.5A**

* Inherently limited
** Non-inherently limited
Maximum secondary fuse value specified
All primaries are 115/230 volt 50/60 Hz

VA (Size)	Dimensions L	W	H	A	B	C	Sq. Pin Dimension	Mtg. Dim. M	N	P	Mtg. Screw Size	Qty	Wgt
2.5	1.62″ 41.3mm	1.31″ 33.3mm	1.12″ 28.6mm	.200″ 5.1mm	.250″ 6.4mm	1.000″ 25.4mm	0.025″ 0.64mm	1.06″ 26.9mm	– –	– –	#4	2	0.25 lb 0.11 kg
5.0	1.62″ 41.3mm	1.31″ 33.3mm	1.37″ 34.9mm	.200″ 5.1mm	.400″ 10.2mm	1.000″ 25.4mm	0.025″ 0.64mm	1.06″ 26.9mm	– –	– –	#4	2	0.37 lb 0.17 kg
10.0	1.87″ 47.6mm	1.56″ 39.7mm	1.37″ 34.9mm	.200″ 5.1mm	.400″ 10.2mm	1.140″ 29.0mm	0.038″ 0.97mm	1.25″ 31.8mm	– –	– –	#4	2	0.53 lb 0.24 kg
20.0	2.25″ 57.2mm	1.87″ 47.6mm	1.62″ 41.3mm	.400″ 10.2mm	.400″ 10.2mm	1.460″ 37.1mm	0.038″ 0.97mm	1.50″ 38.1mm	– –	– –	#4	2	0.90 lb 0.41 kg
30.0	2.62″ 66.7mm	2.18″ 55.5mm	1.56″ 39.7mm	.550″ 14.0mm	.275″ 7.0mm	1.680″ 42.7mm	0.045″ 1.14mm	– –	1.75″ 44.5mm	2.18″ 55.5mm	#6	4	1.15 lbs 0.52 kg
50.0	3.00″ 76.2mm	2.50″ 63.5mm	1.81″ 46.0mm	.600″ 15.2mm	.300″ 7.6mm	1.900″ 48.3mm	0.045″ 1.14mm	– –	2.00″ 50.8mm	2.50″ 63.5mm	#6	4	1.70 lb 0.77 kg

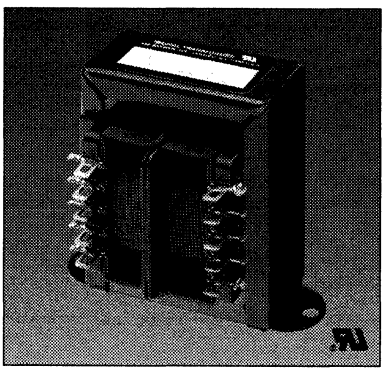
Signal Transformer

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Class 2 Transformers Chassis Mount

BUY DIRECT
Tel: (516) 239-5777
FAX: (516) 239-7208

Inherently or Non-inherently Limited



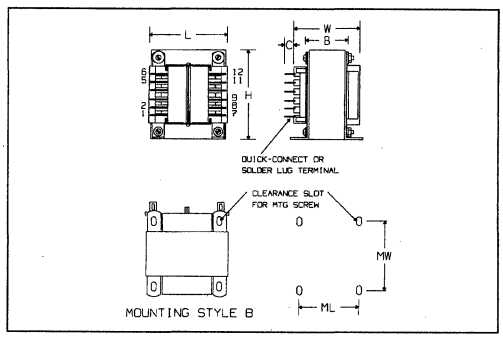
Signal's CL2 transformers are available in printed circuit and chassis mount versions. They are supplied as inherently or non-inherently limited units that are UL 1585 recognized.

General Specifications

- **Power** – 25 VA to 80 VA
- **Dielectric Strength** – 4000VRMS Hipot
- **Primaries** – Dual primaries (115/230V - 50/60 Hz)
- **Secondary** – Single secondary
- **Class 2 Rating** – Inherently or non-inherently limited
  See secondary fuse requirements in tables below
- **Electrostatic Shield** – Not necessary, split or dual bobbin construction
- **Terminals** – Solder lug / quick-connect type terminals
- **Insulation** – Class F insulation (155°C)
- **Flammability Rating** – Bobbin and shroud material meet UL 94V0

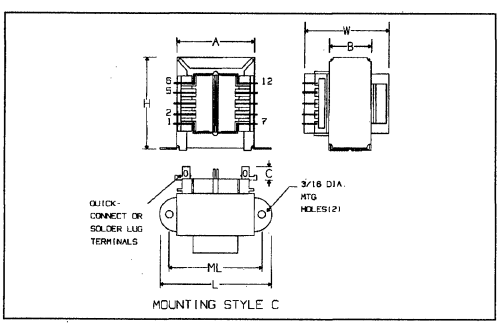
Agency Standards

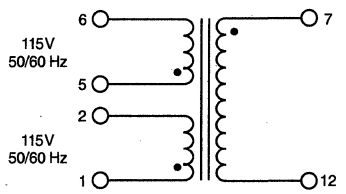
- UL recognized to UL 1585 Class 2 (File #E116583)



Part No.	Secondary RMS Rating	Secondary Fuse Reqd.
CL2-25-12	12V @ 2.10A	2.5A**
CL2-25-24	24V @ 1.05A	1.5A**
CL2-40-12	12V @ 3.33A	4.0A**
CL2-40-24	24V @ 1.66A	2.0A**
CL2-80-24	24V @ 3.33A	3.5A**

* Inherently limited
** Non-inherently limited
Maximum secondary fuse value specified
All primaries are 115/230 volt 50/60 Hz





Primaries are designed to be used simultaneously. That is, they must be used either series or parallel connected (as one winding).

•Indicates Like Polarity

VA (Size)	Dimensions L	W	H	A	B	C	Terminals	Mtg. Style	Mtg. Dim. ML	MW	Mtg. Screw	Wgt
25	2.81″ 71.4mm	1.87″ 47.6mm	2.31″ 58.7mm	2.00″ 50.8mm	1.12″ 28.6mm	.31″ 7.92mm	.187″ 4.75mm	C	2.37″ 60.3mm	— —	#6	1.25 lbs 0.57kg
40	3.12″ 79.4mm	2.06″ 52.3mm	2.68″ 68.2mm	2.25″ 57.2mm	1.12″ 28.6mm	.31″ 7.92mm	.187″ 4.75mm	C	2.81″ 71.4mm	— —	#6	1.6 lbs 0.73 kg
80	2.50″ 63.5mm	2.37″ 60.3mm	3.00″ 76.2mm	— —	1.37″ 34.9mm	.31″ 7.92mm	.187″ 4.75mm	B	2.00″ 50.8mm	2.18″ 55.5mm	#6	2.8 lbs 1.27 kg

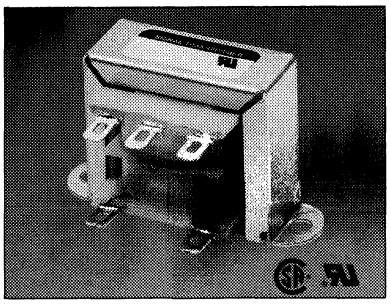
CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Signal Transformer

Two-4-One™ Power Transformers Chassis Mount

BUY DIRECT
Tel: (516) 239-5777
FAX: (516) 239-7208

Split Bobbin with High Isolation



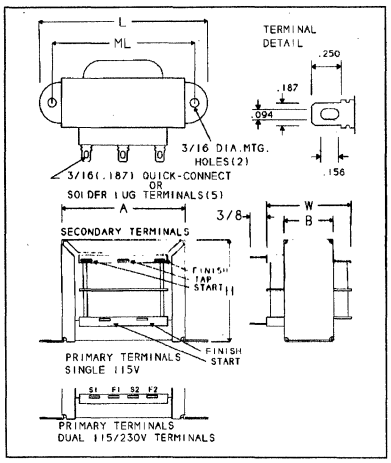
Signal's 241 transformers use a split bobbin that provides superior isolation and low capacitive coupling.

General Specifications

- **Power** – 2.4 VA to 100 VA
- **Dielectric Strength** – 2500VRMS Hipot
- **Primaries** – Single or dual primaries (115V or 115/230V - 50/60 Hz)
- **Secondary** – Single center tapped secondary
- **Electrostatic Shield** – Not necessary, split bobbin construction
- **Terminals** – Solder lug / quick-connect type terminals
- **Insulation** – Class B insulation (130°C)

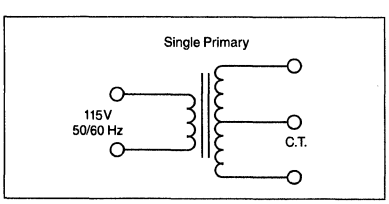
Agency Standards

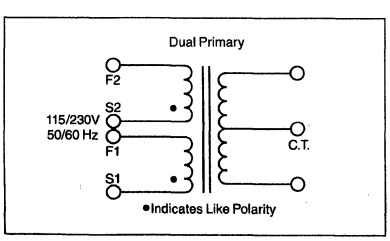
- UL recognized to UL 506 (File #E63829)
- CSA certified to C22.2 #66 (File #LR 51265)



Part Number Single 115V	Part Number Dual 115/230V	Secondary RMS Rating	Part Number Single 115V	Part Number Dual 115/230V	Secondary RMS Rating
241-3-10	Not Available	10VCT @ 0.25A	241-3-28	Not Available	28VCT @ 0.085A
241-4-10	DP-241-4-10	10VCT @ 0.60A	241-4-28	DP-241-4-28	28VCT @ 0.20A
241-5-10	DP-241-5-10	10VCT @ 1.2A	241-5-28	DP-241-5-28	28VCT @ 0.42A
241-6-10	DP-241-6-10	10VCT @ 3.0A	241-6-28	DP-241-6-28	28VCT @ 1.1A
241-7-10	DP-241-7-10	10VCT @ 5.0A	241-7-28	DP-241-7-28	28VCT @ 2.0A
241-8-10	DP-241-8-10	10VCT @ 10A	241-8-28	DP-241-8-28	28VCT @ 3.6A
241-3-12	Not Available	12.6VCT @ 0.20A	241-3-36	Not Available	36VCT @ 0.065A
241-4-12	DP-241-4-12	12.6VCT @ 0.60A	241-4-36	DP-241-4-36	36VCT @ 0.17A
241-5-12	DP-241-5-12	12.6VCT @ 1.0A	241-5-36	DP-241-5-36	36VCT @ 0.35A
241-6-12	DP-241-6-12	12.6VCT @ 2.5A	241-6-36	DP-241-6-36	36VCT @ 0.85A
241-7-12	DP-241-7-12	12.6VCT @ 4.0A	241-7-36	DP-241-7-36	36VCT @ 1.5A
241-8-12	DP-241-8-12	12.6VCT @ 8.0A	241-8-36	DP-241-8-36	36VCT @ 2.8A
241-3-16	Not Available	16VCT @ 0.15A	241-3-48	Not Available	48VCT @ 0.05A
241-4-16	DP-241-4-16	16VCT @ 0.40A	241-4-48	DP-241-4-48	48VCT @ 0.125A
241-5-16	DP-241-5-16	16VCT @ 0.80A	241-5-48	DP-241-5-48	48VCT @ 0.25A
241-6-16	DP-241-6-16	16VCT @ 2.0A	241-6-48	DP-241-6-48	48VCT @ 0.63A
241-7-16	DP-241-7-16	16VCT @ 3.5A	241-7-48	DP-241-7-48	48VCT @ 1.2A
241-8-16	DP-241-8-16	16VCT @ 6.25A	241-8-48	DP-241-8-48	48VCT @ 2.0A
241-3-20	Not Available	20VCT @ 0.12A	241-3-56	Not Available	56VCT @ 0.045A
241-4-20	DP-241-4-20	20VCT @ 0.30A	241-4-56	DP-241-4-56	56VCT @ 0.11A
241-5-20	DP-241-5-20	20VCT @ 0.60A	241-5-56	DP-241-5-56	56VCT @ 0.22A
241-6-20	DP-241-6-20	20VCT @ 1.5A	241-6-56	DP-241-6-56	56VCT @ 0.54A
241-7-20	DP-241-7-20	20VCT @ 2.8A	241-7-56	DP-241-7-56	56VCT @ 1.00A
241-8-20	DP-241-8-20	20VCT @ 5.0A	241-8-56	DP-241-8-56	56VCT @ 1.8A
241-3-24	Not Available	24VCT @ 0.10A	241-3-120	Not Available	120VCT @ 0.02A
241-4-24	DP-241-4-24	24VCT @ 0.25A	241-4-120	DP-241-4-120	120VCT @ 0.05A
241-5-24	DP-241-5-24	24VCT @ 0.50A	241-5-120	DP-241-5-120	120VCT @ 0.10A
241-6-24	DP-241-6-24	24VCT @ 1.25A	241-6-120	DP-241-6-120	120VCT @ 0.25A
241-7-24	DP-241-7-24	24VCT @ 2.4A	241-7-120	DP-241-7-120	120VCT @ 0.50A
241-8-24	DP-241-8-24	24VCT @ 4.0A	241-8-120	DP-241-8-120	120VCT @ 0.85A

See Signal Catalog page 38 or EEM page A-2375 for method of determining RMS secondary current ratings.





Dimensions Size	VA	L	W	H	A	B	ML	Wgt
3	2.4	2.06″ 52.3mm	1.06″ 26.9mm	1.18″ 30.1mm	1.62″ 41.3mm	0.56″ 14.3mm	1.75″ 44.5mm	0.25 lb 0.11 kg
4	6	2.37″ 60.3mm	1.25″ 31.8mm	1.37″ 34.9mm	1.68″ 42.6mm	0.68″ 17.4mm	2.00″ 50.8mm	0.44 lb 0.20 kg
5	12	2.81″ 71.4mm	1.37″ 34.9mm	1.62″ 41.3mm	1.93″ 49.2mm	0.81″ 20.6mm	2.37″ 60.3mm	0.7 lb 0.32 kg
6	30	3.25″ 82.6mm	1.68″ 42.8mm	1.93″ 49.2mm	2.31″ 58.7mm	1.06″ 26.9mm	2.81″ 71.4mm	1.1 lbs 0.50 kg
7	56	3.68″ 93.7mm	1.81″ 46.0mm	2.25″ 57.2mm	2.68″ 68.2mm	1.06″ 26.9mm	3.12″ 79.4mm	1.7 lbs 0.77 kg
8	100	4.03″ 102.4mm	2.25″ 57.2mm	2.56″ 65.1mm	3.06″ 77.7mm	1.31″ 33.3mm	3.56″ 90.5mm	2.75 lbs 1.25 kg

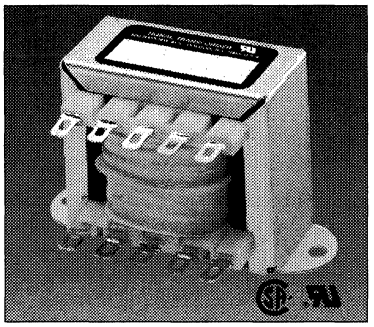
Signal Transformer

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Two-4-One™ Triple Output Transformers • Chassis Mount

BUY DIRECT
24 HOUR
Tel: (516) 239-5777
FAX: (516) 239-7208

For 5 VDC and ±12 VDC or ±15 VDC Regulated Power Supplies



Signal's MT and DMT transformers have all of the performance features of our 241 series.

General Specifications

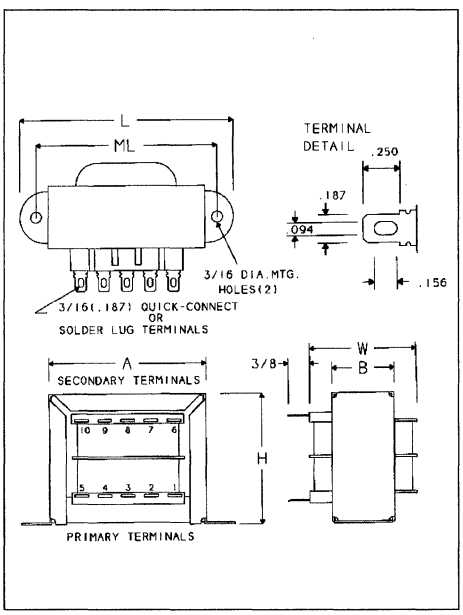
- **Power** – 30 VA, 56 VA, and 100 VA
- **Dielectric Strength** – 2500VRMS Hipot
- **Primaries** – Single or dual primaries (115V or 115/230V nominal - 50/60Hz) Input range (100V to 130V or 200V to 260V - 50/60 Hz)
- **Secondaries** – Dual complementary outputs (5 VDC with ±12 VDC or 5 VDC with ±15 VDC
- **Electrostatic Shield** – Not necessary, split bobbin construction
- **Terminals** – Solder lug / quick-connect type terminals
- **Insulation** – Class B insulation (130°C)

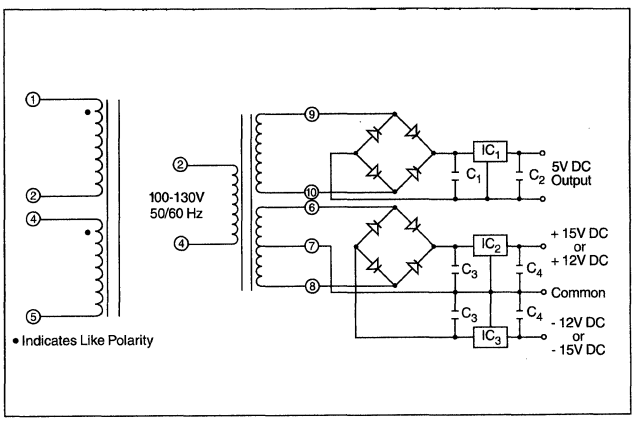
Agency Standards

- UL recognized to UL 506 (File #E63829)
- CSA certified to C22.2 #66 (File # LR 51265)

Part Number Primary 50/60 Hz		DC Output		Size	Suggested Components						C_2 C_4 See Note ①
115V	115/230V	Regulator I	Regulator II		C_1	C_3	$IC_1$③	$IC_2$③	$IC_3$③	D1④	D2④
MT-6-12	DMT-6-12	5V @ 1.75A	±12V @ 210mA	6	10 KMFD	1.5 KMFD	LM-323K-5	LM-340K-12	LM-320K-12	3N253	3N247
MT-6-15	DMT-6-15	5V @ 1.75A	±15V @ 175mA	6	@ 20 VDC	@ 50 VDC	LM-323K-5	LM-340K-15	LM-320K-15	3N253	3N247
MT-7-12	DMT-7-12	5V @ 2.8A	±12V @ 350mA	7	15 KMFD	2 KMFD	LM-323K-5	LM-340K-12	LM-320K-12	MDA-400	3N247
MT-7-15	DMT-7-15	5V @ 2.8A	±15V @ 280mA	7	@ 20 VDC	@ 50 VDC	LM-323K-5	LM-340K-15	LM-320K-15	MDA-400	3N247
MT-8-12	DMT-8-12	5V @ 4A	±12V @ 600mA	8	26 KMFD	3.1 KMFD	LM-338②	LM-340K-12	LM-320K-12	MDA-800	3N247
MT-8-15	DMT-8-15	5V @ 4A	±15V @ 500mA	8	@ 20 VDC	@ 50 VDC	LM-338②	LM-340K-15	LM-320K-15	MDA-800	3N247

Note ①: Output capacitors C_2 and C_4 are required to stabilize regulators. Values can be 1MFD min. tantalum or 10MFD min. electrolytic, 20 V min.
Note ②: LM-338 is an adjustable regulator and MFR's specifications (National Semiconductor) should be consulted for values of external components.
Note ③: All ICs are National Semiconductor types.
Note ④: All diodes are Motorola types.





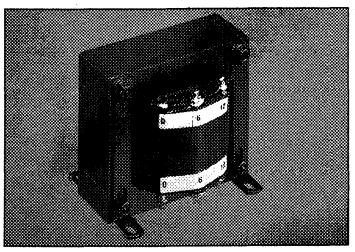
Dimensions							
VA (Size)	L	W	H	A	B	ML	Wgt
6	3.25″ 82.6mm	1.75″ 44.5mm	1.93″ 49.2mm	2.31″ 58.7mm	1.06″ 26.9mm	2.81″ 71.4mm	1.1 lbs 0.50 kg
7	3.68″ 93.6mm	1.81″ 46.0mm	2.25″ 57.2mm	2.68″ 68.2mm	1.06″ 26.9mm	3.12″ 79.4mm	1.7 lbs 0.77 kg
8	4.03″ 102.4mm	2.25″ 57.2mm	2.56″ 65.1mm	3.06″ 77.7mm	1.31″ 33.3mm	3.56″ 90.5mm	2.75 lbs 1.25 kg

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Signal Transformer

Conventional Rectifier Power Transformers • Chassis Mount

BUY DIRECT
PROTO
Tel: (516) 239-5777
FAX: (516) 239-7208



Signal's rectifier power transformers provide a wide variety of outputs. This series of conservatively designed transformers are manufactured using traditional materials and layer wound techniques.

General Specifications

- **Power** – 10 VA to 2800 VA
- **Dielectric Strength** – 1500VRMS Hipot
- **Primaries** – Single, tapped, or dual primaries (105V, 115V, 125V, 230V - 50-500 Hz)
- **Secondaries** – Center-tapped series or center-tapped parallel secondaries
- **Insulation** – Class A insulation (105°C)

Primary 50/60 HZ		Secondary RMS Rating		Mtg. Style	L	W	H	ML	MW	Mtg. Screw	Wgt
Single 115V	Dual* 115/230V	Series	Parallel								
10-1	DL-10-1	10VCT @ 1A	5VCT @ 2A	C	2.87″ 73.0mm	1.75″ 44.5mm	2.31″ 58.7mm	2.37″ 60.3mm	– –	#8	1.0 lb .45 kg
10-2	DL-10-2	10VCT @ 2A	5VCT @ 4A	C	3.12″ 79.4mm	2.12″ 53.9mm	2.75″ 69.9mm	2.81″ 71.4mm	– –	#8	1.5 lbs .68 kg
10-4	DL-10-4	10VCT @ 4A	5VCT @ 8A	C	3.56″ 90.5mm	2.37″ 60.3mm	3.06″ 77.7mm	3.12″ 79.4mm	– –	#8	2.3 lbs 1.04 kg
10-6	DL-10-6	10VCT @ 6A	5VCT @ 12A	B	3.37″ 85.7mm	2.75″ 69.9mm	2.81″ 71.4mm	2.81″ 71.4mm	2.12″ 53.9mm	#8	3.3 lbs 1.50 kg
10-8	DL-10-8	10VCT @ 8A	5VCT @ 16A	B	3.37″ 85.7mm	3.12″ 79.4mm	2.81″ 71.4mm	2.81″ 71.4mm	2.50″ 63.5mm	#8	4.0 lbs 1.81 kg
10-12	DL-10-12	10VCT @ 12A	5VCT @ 24A	B	3.75″ 95.3mm	3.25″ 82.6mm	3.12″ 79.4mm	3.12″ 79.4mm	2.50″ 63.5mm	#8	5.0 lbs 2.27 kg
10-25	DL-10-25	10VCT @ 25A	5VCT @ 50A	B	4.50″ 114.3mm	3.75″ 95.3mm	3.75″ 95.3mm	3.75″ 95.3mm	2.75″ 69.9mm	#10	8.7 lbs 3.95 kg
10-50‡	DL-10-50	10VCT @ 50A	5VCT @ 100A	B	5.25″ 133.4mm	5.50″ 139.7mm	4.37″ 111.1mm	4.37″ 111.1mm	3.62″ 92.1mm	1/4	17.0 lbs 7.71 kg
10-100‡	DL-10-100	10VCT @ 100A	5VCT @ 200A	B	6.37″ 162.0mm	7.25″ 184.2mm	5.31″ 134.9mm	5.31″ 134.9mm	4.37″ 111.1mm	1/4	34.5 lbs 15.65 kg
12.8-1	DL-12.8-1	12.8VCT @ 1A	6.4VCT @ 2A	C	2.87″ 73.0mm	2.00″ 50.8mm	2.31″ 58.7mm	2.37″ 60.3mm	– –	#8	1.2 lbs .54 kg
12.8-2	DL-12.8-2	12.8VCT @ 2A	6.4VCT @ 4A	B	3.00″ 76.2mm	2.50″ 63.5mm	2.50″ 63.5mm	2.50″ 63.5mm	2.00″ 50.8mm	#8	2.3 lbs 1.04 kg
12.8-4	DL-12.8-4	12.8VCT @ 4A	6.4VCT @ 8A	B	3.00″ 76.2mm	2.87″ 73.0mm	2.50″ 63.5mm	2.50″ 63.5mm	2.37″ 60.3mm	#8	2.8 lbs 1.27 kg
12.8-6	DL-12.8-6	12.8VCT @ 6A	6.4VCT @ 12A	B	3.37″ 85.7mm	3.06″ 77.7mm	2.81″ 71.4mm	2.81″ 71.4mm	2.50″ 63.5mm	#8	4.0 lbs 1.81 kg
12.8-8	DL-12.8-8	12.8VCT @ 8A	6.4VCT @ 16A	B	3.75″ 95.3mm	3.12″ 79.4mm	3.12″ 79.4mm	3.12″ 79.4mm	2.25″ 57.2mm	#8	4.5 lbs 2.04 kg
12.8-12	DL-12.8-12	12.8VCT @ 12A	6.4VCT @ 24A	B	4.12″ 104.8mm	3.25″ 82.6mm	3.43″ 87.3mm	3.43″ 87.3mm	2.37″ 60.3mm	#10	6.0 lbs 2.72 kg
12.8-25	DL-12.8-25	12.8VCT @ 25A	6.4VCT @ 50A	B	5.25″ 133.4mm	4.25″ 108.0mm	4.37″ 111.1mm	4.37″ 111.1mm	2.87″ 73.0mm	#10	12.5 lbs 5.69 kg
12.8-50‡	DL-12.8-50	12.8VCT @ 50A	6.4VCT @ 100A	B	5.25″ 133.4mm	6.00″ 152.4mm	4.37″ 111.1mm	4.37″ 111.1mm	4.12″ 104.8mm	1/4	20.7 lbs 9.39 kg
12.8-100‡	DL-12.8-100	12.8VCT @ 100A	6.4VCT @ 200A	B	6.37″ 162.0mm	7.25″ 184.2mm	5.31″ 134.9mm	5.31″ 134.9mm	4.37″ 111.1mm	1/4	34.5 lbs 15.65 kg
16-1	DL-16-1	16VCT @ 1A	8VCT @ 2A	C	2.87″ 73.0mm	2.00″ 50.8mm	2.31″ 58.7mm	2.37″ 60.3mm	– –	#8	1.2 lbs .54 kg
16-2	DL-16-2	16VCT @ 2A	8VCT @ 4A	C	3.12″ 79.4mm	2.25″ 57.2mm	2.75″ 69.9mm	2.81″ 71.4mm	– –	#8	1.7 lbs .77 kg
16-4	DL-16-4	16VCT @ 4A	8VCT @ 8A	B	3.37″ 85.7mm	2.75″ 69.9mm	2.81″ 71.4mm	2.81″ 71.4mm	2.12″ 53.9mm	#8	3.3 lbs 1.50 kg
16-6	DL-16-6	16VCT @ 6A	8VCT @ 12A	B	3.75″ 95.3mm	3.12″ 79.4mm	3.12″ 79.4mm	3.12″ 79.4mm	2.25″ 57.2mm	#10	4.5 lbs 2.04 kg
16-8	DL-16-8	16VCT @ 8A	8VCT @ 16A	B	3.75″ 95.3mm	3.50″ 89.0mm	3.12″ 79.4mm	3.12″ 79.4mm	2.62″ 66.7mm	#10	5.4 lbs 2.45 kg
16-12	DL-16-12	16VCT @ 12A	8VCT @ 24A	B	4.12″ 104.8mm	3.87″ 98.4mm	3.43″ 87.3mm	3.43″ 87.3mm	3.00″ 76.2mm	#10	7.9 lbs 3.58 kg
16-25	DL-16-25	16VCT @ 25A	8VCT @ 50A	B	4.50″ 114.3mm	5.37″ 136.5mm	3.75″ 95.3mm	3.75″ 95.3mm	4.00″ 101.6mm	#10	14.5 lbs 6.58 kg
16-50‡	DL-16-50	16VCT @ 50A	8VCT @ 100A	B	6.37″ 162.0mm	5.75″ 146.1mm	5.31″ 134.9mm	5.31″ 134.9mm	3.75″ 95.3mm	1/4	26.5 lbs 12.02 kg
16-100‡	DL-16-100	16VCT @ 100A	8VCT @ 200A	B	7.50″ 190.5mm	7.50″ 190.5mm	6.37″ 162.0mm	6.75″ 171.5mm	4.62″ 117.5mm	1/4	50.0 lbs 22.68 kg

‡ Nominal 115V primary has added taps, i.e.,105/115/125V; Dual (DL) version is 115/230V only.
Δ Available with dual primary only. Therefore, prefix "DL" is not required.

* Items are not normally in stock. They are standard designs generally available in 3-4 weeks.

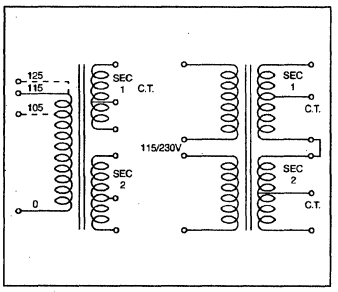
See EEM page A-2375 for determining RMS secondary current ratings.

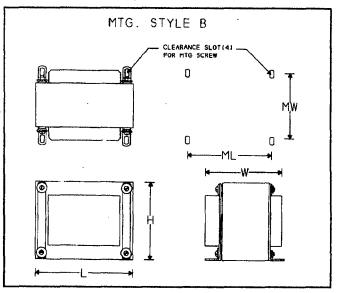
Signal Transformer

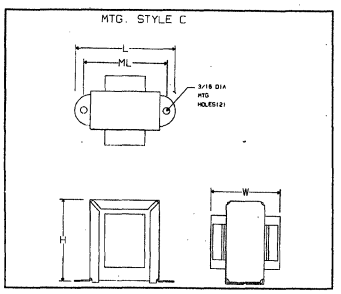
CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Conventional Rectifier Power Transformers • Chassis Mount (continued)

BUY DIRECT
Tel: (516) 239-5777
FAX: (516) 239-7208







Primary 50/60 HZ		Second RMS Rating		Mtg. Style	L	W	H	ML	MW	Mtg. Screw	Wgt
Single 115V	Dual* 115/230V	Series	Parallel								
24-1	DL-24-1	24VCT @ 1A	12VCT @ 2A	B	3.00″ 76.2mm	2.50″ 63.5mm	2.50″ 63.5mm	2.50″ 63.5mm	2.00″ 50.8mm	#8	2.3 lbs 1.04 kg
24-2	DL-24-2	24VCT @ 2A	12VCT @ 4A	B	3.00″ 76.2mm	2.87″ 73.0mm	2.50″ 63.5mm	2.50″ 63.5mm	2.37″ 60.3mm	#8	2.9 lbs 1.32 kg
24-4	DL-24-4	24VCT @ 4A	12VCT @ 8A	B	3.75″ 95.3mm	3.12″ 79.4mm	3.12″ 79.4mm	3.12″ 79.4mm	2.25″ 57.2mm	#8	4.5 lbs 2.04 kg
24-6	DL-24-6	24VCT @ 6A	12VCT @ 12A	B	4.12″ 104.8mm	3.25″ 82.6mm	3.43″ 87.3mm	3.43″ 87.3mm	2.37″ 60.3mm	#10	5.8 lbs 2.63 kg
24-8	DL-24-8	24VCT @ 8A	12VCT @ 16A	B	4.12″ 104.8mm	3.87″ 98.4mm	3.43″ 87.3mm	3.43″ 87.3mm	3.00″ 76.2mm	#10	7.9 lbs 3.58 kg
24-12‡	DL-24-12	24VCT @ 12A	12VCT @ 24A	B	4.50″ 114.3mm	4.50″ 114.3mm	3.75″ 95.3mm	3.75″ 95.3mm	3.37″ 85.7mm	#10	11.0 lbs 4.99 kg
24-20‡	DL-24-20	24VCT @ 20A	12VCT @ 40A	B	5.25″ 133.4mm	4.75″ 120.7mm	4.37″ 111.1mm	4.37″ 111.1mm	3.37″ 85.7mm	1/4	15.3 lbs 6.95 kg
24-25‡	DL-24-25	24VCT @ 25A	12VCT @ 50A	B	5.25″ 133.4mm	5.62″ 142.9mm	4.37″ 111.1mm	4.37″ 111.1mm	4.12″ 104.8mm	1/4	19.5 lbs 8.85 kg
24-50‡	DL-24-50	24VCT @ 50A	12VCT @ 100A	B	6.37″ 162.0mm	6.25″ 158.8mm	5.31″ 134.9mm	5.31″ 134.9mm	4.37″ 111.1mm	1/4	31.3 lbs 14.20 kg
—	24-100Δ	24VCT @ 100A	12VCT @ 200A	B	7.50″ 190.5mm	7.00″ 177.8mm	6.37″ 162.0mm	6.75″ 171.45mm	4.12″ 104.8mm	1/4	43.0 lbs 19.5 kg
36-1	DL-36-1	36VCT @ 1A	18VCT @ 2A	B	3.00″ 76.2mm	2.75″ 69.9mm	2.50″ 63.5mm	2.50″ 63.5mm	2.25″ 57.2mm	#8	2.6 lbs 1.18 kg
36-2	DL-36-2	36VCT @ 2A	18VCT @ 4A	B	3.37″ 85.7mm	2.93″ 74.6mm	2.81″ 71.4mm	2.81″ 71.4mm	2.37″ 60.3mm	#8	3.8 lbs 1.72 kg
36-4	DL-36-4	36VCT @ 4A	18VCT @ 8A	B	4.12″ 104.8mm	3.37″ 85.7mm	3.43″ 87.3mm	3.43″ 87.3mm	2.62″ 66.7mm	#10	6.6 lbs 3.08 kg
36-6	DL-36-6	36VCT @ 6A	18VCT @ 12A	B	4.50″ 114.3mm	3.75″ 95.3mm	3.75″ 95.3mm	3.75″ 95.3mm	2.75″ 69.9mm	#10	8.7 lbs 3.95 kg
36-8‡	DL-36-8	36VCT @ 8A	18VCT @ 16A	B	4.50″ 114.3mm	4.50″ 114.3mm	3.75″ 95.3mm	3.75″ 95.3mm	3.37″ 85.7mm	#10	11.0 lbs 4.99 kg
36-12‡	DL-36-12	36VCT @ 12A	18VCT @ 24A	B	5.25″ 133.4mm	5.00″ 127.0mm	4.37″ 111.1mm	4.37″ 111.1mm	3.37″ 85.7mm	1/4	15.0 lbs 6.80 kg
36-20‡	DL-36-20	36VCT @ 20A	18VCT @ 40A	B	6.37″ 162.0mm	5.37″ 136.5mm	5.31″ 134.9mm	5.31″ 134.9mm	3.37″ 85.7mm	1/4	22.8 lbs 10.34 kg
36-25‡	DL-36-25	36VCT @ 25A	18VCT @ 50A	B	6.37″ 162.0mm	5.75″ 146.1mm	5.31″ 134.9mm	5.31″ 134.9mm	3.75″ 95.3mm	1/4	26.5 lbs 12.02 kg
36-30‡	DL-36-30	36VCT @ 30A	18VCT @ 60A	B	6.37″ 162.0mm	6.00″ 152.4mm	5.31″ 134.9mm	5.31″ 134.9mm	4.37″ 111.1mm	1/4	31.5 lbs 14.28 kg
—	36-50Δ	36VCT @ 50A	18VCT @ 100A	B	6.37″ 162.0mm	7.25″ 184.2m	5.31″ 134.9mm	5.31″ 134.9mm	5.12″ 130.2mm	1/4	40.0 lbs 18.14 kg

‡ Nominal 115V primary has added taps, i.e., 105/115/125V; Dual (DL) version is 115/230V only.
Δ Available with dual primary only. Therefore, prefix "DL" is not required.

* Items are not normally in stock. They are standard designs generally available in 3-4 weeks.

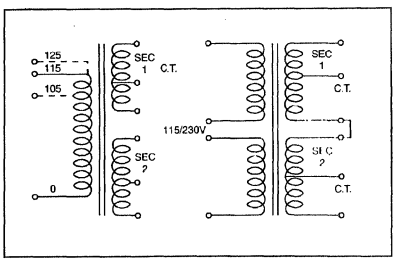
See EEM page A-2375 for determining RMS secondary current ratings.

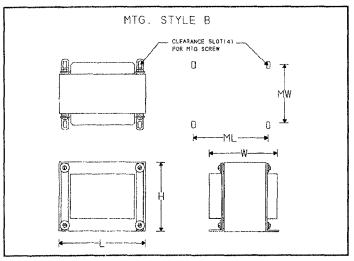
CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

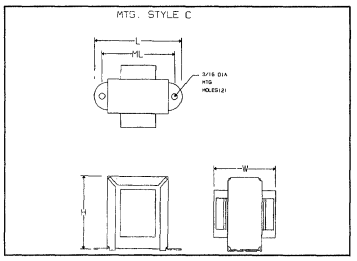
Signal Transformer

Conventional Rectifier Power Transformers • Chassis Mount (continued)

BUY DIRECT
24 HOUR
PRONTO
SERVICE
Tel: (516) 239-5777
FAX: (516) 239-7208







Primary 50/60 HZ		Second RMS Rating		Mtg. Style	L	W	H	ML	MW	Mtg. Screw	Wgt
Single 115V	Dual* 115/230V	Series	Parallel								
56-1	DL-56-1	56VCT @ 1A	28VCT @ 2A	B	3.37″ 85.7mm	2.87″ 73.0mm	2.81″ 71.4mm	2.81″ 71.4mm	2.25″ 57.2mm	#8	3.5 lbs 1.59 kg
56-2	DL-56-2	56VCT @ 2A	28VCT @ 4A	B	3.75″ 95.3mm	3.25″ 82.6mm	3.12″ 79.4mm	3.12″ 79.4mm	2.50″ 63.5mm	#8	5.0 lbs 2.27 kg
56-4	DL-56-4	56VCT @ 4A	28VCT @ 8A	B	4.12″ 104.8mm	3.75″ 95.3mm	3.43″ 87.3mm	3.43″ 87.3mm	3.00″ 76.2mm	#10	7.7 lbs 3.49 kg
56-6	DL-56-6	56VCT @ 6A	28VCT @ 12A	B	5.25″ 133.4mm	4.25″ 108.0mm	4.37″ 111.1mm	4.37″ 111.1mm	2.87″ 73.0mm	#10	12.0 lbs 5.44 kg
56-8‡	DL-56-8	56VCT @ 8A	28VCT @ 16A	B	5.25″ 133.4mm	5.00″ 127.0mm	4.37″ 111.1mm	4.37″ 111.1mm	3.62″ 92.1mm	1/4	17.0 lbs 7.71 kg
56-12‡	DL-56-12	56VCT @ 12A	28VCT @ 24A	B	6.37″ 162.0mm	5.25″ 133.4mm	5.31″ 134.9mm	5.31″ 134.9mm	3.37″ 85.7mm	1/4	22.0 lbs 9.98 kg
56-25‡	DL-56-25	56VCT @ 25A	28VCT @ 50A	B	6.37″ 162.0mm	7.12″ 181.0mm	5.31″ 134.9mm	5.31″ 134.9mm	5.12″ 130.2mm	1/4	38.0 lbs 17.24 kg
—	56-50Δ	56VCT @ 50A	28VCT @ 100A	B	7.50″ 190.5mm	7.50″ 190.5mm	6.25″ 158.8mm	6.75″ 171.5mm	4.87″ 123.8mm	1/4	56.3 lbs 25.54 kg
68-1	DL-68-1	68VCT @ 1A	34VCT @ 2A	B	3.37″ 85.7mm	2.93″ 74.6mm	2.81″ 71.4mm	2.81″ 71.4mm	2.37″ 60.3mm	#8	3.8 lbs 1.72 kg
68-2	DL-68-2	68VCT @ 2A	34VCT @ 4A	B	4.12″ 104.8mm	3.37″ 85.7mm	3.43″ 87.3mm	3.43″ 87.3mm	2.62″ 66.7mm	#10	6.8 lbs 3.08 kg
68-4	DL-68-4	68VCT @ 4A	34VCT @ 8A	B	4.50″ 114.3mm	4.50″ 114.3mm	3.75″ 95.3mm	3.75″ 95.3mm	3.37″ 85.7mm	#10	11.5 lbs 5.22 kg
68-6‡	DL-68-6	68VCT @ 6A	34VCT @ 12A	B	5.25″ 133.4mm	5.00″ 127.0mm	4.37″ 111.1mm	4.37″ 111.1mm	3.37″ 85.7mm	1/4	15.0 lbs 6.80 kg
68-8‡	DL-68-8	68VCT @ 8A	34VCT @ 16A	B	5.25″ 133.4mm	5.50″ 139.7mm	4.37″ 111.1mm	4.37″ 111.1mm	3.87″ 98.4mm	1/4	19.0 lbs 8.62 kg
68-12‡	DL-68-12	68VCT @ 12A	34VCT @ 24A	B	6.37″ 162.0mm	5.75″ 146.1mm	5.31″ 134.9mm	5.31″ 134.9mm	3.75″ 95.3mm	1/4	26.5 lbs 12.02 kg
—	68-25Δ	68VCT @ 25A	34VCT @ 50A	B	6.37″ 162.0mm	7.25″ 184.2mm	5.31″ 134.9mm	5.31″ 134.9mm	5.12″ 130.2mm	1/4	39.7 lbs 18.01 kg
80-1	DL-80-1	80VCT @ 1A	40VCT @ 2A	B	3.37″ 85.7mm	3.06″ 77.7mm	2.81″ 71.4mm	2.81″ 71.4mm	2.50″ 63.5mm	#8	4.0 lbs 1.81 kg
80-2	DL-80-2	80VCT @ 2A	40VCT @ 4A	B	4.12″ 104.8mm	3.37″ 85.7mm	3.43″ 87.3mm	3.43″ 87.3 mm	2.62″ 66.7mm	#10	6.8 lbs 3.08 kg
80-4	DL-80-4	80VCT @ 4A	40VCT @ 8A	B	5.25″ 133.4mm	4.25″ 108.0mm	4.37″ 111.1mm	4.37″ 111.1mm	2.87″ 73.0mm	1/4	12.3 lbs 5.58 kg
80-6‡	DL-80-6	80VCT @ 6A	40VCT @ 12A	B	5.25″ 133.4mm	5.50″ 139.7mm	4.37″ 111.1mm	4.37″ 111.1mm	3.87″ 98.4mm	1/4	19.0 lbs 8.62 kg
80-8‡	DL-80-8	80VCT @ 8A	40VCT @ 16A	B	6.37″ 162.0mm	5.25″ 133.4mm	5.31″ 134.9mm	5.31″ 134.9mm	3.25″ 82.6mm	1/4	20.5 lbs 9.30 kg
80-12‡	DL-80-12	80VCT @ 12A	40VCT @ 24A	B	6.37″ 162.0mm	6.00″ 152.4mm	5.31″ 134.9mm	5.31″ 134.9mm	4.12″ 104.8mm	1/4	29.0 lbs 13.15 kg
—	80-25Δ	80VCT @ 25A	40VCT @ 50A	B	7.50″ 190.5mm	6.50″ 165.1mm	6.25″ 158.8mm	6.75″ 171.5mm	3.87″ 98.4mm	1/4	40.3 lbs 18.28 kg

‡ Nominal 115V primary has added taps, i.e., 105/115/125V; Dual (DL) version is 115/230V only.
Δ Available with dual primary only. Therefore, prefix "DL" is not required.

* Items are not normally in stock. They are standard designs generally available in 3-4 weeks.

See EEM page A-2375 for determining RMS secondary current ratings.

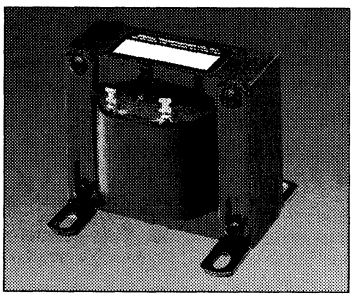
Signal Transformer

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Filter and Dual Chokes Chassis Mount

BUY DIRECT
Tel: (516) 239-5777
FAX: (516) 239-7208

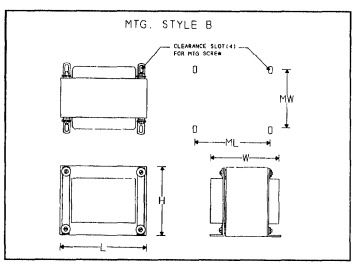
Available in Single and Dual Windings

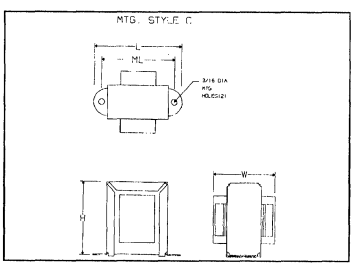


Signal's CH and CL chokes are designed to complement the rectifier power transformers so that a set may be specified for DC power supplies using inductive filters.

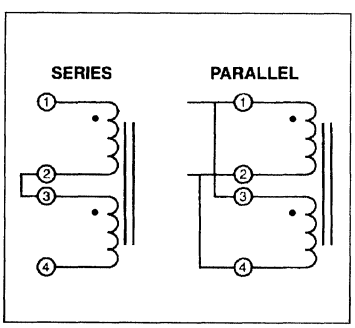
General Specifications

- **Inductance** – 0.12 MHY to 100 MHY
- **DC Current** – 1.0 ADC to 200 ADC
- **Insulation** – Class A insulation (105°C)





Part No.	Inductance (MHY)	Current (Amps)	Resistance (Ohms)	Mtg. Style	L	W	H	ML	MW	Mtg. Screw	Wgt
CH-1	100	1	1.5	B	3.00″ 76.2mm	2.50″ 63.5mm	2.50″ 63.5mm	2.50″ 63.5mm	2.00″ 50.8mm	#8	2.3 lbs 1.04 kg
CH-2	70	2	0.9	B	3.37″ 85.7mm	2.75″ 69.9mm	2.87″ 73.0mm	2.81″ 71.4mm	2.12″ 53.9mm	#8	3.2 lbs 1.45 kg
CH-4	70	4	0.6	B	3.75″ 95.3mm	3.12″ 79.4mm	3.25″ 82.6mm	3.12″ 79.4mm	2.50″ 63.5mm	#8	5.3 lbs 2.40 kg
CH-6	40	6	0.4	B	3.75″ 95.3mm	3.62″ 92.1mm	3.25″ 82.6mm	3.12″ 79.4mm	3.00″ 76.2mm	#8	6.5 lbs 2.95 kg
CH-8	30	8	0.3	B	4.12″ 104.8mm	3.62″ 92.1mm	3.50″ 88.9mm	3.43″ 87.3mm	3.00″ 76.2mm	#10	8.0 lbs 3.63 kg
CH-12	15	12	0.1	B	5.25″ 133.4mm	4.00″ 101.6mm	4.43″ 112.7mm	4.37″ 111.1mm	3.12″ 79.4mm	#10	13.7lbs 6.21 kg
CH-16	15	16	0.08	B	5.25″ 133.4mm	4.62″ 117.5mm	4.43″ 112.7mm	4.37″ 111.1mm	3.62″ 92.0mm	#10	17.5 lbs 7.94 kg
CH-20	7	20	0.05	B	5.25″ 133.4mm	4.00″ 101.6mm	4.43″ 112.7mm	4.37″ 111.1mm	3.12″ 79.4mm	#10	13.3 lbs 6.03 kg
CH-25	5	25	0.025	B	5.25″ 133.4mm	4.75″ 120.7mm	4.43″ 112.7mm	4.37″ 111.1mm	3.87″ 98.4mm	#10	17.8 lbs 8.07 kg
CH-30	4	30	0.01	B	6.37″ 161.9mm	5.00″ 127.0mm	5.37″ 136.5mm	5.31″ 134.9mm	3.37″ 85.7mm	1/4	24.4 lbs 11.07 kg
CH-50	1.4	50	0.01	B	6.37″ 161.9mm	5.25″ 133.4mm	5.37″ 136.5mm	5.31″ 134.9mm	3.75″ 95.3mm	1/4	26.7 lbs 12.11 kg
CH-100	0.5	100	0.005	B	6.37″ 161.9mm	6.25″ 158.8mm	5.37″ 136.5mm	5.31″ 134.9mm	4.12″ 104.8mm	1/4	31.4 lbs 14.24 kg
CH-200	0.3	200	0.001	B	7.50″ 190.5mm	7.50″ 190.5mm	6.25″ 158.8mm	6.75″ 171.5mm	4.12″ 104.8mm	1/4	48.0 lbs 21.77 kg



Part No.	Series Connected Ind. (MHY)	Curr. (Amps)	Res. Ω	Parallel Connected Ind. (MHY)	Curr. (Amps)	Res. Ω	Mtg Style	Dimensions L	W	H	ML	MW	Mtg. Screw	Wgt
CL-1-2	72	1	1.4	18	2	0.35	C	2.87″ 73.0mm	1.75″ 44.5mm	2.31″ 58.7mm	2.37″ 60.3mm		#8	0.9 lb 0.41 kg
CL-2-4	40	2	0.7	10	4	0.18	C	3.12″ 79.4mm	2.12″ 53.9mm	2.75″ 69.9mm	2.81″ 71.4mm	—	#8	1.5 lbs 0.68 kg
CL-4-8	20	4	0.3	5	8	0.075	B	3.00″ 76.2mm	2.87″ 73.0mm	2.50″ 63.5mm	2.50″ 63.5mm	2.50″ 63.5mm	#8	3.0 lbs 1.36 kg
CL-6-12	12	6	0.15	3	12	0.038	B	3.37″ 85.7mm	3.06″ 77.7mm	2.81″ 71.4mm	2.81″ 71.4mm	2.50″ 63.5mm	#8	4.0 lbs 1.81 kg
CL-12-24	4.8	12	0.052	1.2	24	0.013	B	3.37″ 85.7mm	3.56″ 90.5mm	2.81″ 71.4mm	2.81″ 71.4mm	3.00″ 76.2mm	#8	5.3 lbs 2.40 kg
CL-25-50	1.2	25	0.012	0.3	50	0.003	B	3.75″ 95.3mm	3.37″ 85.7mm	3.37″ 85.7mm	3.12″ 79.4mm	2.75″ 69.9mm	#8	6.0 lbs 2.72 kg
CL-50-100	0.5	50	0.0043	0.12	100	0.0011	B	4.50″ 114.3mm	3.75″ 95.3mm	3.75″ 95.3mm	3.75″ 95.3mm	2.50″ 63.5mm	#8	8.0 lbs 3.63 kg

Signal's Dual Chokes are supplied with 2 windings which may be series or parallel connected with rating shown on chart. This line is basically designed for application requiring lower inductance value at high currents, such as low voltage, DC supplies or SCR filters.

See EEM page A-2375 for determining RMS secondary current ratings.

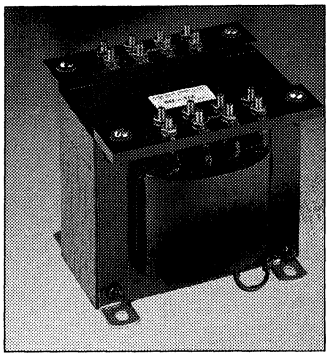
CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Signal Transformer

Power Isolation Transformers

BUY DIRECT
24 HOUR
PRONTO
SERVICE
Tel: (516) 239-5777
FAX: (516) 239-7208

Industrial Grade Step-Up or Step-Down Transformers



Signal's DU and SU transformers have been designed to provide a multitude of step-up or step-down voltages to accommodate the various input voltages available throughout the world.

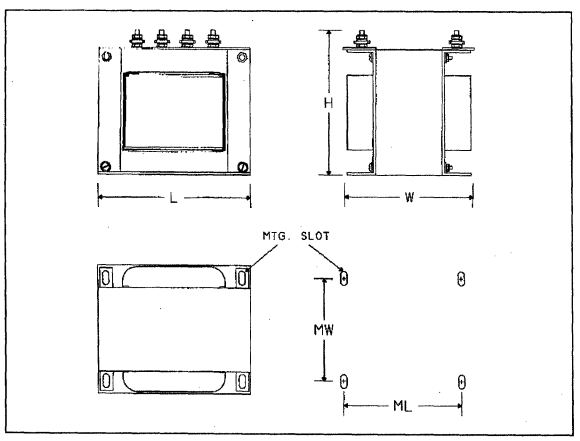
General Specifications

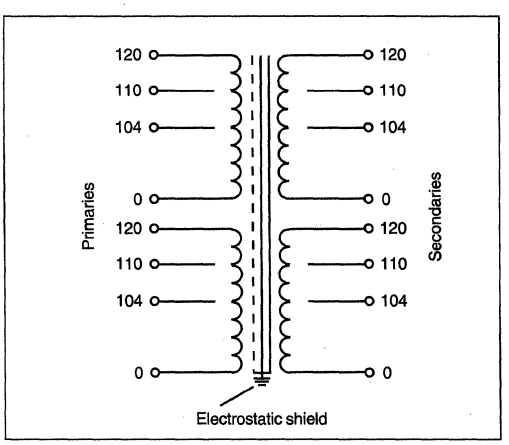
- **Power** – 250 VA to 10 KVA (500 VA to 20 KVA possible if used as auto-transformer)
- **Dielectric Strength** – 2500VRMS Hipot
- **Primaries** – Dual/tapped primaries: Parallel connected (104V, 110V, 120V - 50-500 Hz) Series connected (208V, 220V, 230V, 240V - 50-500 Hz)
- **Secondaries** – Dual/tapped secondaries: **DU Series** Parallel connected (104V, 110V, 120V - 50-500 Hz) Series connected (208V, 220V, 230V, 240V - 50-500 Hz)
- **Electrostatic Shield** – 2 mil thick copper foil connected to ground. The connection may be opened if an ungrounded shield is desired.
- **Terminals** – Plated brass screw type terminals
- **Insulation** – Class A insulation (105°C)

As shown on the schematic diagram the "DU" line is designed with dual primaries and secondaries. All four windings are identically rated at 0/104/110/120 volts. This permits series or parallel connections on either primary or secondary. Therefore, a nominal 110 to 110 volt, 220 to 220 volt,110 to 220 volt, or 220 to 110 volt transformer can be set up. The winding tap permits intermediate series ratings such as 208, 214, or 230 volts. It is also possible to make auto-transformer connections by connecting a primary group in series with a secondary group. Such nominal ratings as 440 to 220 volts or 220 to 440 volts can be set up, in addition to the standard ratings described above. A further advantage to auto-transformer connection is the fact that the KVA rating of a particular type is doubled.

Part No.	KVA	Series Secondaries		Parallel Secondaries		Mechanical Dimensions					Mtg. & Term. Screw	Wgt
		Volts	Max. Amps	Volts	Max. Amps	L *	W *	H *	ML †	MW ‡		
DU-1/4	1/4	0/208/220/240	1.1	0/104/110/120	2.2	5.31″ 134.9mm	4.25″ 107.9mm	5.25″ 133.4mm	4.37″ 111.1mm	2.50″ 63.5mm	#10	12 lbs 5.44 kg
DU-1/2	1/2	0/208/220/240	2.3	0/104/110/120	4.6	5.31″ 134.9mm	5.31″ 134.9mm	5.25″ 133.4mm	4.37″ 111.1mm	3.62″ 92.1mm	#10	18 lbs 8.16 kg
DU-1	1	0/208/220/240	4.5	0/104/110/120	9	7.56″ 192.1mm	6.25″ 158.8mm	7.37″ 187.3mm	6.75″ 171.5mm	4.12″ 104.8mm	1/4	33 lbs 14.97 kg
DU-2	2	0/208/220/240	9	0/104/110/120	18	7.56″ 192.1mm	8.25″ 209.6mm	7.37″ 187.3mm	6.75″ 171.5mm	6.00″ 152.4mm	1/4	56 lbs 25.40 kg
DU-3	3	0/208/220/240	14	0/104/110/120	28	7.56″ 192.1mm	9.25″ 234.9mm	7.37″ 187.3mm	6.75″ 171.5mm	7.00″ 177.8mm	1/4	70 lbs 31.75 kg
DU-5	5	0/208/220/240	23	0/104/110/120	46	7.56″ 192.1mm	10.75″ 273.1mm	7.37″ 187.3mm	6.75″ 171.5mm	8.50″ 215.9mm	1/4	89 lbs 40.37 kg
DU-7.5	7.5	0/208/220/240	31	0/104/110/120	62	9.00″ 228.6mm	10.75″ 273.1mm	8.00″ 203.2mm	7.50″ 190.5mm	6.50″ 165.1mm	1/4	105 lbs 47.63 kg
DU-10	10	0/208/220/240	41	0/104/110/120	82	9.00″ 228.6mm	13.00″ 330.2mm	8.00″ 203.2mm	7.50″ 190.5mm	9.00 228.6mm	1/4	150 lbs 68.04 kg

*Maximum † ± 0.06″ (1.6mm) ‡ ± .12″ (3.2mm)





Signal Transformer

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208

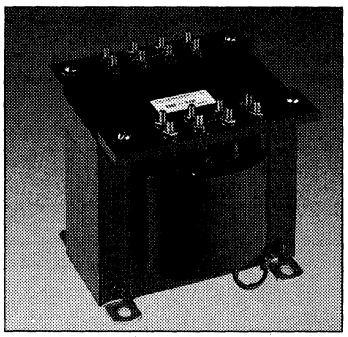
Website: http://www.signaltransformer.com

500 Bayview Avenue, Inwood, New York 11096

Power Isolation Transformers

BUY DIRECT
Tel: (516) 239-5777
FAX: (516) 239-7208

Industrial Grade Step-Up or Step-Down Transformers



Signal's DU and SU transformers have been designed to provide a multitude of step-up or step-down voltages to accommodate the various input voltages available throughout the world.

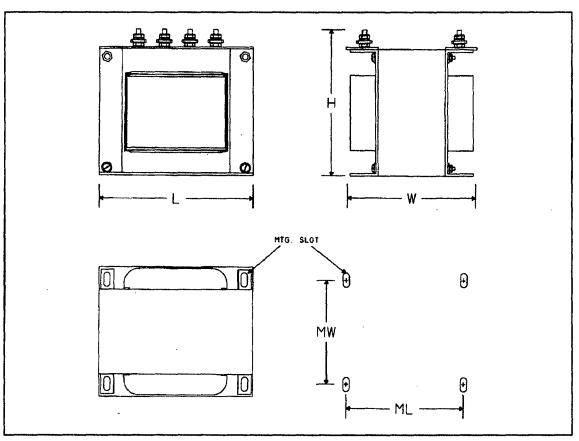
General Specifications

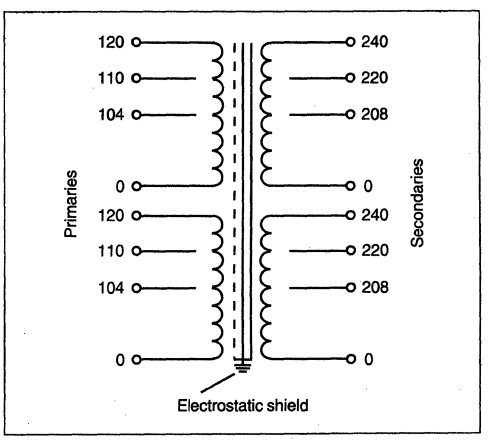
- **Power** – 250 VA to 10 KVA (500 VA to 20 KVA possible if used as auto-transformer)
- **Dielectric Strength** – 2500VRMS Hipot
- **Primaries** – Dual/tapped primaries: Parallel connected (104V, 110V, 120V - 50-500 Hz) Series connected (208V, 220V, 230V, 240V - 50-500 Hz)
- **Secondaries** – Dual/tapped secondaries: **SU Series** Parallel connected (208V, 220V, 240V - 50-500 Hz)0 Series connected (416V, 440V, 460V, 480V - 50-500Hz)
- **Electrostatic Shield** – 2 mil thick copper foil connected to ground. The connection may be opened if an ungrounded shield is desired.
- **Terminals** – Plated brass screw type terminals
- **Insulation** – Class A insulation (105°C)

As shown on the schematic diagram the "SU" line is designed with dual primaries and secondaries. Two primary windings are identically rated at 0/104/110/120. Two secondary windings are identically rated at 0/208/220/240. This permits series or parallel connections on either primary or secondary. Therefore a nominal 110 to 220 volt, 220 to 440 volt, 110 to 440 volt, or 440 to 110 volt transformer can be set up. The winding tap permits intermediate series ratings such as 416, 428, and 460 volts. It is also possible to make auto-transformer connections by connecting a primary group in series with a secondary group. Such nominal ratings as 660 to 330 volts or 330 to 660 volts can be set up, in addition to the standard ratings described above. A further advantage to auto-transformer connection is the fact that the KVA rating of a particular type is doubled.

Part No.	KVA	Series Secondaries		Parallel Secondaries		Mechanical Dimensions					Mtg. & Term. Screw	Wgt.
		Volts	Max. Amps	Volts	Max. Amps	L*	W*	H*	ML†	MW‡		
SU-1/4	1/4	0/416/440/480	0.55	0/208/220/240	1.1	5.31″ 134.9mm	4.25″ 107.9mm	5.25″ 133.4mm	4.37″ 111.1mm	2.50″ 63.5mm	#10	12 lbs 5.44 kg
SU-1/2	1/2	0/416/440/480	1.15	0/208/220/240	2.3	5.31″ 134.9mm	5.31″ 134.9mm	5.25″ 133.4mm	4.37″ 111.1mm	3.62″ 92.1mm	#10	16 lbs 8.16 kg
SU-1	1	0/416/440/480	2.25	0/208/220/240	4.5	7.56″ 192.1mm	6.25″ 158.8mm	7.37″ 187.3mm	6.75″ 171.5mm	4.12″ 104.8mm	1/4	33 lbs 14.97 kg
SU-2	2	0/416/440/480	4.5	0/208/220/240	9	7.56″ 192.1mm	8.25″ 209.6mm	7.37″ 187.3mm	6.75″ 171.5mm	6.00 152.4mm	1/4	56 lbs 25.40 kg
SU-3	3	0/416/440/480	7	0/208/220/240	14	7.56″ 192.1mm	9.25″ 234.9mm	7.37″ 187.3mm	6.75″ 171.5mm	7.00″ 177.8mm	1/4	70 lbs 31.75 kg
SU-5	5	0/416/440/480	11.5	0/208/220/240	23	7.56″ 192.1mm	10.75″ 273.1mm	7.37″ 187.3mm	6.75″ 171.5mm	8.50″ 215.9mm	1/4	89 lbs 40.37 kg
SU-7.5	7.5	0/416/440/480	15.5	0/208/220/240	31	9.00″ 228.6mm	10.75″ 273.1mm	8.00″ 203.2mm	7.50″ 190.5mm	6.50″ 165.1mm	1/4	105 lbs 47.63 kg
SU-10	10	0/416/440/480	20.5	0/208/220/240	41	9.00″ 228.6mm	13.00″ 330.2mm	8.00″ 203.2mm	7.50″ 190.5mm	9.00 228.6mm	1/4	150 lbs 68.04 kg

*Maximum † ± 0.06″ (1.6mm) ‡ ± .12″ (3.2mm)





CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Signal Transformer

Step Down Auto Transformers Chassis Mount

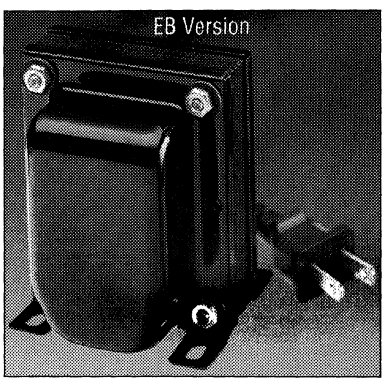
BUY DIRECT
FREE SHIPMENT
Tel: (516) 239-5777
FAX: (516) 239-7208

Available with Receptacle and Line Cord or Leads

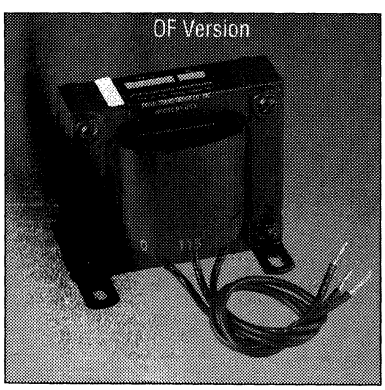
Signal's auto transformers provide the user the capability of adapting voltages for worldwide applications.

General Specifications

- **Power** – 100 VA to 2000 VA
- **Voltage** – EB version (230V to 115V - 50/60 Hz)
  OF version (230V to 115V or 115V to 230V - 50/60 Hz)
- **Connections** – EB version (receptacle and 2-prong line cord)
  OF version (8 inch long leads)
- **Insulation** – Class A insulation (105°C)



Part No.	VA (Size)	Width	Depth	Height	Mtg. Centers	Wgt
110	100	1.87″ 47.6mm	2.37″ 60.3mm	2.50″ 63.5mm	1.50 x 1.68″ 38.1 x 42.8mm	1.5 lbs 0.68 kg
112	120	2.87″ 73.0mm	2.12″ 54.0mm	3.50″ 88.9mm	2.25 x 1.75″ 57.2 x 44.5mm	3.0 lbs 1.36 kg
115	150	2.87″ 73.0mm	3.37″ 85.7mm	3.50″ 88.9mm	2.25 x 2.00″ 57.2 x 50.8mm	3.5 lbs 1.59 kg
120	200	2.87″ 73.0mm	3.50″ 88.9mm	3.50″ 88.9mm	2.25 x 2.12″ 57.2 x 54.0mm	4.0 lbs 1.81 kg
125	250	2.87″ 73.0mm	3.87″ 98.4mm	3.50″ 88.9mm	2.25 x 2.50″ 57.2 x 63.5mm	4.8 lbs 2.18 kg
130	300	3.25″ 82.6mm	3.87″ 98.4mm	3.87″ 98.4mm	2.50 x 2.43″ 63.5 x 61.9mm	5.5 lbs 2.49 kg
150	500	3.25″ 82.6mm	4.87″ 123.8mm	3.87″ 98.4mm	2.50 x 3.43″ 63.5 x 87.3mm	8.0 lbs 3.63 kg
175	750	3.25″ 82.6mm	5.87″ 149.2mm	3.87″ 98.4mm	2.50 x 4.43″ 63.5 x 112.7mm	11 lbs 5.00 kg
1100	1000	4.50″ 114.3mm	5.12″ 130.2mm	5.50″ 139.7mm	3.50 x 3.50″ 88.9 x 88.9mm	14 lbs 6.35 kg
1150	1500	4.50″ 114.3mm	6.12″ 155.6mm	5.50″ 139.7mm	3.50 x 4.50″ 88.9 x 114.3mm	20 lbs 9.07 kg
1200	2000	4.50″ 114.3 mm	7.12″ 181.0mm	5.50″ 139.7mm	3.50 x 5.50″ 88.9 x 139.7mm	26 lbs 11.79 kg



Part No.	VA (Size)	Width	Depth	Height	Mtg. Centers	Wgt
110-OF	100	2.25″ 57.2mm	2.00″ 50.8mm	1.93″ 49.2mm	2.81″ 71.4mm	1.3 lbs 0.59 kg
112-OF	120	3.37″ 85.7mm	2.50″ 63.5mm	2.87″ 73.0mm	2.81 x 1.87″ 71.4 x 47.6mm	2.5 lbs 1.13 kg
115-OF	150	3.37″ 85.7mm	2.75″ 69.9mm	2.87″ 73.0mm	2.81 x 2.12″ 71.4 x 54.0mm	3.0 lbs 1.36 kg
120-OF	200	3.37″ 85.7mm	2.87″ 73.0mm	2.87″ 73.0mm	2.81 x 2.25″ 71.4 x 57.2mm	3.5 lbs 1.59 kg
125-OF	250	3.37″ 85.7mm	3.25″ 82.6mm	2.87″ 73.0mm	2.81 x 2.62″ 71.4 x 66.7mm	4.2 lbs 1.90 kg
130-OF	300	3.75″ 95.3mm	3.25″ 82.6mm	3.12″ 79.4mm	3.12 x 2.50″ 79.4 x 63.5mm	5.0 lbs 2.27 kg
150-OF	500	3.75″ 95.3mm	4.25″ 107.9mm	3.12″ 79.4mm	3.12 x 3.50″ 79.4 x 88.9mm	8.0 lbs 3.63 kg
175-OF	750	3.75″ 95.3mm	5.25″ 133.4mm	3.12″ 79.4mm	3.12 x 4.50″ 79.4 x 114.3mm	11 lbs 5.00 kg
1100-OF	1000	5.25″ 133.4mm	4.50″ 114.3mm	4.37″ 111.1mm	4.37 x 3.12″ 111.1 x 79.4mm	14 lbs 6.35 kg
1150-OF	1500	5.25″ 133.4mm	5.50″ 139.7mm	4.37″ 111.1mm	4.37 x 4.12″ 111.1 x 104.8mm	19 lbs 8.62 kg
1200-OF	2000	5.25″ 133.4mm	6.50″ 165.1mm	4.37″ 111.1mm	4.37 x 5.12″ 111.1 x 130.2mm	25 lbs 11.34 kg

Signal Transformer

CALL: 516-239-5777 • FAX: (24 hrs) 516-239-7208
Website: http://www.signaltransformer.com
500 Bayview Avenue, Inwood, New York 11096

Method of Determining Secondary Current Ratings

The secondary currents shown in the tables are RMS ratings. Depending upon rectifier circuit configurations, the RMS secondary current is different from the DC output current. This is indicated in the chart below:

Rectifier Type	Filter Type	RMS Secondary Current is
Full-Wave Center-Tap	Choke Input	= 0.7 x DC Amps
Full-Wave Center-Tap	Capacitor Input	= 1 to 1.2 x DC Amps
Full-Wave Bridge	Choke Input	= DC Amps
Full-Wave Bridge	Capacitor Input	= 1.6 to 1.8 x DC Amps

For example, in a F.W. Bridge circuit with a capacitive filter, if the load is 1 Amp DC, the RMS Secondary current is 1.6 to 1.8 Amp RMS.

The Insilco Technologies Group...A Closer Look

The Insilco Technologies Group is dedicated to providing world-class quality products and services to leading telecommunications, net-working, computer, automotive, industrial, and electronics firms around the globe.

Chances are, you may already be familiar with the members of the Insilco Technologies Group. There are Signal Transformer, the acknowledged leader in off-the-shelf power transformers in the 50-60 Hz range, and Escod Industries, the largest domestic independent, full-service contract manufacturer of harness and cable assemblies as well as value-added services including electro-mechanical subassemblies. Rounding out the group are Stewart Connector, the premier designer and manufacturer of modular and specialized connector systems, and Stewart Stamping, one of the largest suppliers of precision metal stampings, wire formings, and assemblies.

In a time when more and more companies are trying to reduce their number of vendors, Insilco stands apart from the crowd by increasingly being designated "preferred vendor of choice". This vote of confidence can be traced to an uncompromising corporate philosophy ***to provide solutions,*** rather than just products, for our customers.

Insilco Technologies

Escod Industries

Escod Industries
Insilco Technologies Group

2411 North Oak Street, Suite 105
Myrtle Beach, SC 29577-3164
(803) 946-6200 Fax: (803) 946-9459
http://www.escodindustries.com

Stewart Connector

Stewart Connector Systems, Inc.
Insilco Technologies Group

R.D. 2, Box 2020
Glen Rock, PA 17327-9516
(717) 235-7512 Fax: (717) 235-7954
http://www.stewartconnector.com

Signal Transformer

Signal Transformer Co., Inc.
Insilco Technologies Group

500 Bayview Avenue
Inwood, NY 11096-1792
(516) 239-5777 Fax: (516) 239-7208
http://www.signaltransformer.com

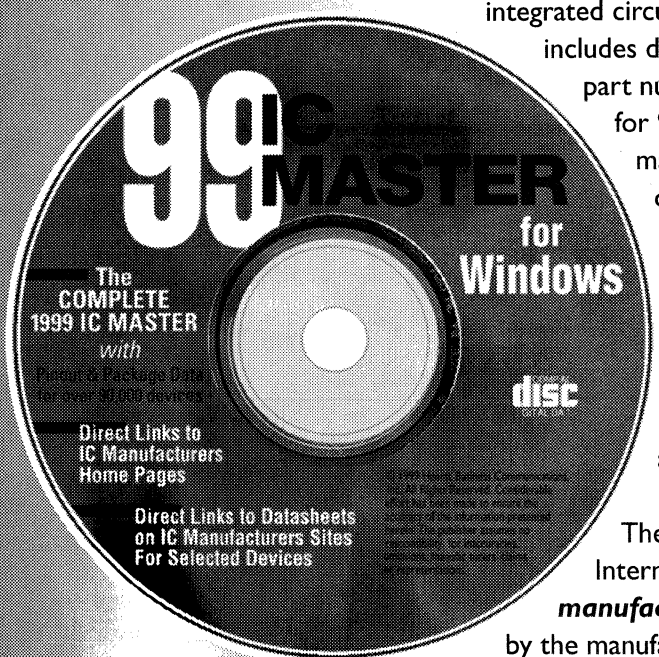
Stewart Stamping

Stewart Stamping Corporation
Insilco Technologies Group

630 Central Park Avenue
Yonkers, NY 10704-2000
(914) 965-0816 Fax: (914) 965-4431
http://www.stewartstamping.com

1999 IC MASTER CD-ROM
for Windows

Now you can search the industry's leading IC database right on your own PC!



The **1999 IC MASTER CD-ROM for Windows** gives you direct access to product information on current and discontinued integrated circuits from over 300 manufacturers. The database includes device specifications for more than 135,000 base part numbers with pinout diagrams and package styles for 90,000 of these devices. Plus, complete manufacturer contact information with sales office and distributor listings.

A powerful part number and specification search engine lets you narrow your search to a few possible devices in just minutes. Then make your final device choices based on the most current and reliable information available, the manufacturer's own data!

The CD-ROM search program can launch your Internet browser and ***link*** you directly ***to the manufacturer's own website.*** And, for devices selected by the manufacturer, ***link*** you directly ***to the actual datasheets*** for the device on the manufacturer's website.

There is simply no better time-saving tool for IC buyers and specifiers.

To order your 1999 IC MASTER CD-ROM for Windows
contact your local IC MASTER distributor or Marie Botta at:

Hearst Business Communications, Inc.
645 Stewart Avenue, Garden City, NY 11530
(516) 227-1314 FAX (516) 227-1453
Credit Card Hotline: 1-800-833-7138

Tell Marie you saw IC MASTER in the 1999 EEM, and she'll take $10.00 off the subscription price!
The IC MASTER CD-ROM is released annually in March.
See us on the World Wide Web at http://icmaster.com

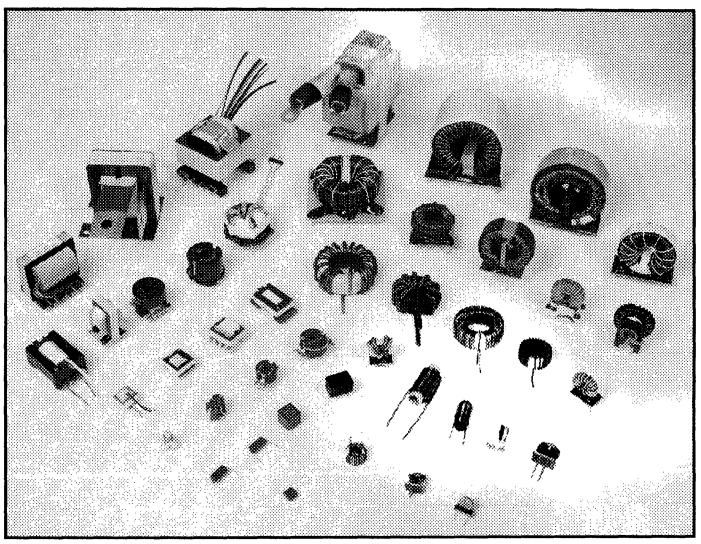
Specialists in JUST in Time Magnetics

Transformers, Coils, Chokes

"A full service custom magnetic house combining the advantages of 30 years experience in off-shore operations, and award winning customer service."

Chokes:
Filter & Swinging.

Coils:
Antenna, Hybrid, RF Shielded, Telephone, TV & Variable. EMI & RFI Filters



Transformers:
Audio • Chopper • Driver • DC to DC Converter • Input Hybrid • Isolation Instrument • Interstage • Inverter Line • Matching • Power Pulse • Split Bobbin Telephone • Toroidal • Transistor • Wideband Switching Power

We are an Off Shore Operation with...

- Dock-to-Stock quality levels.
- Just-In-Time deliveries.
- Globally Competitive Prices.
- Flexible deliveries to meet your changing needs.
- Quantities from 100's to 100,000's.
- Hundreds of custom jobs run each week.
- Two international plant locations.
- Built to UL, CSA, CE, VDE, & other International Standards.

We are an American Company with...

- A well seasoned and growing engineering staff.
- Long term and favorable relations with vendors.
- U.S. location with U.S. shipping point. All port transportation and custom clearances by our employees.
- Flexibility of buyer-seller arrangements to conform to individual requirements.
- Products used by Hewlett-Packard, Cisco Systems, Alcatel, Silicon Graphics, Honeywell, General Datacomm.

* *References provided upon request*

South American Development Corp.

29 Noxon Road
Poughkeepsie, NY 12603

Fax: (914) 452-2526
Phone: 877 For Sadc (367-7232)
Phone: (914) 452-1305
Website: http://www.sadevco.com
E-Mail: sales@sadevco.com

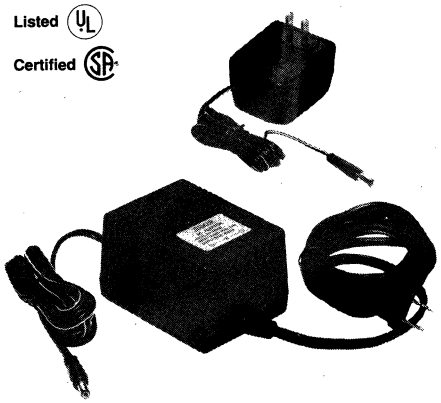
STANCOR® Wall Plug-In Power Sources

WALL PLUG-IN POWER SOURCES—DOMESTIC

DOMESTIC MODELS

Listed UL

Certified CSA



AC-AC MODELS INPUT 120V, 60 Hz.

STANCOR Part Number	Rated Output Volts	MA	Size
STA-3545B	4.5 AC	300	1
STA-4190B	9.0 AC	300	2
STA-4190D	9.0 AC	500	2
STA-4110	10.0 AC	700	2
STA-3512E •	12.0 AC	100	1
STA-3512F •	12.0 AC	200	1
STA-4112A	12.0 AC	500	2
STA-4812B •	12.0 AC	850	3
STA-4116	16.0 AC	250	2
STA-4118 •	18.0 AC	300	2
STA-4820 •	20.0 AC	700	3
STA-4124	24.0 AC	300	2
STA-4824B	24.0 AC	450	3

• UL listed only/not CSA certified.

DESK TOP MODELS

AC-DC UNREGULATED DESK TOP MODELS INPUT 120V, 60 Hz.

STANCOR Part Number	Rated Output Volts	MA	Size
STA-6690	9.0 DC	3000	7
STA-6612	12.0 DC	2000	7
STA-6612A	12.0 DC	2500	7
STA-6612B	12.0 DC	3000	7
STA-5713AC	13.5 DC	1700	4
STA-6013A	13.5 DC	2100	5
STA-6613	13.5 DC	2400	7
STA-6615	15.0 DC	2000	7
STA-6618	18.0 DC	2000	7
STA-6624	24.0 DC	1500	7

AC-AC DESK TOP MODELS INPUT 120V, 60 Hz.

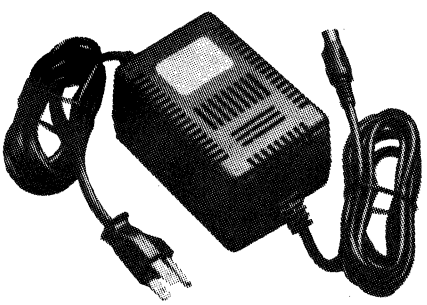
STANCOR Part Number	Rated Output Volts	MA	Size
STA-5760A •	6.0 AC	3300	4
STA-5790	9.0 AC	3400	4

AC-DC UNREGULATED MODELS 120V, 60 Hz.

STANCOR Part Number	Rated Output Volts	MA	Size
STA-3530A	3.0 DC	400	1
STA-3530	3.0 DC	500	1
STA-3540	4.4 DC	400	1
STA-3560B	6.0 DC	100	1
STA-3560	6.0 DC	200	1
STA-3560A	6.0 DC	300	1
STA-4160	6.0 DC	600	2
STA-4160A	6.0 DC	800	2
STA-4860	6.0 DC	1000	3
STA-4860A	6.0 DC	1200	3
STA-5760	6.0 DC	2000	4
STA-3575	7.5 DC	100	1
STA-3575A	7.5 DC	300	1
STA-4175A	7.5 DC	500	2
STA-4875	7.5 DC	1000	3
STA-5775	7.5 DC	1500	4
STA-3590B	9.0 DC	100	1
STA-3590	9.0 DC	200	1
STA-3590A	9.0 DC	300	1
STA-4190A	9.0 DC	500	2
STA-4190F	9.0 DC	700	2
STA-4890	9.0 DC	1000	3
STA-4890A	9.0 DC	1200	3
STA-3512	12.0 DC	50	1
STA-3512C	12.0 DC	100	1
STA-3512B	12.0 DC	200	1
STA-4112B	12.0 DC	300	2
STA-4112	12.0 DC	400	2
STA-4112C	12.0 DC	500	2
STA-4812D	12.0 DC	600	3
STA-4812A	12.0 DC	1000	3
STA-5712	12.0 DC	1200	4
STA-4812	12.5 DC	800	3
STA-5713	13.5 DC	1300	4
STA-5713A	13.5 DC	1700	4
STA-4814	14.5 DC	800	3
STA-4815	15.0 DC	600	3
STA-5715	15.0 DC	1000	4
STA-3518	18.5 DC	80	1
STA-4120	20.0 DC	280	2
STA-3524	24.0 DC	50	1

AC-DC REGULATED MODELS INPUT 120V, 60 Hz.

STANCOR Part Number	Rated Output Volts	MA	Size
STA-4130 •	3.0 DC	350	2
STA-4850	5.0 DC	600	9
STA-4190C •	9.0 DC	200	2
STA-4890B	9.0 DC	400	9
STA-4110A	10.0 DC	300	2
STA-300R	12.0 DC	200	2



POWER SOURCES

OUTPUT CONNECTOR DIAGRAM

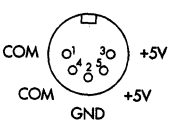


FIGURE 1
5 PIN DIN

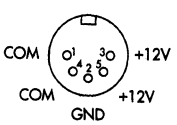


FIGURE 2
5 PIN DIN

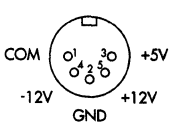
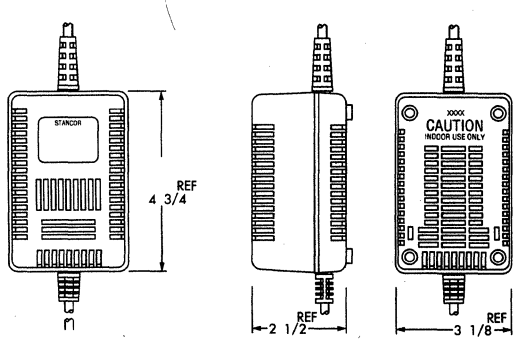


FIGURE 3
5 PIN DIN

REGULATED DC MODELS

STANCOR Part Number	Outputs 1	2	3	Secondary Connection
STAR-9001	+5VDC 1.0A	—	—	Figure 1
STAR-9002	+5VDC 1.5A	—	—	Figure 1
STAR-9003	+12VDC 1.0A	—	—	Figure 2
STAR-9004	+12VDC 1.2A	—	—	Figure 2
STAR-9005	+5VDC 0.8A	+12VDC 0.2A	-12VDC 0.2A	Figure 3
STAR-9006	+5VDC 1.0A	+12VDC 0.2A	-12VDC 0.2A	Figure 3
STAR-9007	+5VDC 1.0A	+12VDC 0.3A	-12VDC 0.3A	Figure 3

DIMENSIONS / OUTLINE DRAWING

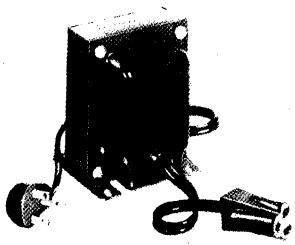


UL LISTED

STANCOR/WHITE RODGERS DIVISION • 9797 Reavis Rd. • St. Louis, MO 63123 • Phone 314-865-8799 • FAX 314-638-2400

STANCOR®

Transformers



AUTO TRANSFORMERS

STEP-DOWN RATIO

Ground safety type with case and core connected to third conductor of NEMA standard cord and receptacle. Primaries 230 VAC, 50/60 Hz secondaries 115 VAC. May be operated from a 400 Hz source with no charge in ouput ratings.

Stancor Number	Mfg. Style	VA	Size. Inches W. x D. x H.	Wt. Lbs.	MW MW x MD
GSD-75	C	75	$3^{3}/_{16}$ x $2^{3}/_{4}$ x $3^{7}/_{8}$	3.0	$2^{1}/_{2}$ x $1^{1}/_{2}$
GSD-100	C	100	$3^{3}/_{16}$ x 3 x $3^{7}/_{8}$	3.7	$2^{1}/_{2}$ x $1^{3}/_{4}$
GSD-150	C	150	$3^{3}/_{16}$ x $3^{1}/_{4}$ x $3^{7}/_{8}$	4.4	$2^{1}/_{2}$ x 2
GSD-250	C	250	$3^{3}/_{16}$ x $3^{5}/_{16}$ x $3^{7}/_{8}$	5.8	$2^{1}/_{2}$ x $2^{3}/_{8}$
GSD-350	C	350	$3^{3}/_{16}$ x $4^{5}/_{16}$ x $3^{7}/_{8}$	7.3	$2^{1}/_{2}$ x 3
GSD-500	C	500	$3^{13}/_{16}$ x $4^{7}/_{16}$ x $4^{5}/_{8}$	10.6	3 x $3^{1}/_{4}$
GSD-750	C	750	$3^{13}/_{16}$ x $5^{3}/_{16}$ x $4^{5}/_{8}$	14.4	3 x $4^{1}/_{8}$
GSD-1000	C	1000	$3^{13}/_{16}$ x 6 x $4^{5}/_{8}$	17.0	3 x 5
GSD-1500	C	1500	$4^{5}/_{8}$ x 6 x $5^{1}/_{2}$	20.0	$3^{1}/_{2}$ x $4^{1}/_{4}$

Primaries 230 VAC, 50/60 Hz secondaries 115 VAC. May be operated from a 400 Hz source with no change in output rating. NEMA standard line cord and female receptacle.

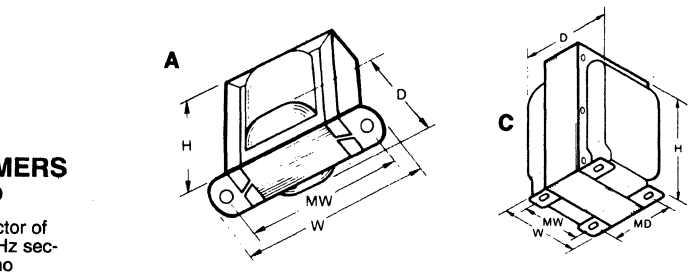
P-8620*	A	50	$3^{11}/_{16}$ x $1^{7}/_{8}$ x $2^{5}/_{16}$	1.5	$3^{1}/_{8}$
P-8630	C	85	$2^{5}/_{8}$ x $2^{3}/_{4}$ x $3^{1}/_{8}$	2.5	2 x $1^{3}/_{4}$
P-8631	C	125	$2^{5}/_{8}$ x 3 x $3^{1}/_{8}$	3.0	2 x 2
P-8632	C	200	$3^{1}/_{8}$ x $3^{1}/_{4}$ x $3^{7}/_{8}$	4.2	$2^{1}/_{2}$ x 2
P-8634	C	400	$3^{1}/_{8}$ x $4^{1}/_{4}$ x $3^{7}/_{8}$	7.0	$2^{1}/_{2}$ x 3

*Has lead wires instead of cord and receptacle.

STEP-UP

Primaries 115 VAC, 50/60 Hz secondaries 230 VAC. May be operated from a 400 Hz source with no change in output rating. NEMA standard line cord and female receptacle.

P-8637	C	85	$2^{5}/_{8}$ x $2^{3}/_{4}$ x $3^{1}/_{8}$	2.5	2 x $1^{3}/_{4}$
P-8638	C	125	$2^{5}/_{8}$ x 3 x $3^{1}/_{8}$	3.0	2 x 2
P-8639	C	300	$3^{1}/_{8}$ x $3^{7}/_{8}$ x $3^{7}/_{8}$	5.2	$2^{1}/_{2}$ x $2^{3}/_{8}$
P-8640	C	500	$3^{3}/_{4}$ x $4^{3}/_{4}$ x $4^{9}/_{16}$	10.3	3x$3^{5}/_{16}$
P-8689	C	1000	$3^{3}/_{4}$ x $6^{1}/_{8}$ x $4^{5}/_{8}$	17.0	3x$4^{15}/_{16}$



ISOLATION TRANSFORMERS

Transformers have NEMA standard line cord for primary receptacle for secondary, except where noted.

STRAIGHT ISOLATION

Case, core, and electrostatic sheild connected to third conductor of line cord for safety.

Stancor Number	Input Volts	Output Volts	Mfg. Style	VA	Size. Inches W. x D. x H.	MW MW x MD
GIS-100	115	115	C	100	$2^{13}/_{16}$ x$3^{9}/_{16}$x$3^{1}/_{2}$	$2^{1}/_{4}$x$2^{7}/_{16}$
GIS-150	115	115	C	150	$3^{3}/_{16}$ x$4^{3}/_{16}$x$3^{7}/_{8}$	$2^{1}/_{2}$x$2^{15}/_{16}$
GIS-250	115	115	C	250	$3^{3}/_{4}$ x$4^{3}/_{8}$x$4^{11}/_{16}$	3x$3^{3}/_{16}$
GIS-500	115	115	C	500	$3^{3}/_{4}$x6x$4^{11}/_{16}$	3x$4^{13}/_{16}$
GIS-1000	115	115	C	1000	$4^{3}/_{8}$ x$8^{1}/_{8}$x$5^{1}/_{2}$	$3^{1}/_{2}$x$6^{1}/_{2}$

STEP-DOWN ISOLATION

Case, core, and electrostatic sheild connected to third conductor of line cord for safety.

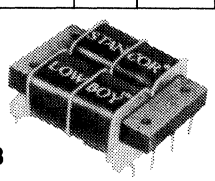
GISD-100	230	115	C	100	$2^{13}/_{16}$ x$3^{9}/_{16}$x$3^{1}/_{2}$	$2^{1}/_{4}$x$2^{7}/_{16}$
GISD-150	230	115	C	150	$3^{3}/_{16}$ x$4^{3}/_{16}$x$3^{7}/_{8}$	$2^{1}/_{2}$x$2^{15}/_{16}$
GISD-250	230	115	C	250	$3^{3}/_{4}$ x$4^{3}/_{8}$x$4^{11}/_{16}$	3x$3^{3}/_{16}$
GISD-500	230	115	C	500	$3^{3}/_{4}$x6x$4^{11}/_{16}$	3x$4^{13}/_{16}$
GISD-1000	230	115	C	1000	$4^{3}/_{8}$ x$8^{1}/_{8}$x$5^{1}/_{2}$	$3^{1}/_{2}$x$6^{1}/_{2}$

STRAIGHT ISOLATION

Electrostatic shield grounded to core.

P-6413*	115	115	A	0.6	$2^{1}/_{8}$ x$1^{1}/_{4}$x$1^{1}/_{4}$	$1^{3}/_{4}$
P-6411*	115	115	A	15	$3^{1}/_{4}$ x$1^{7}/_{8}$x2	$2^{13}/_{16}$
P-6412*	115	115	A	35	$3^{3}/_{4}$ x2x$2^{3}/_{8}$	$3^{1}/_{8}$
P-6410	115	115	C	50	$2^{13}/_{16}$x$3^{1}/_{8}$x$3^{1}/_{2}$	$2^{1}/_{4}$x$1^{7}/_{8}$

*Has lead wires. #Has selector Switch.



LOW BOY™ LOW-PROFILE POWER TRANSFORMERS

Case style. LB. Primaries are dual 115/230 volts. 50/60 Hz.

LB

Stancor Number	Secondary Series	Secondary Parallel	VA	Size. Inches H. x W. x D.	Stancor Number	Secondary Series	Secondary Parallel	VA	Size. Inches H. x W. x D.
LB210	10.0VCT@ 0.2A	5.0V@0.4A	2	0.625x1.562x1.875	**LB612**	12.6VCT@0.45A	6.3V@0.9A	6	0.875x1.562x1.875
LB310	10.0VCT@ 0.3A	5.0V@0.6A	3	0.625x1.562x1.875	**LB1212**	12.6VCT@0.9A	6.3V@1.8A	12	1.062x2.000x2.500
LB215	15.0VCT@ 0.15A	7.5V@0.3A	2	0.625x1.562x1.875	**LB616**	16.0VCT@0.35A	8.0V@0.7A	6	0.875x1.562x1.875
LB240	40.0VCT@ 0.06A	20.0V@0.12A	2	0.625x1.562x1.875	**LB1216**	16.0VCT@0.7A	8.0V@1.4A	12	1.062x2.000x2.500
LB256	56.0VCT@ 0.045A	28.0V@0.09A	2	0.625x1.562x1.875	**LB620**	20.0VCT@0.3A	10.0V@0.6A	6	0.875x1.562x1.875
LB288	88.0VCT@ 0.28A	44.0V@0.056A	2	0.625x1.562x1.875	**LB1220**	20.0VCT@0.6A	10.0V@1.2A	12	1.062x2.000x2.500
LB2120	120.0VCT@ 0.02A	60.0V@0.04A	2	0.625x1.562x1.875	**LB624**	24.0VCT@0.25A	12.0V@0.5A	6	0.875x1.562x1.875
LB2230	230VCT @ 0.01A	115V@0.02A	2	0.625x1.562x1.875	**LB1224**	24.0VCT@0.5A	12.0V@1.0A	12	1.062x2.000x2.500
LB315	15.0VCT@ .225A	7.5V@0.45A	3	0.625x1.562x1.875	**LB634**	34.0VCT@0.17A	17.0V@0.34A	6	0.875x1.562x1.875
LB410	10.0VCT@ 0.4A	5.0V@0.8A	4	0.875x1.562x1.875	**LB1234**	34.0VCT@0.34A	17.0V@0.68A	12	1.062x2.000x2.500
LB510	10.0VCT@ 0.5A	5.0V@1.0A	5	0.875x1.562x1.875	**LB640**	40.0VCT@0.15A	20.0V@0.3A	6	0.875x1.562x1.875
LB412	12.0VCT@ 0.333A	6.0V@0.667A	4	0.875x1.562x1.875	**LB1240**	40.0VCT@0.3A	20.0V@0.6A	12	1.062x2.000x2.500
LB512	12.0VCT@ 0.417A	6.0V@0.833A	5	0.875x1.562x1.875	**LB656**	56.0VCT@0.1A	28.0V@0.2A	6	0.875x1.562x1.875
LB420	20.0VCT@ 0.2A	10.0V@0.4A	4	0.875x1.562x1.875	**LB1256**	56.0VCT@0.2A	28.0V@0.4A	12	1.062x2.000x2.500
LB520	20.0VCT@ 0.25A	10.0V@0.5A	5	0.875x1.562x1.875	**LB688**	88.0VCT@0.065A	44.0V@0.13A	6	0.875x1.562x1.875
LB424	24.0VCT@ 0.167A	12.0V@0.333A	4	0.875x1.562x1.875	**LB1288**	88.0VCT@0.13A	44.0V@0.26A	12	1.062x2.000x2.500
LB524	24.0VCT@ 0.208A	12.0V@0.417A	5	0.875x1.562x1.875	**LB120**	120.0VCT@0.05A	60.0V@0.1A	6	0.875x1.562x1.875
LB4120	120.0VCT@ 0.33A	60.0V@0.066A	4	0.875x1.562x1.875	**LB12120**	120.0VCT@0.1A	60.0V@0.2A	12	1.062x2.000x2.500
LB5120	120.0VCT@ 0.42A	60.0VAK@0.084A	5	0.875x1.562x1.875	**LB6230**	230.0VCT@0.25A	115V@0.05A	6	0.875x1.562x1.875
LB610	10.0VCT@ 0.6A	5.0V@1.2A	6	0.875x1.562x1.875	**LB12230**	230.0VCT@0.05A	115V@0.1A	12	1.062x2.000x2.500
LB1210	10.0VCT@ 1.2A	5.0V@2.4A	12	1.062x2.000x2.500					

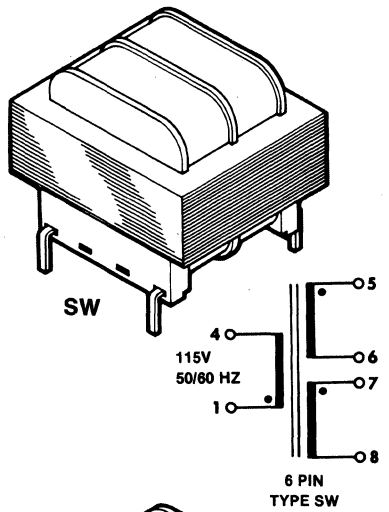
STANCOR®

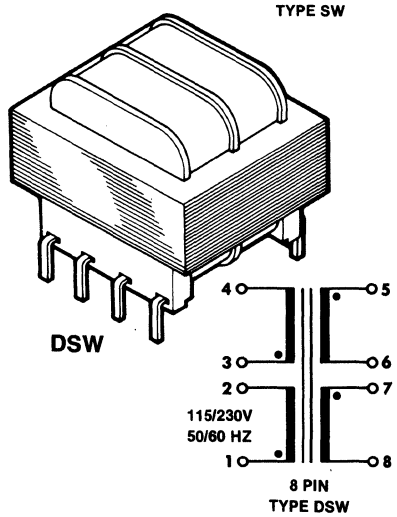
Transformers

"SIDE WINDER" SPLIT BOBBIN PC MOUNT POWER TRANSFORMERS
PRIMARY 115V 50/60Hz OR 115/230V 50/60Hz

Case style SW or DSW

Secondary Ratings		Size Inches H. x W. x D.	115 V Primary	115/230 V Primary
Series	Parallel		Stancor No.	Stancor No.
10.0 VCT at 0.11 A	5.0 V at 0.22 A	15/16 x 1 1/8 x 1 3/8	SW-210	DSW-210
10.0 VCT at 0.25 A	5.0 V at 0.5 A	1 3/16 x 1 1/8 x 1 3/8	SW-310	DSW-310
10.0 VCT at 0.6 A	5.0 V at 1.2 A	1 5/16 x 1 5/16 x 1 5/8	SW-410	DSW-410
10.0 VCT at 1.2 A	5.0 V at 2.4 A	1 7/16 x 1 9/16 x 1 7/8	SW-510	DSW-510
10.0 VCT at 2.0 A	5.0 V at 4.0 A	1 7/16 x 1 7/8 x 2 1/4	SW-610	DSW-610
12.6 VCT at 0.09 A	6.3 V at 0.18 A	15/16 x 1 1/8 x 1 3/8	SW-212	DSW-212
12.6 VCT at 0.2 A	6.3 V at 0.4 A	1 3/16 x 1 1/8 x 1 3/8	SW-312	DSW-312
12.6 VCT at 0.5 A	6.3 V at 1.0 A	1 5/16 x 1 5/16 x 1 5/8	SW-412	DSW-412
12.6 VCT at 1.0 A	6.3 V at 2.0 A	1 7/16 x 1 9/16 x 1 7/8	SW-512	DSW-512
12.6 VCT at 1.6 A	6.3 V at 3.2 A	1 7/16 x 1 7/8 x 2 1/4	SW-612	DSW-612
16.0 VCT at 0.07 A	8.0 V at 0.14 A	15/16 x 1/8 x 1 3/8	SW-216	DSW-216
16.0 VCT at 0.15 A	8.0 V at 0.3 A	1 3/16 x 1 1/8 x 1 3/8	SW-316	DSW-316
16.0 VCT at 0.4 A	8.0 V at 0.8 A	1 5/16 x 1 5/16 x 1 5/8	SW-416	DSW-416
16.0 VCT at 0.8 A	8.0 V at 1.6 A	1 7/16 x 1 9/16 x 1 7/8	SW-516	DSW-516
16.0 VCT at 1.25 A	8.0 V at 2.5 A	1 7/16 x 1 7/8 x 2 1/4	SW-616	DSW-616
20.0 VCT at 0.055 A	10.0 V at 0.11 A	15/16 x 1 1/8 x 1 3/8	SW-220	DSW-220
20.0 VCT at 0.12 A	10.0 V at 0.24 A	1 3/16 x 1 1/8 x 1 3/8	SW-320	DSW-320
20.0 VCT at 0.3 A	10.0 V at 0.6 A	1 5/16 x 1 5/16 x 1 5/8	SW-420	DSW-420
20.0 VCT at 0.6 A	10.0 V at 1.2 A	1 7/16 x 1 9/16 x 1 7/8	SW-520	DSW-520
20.0 VCT at 1.0 A	10.0 V at 2.0 A	1 7/16 x 1 7/8 x 2 1/4	SW-620	DSW-620
24.0 VCT at 0.045 A	12.0 V at 0.09 A	15/16 x 1 1/8 x 1 3/8	SW-224	DSW-224
24.0 VCT at 0.1 A	12.0 V at 0.2 A	1 3/16 x 1 1/8 x 1 3/8	SW-324	DSW-324
24.0 VCT at 0.25 A	12.0 V at 0.5 A	1 5/16 x 1 5/16 x 1 5/8	SW-424	DSW-424
24.0 VCT at 0.5 A	12.0 V at 1.0 A	1 7/16 x 1 9/16 x 1 7/8	SW-524	DSW-524
24.0 VCT at 0.8 A	12.0 V at 1.6 A	1 7/16 x 1 7/8 x 2 1/4	SW-624	DSW-624
28.0 VCT at 0.04 A	14.0 V at 0.08 A	15/16 x 1 1/8 x 1 3/8	SW-228	DSW-228
28.0 VCT at 0.085 A	14.0 V at 0.17 A	1 3/16 x 1 1/8 x 1 3/8	SW-328	DSW-328
28.0 VCT at 0.2 A	14.0 V at 0.4 A	1 5/16 x 1 5/16 x 1 5/8	SW-428	DSW-428
28.0 VCT at 0.42 A	14.0 V at 0.84 A	1 7/16 x 1 9/16 x 1 7/8	SW-528	DSW-528
28.0 VCT at 0.7 A	14.0 V at 1.4 A	1 7/16 x 1 7/8 x 2 1/4	SW-628	DSW-628
32.0 VCT at 0.035 A	16.0 V at 0.07 A	15/16 x 1 1/8 x 1 3/8	SW-232	DSW-232
32.0 VCT at 0.075 A	16.0 V at 0.15 A	1 3/16 x 1 1/8 x 1 3/8	SW-332	DSW-332
32.0 VCT at 0.188 A	16.0 V at 0.376 A	1 5/16 x 1 5/16 x 1 5/8	SW-432	DSW-432
32.0 VCT at 0.375 A	16.0 V at 0.750 A	1 7/16 x 1 9/16 x 1 7/8	SW-532	DSW-532
32.0 VCT at 0.625 A	16.0 V at 1.25 A	1 7/16 x 1 7/8 x 2 1/4	SW-632	DSW-632
36.0 VCT at 0.03 A	18.0 V at 0.06 A	15/16 x 1 1/8 x 1 3/8	SW-236	DSW-236
36.0 VCT at 0.065 A	18.0 V at 0.13 A	1 3/16 x 1 1/8 x 1 3/8	SW-336	DSW-336
36.0 VCT at 0.17 A	18.0 V at 0.34 A	1 5/16 x 1 5/16 x 1 5/8	SW-436	DSW-436
36.0 VCT at 0.35 A	18.0 at 0.7 A	1 7/16 x 1 9/16 x 1 7/8	SW-536	DSW-536
36.0 VCT at 0.55 A	18.0 V at 1.1 A	1 7/16 x 1 7/8 x 2 1/4	SW-636	DSW-636
48.0 VCT at 0.023 A	24.0 V at 0.046 A	15/16 x 1 1/8 x 1 3/8	SW-248	DSW-248
48.0 VCT at 0.05 A	24.0 V at 0.1 A	1 3/16 x 1 1/8 x 1 3/8	SW-348	DSW-348
48.0 VCT at 0.125 A	24.0 V at 0.25 A	1 5/16 x 1 5/16 x 1 5/8	SW-448	DSW-448
48.0 VCT at 0.25 A	24.0 V at 0.5 A	1 7/16 x 1 9/16 x 1 7/8	SW-548	DSW-548
48.0 VCT at 0.4 A	24.0 V at 0.8 A	1 7/16 x 1 7/8 x 2 1/4	SW-648	DSW-648
56.0 VCT at 0.02 A	28.0 V at 0.04 A	15/16 x 1 1/8 x 1 3/8	SW-256	DSW-256
56.0 VCT at 0.045 A	28.0 V at 0.09 A	1 3/16 x 1 1/8 x 1 3/8	SW-358	DSW-356
56.0 VCT at 0.11 A	28.0 V at 0.22 A	1 5/16 x 1 5/16 x 1 5/8	SW-456	DSW-456
56.0 VCT at 0.22 A	28.0 V at 0.44 A	1 7/16 x 1 9/16 x 1 7/8	SW-556	DSW-556
56.0 VCT at 0.35A	28.0 V at 0.7 A	1 7/16 x 1 7/8 x 2 1/4	SW-656	DSW-656
120 VCT at 0.01 A	60.0 V at 0.02 A	15/16 x 1 1/8 x 1 3/8	SW-2120	DSW-2120
120 VCT at 0.02 A	60.0 V at 0.04 A	1 3/16 x 1 1/8 x 1 3/8	SW-3120	DSW-3120
120 VCT at 0.05 A	60.0 V at 0.1 A	1 5/16 x 1 5/16 x 1 5/8	SW-4120	DSW-4120
120 VCT at 0.1 A	60.0 V at 0.2 A	1 7/16 x 1 9/16 x 1 7/8	SW-5120	DSW-5120
120 VCT at 0.16 A	60.0 V at 0.32 A	1 7/16 x 1 7/8 x 2 1/4	SW-6120	DSW-6120

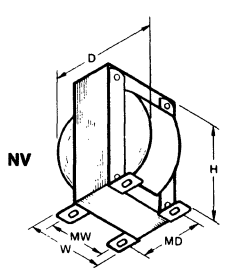




UNIVERSAL RECTIFIER TRANSFORMERS

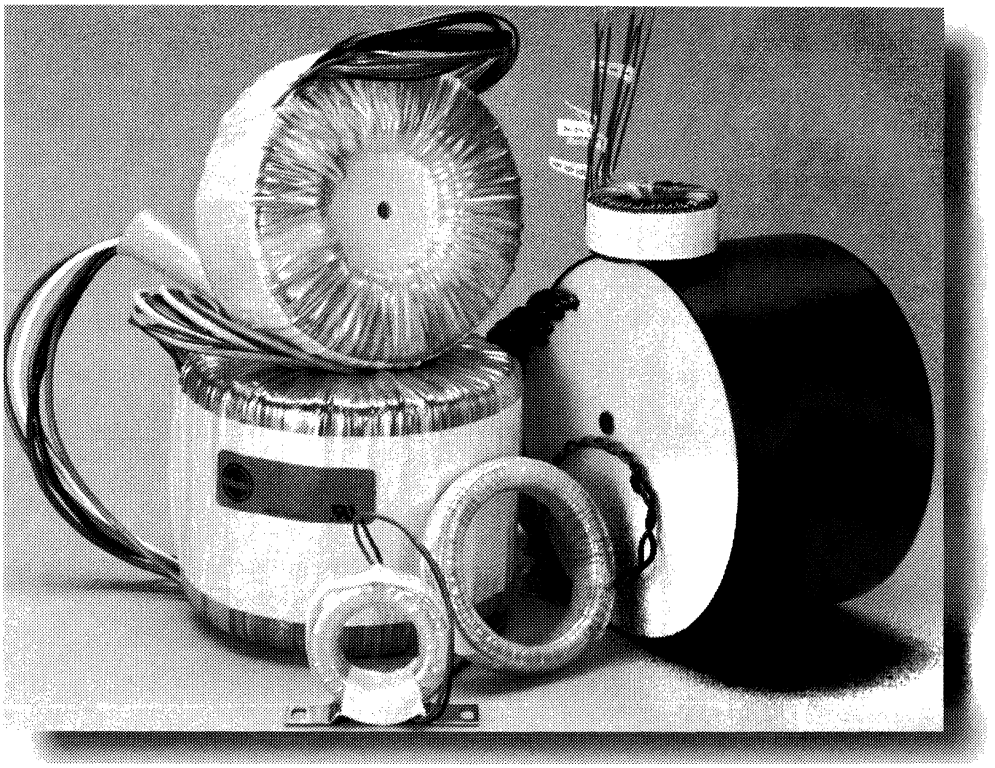
The 117 VAC primary is connected to terminals 1 to 2, 3 or 4. The separate winding 5, 6, and 7 may be used in series with the primary to raise or lower the secondary voltage output. Transformers are designed for 50-60 Hz operations, but may also be operated at 400 Hz. Case style is NV with solder lug terminations.

Stancor Number	Approx. Applies VAC Under Load	Max. DC Output				Filter Capacitor µF	Dimensions				
		Resistive or Induct Load		Capacitive Load							
		Volts	Amps	Volts	Amps		H	W	D	MW	MD
RT-201	11.7-29.4 *	11.2	2.0	13.8	2.0	1000	3 1/8	2 1/2	2 3/8	2	2 1/8
	11.1-28.5†	23.0	1.25	30.0	1.25	500					
RT-202	12.0-29.8*	11.1	4.0	14.7	4.0	2000	3 7/16	2 13/16	2 3/4	2 1/4	2 3/8
	12.0-29.8 †	24.3	2.0	33.0	2.0	1000					
RT-204	11.7-29.2*	12.0	8.0	14.5	8.0	4000	3 13/16	3 1/8	3 7/8	2 1/2	2 7/8
	11.6-29.2 †	24.0	4.0	32.4	4.0	2000					
RT-206	12.0-29.7 *	11.5	12.0	14.4	12.0	6000	4 5/16	3 7/16	4 1/4	2 3/4	3 1/4
	12.0-29.7 †	24.0	6.0	32.0	6.0	3000					
RT-208	12.1-29.2*	11.4	15.0	14.8	15.0	7500	4 9/16	3 3/4	5	2 15/16	3 3/4
	12.1-29.2 †	23.7	8.0	32.5	8.0	4000					
RT-2012	12.2-29.0 *	11.4	22.5	14.3	22.5	12000	5 5/16	4 3/8	5 7/8	3 1/2	4 1/4
	12.2-29.0 †	23.5	12.0	33.0	12.0	6000					
RT-402	23.0-58.0 *	25.0	4.0	33.5	4.0	3000	3 13/16	3 1/8	4 1/2	2 1/2	3 1/16
	23.0-58.0 †	51.5	2.0	72.5	2.0	15000					
RT-408	25.0-54.1 *	23.4	12.0	32.0	12.0	4000	5 5/16	4 3/8	6 3/4	3 1/2	5 1/4
	25.0-54.1 †	46.3	8.0	66.8	8.0	4000					



Welcome To The World Of Talema...

TOROIDAL COMPONENTS



Talema Electronic, Inc. is a member of the Talema Group of Companies with manufacturing locations in the United States, Ireland, Czech Republic, and India. Today, the Talema group is the world's largest producer of toroidal transformers, the majority of which are custom designed, although a comprehensive range of standard products is available. By combining 50 years cumulative design and manufacturing experience, strict adherence to exacting quality standards, and the use of the finest materials available – Talema has become a world leader in toroidal transformers.

Modern, highly developed production techniques allow for today's toroidal transformer to be competitively priced when compared to similarly rated conventional types. Considering the advantages resultant from the near ideal construction, an accurately specified toroidal transformer can be the most economical approach to compact power supply design. As you'll see on the following pages, just a few of the primary advantages are:

- Low weight
- Small size
- Low magnetic interference
- Low audible noise
- Reduced idling currents

Give us a call today and find out more about the Talema Electronic advantage.

talema

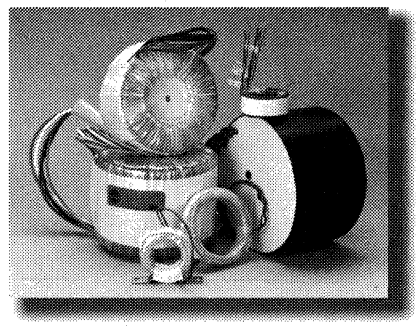
#3 Industrial Park Drive
P.O. Box 306
St. James, Missouri 65559
573-265-5500
E-Mail: talema@talema.com
FAX: 573-265-3350
http://www.talema.com

talema electronic • 573-265-5500

TOROIDAL COMPONENTS

TECHNICAL INFORMATION

Custom Designed Toroidal Transformers



Working in close partnership with equipment designers, Talema uses its technological expertise to create transformers which are as much a part of the original equipment design as any other element of the final product. By operating this way, Talema provides the optimum response to highly specific requirements across a wide spectrum of applications including professional audio equipment, medical equipment, test and measurement instruments, motor controls, and specialty lighting.

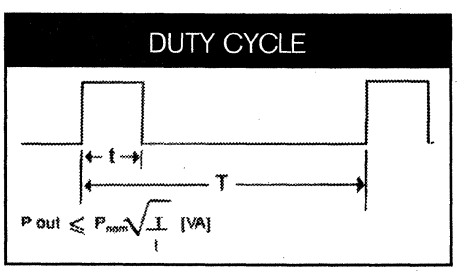
We begin the process by working closely with the equipment designer to create the transformer specifications. Often, our engineering staff will evaluate other key components of the end product design to accurately specify power requirements, duty cycle, temperature rise, and mechanical requirements, in order to optimize transformer performance within the lowest possible cost framework. Then, by utilizing proprietary design software, our engineers can quickly and accurately design the appropriate toroidal transformer for the application.

While temperatures rise, duty cycle, and efficiency are considerations when specifying either toroidal or conventional transformers, the designer should be particularly aware of core quality, radiated magnetic fields, and safety requirements when specifying torodial transformers in order to fully realize their performance advantages and economy. Talema's engineers utilize their extensive experience to assist the equipment designer in control of these areas.

TEMPERATURE RISE

Standard toroidal transformers are designed for a temperature rise of 40-60° C at nominal load. When a transformer is being specified, the ambient temperature, mounting configuration, ventilation, and load duty cycle must be considered to determine the maximum allowable temperature rise and the optimum size and weight of the transformer. If the allowable space for the transformer dictates a smaller, hotter running design, then UL Recognized Class B (130°C) and Class F (155°C) insulation systems are available.

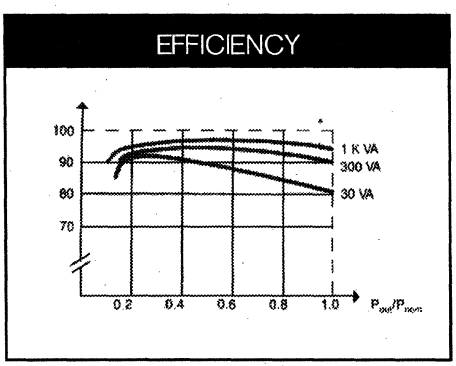
DUTY CYCLE



If the load is intermittent, then a smaller transformer can be used. In this case, the output power significantly exceeds the nominal power thus the secondary voltage will drop at a rate which increases in proportion to the current being drawn. If intermittent use is specified, Talema design engineers can approximate the duty cycle coefficient which is used in the design process to optimize the size and weight of the transformer.

EFFICIENCY

Transformer efficiency can be expressed as a function of the relationship between output power versus nominal power (Pout/Pnom), and transformer size. The following diagram shows typical efficiencies for 30VA, 300VA, and 1KVA transformers wound on standard core geometries.



#3 Industrial Park Drive
P.O. Box 306
St. James, Missouri 65559
573-265-5500
E-Mail: talema@talema.com
FAX: 573-265-3350
http://www.talema.com

talema electronic • 573-265-5500

TECHNICAL INFORMATION

TOROIDAL COMPONENTS

THE CORE

For most applications in the frequency range from 48Hz to 450Hz, a toroidal tapewound core is utilized. The core is tightly wound onto a cylindrical mandrel from a continuous strip of grain oriented silicon steel. Spot welding the beginning and end prevents loosening. Any stresses (introduced by the winding process) which cause unacceptable core loss are relieved by annealing the wound core in a dry nitrogen atmosphere. The result is a stable, predictable core, free from discontinuities, holes, clamps, and gaps.

Talema has invested heavily to provide extensive core manufacturing, annealing, and testing facilities. Using high grade grain oriented electrical steel, with typical losses of 0.70 watts/lb at 1.7 Tesla, the core is manufactured in house under strict process controls in order to maintain the superior performance of the high grade steel.

By virtue of its very basic construction, the geometry of the toroidal tapewound core is easily altered without special setups or custom tooling. Talema engineers are able to utilize a wide range of diameter to height ratios, giving the equipment designer tremendous flexibility in achieving the ultimate level of performance within a specific volume. To approximate the size and weight of transformers from 30VA to 7500VA, use the adjacent chart which provides dimensions, weight, and core losses for typical 50/60Hz transformers.

Output Power	Core Loss	Copper Loss typical		Dimensions mm		Wt.
		T=20°C	T=120°C			
VA	W	W	W	O.D.	Height	kg
15	0.20	2.4	3.3	60	31	0.3
30	0.25	4.6	6.4	72	32	0.5
50	0.44	5.9	8.3	82	35	0.7
80	0.50	9.6	13.2	95	36	1.0
120	0.75	11.7	16.4	95	45	1.3
160	1.00	16.7	23.3	115	40	1.5
225	1.40	17.0	24.0	115	48	2.0
300	2.00	19.0	26.0	115	58	2.4
500	2.50	25.0	35.0	140	60	3.7
625	2.90	31.0	43.0	160	48	4.4
800	3.80	33.0	46.0	160	60	5.5
1000	4.70	34.0	47.0	160	72	6.6
1300	5.70	46.0	65.0	200	65	8.8
1600	7.10	48.0	67.0	200	75	10.5
1900	8.20	50.0	69.0	200	85	12.0
2200	11.50	57.0	79.0	220	85	14.8
2500	12.50	61.0	85.0	245	80	15.2
2800	12.60	69.0	96.0	245	80	16.0
3200	12.90	70.0	97.0	245	90	18.6
3700	15.00	73.0	102.0	245	100	21.2
4400	16.20	84.0	116.0	275	95	24.5
5000	19.00	87.0	120.0	275	105	28.0
6000	23.00	97.0	135.0	290	120	31.0
7500	27.50	110.0	153.0	320	100	39.0

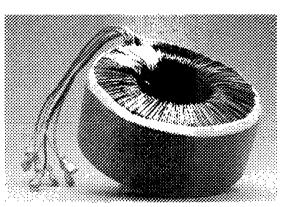
RADIATED MAGNETIC FIELDS

Achieving low levels of stray magnetic fields is often essential for the equipment designer, as this phenomenon can create unwanted noise through interference with sensitive electronic components.

Due to the absence of gaps in the core or discontinuities in the grain orientation of the silicon steel, a toroidal transformer generally offers a reduction of 8:1 in magnetic interference levels when compared to conventional transformers. However, the engineer should be aware of the need to locate the transformer away from sensitive circuitry. Occasionally, the only solution is to separate the transformer entirely by mounting in a remote enclosure, but this can be costly and undesirable.

Talema's engineering staff has extensive experience in solving this type of problem, and has developed several successful techniques to further reduce stray magnetic fields. These include:

- Combining lower operational flux density with special winding techniques
- Using special production techniques to minimize gaps in windings
- Applying a low cost silicon steel perimeter shield, built into the transformer, to further reduce stray field by and order of eight to ten times. (See photo to right).



SAFETY STANDARDS

Compliance to the appropriate safety agency standards is a vital consideration when specifying a transformer due to the impact on performance, construction, selection of materials, and ultimately cost. Talema's engineering staff works closely with the equipment designer to select the component level standards which will most economically assist in securing end product approvals.

Our facility is certified to manufacture transformers recognized to UL506, General Purpose Transformers (reference file E145880) and UL544, Medical and Dental Equipment (reference file E123838). Typically, custom transformers up to 3000VA are eligible to bear the UR symbol of recognition without expensive, time consuming applications. Talema also holds recognitions to UL1411, UL1950, UL478, and IEC435, as well as a letter of compliance from TUV Rheinland for standards EN60950 and EN6061-1, and certification to CSA 22.2 No. 66. Other agency approvals are available upon request.

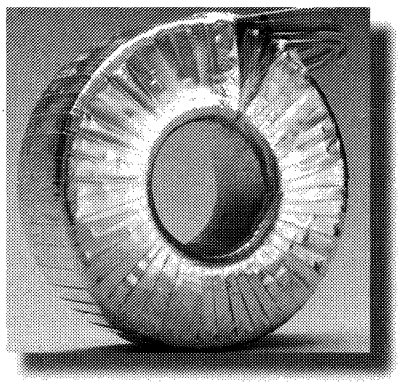
#3 Industrial Park Drive
P.O. Box 306
St. James, Missouri 65559
573-265-5500
E-Mail: talema@talema.com
FAX: 573-265-3350
http://www.talema.com

talema electronic • 573-265-5500

TOROIDAL COMPONENTS

TECHNICAL INFORMATION

Medical Applications



Talema has vast experience designing toroidal transformers to meet the requirements of UL544, IEC601 and UL2601. Talema offers UL Recognition of transformers to UL544 (XORU2), per file E123838. The most important aspects of designing transformers to these safety standards are construction, leakage current, and abnormal operation. Permissible types of construction are defined in the Transformer Construction sections.

CONSTRUCTION

Unless the customer dictates otherwise, Talema will use construction employing either a thermal protective device in combination with a copper shield, or, a thermal protective device with sufficient insulation. These are for patient-care equipment.

The first method is satisfied by using a 0.005" thick copper shield between primaries and secondaries, in combination with thermal protection. Some medical device manufacturers prefer this type of construction because the copper shield is considered a fail-safe protection against electrical shock. However, this approach adds cost and may be unnecessary.

A more economical approach is construction per the second method, which is satisfied by using thermal protection in combination with three layers of insulation, of which any two layers pass a 3500 volt, 60Hz, dielectric withstand test. This amount of insulation is often needed regardless, due to leakage current.

LEAKAGE CURRENT

Leakage current is that current which can be conducted through the patient's body if the protective ground to the wall power cord is broken. Toroidal transformers can contribute leakage current through two paths; from primary to secondary, and from primary to the mounting surface. Drawing on years of experience, Talema engineers can design toroidal transformers and mounting techniques that will minimize the transformer's contribution to system leakage. The equipment designer must also account for other system components the contribute leakage such as power cords, switches, line filters, and fuse holders.

ABNORMAL OPERATION

Sections in the UL standards describe tests which the transformer will be subjected to in order to confirm that abnormal operation (which the system may encounter in actual service) will not present a shock or fire hazard to the patient or operator. Equipment designers should investigate the possible abnormal tests UL may perform on their particular system, then contact Talema engineers for assistance in creating the transformer specifications. Working together with our engineers, equipment designers can be assured of accurate, functional, UL544 and UL2601 Recognized transformers without multiple iterations, thereby cutting development costs.

Standard Products

In addition to custom designed toroidal transformers, Talema offers a comprehensive line of standard toroidal transformers, coils and chokes. Our UL recognized standard power transformers are available in single or dual primary configurations, with power ratings from 30VA to 1000VA (300VA, dual primary). For lower power applications where printed circuit mounting is desirable, Talema offers a line of fully encapsulated PC transformers in ratings from 1.6VA to 50VA (1.6VA through 25VA are UL and VDE approved). Talema also offers an extensive line of higher frequency torodial components for switching power supplies, current sensing, common mode filtering, DC-DC converters, switching regulators, and other applications. For more information about these products, see our catalog pages or give us a call.

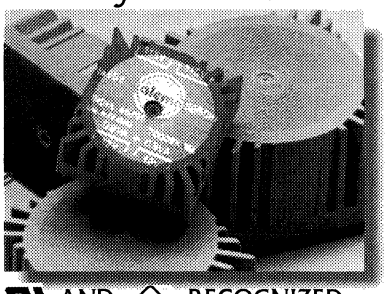
#3 Industrial Park Drive
P.O. Box 306
St. James, Missouri 65559
573-265-5500
E-Mail: talema@talema.com
FAX: 573-265-3350
http://www.talema.com

talema electronic • 573-265-5500

TECHNICAL INFORMATION

TOROIDAL COMPONENTS

Standard Toroidal Transformer, PC Mount, Low Profile Primary 2 x 115V



FEATURES

- Dual primaries 115/230V, 50/60Hz
- Primaries or secondaries can be series or parallel
- Fully encapsulated for durability
- Low magnetic interference fields
- High efficiency

APPLICATIONS

- High end audio equipment
- Video monitors
- Medical equipment

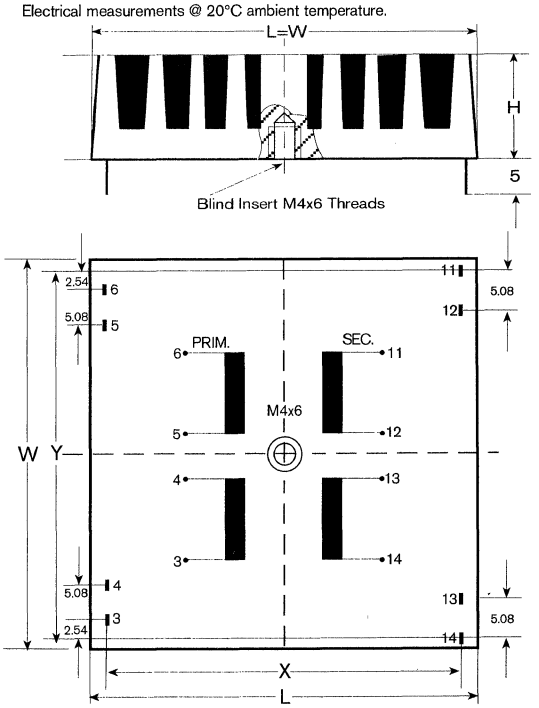
UL AND VDE RECOGNIZED

Power VA	Part Number	Sec. Full Load V	Current mA	Open Circuit V
1.6	70000	2x7	114	2x9.3
	70001	2x9	89	2x12.0
	70002	2x12	67	2x16.0
	70003	2x15	53	2x20.0
	70004	2x18	44	2x23.9
	70005	2x22	36	2x29.3
3.2	70010	2x7	229	2x10.1
	70011	2x9	178	2x13.0
	70012	2x12	133	2x17.3
	70013	2x15	107	2x21.6
	70014	2x18	89	2x25.9
	70015	2x22	73	2x31.7
5.0	70020	2x7	357	2x10.3
	70021	2x9	278	2x13.2
	70022	2x12	208	2x17.6
	70023	2x15	167	2x22.1
	70024	2x18	139	2x26.5
	70025	2x22	114	2x32.3
7.0	70030	2x7	500	2x9.5
	70031	2x9	389	2x12.2
	70032	2x12	292	2x16.2
	70033	2x15	233	2x20.3
	70034	2x18	194	2x24.3
	70035	2x22	159	2x29.7
10.0	70040	2x7	714	2x8.5
	70041	2x9	556	2x11.0
	70042	2x12	417	2x14.6
	70043	2x15	333	2x18.3
	70044	2x18	278	2x22.0
	70045	2x22	227	2x26.8
15.0	70050	2x7	1071	2x8.7
	70051	2x9	833	2x11.2
	70052	2x12	625	2x14.9
	70053	2x15	500	2x18.6
	70054	2x18	417	2x22.0
	70055	2x22	341	2x27.3
25.0	70060	2x7	1785	2x8.3
	70061	2x9	1377	2x10.7
	70062	2x12	1041	2x14.3
	70063	2x15	832	2x17.8
	70064	2x18	694	2x21.4
	70065	2x22	568	2x26.2
35.0	70070	2x7	2500	2x8.2
	70071	2x9	1944	2x10.6
	70072	2x12	1458	2x14.1
	70073	2x15	1166	2x17.7
	70074	2x18	972	2x21.2
	70075	2x22	795	2x25.9
50.0	70080	2x7	3571	2x8.1
	70081	2x9	2777	2x10.4
	70082	2x12	2083	2x13.9
	70083	2x15	1666	2x17.3
	70084	2x18	1388	2x20.8
	70085	2x22	1136	2x25.4

Power VA	Dimensions L x W x H mm	Pin Layout XY mm	Pin Layout Pin Size mm	Weight Total gr	Weight Cu gr	Reg. ΔV/Sec %
1.6	39.6x39.6x18.5	35.56	1.0x0.5	82	20	29
3.2	44.7x44.7x19.5	40.64	1.0x0.5	110	26	43
5.0	49.7x49.7x19.5	45.72	1.0x0.5	144	33	40
7.0	49.7x49.7x23.1	45.72	1.0x0.5	174	36	34
10.0	55.0x55.0x26.0	50.80	1.0x0.5	252	45	20
15.0	60.0x60.0x26.3	55.88	1.0x0.5	304	57	23
25.0	60.0x60.0x37.5	55.88	1.0x0.5	435	85	19
35.0	72.0x72.0x37.5	66.04	1.0x1.0	525	187	17.7
50.0	82.4x82.4x37.5	76.20	1.0x1.0	685	209	15.5

Electrical measurements @ 20°C ambient temperature.

STANDARD OUTPUTS



Primary-secondary test voltage 4.0kV in accordance with IEC742, VDE0551 and EN6072. Primaries and secondaries for parallel or series connection. Ambient operating temperature: +60°C maximum. Recognized for Class A (105°C) and meets all requirements of Class E (125°C). UL and VDE recognized for P/N's 70000 through 70065. Other types available upon request.

talema

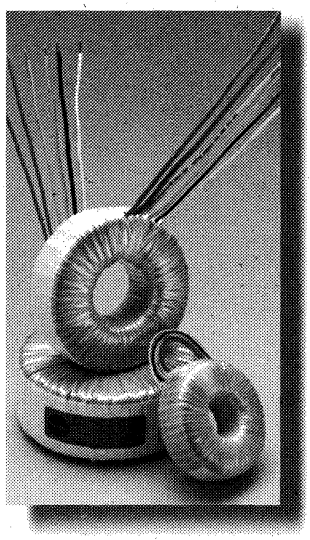
#3 Industrial Park Drive
P.O. Box 306
St. James, Missouri 65559
573-265-5500
E-Mail: talema@talema.com
FAX: 573-265-3350
http://www.talema.com

talema electronic • 573-265-5500

TOROIDAL COMPONENTS

TECHNICAL INFORMATION

Talema's comprehensive range of standard toroidal transformers feature compact size, low weight, lower magnetic strayfield, and improved efficiency when compared to similarly, and improved efficiency when compared to similarly rated conventional types. Available in either dual primary 117/234V, 50/60Hz or single primary 117V, 60Hz models.



117/234 Volt, 50/60 Hz Standards

FEATURES

- Primaries or secondaries can be series or parallel
- Recognized to UL506 General Purpose Transformers
- Provided with mounting disk and pads
- Flexible leads, center potting, or perimeter shielding available upon request

UL RECOGNIZED

PART NUMBER		SECONDARY DATA			Dimensions and Weight with Centering Washers		
		Full Load Voltage	No Load Voltage	Current Each Sec	Ømm	HTmm	WTkg
30VA	UR2030-2-015	2x15	2x18.6	1.00	72	32	0.48
	UR2030-2-018	2x18	2x21.6	0.84			
	UR2030-2-117	2x117	2x145.6	0.13			
50VA	UR2050-2-015	2x15	2x17.5	1.70	82	35	0.67
	UR2050-2-018	2x18	2x20.6	1.40			
	UR2050-2-117	2x117	2x133.8	0.21			
80VA	UR2080-2-015	2x15	2x17.3	2.70	95	36	0.92
	UR2080-2-018	2x18	2x20.9	2.30			
	UR2080-2-117	2x117	2x134.8	0.34			
120VA	UR2120-2-012	2x12	2x13.5	5.00	95	45	1.20
	UR2120-2-015	2x15	2x16.9	4.00			
	UR2120-2-018	2x18	2x20.3	3.30			
	UR2120-2-117	2x117	2x132.1	0.51			
160VA	UR2160-2-012	2x12	2x13.6	6.70	115	40	1.50
	UR2160-2-015	2x15	2x17.0	5.40			
	UR2160-2-018	2x18	2x20.1	4.50			
	UR2160-2-117	2x117	2x131.5	0.70			
225VA	UR2225-2-012	2x12	2x13.1	9.40	115	48	1.90
	UR2225-2-015	2x15	2x16.8	7.50			
	UR2225-2-018	2x18	2x20.0	6.30			
	UR2225-2-117	2x117	2x127.7	1.00			
300VA	UR2300-2-012	2x12	2x13.2	12.50	115	58	2.50
	UR2300-2-015	2x15	2x16.4	10.00			
	UR2300-2-018	2x18	2x19.5	8.30			
	UR2300-2-017	2x117	2x127.5	1.30			

#3 Industrial Park Drive
P.O. Box 306
St. James, Missouri 65559
573-265-5500
E-Mail: talema@talema.com
FAX: 573-265-3350
http://www.talema.com

talema electronic • 573-265-5500

TECHNICAL INFORMATION

TOROIDAL COMPONENTS

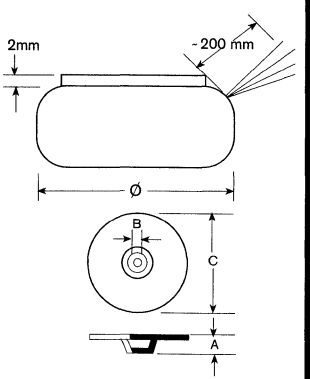
117 Volt, 60 Hz Standards

- Recognized to UL1411 Radio and Television Equipment and UL 506 General Purpose Transformers
- Conservative 45 Deg C temperature rise at rated load current
- Provided with mounting disk and pads
- Flexible leads, center potting, or perimeter shielding available on request

FEATURES

UL RECOGNIZED

PART NUMBER		SECONDARY DATA			Dimensions and Weight with Centering Washers		
		Full Load Voltage	No Load Voltage	Current	Ømm	Height/mm	Weight/kg
30VA	UR0030-2-010	2x10	2x11.9	1.50	72	32	0.48
	UR0030-2-012	2X12	2X14.7	1.25			
	UR0030-2-015	2X15	2X17.8	1.00			
	UR0030-2-018	2X18	2X21.4	0.83			
50VA	UR0050-1-117	117	135.8	0.43	82	35	0.67
	UR0050-2-010	2x10	2x11.6	2.50			
	UR0050-2-012A	2x12	2x14.4	2.08			
	UR0050-2-015	2x15	2x17.4	1.60			
	UR0050-2-020	2x20	2x23.2	1.25			
80VA	UR0080-1-117	117	135.8	0.68	95	36	0.92
	UR0080-2-012	2x12	2x14.4	3.33			
	UR0080-2-018	2x18	2x20.9	2.20			
	UR0080-2-022	2x22	2x25.5	1.80			
	UR0080-2-030	2x30	2x34.8	1.30			
120VA	UR0120-1-117	117	132.3	1.00	95	45	1.2
	UR0120-2-012	2x12	2x13.9	5.00			
	UR0120-2-018	2x18	2x20.4	3.30			
	UR0120-2-022	2x22	2x24.9	2.70			
	UR0120-2-030	2x30	2x34.5	2.00			
160VA	UR0160-1-117	117	133.3	1.37	115	40	1.5
	UR0160-2-012	2x12	2x14.1	6.67			
	UR0160-2-018	2x18	2x20.5	4.40			
	UR0160-2-022	2x22	2x25.1	3.60			
	UR0160-2-030	2x20	2x34.2	2.60			
225VA	UR0225-1-117	117	131.0	1.90	115	48	1.9
	UR0225-2-012	2x12	2x13.8	9.38			
	UR0225-2-030	2x30	2x33.7	3.70			
300VA	UR0300-1-117	117	128.0	2.60	115	58	2.5
	UR0300-2-012	2x12	2x13.4	12.50			
	UR0300-2-030	2x30	2x32.9	5.00			
500VA	UR0500-1-117	117	126.5	4.30	140	60	3.6
	UR0500-2-024	2x24	2x25.9	10.40			
	UR0500-2-030	2x30	2x32.4	8.30			
	UR0500-2-060	2x60	2x65.2	4.20			
625VA	UR0625-1-117	117	127.0	5.30	160	48	4.4
	UR0625-2-024	2x24	2x26.0	13.0			
	UR0625-2-030	2x30	2x32.7	10.40			
	UR0625-2-060	2x60	2x65.0	5.20			
800VA	UR0800-1-117	117	125.2	6.80	160	60	5.6
	UR0800-2-024	2x24	2x25.5	16.70			
	UR0800-2-030	2x30	2x32.2	13.30			
	UR0800-2-060	2x60	2x64.0	6.70			
1000VA	UR1000-1-117	117	123.4	8.50	160	72	6.7
	UR1000-2-024	2x24	2x25.6	20.80			
	UR1000-2-030	2x30	2x31.4	16.70			



CENTERING WASHER mm

Power	A	B	C	Mtg. Torque IN-LB
30-50	4	6.7	60	7
80-120	6	6.7	70	10
160-300	6	6.7	90	15
500-625	6	6.7	112	15
800-1000	10	13	145	18

talema

#3 Industrial Park Drive
P.O. Box 306
St. James, Missouri 65559
573-265-5500
E-Mail: talema@talema.com
FAX: 573-265-3350
http://www.talema.com

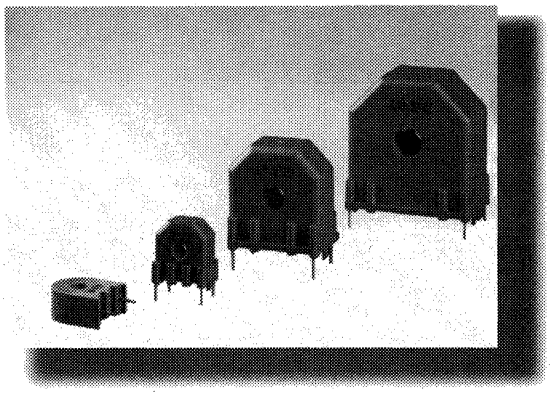
talema electronic • 573-265-5500

TECHNICAL INFORMATION

ASM SERIES

Current Sensors for 50/60 Hz

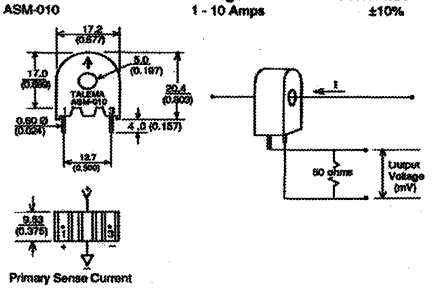
ASM Series current sensors operate as the sealed secondary of a current transformer while the conductor carrying the current to be measured functions as a one turn primary. Measurement accuracy can be improved by increasing the number of primary turns. Applications include detection of branch circuit overload and load drop or shutdown.



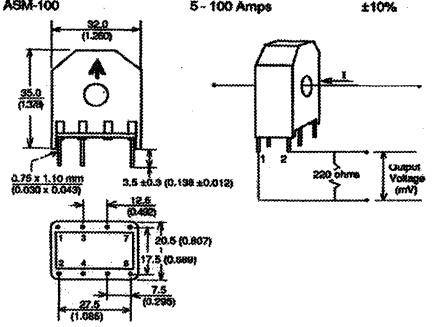
FEATURES

- Fully encapsulated for optimal PC board mounting
- Mains frequency of 50/60 Hz
- Primary current rating from 1 to 100 Amps
- Primary to secondary isolated to 2500 VAC
- Operating temperature range: -40 degrees C to + 120 degrees C
- UL94, VO recognized materials
- Competitive pricing due to high volume production
- Manufactured in ISO-9000 approved facility

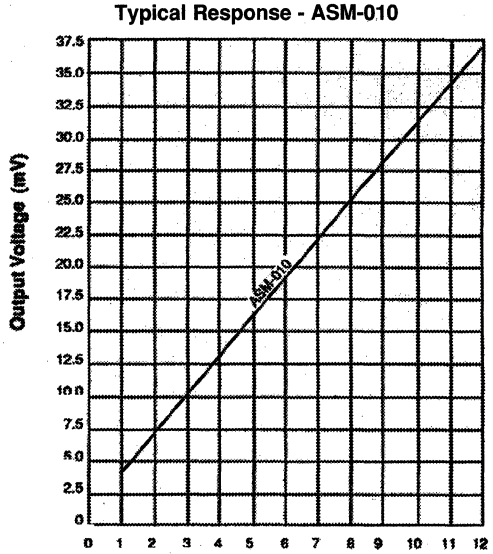
Part Number	Current Range	Output Voltage Tolerance
ASM-010	1 - 10 Amps	±10%



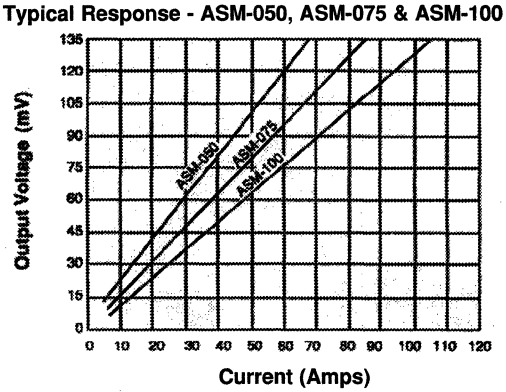
Part Number	Current Range	Output Voltage Tolerance
ASM-050	5 - 50 Amps	±10%
ASM-075	5 - 75 Amps	±10%
ASM-100	5 - 100 Amps	±10%



Typical Response - ASM-010



Typical Response - ASM-050, ASM-075 & ASM-100



#3 Industrial Park Drive
P.O. Box 306
St. James, Missouri 65559
573-265-5500
E-Mail: talema@talema.com
FAX: 573-265-3350
http://www.talema.com

talema electronic • 573-265-5500

TAMURA Transformers

Custom Designed to OEM Specs Meet World Safety Standards

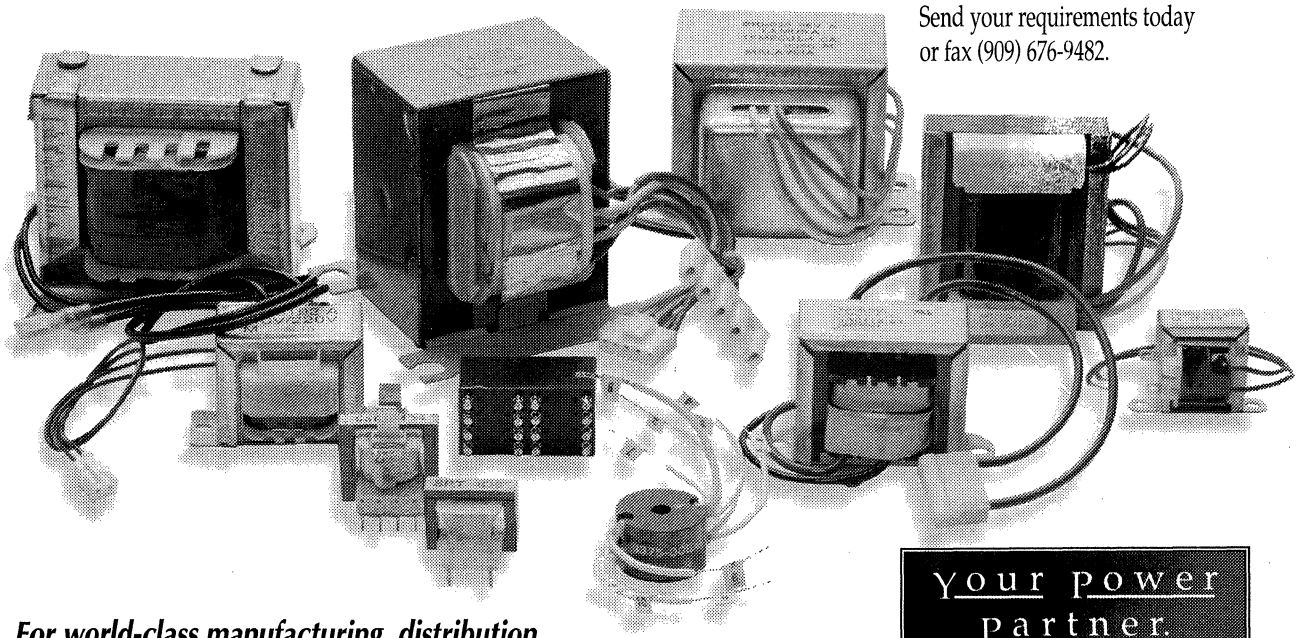
TAMURA custom designs and manufactures transformers to OEM specifications for consumer, commercial, and industrial applications. Our UL family of custom transformers come in 24 case sizes and 350 configurations... up to 300VA... and all are recognized to severe UL 1411 requirements (file E98949). Certification requirements to CSA, IEC, VDE and MITI are easily met.

Features include a double protection system, 4000V dielectric strength, and physical barriers between primary and secondary.

ISO REGISTERED 9001/9002

TAMURA HAS IT ALL.

For world-class manufacturing, reliability and responsibility, go to the source. Partner with TAMURA and you'll get it all. Send your requirements today or fax (909) 676-9482.



your power partner

For world-class manufacturing, distribution, reliability, and responsibility, go to the sources...

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

Microtran Division, Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

tamura
MICROTRAN

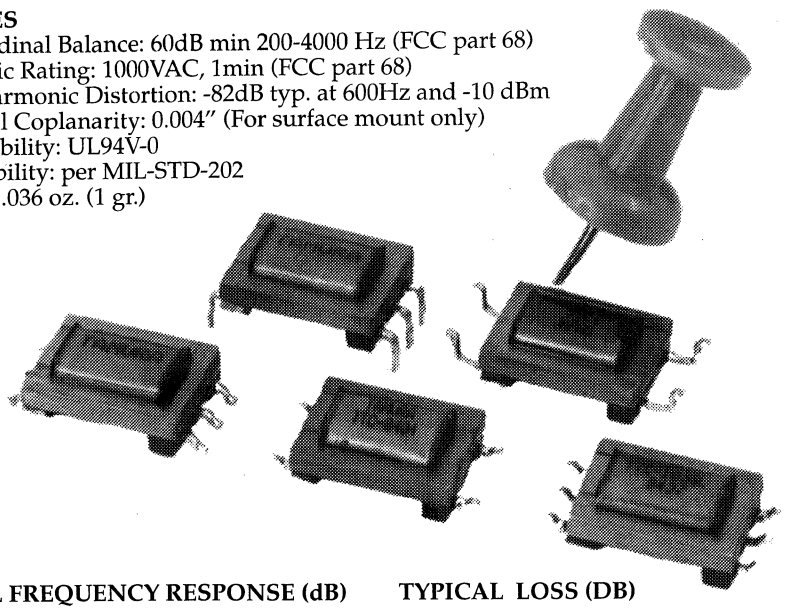
BANTAM™ MODEM & TELECOMMUNICATIONS TRANSFORMERS- FCC PART 68

c UL File No's. 138028 142035

CSA File No. LR1383

Telecommunications Transformers for Surface Mount and Thru-Hole Applications. 4MM Profile PCMCIA Applications

FEATURES
- Longitudinal Balance: 60dB min 200-4000 Hz (FCC part 68)
- Dielectric Rating: 1000VAC, 1min (FCC part 68)
- Total Harmonic Distortion: -82dB typ. at 600Hz and -10 dBm
- Terminal Coplanarity: 0.004" (For surface mount only)
- Flammability: UL94V-0
- Solderability: per MIL-STD-202
- Weight: .036 oz. (1 gr.)



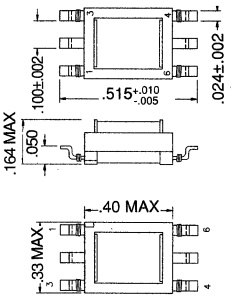


FIG. 1

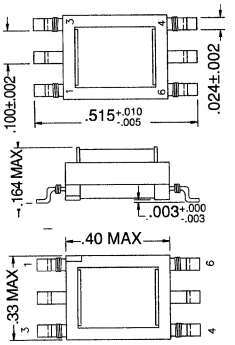


FIG. 2

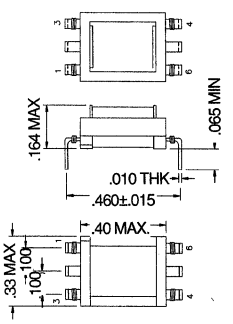
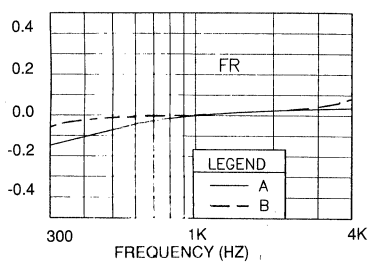
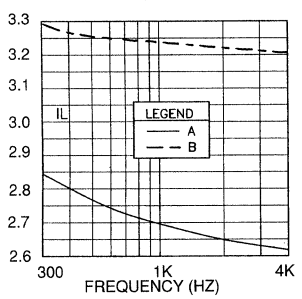


FIG. 3

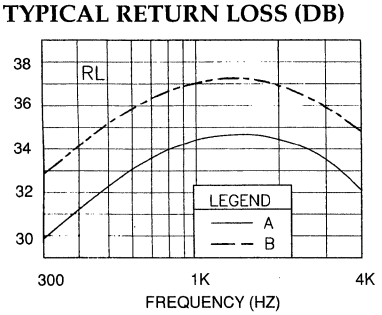
TYPICAL FREQUENCY RESPONSE (dB)



TYPICAL LOSS (DB)



TYPICAL RETURN LOSS (DB)



CIRCUIT DIAGRAM

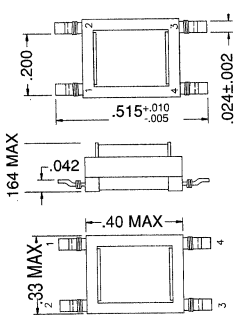


FIG. 5

TAMURA PART NUMBER	MICROTRAN PART NUMBER	CROSS TO MIDCOM	IMPEDANCE (OHMS) PRI:SEC	PRI MADC	PRI DCR	SEC DCR	GRAPH LEGEND	FIG.
TTC-103SL	TSL103		600:346	0	127	150	A	1
TTC-203SL	TSL203		600:346	0	127	150	A	2
TTC-303SL	TSL303		600:346	0	127	150	A	3
TTC-8324	TSL501	671-8234	600:301	0	157	146	B	4
TTC-8404	TSL506	671-8404	600:301	0	157	146	B	5

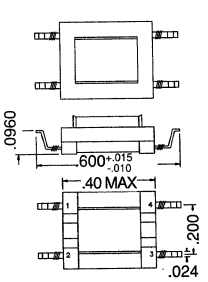


FIG. 4

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

SURFACE MOUNT TELECOMMUNICATIONS TRANSFORMERS FCC PART 68

c UL File No's. 138028 142035

CSA® File No. LR1383

tamura MICROTRAN

Coupling, Hybrid, Voice, and Data Applications.

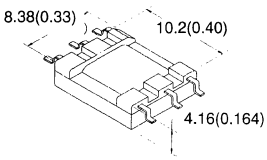
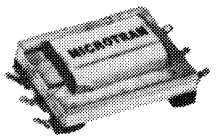


FIG. 12A

PCMCIA V.32 & V.34 MODEM APPLICATIONS

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE PRI:SEC	PRI maDC	PRI DCR	SEC DCR	GRAPH* LEGEND	FIG*
TTC-103SL	TSL103	600:346	0	127	150	A	12A
TTC-203SL	TSL203	600:346	0	127	150	A	2*
TTC-8324	TSL501	600:301	0	157	146	B	4*
TTC-8404	TSL506	600:301	0	157	146	B	5*

*For graphs and figures see previous page A•2390.



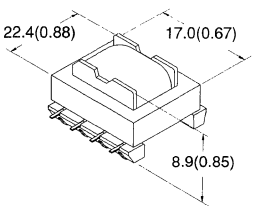
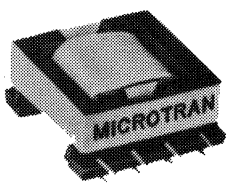


FIG. 12B

LOW PROFILE FOR VOICE & MODEM APPLICATIONS

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL[1] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
TS3104	TS3104	600:600	0	1.4	A	±0.5	76	135	12B	1000V hi-pot
TS3106	TS3106	600CT:600CT	0	1.4	D	±0.5	76	135	12B	—
TS3220	TS3220	(4W)600:600/600	0	1.0[2]	E	±0.5	49	70/70	12B	Hybrid App
TS3154	TS3154	600:600	0	1.4	A	±0.5	54	67	12B	Voice/Data
TS3114	TS3114	600:500	0	1.0	A	±0.5	54	67	12B	—



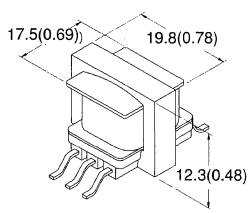
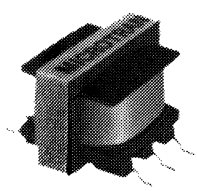


FIG. 12C

COMMERCIAL COMMUNICATION APPLICATIONS

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL[1] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
TS1220	TS1220	(4W)600:600/600	0	0.7[2]	E	±0.5	39	37/37	12C	—
TS1106	TS1106	600CT:600CT	0	1.5	D	±0.5	46	63	12C	—
TS1104	TS1104	600:600	0	1.0	A	±0.5	46	63	12C	—
TS1115	TS1115	600:600	65	1.5	A	±0.5	42	59	12C	IL at rated DC
TTC-288NS	TTC-288NS	600:1600	0	1.5	A	±0.5	45	100	12C	—



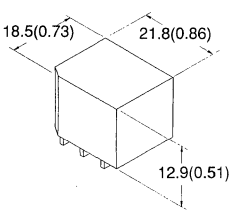
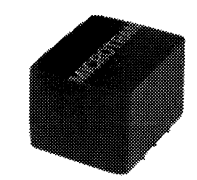


FIG. 12D

SEVERE ENVIRONMENT APPLICATIONS

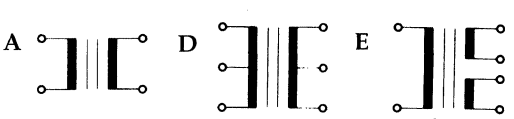
TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL[1] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
TS1106-M	TS1106-M	600CT:600CT	0	1.5	D	±0.5	46	63	12D	Meets MIL-T-27 G5
TS1104-M	TS1104-M	600:600	0	1.0	A	±0.5	46	63	12D	Meets MIL-T-27 G5
TS1220-M	TS1220-M	(4W)600:600/600	0	0.7[2]	E	±0.5	39	37/37	12D	Meets MIL-T-27 G5



NOTES

Note 1: Typical insertion loss (IL) in dB @ rated unbalanced maDC, 0dBm & 1kHz.
Note 2: Add 3dB to IL for single hybrid use with balancing network on 2-wire side.
Note 3: Typical frequency response (FR) from 0.3 to 3.5kHz, relative to 1kHz at rated maDC & 0dBm.
Note 4: Outline drawings show max. no. of pins. Actual part may have fewer pins.

CIRCUIT DIAGRAMS



Refer to Aaltam in this section for additional specifications and model numbers.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

Microtran Division, Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

WIDE BAND AND PULSE TRANSFORMERS

For Isolation, Data Interface and ISDN Applications

MICROTRAN.

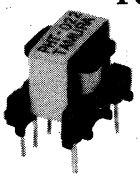


FIG. 2F

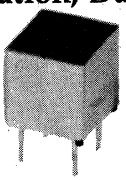


FIG. EP10

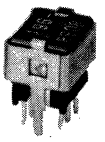
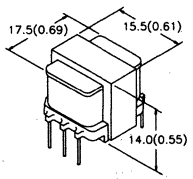


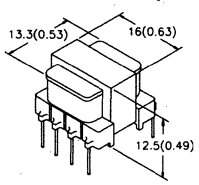
FIG. EP7

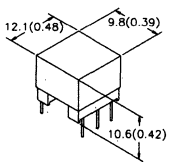
FIG. G5

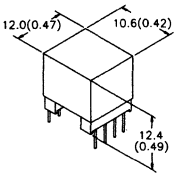
FIG. RM5

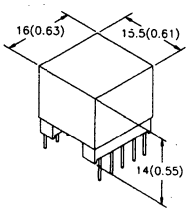
FIGS

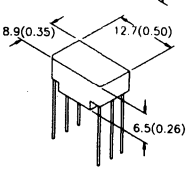
3


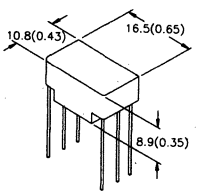
2F


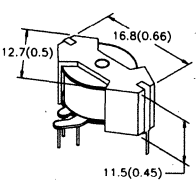
EP7


EP10


EP13


G5


G7


RM5


ENCAPSULATED PULSE TRANSFORMERS FOR ISOLATION & DATA INTERFACE

MODEL NO.	FIG. NO.	PRIMARY[1] OCL mH	TURNS RATIO	PRI[2] C pF	SEC[3] LμH	DCR (Ω)	CKT DIA	FEATURES (CROSS REF)
PHT-029	3	1.70mH	1:0.83	87	3.9	0.27:0.12	A	—
PHT-023	RM5	2.40mH	1:0.65	25	2.0	0.45:0.13	C	(AIE 315-0719)
G511[4]	G5	2.00mH	1:1	25	8.0	1:1	A	2kV rms hi-pot for LAN
PHT-022	2F	0.50mH	1:1	26	1.7	1.3:1.4	A	Low cost
G516	G5	0.50mH	1:1.3	32	0.7	1.35:1.35	A	—
PHT-031	EP10	10.00mH	1:4	15	350.0	7.3:24	A	2.5kV rms hi-pot
G510	G5	0.05mH	1CT:1CT	18	0.5	1.3:1.3	D	(Valor TT1500)
G509	G5	0.50mH	1CT:1CT	32	0.4	1.3:1.3	D	—
G508	G5	2.00mH	1CT:1CT	37	0.8	2.5:2.5	D	(Pulse PE-8270)
PHT-032	2F	7.00mH	1CT:1CT	30	19.0	2.4:2.8	D	(AIE 315-0729)
G517	G5	1.00mH	1CT:1.41CT	32	1.5	1.5:1.5	D	(Technitrol T1553-20)
PHT-030	EP7	9.00mH	1CT:2	12	15.0	1.6:3.8	C	—
G515	G5	0.20mH	2CT:1CT	8	0.8	0.9:0.5	D	—
G512	G5	2.00mH	2CT:1	19	1.8	2.5:1.4	C	(Pulse PE-8276)
G504	G5	0.05mH	1:1:1	18	0.5	1.3:1.3:1.3	E	(Valor CT 1500)
G503	G5	0.20mH	1:1:1	18	0.3	0.9:0.9:0.9	E	—
G52E111[5]	G5	0.25mH	1:1:1	16	0.5	1.1:1.1:1.1	E	(Datatronic 4258-0004)
G502	G5	0.50mH	1:1:1	32	0.4	1.3:1.3:1.3	E	(Pulse PE-5762)
PHT-029-3	3	1.00mH	1:1:1	130	1.0	0.75:0.75:0.75	E	—
G513	G5	1.20mH	1:1:1	25	0.5	0.7:0.7:0.7	E	—
G514	G5	1.20mH	1:1:1	30	0.7	0.7:0.7:0.7	E	—
G501	G5	2.00mH	1:1:1	37	0.8	2.5:2.5:2.5	E	—
G53E111P[5]	G5	2.50mH	1:1:1	35	0.8	2.4:2.4:2.4	E	(Datatronic 4258-0007)
PHT-034	2F	2.50mH	1:1:1	30	5.0	2:2:2	E	(Pulse PE-2229X)
G500	G5	5.00mH	1:1:1	60	1.3	3.9:3.9:3.9	E	0.25" ht.
G52J111P[5]	G5	0.80mH	1:1:1	20	0.4	1.4:1.4:1.4	E	—
G74B111[5]	G7	12.50mH	1:1:1	127	3.0	8.9:8.9:8.9	E	(Datatronic 4259-0004)
PHT-068	EP13	35.00mH	1CT:1CT:1CT	20	50.0	3.5:6:5.5	T	—
G52E211[5]	G5	0.25mH	2:1:1	10	2.5	1.0:0.7:0.7	E	(Technitrol 21HHA)
G507	G5	0.50mH	2:1:1	11	1.1	1.3:0.7:0.7	E	—
G506	G5	2.00mH	2:1:1	19	1.8	2.5:1.4:1.4	E	—
G505	G5	5.0mH	2:1:1	33	3.6	3.9:2.2	E	—
PHT-015	2F	0.60mH	4:1:4	12	19.0	0.6:0.2:0.6	F	1.2kV rms hi-pot

DATA BUS INTERFACE TRANSFORMERS: FOR MIL-STD-1553 APPLICATIONS

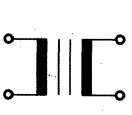
MODEL NO.	FIG. NO.	PRIMARY[1] OCL mH	TURNS RATIO	PRI[2] C pF	SEC[3] LμH	DCR (Ω)	CKT DIA	FEATURES (CROSS REF)
PHT-027[5]	G5	2.90mH	1CT:1CT	50	2.3	1.25:1.25	D	(Technitrol T1553-21)
PHT-028[5]	G5	2.90mH	1CT:1CT	25	2.3	1.25:1.25	D	(Technitrol 12UHD)
PHT-036[5]	G5	4.00mH	1CT:1.41CT	24	0.9	1:1.4	D	(Technitrol T1553-22)

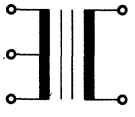
ISDN TRANSFORMERS: MEET CCITT I-430

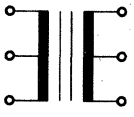
MODEL NO.	FIG. NO.	PRIMARY[1] OCL mH	TURNS RATIO	PRI[2] C pF	SEC[3] LμH	DCR (Ω)	CKT DIA	FEATURES (CROSS REF)
SEP-1	EP13	30.0mH	1CT:1CT	50	13.0	1.1:2.6	D	AMD 79030A
SEP-2	EP13	30.0mH	1CT:1CT	50	15.0	1.1:1.3	D	Motorola MC145474
SEP-3	EP13	30.0mH	1CT:2.5CT	50	13.0	1.1:4.2	D	Intel 29C53 Transmit
SEP-4	EP13	30.0mH	1CT:1.8CT	50	13.0	1.2:2.6	D	Intel 29C53 Receive
SEP-5	EP13	30.0mH	1CT:2CT	50	10.0	10:20	D	NEC μPD98201 Receive
SEP-6	EP13	30.0mH	1CT:1CT	50	10.0	2.2:2.2	D	NEC μPD98201 Transmit
SRM-1	RM5	30.0mH	1CT:2CT	50	15.0	2.2:4.8	D	Mitel MT8930
SRM-2	RM5	30.0mH	1CT:1CT	50	22.0	2.2:1.5	D	Motorola MC145474
SRM-3	RM5	30.0mH	1CT:2.5CT	50	15.0	2.2:8.2	D	Intel 29C53 Transmit
SRM-4	RM5	30.0mH	1CT:1.8CT	50	15.0	2.2:4.2	D	Intel 29C53 Receive

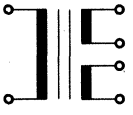
Note 1: "OCL" is typical primary open circuit inductance (L), in milli-Henry (except PHT-023), as read on an LC meter.
Note 2: "C pF" is primary to secondary interwinding capacitance (C) in pico-Farad.
Note 3: "LμH" is primary winding leakage inductance (L), in micro-Henry, with the secondary(s) shorted.
Note 4: Designed for IEEE-802.3 LAN applications.
Note 5: Designed and tested to MIL-T-27 specifications.

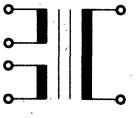
SCHEMATIC CIRCUIT DIAGRAMS

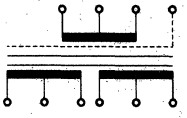
A


C


D


E


F


T


Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

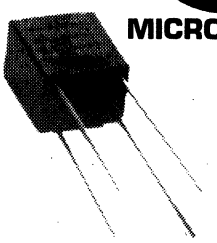
Microtran Division, Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

MINIATURE ENCAPSULATED TRANSFORMERS AND INDUCTORS

Telecommunications, Input, Interface, Isolation & Output Impedance Matching

tamura MICROTRAN



FEATURES

- FCC Part 68 Models Available.
- Miniature: 0.31" x 0.41" x 0.465".
- Tested to MIL-T-27 Specifications.
- Dielectric Strength: 1kVrms.
- Insulation Resistance: 10kMΩ.
- Oper. Temp: ≤105°C (Class S).
- Thermal Shock: 5cyc, -55≈105°C.
- Freq. Response: ±2dB, .3≈100kHz.
- Max. Distort: 10-25% @ rated pwr.
- Impedance: 3.2 to 200kΩ.
- Solder Plated Nickel Leads.
- Molded Case Constr/Base Mtg., Pad.

MINIATURE ENCAPSULATED TRANSFORMERS

TAMURA PART NO.	MICROTRAN PART NO.	MATCHING Z PRI:SEC[1]	PRI maDC	DCR(Ω) PRI	DCR(Ω) SEC	PWR (MW)	TURN RATIO PRI	TURN RATIO SEC	FIG. No.
MET-01	PM3-M	200kCT:1000CT	0.00	5300	120	10	14.10	1	1
MET-02	MET-02	100kCT:1000CT	0.00	4300	120	10	10.00	1	1
MET-03	PM7-M	50kCT:1000CT	0.00	3800	90	25	7.07	1	1
MET-04	PM9-M	50k:1kCT*	0.00	3800	90	25	14.10	1/1	2
MET-05	PM11-M	25kCT:1000CT	0.50	1600	95	30	5.00	1	1
MET-06	PM13-M	25k:1kCT*	0.25	1600	95	30	10.00	1/1	2
MET-07	MET-07	25kCT:600CT	0.50	1600	95	30	6.45	1	1
MET-09	PM17-M	10kCT:10kCT	1.00	1000	1300	40	1.00	1	1
MET-10	MET-10	10kCT:4000CT	1.00	1000	500	40	1.58	1	1
MET-11	PM19-M	10kCT:2000CT	1.00	1000	300	40	2.23	1	1
MET-12	PM21-M	10K:2kCT*	0.50	1000	300	40	4.47	1/1	2
MET-13	MET-13	10kCT:1500CT	1.00	1000	260	40	2.58	1	1
MET-14	PM23-M	10kCT:1.2kCT	1.00	1050	280	40	2.76	1	1
MET-15	PM25-M	10K:1.2kCT*	0.50	1000	220	40	5.77	1/1	2
MET-17	PM29-M	10kCT:500CT	1.00	1000	80	40	4.47	1	1
MET-18	MET-18	10kCT:4.0	1.00	1200	1	40	50.00	1	3
MET-19	MET-19	10k:3.2	0.50	1200	0.8	40	55.90	1	4
MET-20	MET-20	8000CT:3.2	1.00	1000	0.8	40	50.00	1	3
MET-21	MET-21	5000CT:2000CT	1.00	490	300	40	1.58	1	1
MET-22	PM31-M	2500CT:2500CT	1.00	280	350	40	1.00	1	1
PM31-F[5]	PM31-F[5]	2500CT:2500CT	1.00	280	350	40	1.00	1	1
MET-23	MET-23	1600CT:3.2	2.50	186	0.8	50	22.30	1	3
MET-24	PM33-M	1500CT:600	3.00	160	95	50	1.58	1	3
PM33-F[5]	PM33-F[5]	1500CT:600	3.00	160	95	50	1.58	1	3
MET-25	MET-25	1200CT:3.2	3.00	125	0.7	50	19.40	1	3
MET-26	MET-26	1000CT:1000CT	3.00	80	100	50	1.00	1	1
MET-27	MET-27	1000CT:600CT	3.00	95	85	50	1.29	1	1
MET-28	MET-28	1000:50	3.00	110	8	50	4.47	1	4
MET-29[1]	MET-29[1]	900CT:600	3.00	80	95	50	1.22	1	3
MET-31[1]	PM34-M[1]	600CT:600CT	3.00	70	95	50	1.00	1	1
PM34-F[5]	PM34-F[5]	600CT:600CT	3.00	70	95	50	1.00	1	1
MET-32	MET-32	600:600CT*	3.00	70	95	50	2.00	1/1	2
MET-33	MET-33	600CT:250CT	3.00	70	35	50	1.55	1	1
MET-35	MET-35	600CT:8	4.50	60	1.5	50	8.66	1	3
MET-36	MET-36	600CT:3.2	4.50	60	0.7	50	13.70	1	3
MET-37	MET-37	500CT:600	3.00	65	95	50	0.91	1	3
MET-38	PM36-M	500:500CT*	3.00	72	85	50	1.88	1/1	2
PM36-F[5]	PM36-F[5]	500:500CT*	3.00	72	85	50	1.88	1/1	2
MET-39	PM35-M	500:50	3.00	55	8	50	3.16	1	4
PM35-F[5]	PM35-F[5]	500:50	3.00	55	8	50	3.16	1	4
MET-40	MET-40	320CT:3.2	6.00	35	0.7	50	10.00	1	3
MET-41	PM38-M	300CT:600	7.00	41	98	50	0.71	1	3
PM38-F[5]	PM38-F[5]	300CT:600	7.00	41	98	50	0.71	1	3
MET-42	MET-42	150:12	10.00	20	2.5	50	3.54	1	4
MET-43	PM37-M	120CT:3.2	10.00	13	0.7	50	6.12	1	3
PM37-F[5]	PM37-F[5]	120CT:3.2	10.00	13	0.7	50	6.12	1	3
MET-44	MET-44	300CT:12	7.00	42	3.4	50	5.00	1	3
MET-45	MET-45	10k:10kCT*	1.00	1100	1300	50	2.00	1/1	2
MET-46[1]	PM32-M[1]	600:600	3.00	72	93	50	1.00	1	4
PM32-F[5]	PM32-F[5]	600:600	3.00	72	93	50	1.00	1	4
MET-49	MET-49	600:600/600	3.00	72	210	50	1.41	1/1	2
MET-50	MET-50	10k:125	0.00	1100	28	10	8.62	1	4
MET-59	MET-59	600:600CT	3.00	70	95	50	2.00	1/1	2A
MET-60	MET-60	135:135CT	10.00	10	10	50	1.00	1	1
MET-51	PM-5M	200k:1k	0.00	5300	110	10	14.07	1	4
PM-27M	PM-27M	10k:1.2k	0.5	1050	280	50	0.36	1	4
PM27-F[5]	PM27-F[5]	10k:1.2k	0.5	1050	280	50	0.36	1	4
MET-52	PM-15M	25k:1k	0.25	1700	110	40	0.21	1	4
METC-99	PM90	MU METAL SHIELD	—	—	—	—	—	—	—

MINIATURE ENCAPSULATED INDUCTORS

TAMURA PART No.	MICROTRAN PART No.	INDUCTANCE H(min) @ 300Hz	Q (MIN) @1V 1kHz	DCR (Ω)	DC (ma)	FIG. No.
MEI-01	PM39-M	6 @ 15V	5.0	1800	2.0	5
PM39-F[5]	PM-39-F[5]	6 @ 15V	5.0	1800	2.0	5
MEI-02	PM40-M	3.5 @ 15V	4.0	1200	2.0	5
MEI-03	MEI-03	1.25 @ 3V	3.5	180	2.0	5
MEI-04	PM41-M	0.3 @ 3V	3.0	40	4.0	5
PM41-F[5]	PM41-F[5]	0.3 @ 3V	3.0	40	4.0	5
MEI-05	MEI-05	0.1 @ 3V	2.0	15	5.0	5

MET & MEI SCHEMATIC & CONNECTION DIAGRAMS

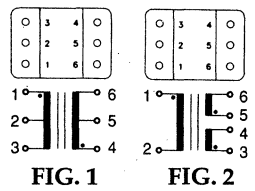


FIG. 1 FIG. 2

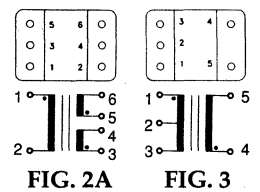


FIG. 2A FIG. 3

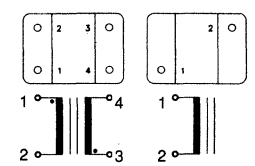
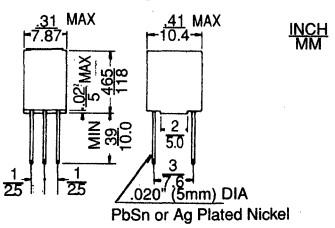
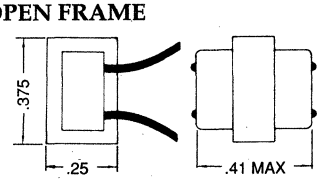


FIG. 4 FIG. 5

MECHANICAL DIMENSIONS- MOLDED



MECHANICAL DIMENSIONS- OPEN FRAME



Note 1: Meets FCC part 68 (hi-pot 1.5kV or 1.0kV).
Note 2: PRI maDC-Primary maximum rated unbalanced current in milli-amps, DC.
Note 3: PWR (mW)-Maximum power level in milli-watts @ 300Hz.
Note 4: CT*-Winding can be connected as a center tapped winding or as two isolated windings.
Note 5: -F is open frame construction.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

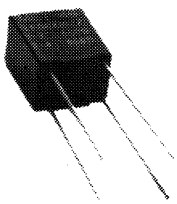
tamura
MICROTRAN.

TELECOMMUNICATIONS TRANSFORMERS- FCC PART 68

c UL File No's. 138028 142035

CSA® File No. LR81383

International, coupling, hybrid, voice, V.32 & V.34 data applications.



MINIATURE ENCAPSULATED TELECOMMUNICATIONS TRANSFORMERS

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
MET-29	MET-29	900CT:600	3	1.5	C	1.0	80	95	1E	—
MET-31	PM34-M	600CT:600CT	3	1.5	D	1.0	75	105	1E	(TRIAD SP-67)
MET-32	MET-32	600:600CT	3	1.5	E	1.2	70	95	1E	Tested to MIL-T-27
MET-46	PM32-M	600:600	3	1.5	A	1.0	75	105	1E	1500v rms hi-pot
MET-49	MET-49	600:600/600	3	1.6	E	1.1	72	210	1E	Single hybrid
METC-99	PM90	MU METAL SHIELD	—	—	—	—	—	—	1E	EMI slip-on can
PM32-F	PM32-F	600:600	3	1.5	A	1.0	75	105	*	1500v rms hi-pot
PM34-F	PM34-F	600CT:600CT	3	1.5	D	1.0	75	105	*	----

* Open Frame Construction. Call Tamura for outline drawing.

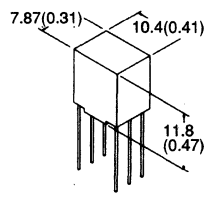
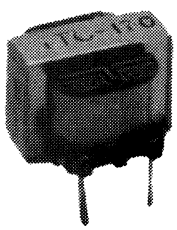


FIG. 1E



MINIATURE TELECOMMUNICATIONS TRANSFORMERS

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
TTC-135	TTC-135	600:S:600	0	1.3	J	0.3	56	78	B	With static shield
TTC-167	TTC-167	10k:10k	0	1.4	A	0.7	330	420	B	Bridging transformer
TTC-170	TTC-170	600:600	0	1.7	A	0.7	47	61	A	0.385" typ. ht.
TTC-170-2	TTC-170-2	600:600CT*	0	1.7	E	0.7	47	31	A	Small Size
TTC-171-2	TTC-171-2	600:600CT*	0	2.0	E	1.0	64	81	B	0.49" typ ht.

FIGURE	DIMENSIONS MM (in)		
	W	D	H
3A	13.0 (0.51)	13.4 (0.53)	10.7 (0.42)
3B	17.5 (0.69)	15.5 (0.61)	14.0 (0.55)

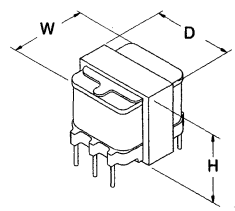
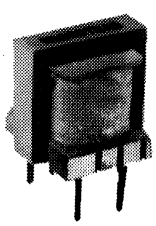


FIG. 3



COMPACT TELECOMMUNICATIONS TRANSFORMERS

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
TV104	TV104	600:600	2.5	2.2	A	0.4	50	65	12I	Small footprint

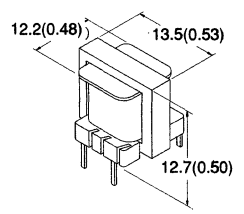
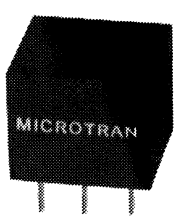


FIG. 12I



ENCAPSULATED TELECOMMUNICATIONS TRANSFORMERS FOR SEVERE ENVIRONMENTS

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
THP104-M	THP104-M	600:600	0	1.1	A	0.2	65	73	12Z	Int. Voice/Data
THP220-M	THP220-M	(4W)600:600/600	0	1.0[5]	E	0.5	60	62.5/62.5	12Z	Int. Hybrid

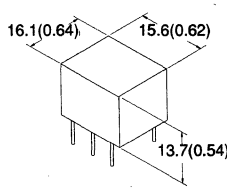


FIG. 12Z

NOTES

Note 1: CT* indicates windings can be connected as a centertapped winding or as two isolated windings.
Note 2: Typical insertion loss (IL) in dB @ rated unbalanced maDC, 0dBm & 1kHz.
Note 3: Typical frequency response (FR) from 0.3 to 3.5kHz, relative to 1kHz at rated maDC & 0dBm.
Note 4: Outline drawings show max. no. of pins. Actual part may have fewer pins.
Note 5: Add 3dB to IL for single hybrid use with balancing network on 2-wire side.

Refer to Aaltam in this section for additional specifications and model numbers.

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

TELECOMMUNICATIONS TRANSFORMERS- FCC PART 68

c UL File No's. 138028 142035

CSA® File No. LR81383

tamura MICROTRAN

International, coupling, hybrid, voice, V.32 & V.34 data applications.

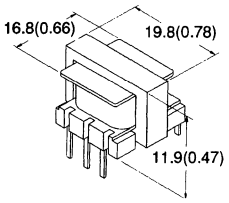
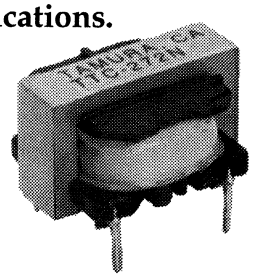


FIG. 12L

.47" LOW PROFILE TELECOMMUNICATIONS TRANSFORMER

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
TL1104	TL1104	600:600	0	1.5	A	0.3	66	102	12L	Voice/Data
TL1106	TL1106	600CT:600CT	0	1.5	D	0.3	66	102	12L	Voice/Data
TL1115	TL1115	600:600	65	1.5	A	3.0	42	59	12L	Data/Modem
TL1220	TL1220	(4W)600:600/600	0	0.7[5]	E	0.5	49	70/70	12L	Hybrid



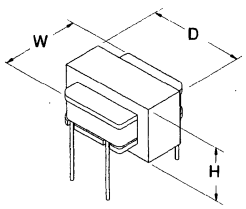
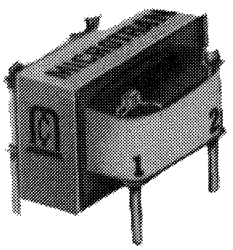


FIG. 5

.5" LOW PROFILE TELECOMMUNICATIONS TRANSFORMER

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4] 5	FEATURES
T1104	T1104	600:600	0	1.0	A	0.25	46	65	A	—
T1104N	T1104N	600:600	0	1.0	A	0.50	46	65	C	—
TTC-272N	TTC-272N	600:600	0	1.0	A	0.50	46	65	A	—
TTC-02	TTC-02	600:600	0	1.2	A	0.40	72	90	A	Low Cost
TTC-03	TTC-03	600CT:600CT	0	0.8	D	0.30	46	63	A	(Stancor TTPC-03)
TTC-04	TTC-04	600:900	0	1.0	A	0.30	46	100	A	—
TTC-05	TTC-05	4K:600	0	1.0	A	0.30	365	60	A	Bridging Transformer
TTC-118	TTC-118	600:600	0	0.8	A	0.30	46	63	A	—
TTC-258	TTC-258	600:600	80	1.7	A	2.10	77	103	B	490" max ht.
TTC-258-2	TTC-258-2	600:600CT	80	1.7	E	2.10	77	103	B	—

FIGURE 5	DIMENSIONS MM (in) W	D	H
A	16.5(0.65)	19.8(0.78)	12.4(0.49)
B	21.4(0.84)	19.8(0.78)	12.4(0.49)
C	16.5(0.65)	19.8(0.78)	12.7(0.50)



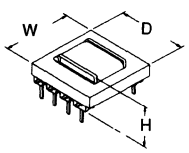
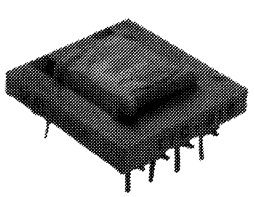


FIG. 6 LM

.35" LOW PROFILE TELECOMMUNICATIONS TRANSFORMER

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4] 6LM	FEATURES
TP3104	TP3104	600:600	0	1.4	D	0.5	76	135	A	Voice/Data
TP3106	TP3106	600CT:600CT	0	1.4	D	0.5	76	135	A	Voice/Data
TP3220	TP3220	(4W)600:600/600	0	1.0[5]	E	0.8	49	70/70	A	Hybrid
TTC-218	TP3111	600:600	50	1.5	A	1.3	49	76	B	Data/Modem
TTC-218-2	TTC-218-2	600:600CT	50	1.5	E	1.3	49	76	B	Data/Modem

FIGURE 6LM	DIMENSIONS MM (in) W	D	H
A	17.0(0.67)	16.9(0.66)	8.3(0.32)
B	22.4(0.88)	20.3(0.80)	8.9(0.35)



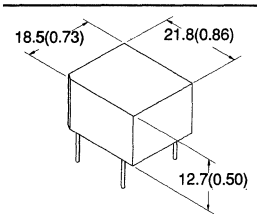
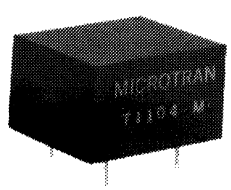


FIG. 12K

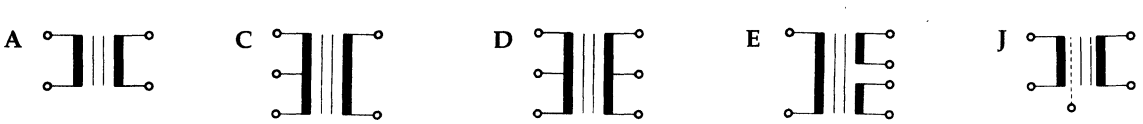
.5" LOW PROFILE TELECOMMUNICATIONS TRANSFORMER FOR SEVERE ENVIRONMENTAL CONDITIONS

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
T1104-M[5]	T1104-M	600:600	0	1.0	A	0.5	46	63	12K	hi-pot 3750V.



See Previous Page for Notes 1-5

CIRCUIT DIAGRAMS



Refer to Aaltam in this section for additional specifications and model numbers.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

tamura
MICROTRAN

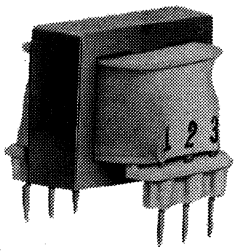
TELECOMMUNICATIONS TRANSFORMERS- FCC PART 68

c UL File No's. 138028 142035

CSA® File No. LR81383

International, coupling, hybrid, voice, V.32 & V.34 data applications.

STANDARD TELECOMMUNICATIONS TRANSFORMERS



TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
T2316	T2316	4000:600	0	1.0	A	0.5	340	51	6	For bridging applications (UL)
T2110	T2110	900:900	0	1.0	J	0.1	55	78	6	Electrostatic Shield
TH2104	TH2104	600:600	0	1.0	A	0.2	38	52	6	Int. Voice/Data
TH2106	TH2106	600CT:600CT	0	1.0	D	0.3	38	52	6	International Voice
TTC-09	T2106	600CT:600CT	0	0.8	D	0.3	36	50	6	(Dale TA10-04)
TTC-105	T2113[5]	600:600	90	2.0	A	+0.5/-2.5	71	117	6	Low cost
TTC-105-1	T2114	600:600CT	90	2.0	B	+0.5/-2.5	71	117	6	(Stancor TTPC-06)
TTC-108	DCM21-PC	600CT:600CT	0	1.2	D	0.3	44	56	6	Low Cost
TTC-110	T2104	600:600	0	0.8	A	0.3	36	50	6	(Stancor TTPC-07)
TTC-112	T2108	600:900	0	0.9	A	0.2	36	77	6	(James 13648)
TTC-13	TTC-13	4000:600	0	0.9	A	0.3	225	45	6	(Stancor TTPC-11)

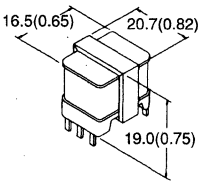
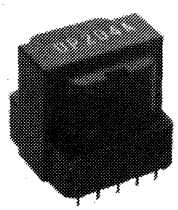


FIG. 6

ENCAPSULATED TELECOMMUNICATIONS TRANSFORMERS FOR SEVERE ENVIRONMENTAL CONDITIONS



TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4] 6EM	FEATURES
DP-101A	DP-101A	600CT:600CT	5	0.9	D	0.5	38	48	B	—
DP-105A	DP-105A	4KCT:600CT	1	1.1	B	0.6	280	35	B	—
DP-108A	DP-108A	600:600CT	5	0.9	D	0.6	38	48	B	—
DP-128A	DP-128A	600:600CT/600CT	0	0.8	M	0.7	37	42/42	A	—
DP-204A	DP-204A	600:600CT	10	0.9	B	0.5	36	50	C	—
DP-226A	DP-226A	600:600CT/600CT	0	0.9	I	0.7	41	36/36	C	—

FIGURE 6EM	DIMENSIONS MM (in) W	D	H
A	22.0(0.87)	22.0(0.87)	21.0(0.83)
B	22.0(0.87)	22.0(0.87)	20.0(0.79)
C	31.0(1.22)	32.0(1.26)	30.0(1.18)

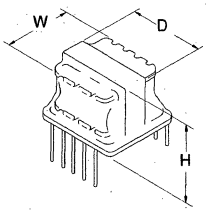
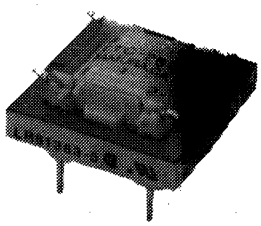


FIG. 6EM

.47" STANDARD LOW PROFILE TELECOMMUNICATIONS TRANSFORMERS



TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES TM104
TM104	TM104	600:374	0	2.0	A	0.1	108	120	6L	1,000V hi-pot
TTC-263	TM103	600:600	0	0.8	A	0.3	25	20	6L	(Midcom 671-8000)
TTC-264	TM105	600:470	100	2.3	A	+0.5/-2.5	108	120	6L	(Midcom 671-8001)
TTC-265	TM106	600:470	100	1.9	A	+0.5/-2.0	108	120	6L	(Midcom 671-8005)

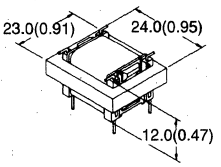
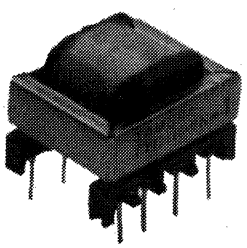


FIG. 6L

.58" STANDARD LOW PROFILE TELECOMMUNICATIONS TRANSFORMERS



TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
TTC-109N	T2111	600:600	90	2.0	A	1.0	71	117	6H1	Data/Modem
TTC-109N-1	T2112	600:600CT	90	2.0	B	1.0	71	117	6H1	Data/Modem
TTC-109N-2	TTC-109N-2	600:600CT	90	2.0	E	3.0	71	117	6H1	Data/Modem
TTC-204N	TTC-204N	600:600	100	2.5	A	0.7	180	75	6H1	(Midcom 671-1046)

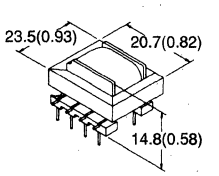
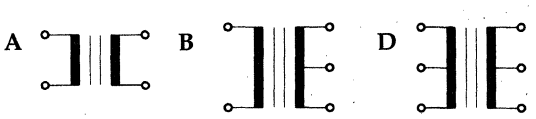


FIG. 6H1

NOTES

Note 1: CT* indicates windings can be connected as a centertapped winding or as two isolated windings.
Note 2: Typical insertion loss (IL) in dB @ rated unbalanced maDC, 0dBm & 1kHz.
Note 3: Typical frequency response (FR) from 0.3 to 3.5kHz, relative to 1kHz at rated maDC & 0dBm.
Note 4: Outline drawings show max. no. of pins. Actual part may have fewer pins.
Note 5: Add 3dB to IL for single hybrid use with balancing network on 2-wire side.

CIRCUIT DIAGRAMS



Refer to Aaltam in this section for additional specifications and model numbers.

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

TELECOMMUNICATIONS TRANSFORMERS- FCC PART 68

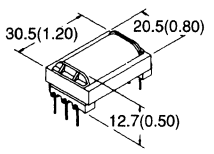
c UL File No's. 138028 142035

CSA File No. LR81383

tamura MICROTRAN

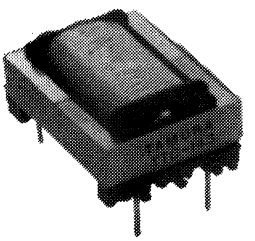
International, coupling, hybrid, voice, V.32 & V.34 data applications.

HIGH PERFORMANCE LOW PROFILE TELECOMMUNICATIONS TRANSFORMERS

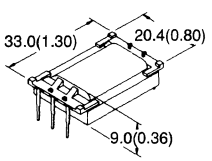


7H

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
TTC-142	T9311	600:600	90	1.8	A	+0.5/-2.75	75	100	7H	0.500" max. ht
TTC-142-2	T9312	600:600 Split	90	1.8	E	+0.5/-2.75	75	100	7H	Data/Modem
TTC-143	TTC-143	600:600	90	1.6	A	+0.25/-2.25	75	100	7H	For hi-speed modem
TTC-158	TH9304	600:600	0	1.1	A	0.3	44	56	7H	BSI telecom
TTC-158-1	TH9306	600CT:600CT	0	1.1	D	0.3	44	56	7H	3750VAC hi-pot
TTC-174	T9320	600:600/600	50	1.0[5]	E	+0.3/-1.6	75	85/85	7H	Single hybrid
TTC-176-2	T9317	600:600Split	50	1.0	E	+0.3/-1.6	75	95	7H	0.50" max. ht (UL)
TTC-215	TTC-215	600:600	90	1.6	A	+0.25/-3.0	75	100	7H	Low cross talk
TTC-221	TTC-221	600:600	80	1.3	A	+0.5/-3.0	71	100	7H	3750VAC hi-pot
TTC-231	TTC-231	600:1200CT	90	1.5	B	+0.5/-1.8	75	170	7H	(Midcom 671-1489)
TTC-238	TTC-238	600:600	0	1.4	A	0.4	46	57	7H	BABT telecom
TTC-238-1	TTC-238-1	600CT:600CT	0	1.4	D	0.7	47	62	7H	—
TTC-243	TTC-243	600CT:S:600CT	0	1.5	J	0.8	57	81	7H	BABT telecom
TTCC-7H Shield	TTCC-7H Shield	MU Metal Shield	—	—	—	—	—	—	7H	EMI slip-on can

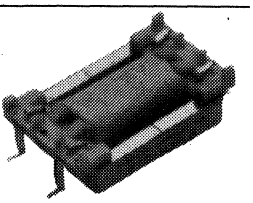


.36" ABOVE PCB HIGH PERFORMANCE LOW PROFILE TELECOMMUNICATIONS TRANSFORMERS

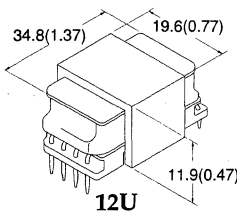


7HL

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
TTC-142-2LB	TTC-142-2LB	600:600CT[5]	90	1.8	E	+0.5/-2.75	75	100	7HL	.36" max ht
TTC-142-LB	TTC-142-LB	600:600	90	1.8	A	+0.5/-2.75	75	100	7HL	.36" max ht
TTC-143-LB	TTC-143-LB	600:600	90	1.6	A	+0.25/-2.25	85	110	7HL	.36" max ht

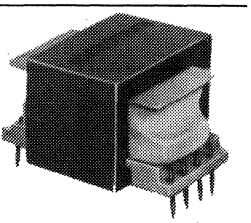


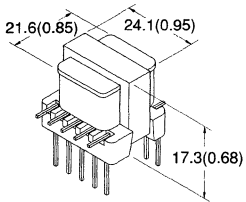
.47" HYBRID LOW PROFILE TELECOMMUNICATIONS TRANSFORMERS



12U

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
TL1111	TL1111	600CT:600 Split	90	1.6	R	2.5	63	103	12U	Data/Modem
TL1114	TL1114	600CT:600 Split	90	1.8	R	0.5	73	134	12U	Handles loop currents (UL)
TL1320	TL1320	(4W)600:600/600	(2W)80	1.8[5]	R	0.7	98	78/78	12U	Handles loop currents

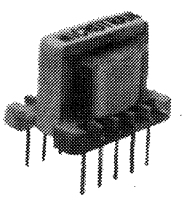


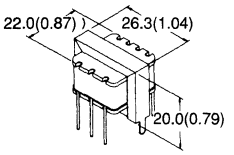


12EE

INTERNATIONAL HYBRID TELECOMMUNICATIONS TRANSFORMERS

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
TH2220	TH2220	(4W)600:600/600	0	1.2[5]	E	0.5	60	25/25	12EE	3750 rms hi-pot

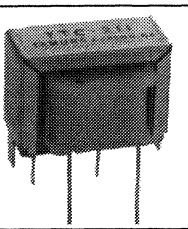




8M

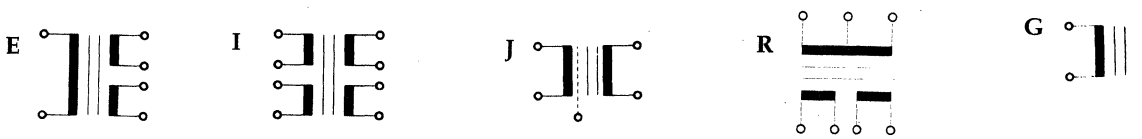
HIGH PERFORMANCE TELECOMMUNICATIONS TRANSFORMERS

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
TTC-198	TTC-198	600:600CT	0	1.2	B	0.3	33	56	8M	Australia telecom
TTC-211	TTC-211	600:600	90	1.2	A	+1.0/-2.5	52	25	8M	Low cost
TTC-211-2	TTC-211-2	600:600CT	90	1.2	E	+1.0/-2.5	52	25	8M	—
TTC-212	TTC-212	hidg:0.275Hy	80	—	G	—	91	—	8M	—



See Previous Page for Notes 1-5

CIRCUIT DIAGRAMS



Refer to Aaltam in this section for additional specifications and model numbers.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

tamura
MICROTRAN

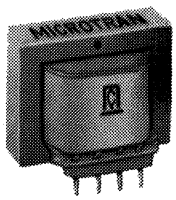
TELECOMMUNICATIONS TRANSFORMERS- FCC PART 68

c UL File No's. 138028 142035

CSA® File No. LR81383

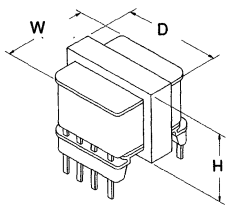
International, coupling, hybrid, voice, V.32 & V.34 data applications.

HIGH PERFORMANCE HYBRID TELECOMMUNICATIONS TRANSFORMER



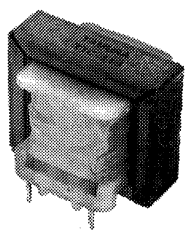
TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4] 12R	FEATURES
T4113	T4113	900/600:600 Split	60/75 PRI.	1.2	O	0.5	62	36/36	B	Level 1.5 to +7dBm.
T4220	T4220	(1W)600:600/600	60(2W)	1.0[5]	P	0.5	61	62/62	B	Hybrid
TTC-10	T2220	(4W)600:600/600	0	1.0	E	0.5	57	42/42	C	Trans-Hybrid loss 45dB typical
TTC-168	T3220	(4W)600:600/600	0	0.6[5]	E	0.1	34	25/25	C	(Midcom 671-0256)

FIGURE 12R	DIMENSIONS MM (in) W	D	H
A	25.4(1.0)	37.4(1.47)	31.8(1.25)
B	25.4(1.0)	37.4(1.47)	30.7(1.21)
C	24.3(0.96)	26.4(1.04)	21.8(0.86)

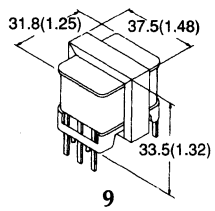


12R

HOLDING COIL

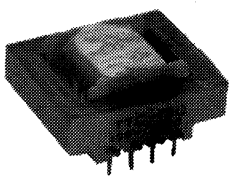


TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
TTC-119	T4415	Hldg:1.3Hy	100	—	H	—	180	—	9	(Triad TY350P)



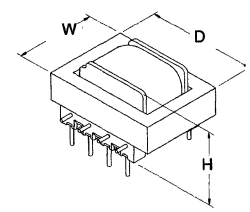
9

LOW PROFILE HIGH PERFORMANCE TELECOMMUNICATIONS TRANSFORMER



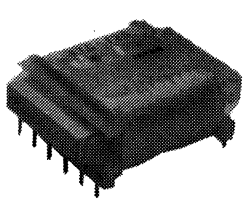
TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4] 9H2	FEATURES
TTC-126	TTC-126	600CT:600CT*	90	0.8[5]	I	0.6	41	54	B	—
TTC-126-2	TTC-126-2	600:600	90	0.8	A	0.6	41	54	B	—
TTC-126-3	TTC-126-3	600:600/600	90	0.8	E	0.3	41	96	B	—
TTC-130	TTC-130	600:600	90	1.8	A	0.3	95	135	A	For hi-speed modem
TTC-130-2	TTC-130-2	600CT:600CT*	90	1.8	E	0.3	95	135	A	—
TTC-131	TTC-131	600CT:S:600CT	90	1.8	J	0.3	95	135	A	BSI telecom
TTC-164	TTC-164	600CT:S:600CT	0	0.9	J	0.2	34	41	A	Europe bi-directional

FIGURE 9H2	DIMENSIONS MM (in) W	D	H
A	32.0(1.26)	36.5(1.44)	18.0(0.71)
B	31.5(1.24)	38.1(1.50)	26.5(1.05)

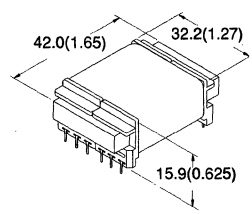


9H2

.625" LOW PROFILE HIGH PERFORMANCE TELECOMMUNICATIONS TRANSFORMER



TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
TTC-124	T9117	600Split:600/600	90	1.3	L	0.4	78	92	25H2	(Stancor TTPC-18)
TTC-125	T9116	600:CT:600:CT	80	1.8	I	0.3	95	180	25H2	(Stancor TTPC-19)
TTC-129	T9220	600Split:600/600	90	1.5[5]	L	0.4	100	190	25H2	Hybrid

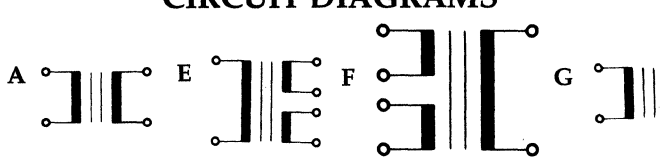


25H2

NOTES

Note 1: CT* indicates windings can be connected as a centertapped winding or as two isolated windings.
Note 2: Typical insertion loss (IL) in dB @ rated unbalanced maDC, 0dBm & 1kHz.
Note 3: Typical frequency response (FR) from 0.3 to 3.5kHz, relative to 1kHz at rated maDC & 0dBm.
Note 4: Outline drawings show max. no. of pins. Actual part may have fewer pins.
Note 5: Add 3dB to IL for single hybrid use with balancing network on 2-wire side.

CIRCUIT DIAGRAMS



Refer to Aaltam in this section for additional specifications and model numbers.

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

TELECOMMUNICATIONS TRANSFORMERS- FCC PART 68

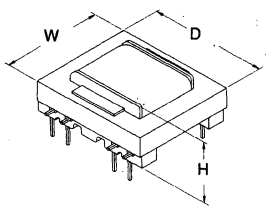
c UL File No's. 138028 142035

CSA® File No. LR81383

tamura MICROTRAN.

International, coupling, hybrid, voice, V.32 & V.34 data applications.

STANDARD LOW PROFILE HIGH PERFORMANCE TELECOMMUNICATIONS TRANSFORMER



11H

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4] 11H	FEATURES
T5117	T5117	600:600	125	1.1	A	0.5	45	58	A	Voice/Data
TH5114	TH5114	600:600 Split	75	2.0	E	0.5	127	76/76	A	Int.Voice/Data
TH5116	TH5116	600:600 Split	125	1.0	E	0.5	56	37/37	A	Longitudinal balance 40db min.
TH5117	TH5117	600:600	125	1.1	A	0.5	56	74	A	Int. Voice/Data
TH5118	TH5118	600 Split:600	125	1.0	E	0.5	28/28	74	A	Int. Voice/Data
TTC-120	T5415	Hldg:1.4Hy	120	—	G	—	90/90	—	A	(Midcom 671-4031)
T5114	T5114	600:600CT*	80	0.9	E	0.5	100	49/49	A	(Stancor TTPC-14)
T5119	T5119	600:600	80	0.9	A	0.5	62	108	A	(Stancor TTPC-15)
TTC-123	TTC-123	900:600	80	1.1	A	0.7	78	88	A	—
TTC-160	TTC-160	600:S:600	120	1.3	A	0.5	58	99	B	(PREM SPT 185)
TTC-199	TTC-199	600:600	70	1.2	A	0.5	66	66	C	(PREM SPT 186)
TTC-121	TTC-121	600:600CT	80	1.1	E	0.5	74	64	A	—
TTC-122	TTC-122	600:600	80	1.1	A	0.5	60	72	A	—

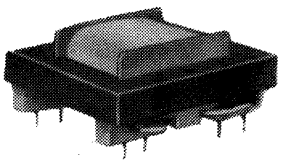
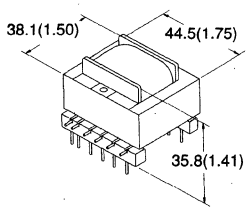


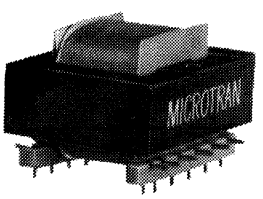
FIGURE 11H	DIMENSIONS MM (in) W	D	H
A	35.0(1.38)	42.5(1.67)	15.3(0.60)
B	35.0(1.38)	42.5(1.67)	17.3(0.68)
C	39.9(1.57)	42.5(1.67)	21.1(0.83)

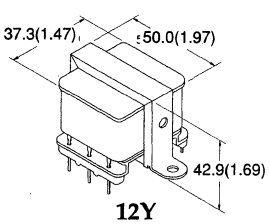


12W

LOW PROFILE HIGH PERFORMANCE HYBRID TELECOMMUNICATIONS TRANSFORMER

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
T5115	T5115	600:600 SPLIT	120	0.8	F	0.5	40	25/25	12W	Voice/Data
TH5220	TH5220	(4W)600:600/600	(2W)100	0.7[5]	L	0.3	50	30/30	12W	Int. Hybrid

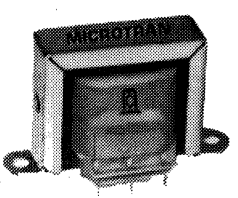


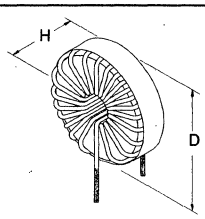


12Y

HYBRID TRANSFORMER

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
T6112	T6112	600:S:900/600	100/120 sec.	0.5	Q	0.5	25	26	12Y	Electrostatic Shield (UL)

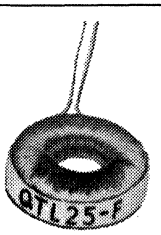




12DD

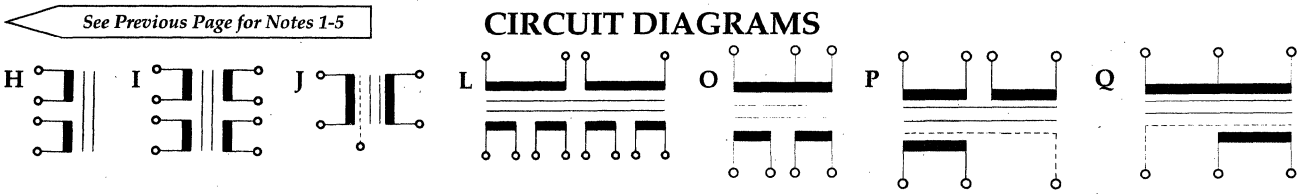
TOROIDAL HOLDING COILS

TAMURA PART NO.	MICROTRAN PART NO.	IMPEDANCE[1] PRI:SEC	maDC UNBAL	IL[2] dB	CKT DIA	FR[3] ±dB	PRI DCR	SEC DCR	FIG[4]	FEATURES
T7410	T7410	1.0H/0.8H	0/25	NA	G	N/A	225	NA	12DD	Low Crosstalk/1000V hi-pot
T8410	T8410	1.0H/0.8H	0/40	NA	G	N/A	113	NA	12DD	Low Crosstalk/1000V hi-pot



See Previous Page for Notes 1-5

CIRCUIT DIAGRAMS



Refer to Aaltam in this section for additional specifications and model numbers.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

tamura
MICROTRAN

INTERNATIONAL POWER TRANSFORMERS

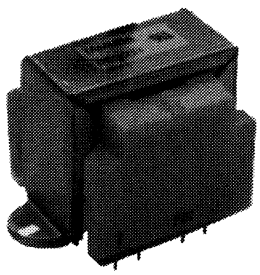
For PC Board, Solid-State Power, Control, and Instrumentation Applications.

MITI

Recognized Component
Underwriters Labs,Inc.

FEATURES:

- UL Recognized-Meets IEC-65 Safety Requirements for Worldwide Usage. UL 1411-File# E82992, E98949.
- Physical Barriers Between Primary and Secondary-Double Protection System-4,000 Volt hi-pot



INTERNATIONAL SERIES DIMENSIONS

FIG. A

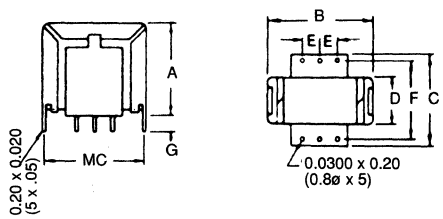


FIG.B

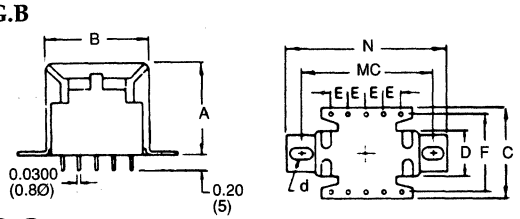
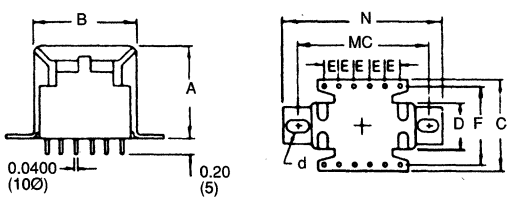


FIG. C



Dimensions "d": 5VA Series, 0.138" x 0.177: (3.5mm x 4.5mm); 9.5 and 15VA Series: 0.177" x 0.256" (4.5mm x 6.5mm)

INTERNATIONAL SERIES MODELS & RATINGS

TAMURA PART NO.	MICROTRAN PART NO.	SECONDARY RATINGS rms SERIES	SECONDARY RATINGS rms PARALLEL	VA (max.)	CKT NO.	FIG. NO.
10A006[2]	PW28-10[2]	10.0V CT, 0.050A	Single secondary	0.7	1	A
10A009[2]	PW28-10-230	10.0V CT, 0.050A	Single secondary	0.7	2	A
10B004	PW35-10	10.0V CT, 0.110A	Single secondary	2.0	3	A
10C009	PW41-10	10.0V CT, 0.350A	Single secondary	5.0	3	B
11D014H	PW48-10	10.0V CT, 0.950A	5.0V, 1.900A	9.5	4	B
11E006H	PW54-10	10.0V CT, 1.250A	5.0V, 2.500A	15.0	4	C
10B005	PW35-12	12.6V CT, 0.090A	Single secondary	2.0	3	A
10C010	PW41-12	12.6V CT, 0.280A	Single secondary	5.0	3	B
11D015H	PW48-12	12.6V CT, 0.750A	6.3V, 1.500A	9.5	4	B
11E007H	PW54-12	12.6V CT, 1.000A	6.3V, 2.000A	15.0	4	C
10A007[2]	PW28-16[2]	16.0V CT, 0.031A	Single secondary	0.7	1	A
10A010[2]	PW28-16-230	16.0V CT, 0.031A	Single secondary	0.7	2	A
10B006	PW35-16	16.0V CT, 0.070A	Single secondary	2.0	3	A
10C011	PW41-16	16.0V CT, 0.220A	Single secondary	5.0	3	B
11D016H	PW48-16	16.0V CT, 0.600A	8.0V, 1.200A	9.5	4	B
11E008H	PW54-16	16.0V CT, 0.780A	8.0V, 1.560A	15.0	4	C
10A008[2]	PW28-24[2]	24.0V CT, 0.021A	Single secondary	0.7	1	A
10A011[2]	PW28-24-230	24.0V CT, 0.021A	Single secondary	0.7	2	A
11B001H	PW35-24	24.0V CT, 0.046A	Single secondary	2.0	3	A
10C012	PW41-24	24.0V CT, 0.150A	Single secondary	5.0	3	B
11D017H	PW48-24	24.0V CT, 0.400A	12.0V, 0.800A	9.5	4	B
11E009H	PW54-24	24.0V CT, 0.520A	12.0V, 1.040A	15.0	4	C
11B002H	PW35-36	36.0V CT, 0.031A	Single secondary	2.0	3	A
11C005H	PW41-36	36.0V CT, 0.100A	Single secondary	5.0	3	B
11D018H	PW48-36	36.0V CT, 0.260A	18.0V, 0.520A	9.5	4	B
11E010H	PW54-36	36.0V CT, 0.350A	18.0V, 0.700A	15.0	4	C
11D019H	PW48-56	56.0V CT, 0.170A	28.0V, 0.340A	9.5	4	B
11E011H	PW54-56	56.0V CT, 0.223A	28.0V, 0.446A	15.0	4	C

Note 1: Individual transformer coil rating is parallel connection voltage & series connection current.

Note 2: Single primary: models 10A006, 7,8, PW28-10, PW28-16, PW-28-24, ,115VAC; models 10A009, 10, 11, PW28-10-230, PW28-16-230, PW28-24-230, 230VAC.

TRIPLE OUTPUT TRANSFORMERS FOR REGULATED & UNREGULATED POWER SUPPLIES

TAMURA PART NO.	MICROTRAN PART NO.	SECONDARY 1 AC RMS	SECONDARY 2 AC RMS	DC OUTPUT 1 C.T.F.W.	DC OUTPUT 2 C.T.F.W.	CKT NO.	FIG NO.
11E012H	PWT54-1024	9V, 800ma	24V, 300ma	+5V, 670ma	±15V, 170ma	5	C
11E013H	PWT54-1633	16V, 550ma	33V, 180ma	+9V[3], 470ma	±21V[3], 120ma	6	C

Note 3: ±9VDC and ±21VDC outputs are for input to ±5VDC and ±15VDC IC voltage regulators (ckt 6.)

INTERNATIONAL SERIES DIMENSIONS AND WEIGHTS[4]

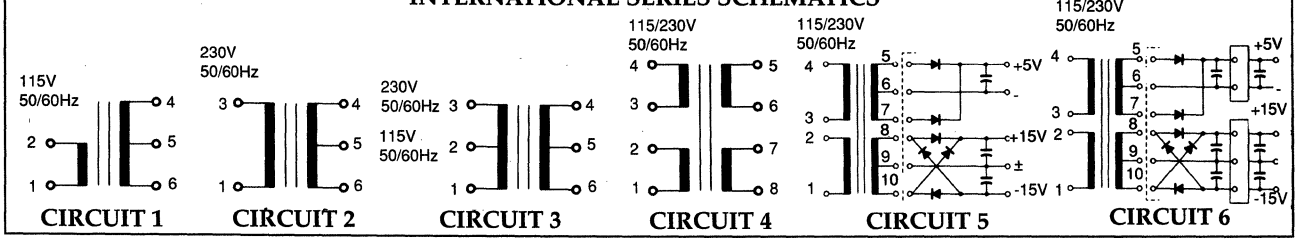
SERIES PREFIX		A	B	C	MC	D[5]	E	F	G	N	WT.
10A	PW28	1.10 (28)	1.16 (29.5)	1.32 (33.5)	1.12 (28.5)	0.49 (12.5)	0.20 (5)	0.98 (25)	0.20 (5)	N/A	2.47 (70)
10B & 11B	PW35	1.26 (32)	1.44 (36.5)	1.69 (43)	1.40 (35.5)	0.61 (15.5)	0.30 (7.5)	1.38 (35)	0.24 (6)	N/A	4.59 (130)
10C & 11C	PW41	1.42 (36)	1.67 (42.5)	1.91 (48.5)	2.05 (52)	0.85 (21.5)	0.39 (10)	1.57 (40)	N/A	2.36 (60)	9.11 (230)
11D	PW48	1.69 (43)	1.97 (50)	2.05 (52)	2.32 (59)	1.08 (27.5)	0.30 (7.5)	1.77 (45)	N.A	2.72 (69)	15.87 (450)
11E	PW54	1.93 (49)	2.22 (56.5)	2.09 (53)	2.72 (69)	1.08 (27.5)	0.30 (7.5)	1.77 (45)	N/A	3.15 (80)	19.05 (540)

Note 4: Dimensions in inches (mm). Weight in ounces (gm).

Note 5: See note under mechanical specifications for dimension "d".

Note 6: Ratings based on 120V nominal input.

INTERNATIONAL SERIES SCHEMATICS[6]



Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

WORLDTRANS® POWER TRANSFORMERS

For PC Board, Solid-State Power, Control, and Instrumentation Applications.

File #LR69222 File 810/89
File #LR69223 811/89
VDE 0551, 0806

TUV File 810/89
811/89
IEC 380 EN60950

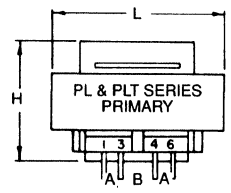
File #E79781
UL506
File #138028
UL1411

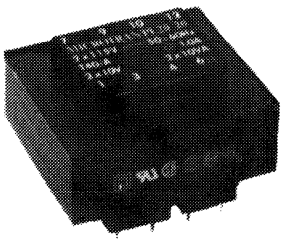
tamura
MICROTRAN.

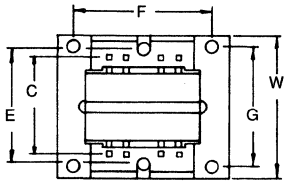
- **115V/230V 50/60 Hz primary**
- Meets US and International Safety Standards-UL, VDE, IEC, CSA
- 4,000 Volt RMS hi-pot Test-Dual Non-concentric Bobbins and Insulating Shroud Provide High Isolation and Reduced Capacitance
- 130°C Insulation System- Insulating Materials Meet UL 94V-0 Flammability Requirements
- Cost Effective Design

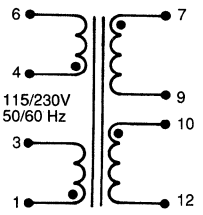
PL SERIES-FOR CONTROL AND POWER SUPPLY APPLICATIONS

PART NO.	VA (SIZE)	SECONDARY			
		PARALLEL CONNECTED		SERIES CONNECTED	
		AC VOLTS	RMS AMPS	AC VOLTS	RMS AMPS
PL2.5-10	2.5	5.0	0.50	10.0 CT	0.25
PL5.0-10	5.0	5.0	1.00	10.0 CT	0.50
PL10-10	10.0	5.0	2.00	10.0 CT	1.00
PL20-10	20.0	5.0	4.00	10.0 CT	2.00
PL30-10	30.0	5.0	6.00	10.0 CT	3.00
PL56-10	56.0	5.0	11.20	10.0 CT	5.60
PL2.5-12	2.5	6.3	0.40	12.6 CT	0.20
PL5.0-12	5.0	6.3	0.80	12.6 CT	0.40
PL10-12	10.0	6.3	1.60	12.6 CT	0.80
PL20-12	20.0	6.3	3.20	12.6 CT	1.60
PL30-12	30.0	6.3	4.80	12.6 CT	2.40
PL56-12	56.0	6.3	8.80	12.6 CT	4.40
PL2.5-16	2.5	8.0	0.30	16.0 CT	0.15
PL5.0-16	5.0	8.0	0.62	16.0 CT	0.31
PL10-16	10.0	8.0	1.25	16.0 CT	0.62
PL20-16	20.0	8.0	2.50	16.0 CT	1.25
PL30-16	30.0	8.0	3.80	16.0 CT	1.90
PL56-16	56.0	8.0	7.00	16.0 CT	3.50
PL2.5-20	2.5	10.0	0.24	20.0 CT	0.12
PL5.0-20	5.0	10.0	0.50	20.0 CT	0.25
PL10-20	10.0	10.0	1.00	20.0 CT	0.50
PL20-20	20.0	10.0	2.00	20.0 CT	1.00
PL30-20	30.0	10.0	3.00	20.0 CT	1.50
PL56-20	56.0	10.0	5.60	20.0 CT	2.80
PL2.5-24	2.5	12.0	0.20	24.0 CT	0.10
PL5.0-24	5.0	12.0	0.42	24.0 CT	0.21
PL10-24	10.0	12.0	0.84	24.0 CT	0.42
PL20-24	20.0	12.0	1.66	24.0 CT	0.83
PL30-24	30.0	12.0	2.50	24.0 CT	1.25
PL56-24	56.0	12.0	4.66	24.0 CT	2.33
PL2.5-28	2.5	14.0	0.18	28.0 CT	0.09
PL5.0-28	5.0	14.0	0.36	28.0 CT	0.18
PL10-28	10.0	14.0	0.72	28.0 CT	0.36
PL20-28	20.0	14.0	1.44	28.0 CT	0.72
PL30-28	30.0	14.0	2.12	28.0 CT	1.06
PL56-28	56.0	14.0	4.00	28.0 CT	2.00
PL2.5-36	2.5	18.0	0.14	36.0 CT	0.07
PL5.0-36	5.0	18.0	0.28	36.0 CT	0.14
PL10-36	10.0	18.0	0.56	36.0 CT	0.28
PL20-36	20.0	18.0	1.12	36.0 CT	0.56
PL30-36	30.0	18.0	1.64	36.0 CT	0.82
PL56-36	56.0	18.0	3.12	36.0 CT	1.56

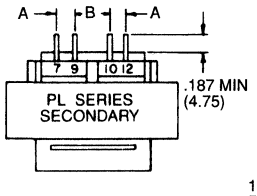


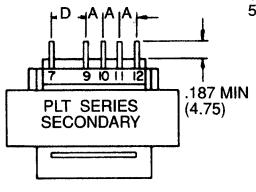


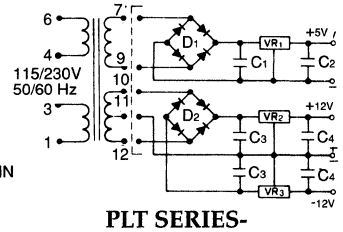




PL SERIES







PLT SERIES-
TYPICAL SCHEMATIC*

DIMENSIONS INCHES (MM)

VA (SIZE)	L	W	H	A†	B	C	D	MOUNTING E	MOUNTING F	MOUNTING G	METR. SCREWS	PIN SQUARE	LBS (KG.)
2.5	1.625 (41.3)	1.313 (33.3)	1.125 (28.6)	.200 (5.1)	.250 (6.4)	1.000 (25.4)	—	1.063 (27.0)	—	—	2X#4 (2X M3)	.025 (.635)	.25 (.11)
5.0	1.625 (41.3)	1.313 (33.3)	1.375 (34.9)	.200 (5.1)	.400 (10.2)	1.000 (25.4)	—	1.063 (27.0)	—	—	2X#4 (2X M3)	.025 (.635)	.37 (.17)
10.0	1.875 (47.6)	1.563 (39.7)	1.375 (34.9)	.200 (5.1)	.400 (10.2)	1.140 (28.0)	—	1.250 (31.8)	—	—	2X#4 (2X M3)	.036 (.914)	.53 (.24)
20.0	2.250 (57.1)	1.875 (47.6)	1.625 (41.3)	.400 (10.2)	.400 (10.2)	1.460 (37.1)	.40 (10.2)	1.500 (38.1)	—	—	2X#4 (2X M3)	.036 (.914)	.90 (.41)
30.0	2.625 (66.7)	2.188 (55.6)	1.563 (39.7)	.550 (14.0)	.275 (7.0)	1.660 (42.7)	.55 (14.0)	—	2.19 (55.6)	1.75 (44.5)	4X#6 (4X M3)	.045 (1.14)	1.15 (.52)
56.0	3.000 (76.2)	2.500 (63.5)	1.845 (46.9)	.600 (15.2)	.300 (7.6)	1.900 (48.3)	.60 (15.2)	—	2.50 (63.5)	2.00 (50.8)	4X#6 (4X M5)	.045 (1.14)	1.70 (.77)

† For PLT series secondary only, dimension A is 1/2 of value shown.
* Ratings based on 120V nominal input.

TRIPLE OUTPUT TRANSFORMERS FOR REGULATED & UNREGULATED POWER SUPPLIES

PART NO.	VA AC (SIZE)	SECONDARY AC RMS		DC OUTPUT #1		DC OUTPUT #2		C_1	C_2	VR_1	VR_2	VR_3	D_1	D_2
		OUTPUT 1	OUTPUT 2	DC VOLTS	AMPS DC	DC VOLTS	mA DC							
PLT20-32	20.0	11.11V	33.0 CT	5.0	1.25	±12	150 20V DC	7,500 µF 50V DC	1,500 µF	LM-323K-5	LM-340K-12	LM-320K-12	3N253	3N247
PLT30-32	30.0	11.77V	34.0 CT	5.0	1.75	±12	210 20V DC	10,000 µF 50V DC	1,500 µF	LM-323K-5	LM-340K-12	LM-320K-12	3N253	3N247
PLT56-32	56.0	11.60V	33.5 CT	5.0	2.8	±12	350 20V DC	15,000 µF 50V DC	2,000 µF	LM-323K-5	LM-340K-12	LM-320K-12	MDA-400	3N247

C_2 and C_4 10,000 µF @ 20V. All VR's are National Semiconductor P/N's. All diodes are Motorola P/N's.

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

tamura
MICROTRAN

SPLITFORM™ POWER TRANSFORMER

UL 1585 Class 2 & 3- 130B

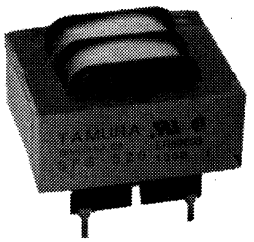
File #'s LR73078 LR69808

File#'s E96720,95844

File No.E92957

UL 506-File# E79781, E91239

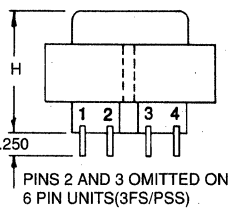
For PC Board, Solid-State Power, Control, and Instrumentation Applications.

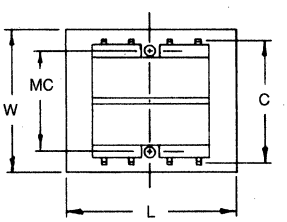


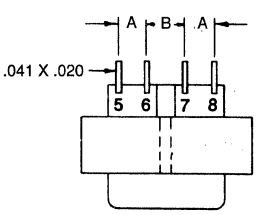
FEATURES

- 115V Single or 115/230V 50/60 Hz Dual Primary
- 130°C insulation system
- 2,500Vrms hi-pot
- Dual Secondaries may be either Parallel or Series Connected
- Attractive pricing-Superior quality
- Split Bobbin Construction-Center Flange Insulation Barrier; High Isolation for Low Leakage Applications; Low Capacitive Coupling Minimizes Line Noise and False Triggering
- Precision Spaced Terminals.Terminal Numbers are Molded on Bobbin

115V 50/60 Hz SINGLE PRIMARY		115/230V 50/60 HZ DUAL PRIMARY		SECONDARY RMS RATING PARALLEL CONNECTED		SERIES CONNECTED		
TAMURA PART NO.	MICROTRAN PART NO.	TAMURA PART NO.	MICROTRAN PART NO.	AC VOLTS	RMS AMPS	AC VOLTS	RMS AMPS	SIZE
3FS-210	PSS2-10	3FD-210	PSD2-10	5.0	0.220	10.0 CT	0.110	2
3FS-310	PSS3-10	3FD-310	PSD3-10	5.0	0.500	10.0 CT	0.250	3
3FS-410	PSS4-10	3FD-410	PSD4-10	5.0	1.200	10.0 CT	0.600	4
3FS-510	PSS5-10	3FD-510	PSD5-10	5.0	2.400	10.0 CT	1.200	5
3FS-212	PSS2-12	3FD-212	PSD2-12	6.3	0.180	12.6 CT	0.090	2
3FS-312	PSS3-12	3FD-312	PSD3-12	6.3	0.400	12.6 CT	0.200	3
3FS-412	PSS4-12	3FD-412	PSD4-12	6.3	1.000	12.6 CT	0.500	4
3FS-512	PSS5-12	3FD-512	PSD5-12	6.3	2.000	12.6 CT	1.000	5
3FS-216	PSS2-16	3FD-216	PSD2-16	8.0	0.140	16.0 CT	0.070	2
3FS-316	PSS3-16	3FD-316	PSD3-16	8.0	0.300	16.0 CT	0.150	3
3FS-416	PSS4-16	3FD-416	PSD4-16	8.0	0.800	16.0 CT	0.400	4
3FS-516	PSS5-16	3FD-516	PSD5-16	8.0	1.600	16.0 CT	0.800	5
3FS-220	PSS2-20	3FD-220	PSD2-20	10.0	0.110	20.0 CT	0.055	2
3FS-320	PSS3-20	3FD-320	PSD3-20	10.0	0.240	20.0 CT	0.120	3
3FS-420	PSS4-20	3FD-420	PSD4-20	10.0	0.600	20.0 CT	0.300	4
3FS-520	PSS5-20	3FD-520	PSD5-20	10.0	1.200	20.0 CT	0.600	5
3FS-224	PSS2-24	3FD-224	PSD2-24	12.0	0.090	24.0 CT	0.045	2
3FS-324	PSS3-24	3FD-324	PSD3-24	12.0	0.200	24.0 CT	0.100	3
3FS-424	PSS4-24	3FD-424	PSD4-24	12.0	0.500	24.0 CT	0.250	4
3FS-524	PSS5-24	3FD-524	PSD5-24	12.0	1.000	24.0 CT	0.500	5
3FS-228	PSS2-28	3FD-228	PSD2-28	14.0	0.080	28.0 CT	0.040	2
3FS-328	PSS3-28	3FD-328	PSD3-28	14.0	0.170	28.0 CT	0.085	3
3FS-428	PSS4-28	3FD-428	PSD4-28	14.0	0.400	28.0 CT	0.200	4
3FS-528	PSS5-28	3FD-528	PSD5-28	14.0	0.840	28.0 CT	0.420	5
3FS-236	PSS2-36	3FD-236	PSD2-36	18.0	0.060	36.0 CT	0.030	2
3FS-336	PSS3-36	3FD-336	PSD3-36	18.0	0.130	36.0 CT	0.065	3
3FS-436	PSS4-36	3FD-436	PSD4-36	18.0	0.340	36.0 CT	0.170	4
3FS-536	PSS5-36	3FD-536	PSD5-36	18.0	0.700	36.0 CT	0.350	5
3FS-248	PSS2-48	3FD-248	PSD2-48	24.0	0.046	48.0 CT	0.023	2
3FS-348	PSS3-48	3FD-348	PSD3-48	24.0	0.100	48.0 CT	0.050	3
3FS-448	PSS4-48	3FD-448	PSD4-48	24.0	0.250	48.0 CT	0.125	4
3FS-548	PSS5-48	3FD-548	PSD5-48	24.0	0.500	48.0 CT	0.250	5
3FS-256	PSS2-56	3FD-256	PSD2-56	28.0	0.040	56.0 CT	0.020	2
3FS-356	PSS3-56	3FD-356	PSD3-56	28.0	0.090	56.0 CT	0.045	3
3FS-456	PSS4-56	3FD-456	PSD4-56	28.0	0.220	56.0 CT	0.110	4
3FS-556	PSS5-56	3FD-556	PSD5-56	28.0	0.440	56.0 CT	0.220	5
3FS-2120	PSS2-120	3FD-2120	PSD2-120	60.0	0.020	120.0 CT	0.010	2
3FS-3120	PSS3-120	3FD-3120	PSD3-120	60.0	0.040	120.0 CT	0.020	3
3FS-4120	PSS4-120	3FD-4120	PSD4-120	60.0	0.100	120.0 CT	0.050	4
3FS-5120	PSS5-120	3FD-5120	PSD5-120	60.0	0.200	120.0 CT	0.100	5





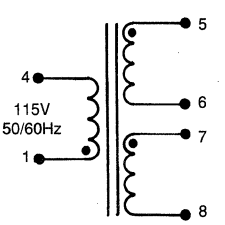


DIMENSIONS INCHES (MM)

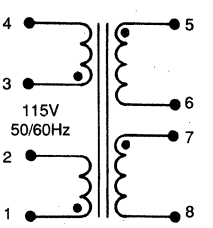
SIZE	VA	L	W	H	MC	A	B	C	LB (GM.)
2	1.1	1.44 (36.6)	1.230 (31.2)	1.00 (25.4)	– –	.250 (6.35)	.250 (6.35)	1.200 (30.5)	0.17 (77.4)
3	2.4	1.44 (36.6)	1.230 (31.2)	1.26 (32)	– –	.250 (6.35)	.250 (6.35)	1.200 (30.5)	0.25 (114)
4	6	1.69 (43)	1.39 (35.3)	1.36 (34.5)	1.0625[1] (27.0)[1]	.250 (6.35)	.350 (8.9)	1.280 (32.5)	0.44 (200)
5	12	1.97 (50)	1.63 (41.4)	1.5 (38.1)	1.250[1] (31.8)[1]	.300 (7.62)	.400 (10.16)	1.410 (35.8)	0.70 (319)

Note 1: Clearance hole for 4-40 x 1 3/8" nylon mtg. screws. Order screw as P/N PS-S and nut as P/N PS-N; Sold only in pkgs. of 100 each.
Note 2: Ratings based on 120V nominal input

SCHEMATICS[2]



6 PIN
3FS/PSS SERIES



8 PIN
3FS/PSD SERIES

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

FLATSTACK® LOW PROFILE POWER TRANSFORMERS

130B

CSA22,2 No 66
File # LR81383-7

File No.E92957

UL506,
File # E145619, E79781

tamura
MICROTRAN.

For Low Height PC Board Solid-State Power, Control, and Instrumentation Applications.

FEATURES

- Three Flange Bobbin.
- 1500Vrms hi-pot.
- 115/230VAC, 50/60Hz., Dual Primary.
- Low Profile: 0.65", 0.85", 1.065", 1.25" Heights.
- 4 Sizes: 2.5, 6.0, 12 and 24VA Ratings.
- NL-FL Regulation: 30%; 12VA, 20%
- Tube Packaged.
- 80 Models Stocked.
- Competitive Prices.
- Drop-in compatibility.
- DC Power Supply Models.
- 130B on 3FL series.

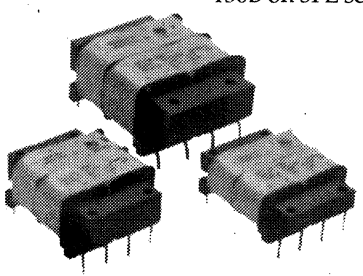
LOW PROFILE SERIES MODELS AND RATINGS

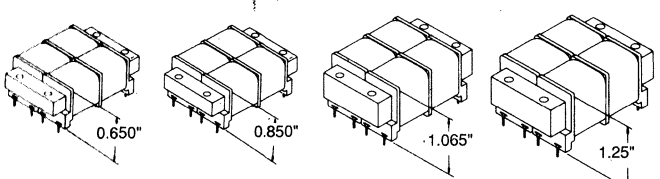
TAMURA PART NO.	MICROTRAN PART NO.	VA (SIZE)	SECONDARY			
			PARALLEL CONNECTED		SERIES CONNECTED	
			AC VOLTS	RMS AMPS	AC VOLTS	RMS AMPS
3FL10-250	PF2.5-10	2.5	5.0	.500	10.0 CT	.250
3FL10-600	PF6-10	6.0	5.0	1.200	10.0 CT	.600
3FL10-1200	PF12-10	12.0	5.0	2.400	10.0 CT	1.200
PF24-10	PF24-10	24.0	5.0	4.800	10.0 CT	2.400
3FL12-200	PF2.5-12	2.5	6.3	.400	12.6 CT	.200
3FL12-475	PF6-12	6.0	6.3	.900	12.6 CT	.450
3FL12-950	PF12-12	12.0	6.3	1.900	12.6 CT	.950
PF24-12	PF24-12	24.0	6.3	3.800	12.6 CT	1.900
3FL16-150	PF2.5-16	2.5	8.0	.300	16.0 CT	.150
3FL16-350	PF6-16	6.0	8.0	.700	16.0 CT	.350
3FL16-700	PF12-16	12.0	8.0	1.500	16.0 CT	.750
PF24-16	PF24-16	24.0	8.0	3.000	16.0 CT	1.500
3FL20-125	PF2.5-20	2.5	10.0	.250	20.0 CT	.125
3FL20-300	PF6-20	6.0	10.0	.600	20.0 CT	.300
3FL20-600	PF12-20	12.0	10.0	1.200	20.0 CT	.600
PF24-20	PF24-20	24.0	10.0	2.400	20.0 CT	1.200
3FL24-100	PF2.5-24	2.5	12.0	.200	24.0 CT	.100
3FL24-250	PF6-24	6.0	12.0	.500	24.0 CT	.250
3FL24-500	PF12-24	12.0	12.0	1.000	24.0 CT	.500
PF24-24	PF24-24	24.0	12.0	2.000	24.0 CT	1.000
3FL30-85	PF2.5-30	2.5	15.0	.170	30.0 CT	.085
3FL30-200	PF6-30	6.0	15.0	.400	30.0 CT	.200
3FL30-400	PF12-30	12.0	15.0	.800	30.0 CT	.400
PF24-30	PF24-30	24.0	15.0	1.600	30.0 CT	.800
3FL34-75	PF2.5-34	2.5	17.0	.150	34.0 CT	.075
3FL34-170	PF6-34	6.0	17.0	.340	34.0 CT	.170
3FL34-340	PF12-34	12.0	17.0	.700	34.0 CT	.350
PF24-34	PF24-34	24.0	17.0	1.400	34.0 CT	.700
3FL40-60	3FL40-60	2.5	20.0	.120	40.0 CT	.060
3FL40-150	3FL40-150	6.0	20.0	.300	40.0 CT	.150
3FL40-300	3FL40-300	12.0	20.0	.600	40.0 CT	.300
3FL56-45	PF2.5-56	2.5	28.0	.090	56.0 CT	.045
3FL56-100	PF6-56	6.0	28.0	.200	56.0 CT	.100
3FL56-200	PF12-56	12.0	28.0	.420	56.0 CT	.210
PF24-56	PF24-56	24.0	28.0	.850	56.0 CT	.430
3FL88-28	3FL88-28	2.5	44.0	.056	88.0 CT	.028
3FL88-65	3FL88-65	6.0	44.0	.130	88.0 CT	.065
3FL88-130	3FL88-130	12.0	44.0	.260	88.0 CT	.130
3FL120-20	3FL120-20	2.5	60.0	.040	120.0 CT	.020
3FL120-50	3FL120-50	6.0	60.0	.100	120.0 CT	.050
3FL120-100	3FL120-100	12.0	60.0	.200	120.0 CT	.100
3FL230-10	3FL230-10	2.5	115.0	.020	230.0 CT	.010
3FL230-25	3FL230-25	6.0	115.0	.050	230.0 CT	.025
3FL230-50	3FL230-50	12.0	115.0	.100	230.0 CT	.050

TRIPLE OUTPUT TRANSFORMERS FOR REGULATED & UNREGULATED POWER SUPPLIES

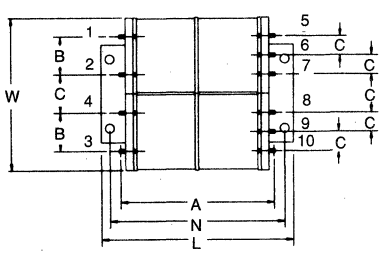
TAMURA PART NO.	MICROTRAN PART NO.	VA (SIZE)	SECONDARY #1		SECONDARY #2		DC OUTPUT #1		DC OUTPUT #2	
			AC VOLTS	RMS AMPS	AC VOLTS	RMS AMPS	DC VOLTS	mA DC	DC VOLTS	mA DC
3FL612	3FL612	6	17.5 CT	.155	31.5 CT	.065	+5	135	±12	40
3FL615	3FL615	6	17.5 CT	.155	37.5 CT	.060	+5	135	±15	35
3FL1212	3FL1212	12	17.0 CT	.340	29.0 CT	.140	+5	270	±12	85
3FL1215	3FL1215	12	17.0 CT	.340	36.0 CT	.115	+5	270	±15	70
PFT12-35	PFT12-35	12	16.0 CT	0.36	35.0 CT	.15	+8.75*	300	±22*	85
PFT12-28	PFT12-28	12	16.0 CT	0.36	28.0 CT	.187	+8.75*	300	±17.6	106
PFT24-35	PFT24-35	24	16.0 CT	0.72	35.0 CT	.30	+8.75*	600	±22*	170
PFT24-28	PFT24-28	24	16.0 CT	0.72	28.0 CT	.375	+8.75*	600	±17.6	212

* +8.75, ±17.6 or ±22DCV output volts are for inputs to +5V and ±12 or ±15V IC Voltage Regulators. See PFT schematic.
Line input 115/230V±10%





2.5VA 6.0VA 12VA 24VA



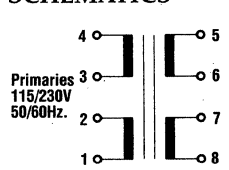
PIN DIMENSIONS 0.091 X 0.02

DIMENSIONS AND WEIGHTS[1]

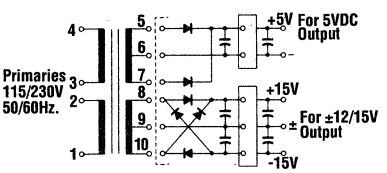
VA	A	B	C[2]	L	W	H	WT
2.5	1.60	0.375	0.187	1.87	1.56	0.650	5
6.0	1.60	0.375	0.187	1.87	1.56	0.850	7
12.0	2.00	0.500	0.250	2.50	2.00	1.065	11
24.0	1.90	0.530	0.300	2.87	2.25	1.25	15

Note 1: Dimensions in inches. Weight in oz.
Note 2: Output config has 10 pins all others 8 pins (omit pin 6 & 9).
Note 3: Ratings based on 120V nominal input

SCHEMATICS[3]



SPLIT SECONDARY SCHEMATIC



TRIPLE OUTPUT SCHEMATIC

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

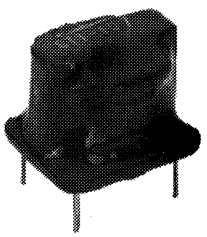
Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

tamura

MICROTRAN.

ENCAPSULATED SCR AND TRIAC TRIGGER TRANSFORMERS



Tamura's STT series transformers are designed for low cost source isolation in half and full wave SCR or TRI-AC control circuits. The STT trigger transformers are encapsulated for environmental protection and pass 2600V rms dielectric breakdown testing.

PART NO.	TURNS RATIO	PRIM Ldd(+)	LEAK Ld(+)	WDG Cpf	E.T.(=) V-μsec	DCR ohms(max)	DIA NO.
STT-101	1:1	1.0	15	80	90	2.5/2.5	1
STT-102	1:1	5.0	50	80	200	5.0/5.0	1
STT-103	1:1	10.0	100	80	280	7.0/7.0	1
STT-104	1:1:1	1.0	25	80	90	2.5/2.5/2.5	2
STT-105	1:1:1	5.0	100	80	200	5.0/5.0/5.0	2
STT-106	1:1:1	10.0	200	80	280	7.0/7.0/7.0	2
STT-107	2:1	1.0	20	80	90	2.5/1.5	1
STT-108	2:1	5.0	60	80	200	5.0/2.5	1
STT-109	2:1	10.0	130	80	280	7.0/3.5	1
STT-110	2:1:1	1.0	30	80	90	2.5/1.5/1.5	2
STT-111	2:1:1	5.0	130	80	200	5.0/2.5/2.5	2
STT-112	2:1:1	10.0	200	80	280	7.0/3.5/3.5	2

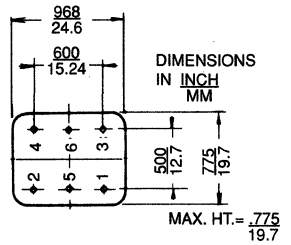


DIAGRAM 1

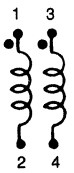
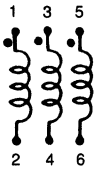


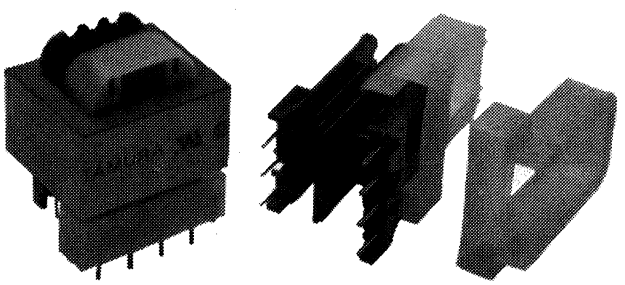
DIAGRAM 2



CUSTOM POWER AND AUDIO TRANSFORMERS TO 300VA

UL 1411

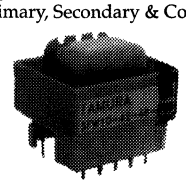
E59673



INTERNATIONAL POWER TRANSFORMERS-UL, CSA, IEC, MITI

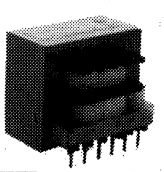
PEPF SERIES

- Ratings-0.7 to 6VA
- Physical Barrier Between Primary, Secondary & Core



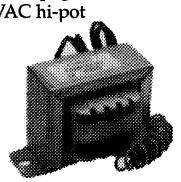
PEPY SERIES

- Ratings-4 to 20VA
- Physical Barrier Between Primary, Secondary & Core



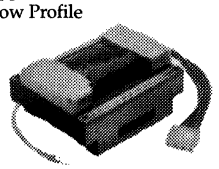
PEE SERIES

- Ratings-0.7 to 40VA
- 8mm Creepage
- 4000VAC hi-pot



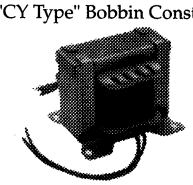
PMZF SERIES

- 10 to 80VA
- Minimum Flux Field for CRT applications
- Low Profile



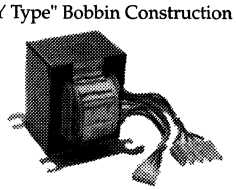
PEB SERIES

- Ratings-70 to 300VA
- Horizontal Mounting
- CU Flux Shorting Band
- Concentric Wound Coils
- "CY Type" Bobbin Construction



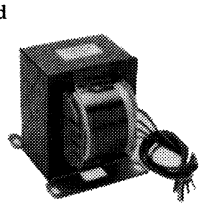
PEBT SERIES

- Ratings-70 to 300VA
- Vertical Mounting
- CU Flux Shorting Band
- Concentric Wound Coils
- "CY Type" Bobbin Construction



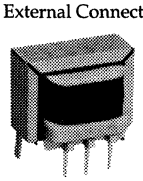
PEKT SERIES

- Ratings-70 to 200VA
- Welded Stack
- Shielded Core to Reduce Stray Field



EPH SERIES AUDIO TRANSFORMERS

- Double Protection System
- 3500VAC hi-pot
- Isolation for TV Audio and Video External Connections



Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

AC-AC WALL PLUG-IN TRANSFORMERS

120 VAC, 60 Hz. AND 220VAC, 50Hz.

File No. E82180 File No. LR38236

File No. 7969-3330, 7969-3331

MICROTRAN.

FEATURES

- UL Class II Xfmrs-UL 1310.
- UL 544 Medical Capability
- Thermal Overload Protection.
- 100% Testing
- Screw terminal models
- Transformer: 3 flange bobbin.
- US 3-Blade Ground Plug Available.
- Temp. Range: 0 to +40°C.
- Case Temp. Rise: ≤35°C.
- Output cords available
- Oper. Humidity: 10-90% RH.
- Material: Black ABS resin/UL 94-V0.
- No Audible Noise.
- Mounting Tab Available.

AC-AC CLASS 2 TRANSFORMERS-120VAC,60HZ. (FIGURE 1)

UL/CSA MODEL NO.	RATED OUTPUT VOLTS AC	RATED OUTPUT mA AC	OUTPUT VAC 100% FL 108VAC	OUTPUT VAC 100% FL 132VAC	OUTPUT VAC 10% FL 132VAC	UL[2]	CSA[3]	PLUG[4]
310A0001	2.5	500	2.15	1.70	3.20	UL*	L	P
420A0003	9.0	800	7.75	9.20	10.90	UL*	L	M
825A0007G	9.0	1500	7.85	10.00	11.25	UL	L	I
420A0001	11.0	600	9.85	12.35	13.65	UL*	L	I
310A0002	12.0	110	11.00	13.70	15.30	UL*	C	I
825A0001	12.0	1300	10.50	13.50	15.90	UL	C	I
816A0001	14.0	500	12.60	15.85	17.75	UL	L	I
420A0002	14.0	770	12.25	15.50	18.30	UL*	L	I
420A0008	16.5	600	14.10	18.25	19.90	UL	C	I
818A0001	17CT	500	16.00	20.10	23.40	UL	L	V
825A0002	18.0	880	15.95	21.50	22.90	UL	C	I
420A0005	24.0	450	20.60	26.50	30.50	UL*	L	I
825A0003	24.0	660	21.00	26.60	30.25	UL	C	I

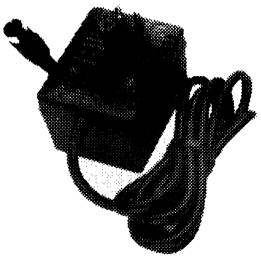


FIG. 1 UL/CSA

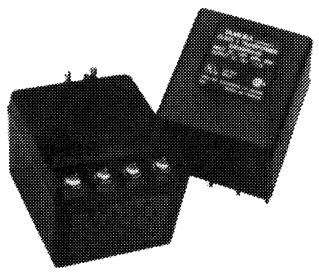


FIG. 2 SCREW TERMINAL

SCREW TERMINAL TYPE-120VAC, 60HZ. (FIGURE 2).

UL/CSA MODEL NO.	RATED OUTPUT VOLTS AC	RATED OUTPUT mA AC	OUTPUT VAC 100% FL 108VAC	OUTPUT VAC 100% FL 132VAC	OUTPUT VAC 10% FL 132VAC	UL[2]	CSA[3]	PLUG[4]
820A0060-03	10.0	1200	8.60	11.40	12.75	UL	L	SCRW
825A0050-03	10CT	1600	8.70	11.30	12.65	UL	L	SCRW
830A0060-03	10.0	2000	8.60	11.20	12.55	UL	L	SCRW
820A0061-03	12.0	1000	10.25	13.75	15.40	UL	L	SCRW
825A0051-03	12CT	1330	10.40	13.60	15.25	UL	L	SCRW
830A0061-03	12.0	1600	10.55	13.75	15.30	UL	L	SCRW
820A0062-03	14.0	850	12.05	15.70	17.55	UL	L	SCRW
825A0052-03	14CT	1140	12.00	15.60	17.45	UL	L	SCRW
830A0062-03	14.0	1430	11.90	15.50	17.35	UL	L	SCRW
820A0063-03	16.0	750	13.50	17.70	20.10	UL	L	SCRW
825A0053-03	16CT	1000	13.80	18.05	20.05	UL	L	SCRW
830A0063-03	16.0	1250	13.65	17.90	19.90	UL	L	SCRW
820A0064-03	18.0	650	15.45	20.30	22.85	UL	L	SCRW
825A0054-03	18CT	880	15.45	20.30	22.70	UL	L	SCRW
830A0064-03	18.0	1110	15.35	20.25	22.60	UL	L	SCRW
820A0065-03	20.0	600	17.00	22.35	25.10	UL	L	SCRW
825A0055-03	20CT	800	17.10	22.40	25.10	UL	L	SCRW
830A0065-03	20.0	1000	16.95	22.30	25.05	UL	L	SCRW
820A0066-03	22.0	550	18.85	24.86	27.80	UL	L	SCRW
825A0056-03	22CT	720	18.75	24.75	27.65	UL	L	SCRW
830A0066-03	22.0	900	18.70	24.70	27.60	UL	L	SCRW
820A0067-03	24.0	500	20.70	26.95	30.10	UL	L	SCRW
825A0057-03	24CT	660	20.60	26.85	29.95	UL	L	SCRW
830A0067-03	24.0	830	20.60	26.85	30.00	UL	L	SCRW

Note 1: Typ. output VAC for load & line shown.
Note 2: UL: UL 1310 Listed
UL*: UL 1310 & UL 1411 Transformer
Note 3: Complies (C) or listed (L) to CSA 22.2 No. 223/66.
Note 4: Screw term.: 4ea. #6-32; input gnd & output screw term gnd.

AC-AC TRANSFORMER-220VAC,50Hz. - VDE APPROVED (FIGURE 3)

VDE MODEL NO.	RATED OUTPUT VOLTS AC	RATED OUTPUT mA AC	OUTPUT VAC 100% FL 198VAC	OUTPUT VAC 100% FL 242VAC	OUTPUT VAC 10% FL 242VAC	PLUG TYPE
310F0006	9.5	150	9.40	11.80	18.50	I
310F0007	12.0	100	10.00	14.00	18.70	I

Note 5: Typical output voltage for % load (FL) and line (VAC) as indicated.

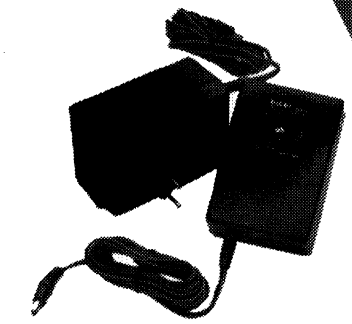


FIG. 3 VDE

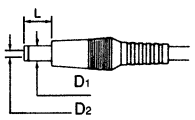


FIG. 4 FEMALE

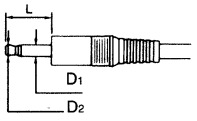


FIG. 5 MALE

OUTPUT PLUG DIMENSIONS

PLUG TYPE	D1 (mm)	D2 (mm)	L (mm)	GENDER	FIG No.
I	5.5	2.10	9.5	FEMALE	4
M	5.5	2.55	9.5	FEMALE	4
O	5.5	2.55	12.4	FEMALE	4
P	2.5	2.30	11.0	MALE	5
V	3 POS. AMP 102241-1 MOLDED				N/A

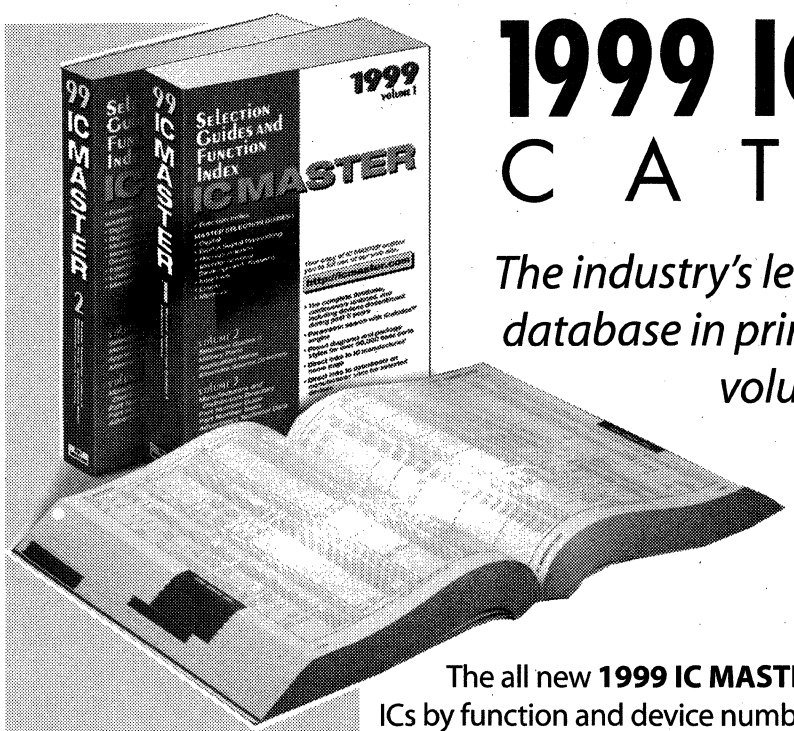
MECHANICAL DIMENSIONS TABLE

SERIES PREFIX	LENGTH (L) mm(inch)	WIDTH (W) mm(inch)	HEIGHT (H) mm(inch)	WEIGHT (W) gm(oz)	FIG No.
310A	60 (2.36)	45 (1.77)	35 (1.38)	150 (5.29)	1
310F	58 (2.28)	45 (1.77)	39 (1.54)	190 (6.70)	3
420A	61 (2.40)	55 (2.17)	41 (1.62)	270 (9.52)	1
816A	81 (3.19)	59 (2.32)	52 (2.05)	297 (10.49)	1
818A	51 (2.01)	60 (2.36)	50 (1.97)	330 (11.64)	1
820A-03	75 (2.95)	63 (2.48)	50 (1.97)	400 (14.13)	2
825A	82 (3.23)	60 (2.36)	55 (2.17)	490 (17.28)	1
825A-03	75 (2.95)	63 (2.48)	50 (1.97)	470 (16.58)	2
830A-03	75 (2.95)	63 (2.48)	50 (1.97)	530 (18.73)	2

Aaltam Distribution Center
702.566.0800 • Fax: 702.566.2080
www.aaltam.com

Microtran Division,Tamura
516.561.6050 • Fax: 516.561.1117
www.microtran.com

Tamura Corporation of America
909.699.1270 • Fax: 909.676.9482
www.tamuracorp.com



1999 IC MASTER CATALOG

The industry's leading integrated circuit database in print. In three easy-to-use volumes you can:

- **Review current IC product information.**
- **Identify second-sources.**
- **Locate manufacturers with sales offices and distributors.**

The all new **1999 IC MASTER** catalog lists over 100,000 current ICs by function and device number. To make your search for information fast and easy, device data is organized in ten Master Selection Guides:

- **Digital**
- **Digital Signal Processing**
- **Microprocessor**
- **Interface**
- **Microprocessor Development Systems**
- **Linear**
- **Programmable Logic Devices**
- **ASIC/Custom**
- **Memory**
- **Chip Sets & Multifunction Devices**

The comprehensive, industry-wide Alternate Source Directory lists over 120,000 functional equivalents for current and discontinued ICs. It includes NTE and Philips ECG parts.

There's more. Other valuable sections include the Part Number Index, the Military Parts Directory, the Application Notes Directory, and the Manufacturers & Distributors Directory. You have access to pinout and package data for over 90,000 devices on the Internet at http://icmaster.com.

When you want a comprehensive overview of the IC industry, turn to the **1999 IC MASTER** catalog. An industry standard since 1974.

To order your 1999 IC MASTER

contact your local IC MASTER distributor or Marie Botta at:

Hearst Business Communications, Inc.
645 Stewart Avenue, Garden City, NY 11530
(516) 227-1314 FAX (516) 227-1453
Credit Card Hotline: 1-800-833-7138

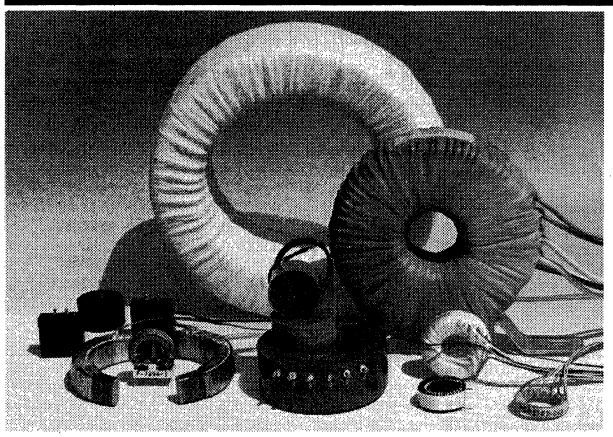
Tell Marie you saw IC MASTER in the 1999 EEM, and she'll take $10.00 off the subscription price!

The IC MASTER catalog is published annually in February.

See us on the World Wide Web at http://icmaster.com

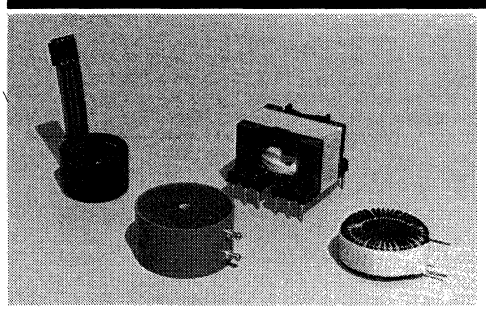
Torelco's Custom Wound Magnetic Devices

QUALITY MAGNETICS - MADE WITH PRIDE IN THE USA

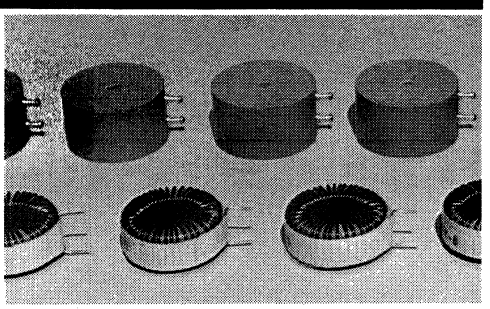


For over 30 years, the industry has known Torelco as a partner that supplies toroids of superior quality, shipped to you with flawless adhesion to delivery schedules. Coils from .093 inside diameter, to over 10 inches outside diameter can be wound using wire sizes from 8 AWG through 46 AWG, in open or cased styles, varnish or epoxy encapsulated.

TAPE WOUND · MPP · FERRITE · POWDERED IRON · ALL INSULATION SYSTEMS

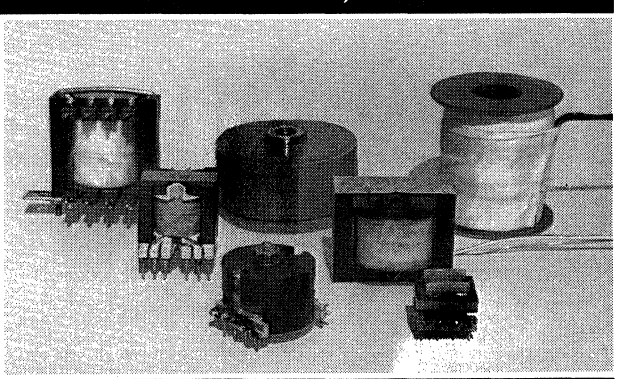


From prototype to production You can count on **Torelco** to supply a Quality product On-time **Every time**.



MIL-T-27 GRADES 4, 5, 6 - FROM 1 PIECE TO 100,000

Torelco is equipped to fill your requirements for bobbin wound devices with the same attention to quality and service that the industry has come to expect from our toroid line. Please give Torelco the opportunity to quote on EI laminated, pot core, E-core and other styles of custom bobbin wound magnetic devices.



RUSH DELIVERIES ON ENGINEERING PROTOTYPES!

Torelco

CUSTOM WOUND MAGNETIC DEVICES

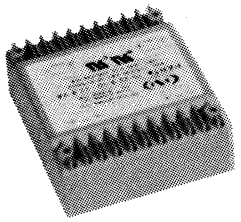
Call Toll Free 1-800-TORELCO (1-800-867-3526)

14 Paine Avenue • P.O. Box 560 • Irvington, New Jersey 07111 • TEL: (973) 374-8641 • FAX: (973) 374-7611

Division of Hunterdon Transformer Company

NEW INTERNATIONAL LOW PROFILE, PRINTED CIRCUIT MOUNT TRANSFORMERS

With industry standard packaging, plus 60% more power than existing transformers of their type. These transformers are ideal where minimum height is an advantage and international safety requirements is required. These transformers are fully encapsulated and wound with unique insulating techniques to meet international safety requirements.



General Specifications

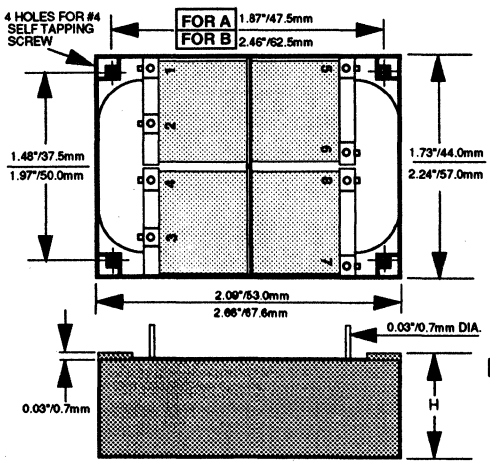
Power: 3.2 VA to 48 VA
Height: 0.69" to 1.39" / 17.5mm to 35.3mm
Insulation: Class B, 130 C
Dielectric Strenght: 4000 VRMS Hipot
Primaries: Dual primaries, 115/230 VAC @ 50/60 Hz
Secondaries: Series or Parallel
Electrostatic Shield: Not necessary, split bobbin construction
Magnetic Field: Reduced magnetic radiation

Recognized Component Underwriters Labs Inc.

Recognized Component Mark of Canada

ISO 9001

MECHANICAL DRAWING & DIMENSIONS



A

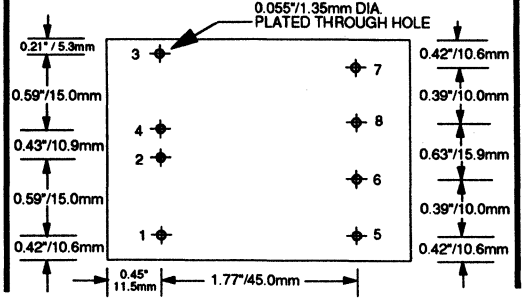
Part No.	VA (Size)	Secondarry RMS Rating Series	Parallel	Dim. H
IS-3.2-10		10VCT @ 320mA	5V @ 640mA	
IS-3.2-12		12VCT @ 266mA	6V @ 532mA	
IS-3.2-16		16VCT @ 200mA	8V @ 400mA	
IS-3.2-20		20VCT @ 160mA	10V @ 320mA	
IS-3.2-24	3.2	24VCT @ 133mA	12V @ 266mA	0.69"
IS-3.2-30		30VCT @ 106mA	15V @ 212mA	17.6mm
IS-3.2-34		34VCT @ 94mA	17V @ 188mA	
IS-3.2-40		40VCT @ 80mA	20V @ 160mA	
IS-3.2-56		56VCT @ 57mA	28V @ 114mA	
IS-3.2-230		230VCT @ 14mA	115V @ 28mA	
IS-6.4-10		10VCT @ 640mA	5V @ 1.28A	
IS-6.4-12		12VCT @ 533mA	6V @ 1.06A	
IS-6.4-16		16VCT @ 400mA	8V @ 800mA	
IS-6.4-20		20VCT @ 320mA	10V @ 640mA	
IS-6.4-24	6.4	24VCT @ 266mA	12V @ 532mA	0.77"
IS-6.4-30		30VCT @ 213mA	15V @ 426mA	19.6mm
IS-6.4-34		34VCT @ 188mA	17V @ 376mA	
IS-6.4-40		40VCT @ 160mA	20V @ 320mA	
IS-6.4-56		56VCT @ 114mA	28V @ 228mA	
IS-6.4-230		230VCT @ 28mA	115V @ 56mA	
IS-9.6-10		10VCT @ 960mA	5V @ 1.92A	
IS-9.6-12		12VCT @ 800mA	6V @ 1.60A	
IS-9.6-16		16VCT @ 600mA	8V @ 1.20A	
IS-9.6-20		20VCT @ 480mA	10V @ 960mA	
IS-9.6-24	9.6	24VCT @ 400mA	12V @ 800mA	0.89"
IS-9.6-30		30VCT @ 320mA	15V @ 640mA	22.6mm
IS-9.6-34		34VCT @ 282mA	17V @ 564mA	
IS-9.6-40		40VCT @ 240mA	20V @ 480mA	
IS-9.6-56		56VCT @ 171mA	28V @ 342mA	
IS-9.6-230		230VCT @ 42mA	115V @ 84mA	
IS-14.4-10		10VCT @ 1.44A	5V @ 2.88A	
IS-14.4-12		12VCT @ 1.20A	6V @ 2.40A	
IS-14.4-16		16VCT @ 900mA	8V @ 1.80A	
IS-14.4-20		20VCT @ 720mA	10V @ 1.44A	
IS-14.4-24	14.4	24VCT @ 600mA	12V @ 1.20A	1.13"
IS-14.4-30		30VCT @ 480mA	15V @ 960mA	28.6mm
IS-14.4-34		34VCT @ 423mA	17V @ 846mA	
IS-14.4-40		40VCT @ 360mA	20V @ 720mA	
IS-14.4-56		56VCT @ 257mA	28V @ 514mA	
IS-14.4-230		230VCT @ 62mA	115V @ 124mA	

B

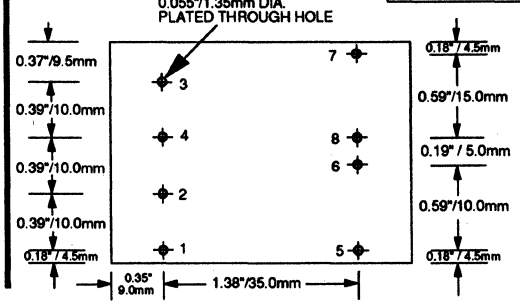
Part No.	VA (Size)	Secondarry RMS Rating Series	Parallel	Dim. H
IS-16-10		10VCT @ 1.60A	5V @ 3.20A	
IS-16-12		12VCT @ 1.33A	6V @ 2.66A	
IS-16-16		16VCT @ 1.00A	8V @ 2.00A	
IS-16-20		20VCT @ 800mA	10V @ 1.60A	
IS-16-24	16	24VCT @ 666mA	12V @ 1.33A	0.89"
IS-16-30		30VCT @ 533mA	15V @ 1.06A	22.6mm
IS-16-34		34VCT @ 470mA	17V @ 940mA	
IS-16-40		40VCT @ 400mA	20V @ 800mA	
IS-16-56		56VCT @ 286mA	28V @ 572mA	
IS-16-230		230VCT @ 69mA	115V @ 138mA	
IS-22.4-10		10VCT @ 2.24A	5V @ 4.48A	
IS-22.4-12		12VCT @ 1.86A	6V @ 3.72A	
IS-22.4-16		16VCT @ 1.40A	8V @ 2.80A	
IS-22.4-20		20VCT @ 1.12A	10V @ 2.24A	
IS-22.4-24	22.4	24VCT @ 933mA	12V @ 1.86A	0.96"
IS-22.4-30		30VCT @ 746mA	15V @ 1.49A	24.3mm
IS-22.4-34		34VCT @ 659mA	17V @ 1.32A	
IS-22.4-40		40VCT @ 560mA	20V @ 1.12A	
IS-22.4-56		56VCT @ 400mA	28V @ 800mA	
IS-22.4-230		230VCT @ 97mA	115V @ 194mA	
IS-28.8-10		10VCT @ 2.88A	5V @ 5.76A	
IS-28.8-12		12VCT @ 2.40A	6V @ 4.80A	
IS-28.8-16		16VCT @ 1.80A	8V @ 3.60A	
IS-28.8-20		20VCT @ 1.44A	10V @ 2.88A	
IS-28.8-24	28.8	24VCT @ 1.20A	12V @ 2.40A	1.09"
IS-28.8-30		30VCT @ 960mA	15V @ 1.92A	27.6mm
IS-28.8-34		34VCT @ 847mA	17V @ 1.69A	
IS-28.8-40		40VCT @ 720mA	20V @ 1.44A	
IS-28.8-56		56VCT @ 514mA	28V @ 1.03A	
IS-28.8-230		230VCT @ 125mA	115V @ 250mA	
IS-38.4-10		10VCT @ 3.84A	5V @ 7.68A	
IS-38.4-12		12VCT @ 3.20A	6V @ 6.40A	
IS-38.4-16		16VCT @ 2.40A	8V @ 4.80A	
IS-38.4-20		20VCT @ 1.92A	10V @ 3.84A	
IS-38.4-24	38.4	24VCT @ 1.60A	12V @ 3.20A	1.23"
IS-38.4-30		30VCT @ 1.28A	15V @ 2.56A	31.3mm
IS-38.4-34		34VCT @ 1.13A	17V @ 2.26A	
IS-38.4-40		40VCT @ 960mA	20V @ 1.92A	
IS-38.4-56		56VCT @ 685mA	28V @ 1.37A	
IS-38.4-230		230VCT @ 167mA	115V @ 334mA	
IS-48-10		10VCT @ 4.80A	5V @ 9.60A	
IS-48-12		12VCT @ 4.00A	6V @ 8.00A	
IS-48-16		16VCT @ 3.00A	8V @ 6.00A	
IS-48-20		20VCT @ 2.40A	10V @ 4.80A	
IS-48-24	48	24VCT @ 2.00A	12V @ 4.00A	1.39"
IS-48-30		30VCT @ 1.60A	15V @ 3.20A	35.3mm
IS-48-34		34VCT @ 1.41A	17V @ 2.82A	
IS-48-40		40VCT @ 1.20A	20V @ 2.40A	
IS-48-56		56VCT @ 857mA	28V @ 1.71A	
IS-48-230		230VCT @ 208mA	115V @ 416mA	

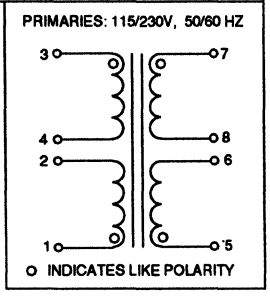
Note: Special Ratings & variations Are Also Available & Will Be Quoted& Shipped Promptly.

PRINTED CIRCUIT DRILL PATTERN FOR B



PRINTED CIRCUIT DRILL PATTERN FOR A





3S INDUSTRIES, INC.
12862 Foothill Blvd., Sylmar, CA 91342 • Phone: TOLL FREE: 1-800-475-9784
(818) 898-0247; Fax: (818) 898-1039; E-Mail: 3si@sprynet.com; Web: http://3sind.com

MANUFACTURERS OF STANDARD & CUSTOM TRANSFORMERS & INDUCTORS

Experienced, Qualified Engineers - Competitive Prices

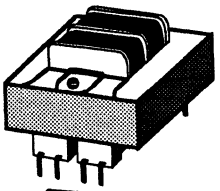
- EI, UI Laminations
- EI, EE Ferrite Cores
- Pot Cores
- RM, EP, PQ Cores

- Power
- Control
- Current
- Audio

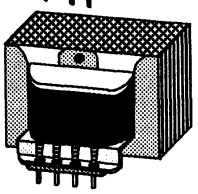
- Switching
- U. L.
- C.S.A.
- I.E.C.

- V.D.E.
- MIL. Spec.

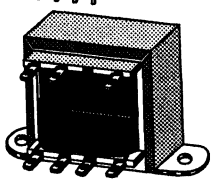
ISO 9001



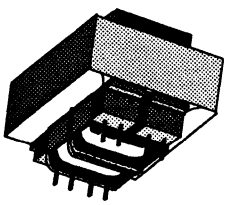
DB / DDB TYPE THE INDUSTRY STANDARD FOR PRINTED CIRCUIT APPLICATIONS, HORIZONTAL SPLIT BOBBIN, HIGHLY ISOLATED TRANSFORMERS. SIZES AVAILABLE **1.1; 2.4; 6.0; 12; 20 & 36 VA.** SECONDARY RMS RATINGS FROM **5 VAC TO 120 VAC.** SPECIAL RATINGS & VARIATIONS ARE ALSO AVAILABLE AND WILL BE QUOTED & SHIPPED PROMPTLY.



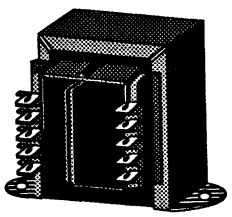
VB / DVB TYPE THE INDUSTRY STANDARD FOR PRINTED CIRCUIT APPLICATIONS, VERTICAL BOBBIN, HIGHLY ISOLATED TRANSFORMERS. SIZES AVAILABLE **1.0; 1.2; 4.4; 10.0 & 24.0 VA.** SECONDARY RMS RATINGS FROM **5 VAC TO 120 VAC.** SPLIT BOBBIN, SPECIAL RATINGS & VARIATIONS ARE ALSO AVAILABLE AND WILL BE QUOTED & SHIPPED PROMPTLY.



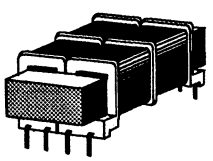
QUICK CONNECT TYPE THE INDUSTRY STANDARD TRANSFORMERS WITH SOLDER OR QUICK-DISCONNECT TERMINALS. SIZES AVAILABLE **2.4; 6; 12; 30; 56 & 100 VA.** SECONDARY RMS RATINGS FROM **10 VAC TO 120 VAC.** SPECIAL RATINGS & VARIATIONS ARE ALSO AVAILABLE AND WILL BE QUOTED & SHIPPED PROMPTLY.



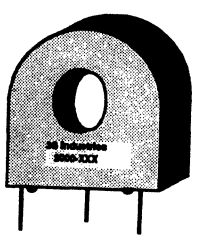
3S / INTERNATIONAL / PC THE INDUSTRY STANDARD FOR PRINTED CIRCUIT APPLICATIONS. THESE TRANSFORMER ARE BUILT ON DUAL-BOBBINS WITH INSULATING SHROUDS TO PROVIDE **4000V RMS** ISOLATION BETWEEN PRI. & SEC., ALSO TO PROVIDE CREEPAGE & CLEARANCE DISTANCES. SIZES AVAILABLE **2.5; 5; 10; 20; 30 & 56 VA.** SECONDARY RMS RATINGS FROM **5 VAC TO 36 VAC.** SPECIAL RATINGS & VARIATIONS ARE ALSO AVAILABLE AND WILL BE QUOTED & SHIPPED PROMPTLY.



3S / INTERNATIONAL / CHASSIS THE INDUSTRY STANDARD FOR CHASSIS MOUNT APPLICATIONS. THESE TRANSFORMER ARE BUILT ON DUAL-BOBBINS WITH INSULATING SHROUDS TO PROVIDE **4000V RMS** ISOLATION BETWEEN PRIMARY & SECONDARY, ALSO TO PROVIDE CREEPAGE & CLEARANCE DISTANCES. SIZES AVAILABLE **25; 43; 80; 130 & 175 VA.** SECONDARY RMS RATINGS FROM **5 VAC TO 230 VAC.** SPECIAL RATINGS & VARIATIONS ARE ALSO AVAILABLE AND WILL BE QUOTED & SHIPPED PROMPTLY.



UI /PLUG IN THE INDUSTRY STANDARD LOW PROFILE POWER TRANSFORMERS IS IDEAL FOR LOW HEIGHT, CRITICAL PC BOARD POWER APPLICATIONS IN SEMI-CONDUCTOR CONTROL & INSTRUMENTATION. COMPLETE WINDING ISOLATION. SIZES AVAILABLE **2.5; 6; 12; 24 & 48 VA.** SECONDARY RMS RATINGS FROM **5 TO 230 VAC.** SPECIAL RATINGS & VARIATIONS ARE ALSO AVAILABLE AND WILL BE QUOTED & SHIPPED PROMPTLY.



TRUE CURRENT TRANSFORMERS/CURRENT SENSORS LARGE SELECTION OF CURRENT TRANSFORMERS FOR CONTROLLING, MONITORING, OR MEASURING AC CURRENT. DESIGNED FOR UP TO 200A ISOLATED CURRENT MEASURING. AVAILABLE IN 12 SIZES WITH WINDOW OPENINGS UP TO 0.575". FULLY ENCAPSULATED FOR OPTIMAL PC BOARD MOUNTING. PRIMARY TO SECONDARY ISOLATED TO 4KV RMS. CONFORMS UL94-VO, MEETS VDE NORMS. MANUFACTURED IN ISO-9001 APPROVED FACILITY. COMPETITIVE PRICING DUE TO HIGH VOLUME PRODUCTION.

3S INDUSTRIES, INC.

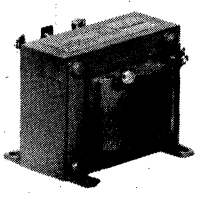
12862 Foothill Blvd., Sylmar, CA 91342 • Phone: TOLL FREE: 1-800-475-9784
(818) 898-0247; Fax: (818) 898-1039; E-Mail: 3si@sprynet.com; Web: http://3sind.com

TODD ENGINEERED

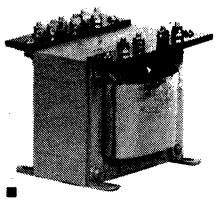
• NAME PLATES
• WIRING DIAGRAMS

HIGH CURRENT TRANSFORMERS

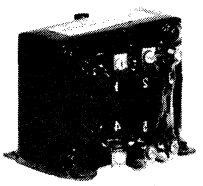
• 45° TEMP. RISE
• MINIMUM REGULATION



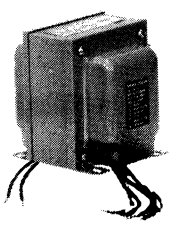
STYLE B



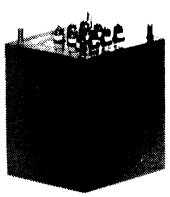
■ STYLE B (OVER 700 VA)



STYLE BE



STYLE V



STYLE CM

FOUR STYLES STOCKED IN DEPTH

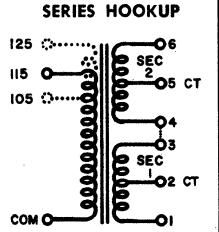
SECONDARY VOLTS TAP VOLTS	PART NO.	RATING VA	PRIMARY VOLTS 50-500 Hz.	OPTIONAL SECONDARY HOOKUP SERIES VOLTS	SERIES AMPS (RMS)	PARALLEL VOLTS	PARALLEL AMPS (RMS)
10 VOLTS Parallel: 2.5, 5V Series: 7.5, 10V	10 02	20	115	10V CT OR 7.5V	2 5 10 20	5V CT OR 2.5V	4 10 20 40
	10 05	50	115				
	10 10	100	115				
	10 20	200	115				
12.6 VOLTS Parallel: 3.1, 6.3V Series: 9.4, 12.6V	12 02	24	115	12.6V CT OR 9.4V	2 5 10 20	6.3V CT OR 3.1V	4 10 20 40
	12 05	60	115				
	12 10	120	115				
	12 20	240	115				
16 VOLTS Parallel: 4, 8V Series: 12, 16V	16 01	16	115	16V CT OR 12V	1 2 5 10 20	8V CT OR 4V	2 4 10 20 40
	16 02	32	115				
	16 05	80	115				
	16 10	160	115				
	16 20	320	115				
24 VOLTS Parallel: 6, 12V Series: 18, 24V INTERMEDIATE RATINGS AVAILABLE	24 01	24	115	24V CT OR 18V	1 2 4 6 8 12 20 25 50 100	12V CT OR 6V	2 4 8 12 16 24 40 50 100 200
	24 02	48	115				
	24 04	96	115				
	24 06	144	115				
	24 08	192	115				
	24 12	288	105, 115, 125				
	24 20	480	105, 115, 125				
	24 25	600	105, 115, 125				
	24 50	1200	105, 115, 125				
	24 100	2400	115, 230				
36 VOLTS Parallel: 9, 18V Series: 27, 36V	36 00	18	115	36V CT OR 27V	0.5 1 2 4 6 8 12 20 30 50 100	18V CT OR 9V	1 2 4 8 12 16 24 40 60 100 200
	36 01	36	115				
	36 02	72	115				
	36 04	144	115				
	36 06	216	115				
	36 08	288	115				
	36 12	432	105, 115, 125				
	36 20	720	105, 115, 125				
	36 30	1080	105, 115, 125				
	36 50	1800	115, 230				
	36 100	3600	115, 230				
56 VOLTS Parallel: 14, 28V Series: 42, 56V	56 01	56	115	56V CT OR 42V	1 2 5 8 12 25 50 100	28V CT OR 14V	2 4 10 16 24 50 100 200
	56 02	112	115				
	56 05	280	115				
	56 08	448	105, 115, 125				
	56 12	672	105, 115, 125				
	56 25	1400	105, 115, 125				
	56 50	2800	115, 230				
	56 100	5600	115, 230				
64 VOLTS Parallel: 16, 32V Series: 48, 64V	64 00	32	115	64V CT OR 48V	0.5 1 2 4 8 12 25 50	32V CT OR 16V	1 2 4 8 16 24 50 100
	64 01	64	115				
	64 02	128	115				
	64 04	256	115				
	64 08	512	105, 115, 125				
	64 12	780	105, 115, 125				
	64 25	1600	105, 115, 125				
	64 50	3200	115, 230				
68 VOLTS Parallel: 17, 34V Series: 51, 68V	68 01	68	115	68V CT OR 51V	1 2 4 8 12	34V CT OR 17V	2 4 8 16 24
	68 02	136	115				
	68 04	272	115				
	68 08	544	105, 115, 125				
	68 12	816	105, 115, 125				
80 VOLTS Parallel: 20, 40V Series: 60, 80V	80 01	80	115	80V CT OR 60V	1 2 5 10 25 50	40V CT OR 20V	2 4 10 20 50 100
	80 02	160	115				
	80 05	400	115				
	80 10	800	105, 115, 125				
	80 25	2000	115, 230				
	80 50	4000	115, 230				
120 VOLTS Parallel: 30, 60V Series: 90, 120V	120 01	120	115	120V CT OR 90V	1 2 4 8 12	60V CT OR 30V	2 4 8 16 24
	120 02	240	115				
	120 04	480	115				
	120 08	960	105, 115, 125				
	120 12	1440	105, 115, 125				
180 VOLTS Parallel: 45, 90V Series: 135, 180V	180 00	90	115	180V CT OR 135V	0.5 1 4 8	90V CT OR 45V	1 2 8 16
	180 01	180	115				
	180 04	720	105, 115, 125				
	180 08	1440	105, 115, 125				
230 VOLTS Parallel: 57.5, 115V Series: 172.5, 230V	230 00	115	115	230V CT OR 172.5V	0.5 1 2 5 8	115V CT OR 57.5V	1 2 4 10 16
	230 01	230	115				
	230 02	460	115				
	230 05	1150	105, 115, 125				
	230 08	1840	115, 230				
300 VOLTS Parallel: 75, 150V Series: 225, 300V	300 00	150	115	300V CT OR 225V	0.5 1 2 5	150V CT OR 75V	1 2 4 10
	300 01	300	115				
	300 02	600	115				
	300 05	1500	105, 115, 125				

DC TO RMS CONVERSION CHART

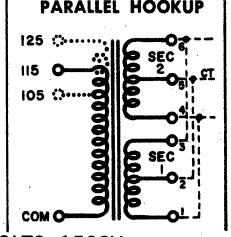
SECONDARY RMS CURRENT = DC CURRENT × FACTOR BELOW	Choke Input Filter or Inductive Load	Resistive Load	Capacitor Input Filter or Capacitive Load
FULL WAVE BRIDGE	1.0	1.0	1.8
FULL WAVE C.T.	.7	1.0	1.15

CUSTOM VARIATIONS QUOTED PROMPTLY

SERIES HOOKUP



PARALLEL HOOKUP



TODD SYSTEMS "HIGH CURRENT TRANSFORMERS & CHOKES" are designed for use in high power rectifier circuits, and high current A.C. applications. "TODD ENGINEERED" designs feature a nominal temperature rise of 45°C., at full load, thus providing outstanding overload capacity. All designs utilize extremely low regulation, varying from 10% in the smallest to 1% in the larger units. Four styles . . . select the type best suited for your lab, test rigs, OEM or production equipment

FILTER CHOKES IN STOCK FOR 0.5 TO 200 AMPS

HIPOT TEST VOLTS: 1500V rms

QUALITY ENGINEERED
www.toddsystems.com
e-mail: info@toddsystems.com

TODD SYSTEMS INC.
50 ASH STREET, YONKERS, NY, 10701 U.S.A.

PRECISION BUILT
Tel: (914) 963-3400
Fax: (914) 963-3506

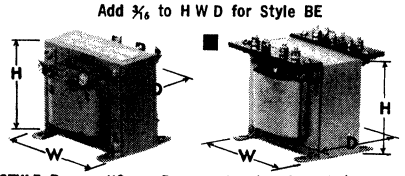
TODD ENGINEERED

HIGH CURRENT TRANSFORMERS

MECHANICAL SPECIFICATIONS · · · · · · · · · · · · · SPECIFY STYLE REQUIRED

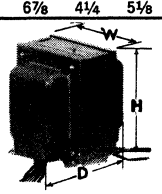
PART NO.	• BRACKET MTD. (STYLE B) • ENCAPSULATED (STYLE BE) H	W	D	MW	MD	WGT.	• FULLY MTD. SHELLS (STYLE V) H	W	D	MW	MD	WGT.	• HERMETIC SEALED MIL-T (STYLE CM) H	W	D	MW	MD	WGT.	PART NO.
10 02	2¼	2⅝	2 1/16	2 3/16	1 11/16	1¼	2⅝	2 3/16	2	1¾	1¼	1¼	3⅛	3	2 9/16	2 9/32	1 27/32	2	10 02
10 05	2½	3	2⅝	2½	2⅛	2⅜	3 1/16	2½	2¾	2	1 13/16	2½	3 13/16	3½	3	2⅝	2⅛	4	10 05
10 10	3⅛	3¾	3	3⅛	2⅛	4⅜	3⅞	3¼	3⅝	2½	2⅜	5	4¼	3⅞	3⅝	3	2 7/16	7¾	10 10
10 20	3¾	4½	3⅝	3¾	2⅜	7½	4⅝	3⅞	3⅞	3	2 13/16	8	5 7/16	5	4¼	4 1/16	3 5/16	12½	10 20
12 02	2½	3	2⅛	2½	1⅝	1½	3 1/16	2½	2¼	2	1⅝	1⅝	3 13/16	3½	3	2⅝	2⅛	2½	12 02
12 05	2½	3	2⅞	2½	2⅜	2¾	3 1/16	2½	3	2	2 1/16	2⅞	3 13/16	3½	3	2⅝	2⅛	4	12 05
12 10	3⅛	3¾	3 11/16	3⅛	2½	5¼	3⅞	3¼	3¾	2½	2½	5½	4 7/16	4¼	3⅝	3 1/16	2 1/16	8	12 10
12 20	3¾	4½	4	3¾	2¾	9	4⅝	3⅞	4 3/16	3	3⅛	9¼	5 7/16	5	4¼	4 1/16	3 5/16	13	12 20
16 01	2¼	2⅝	2	2 9/16	1⅝	1¼	2⅝	2 3/16	1 15/16	1¾	1 3/16	1⅜	3⅛	3	2 9/16	2 9/32	1 27/32	2⅛	16 01
16 02	2½	3	2	2½	1¾	1⅞	3 1/16	2½	2½	2	1 3/16	1⅞	3 13/16	3½	3	2⅝	2⅛	3⅛	16 02
16 05	2 13/16	3⅜	2¾	2 13/16	2¼	3½	3⅜	2 13/16	3 5/16	2 1/16	2 3/16	3¾	4¼	3⅞	3	2 7/16	2 1/16	5¼	16 05
16 10	3 7/16	4⅛	3¾	3 7/16	2⅝	7	4⅛	3 7/16	4	2¾	3	7⅛	4 7/8	4⅝	3 1/16	3 11/16	3	11	16 10
16 20	3¾	4½	5	3¾	3¾	12¾	4⅝	3⅞	5⅜	3	3 1/16	13	5 7/16	5	4¼	4 1/16	3 5/16	16¼	16 20
24 01	2½	3	2⅛	2½	1¾	1¾	3 1/16	2½	2½	2	1 3/16	1¾	3 13/16	3½	3	2⅝	2⅛	3¼	24 01
24 02	2½	3	2½	2½	2	2¼	3 1/16	2½	2⅝	2	1¾	2¼	3 13/16	3½	3	2⅝	2⅛	4¼	24 02
24 04	3⅛	3¾	3⅛	3⅛	2⅛	4¼	3⅞	3¼	3¼	2½	2 1/16	4⅜	4 1/16	4¼	3⅝	3 5/16	2 1/16	7½	24 04
24 06	3 7/16	4⅛	3½	3 7/16	2⅜	6	4⅛	3 7/16	3¾	2¾	2 11/16	6¼	4⅞	4⅝	3 1/16	3 11/16	3	10	24 06
24 08	3 7/16	4⅛	4	3 7/16	2⅞	7½	4⅛	3 7/16	4 1/16	2¾	3 3/16	7¾	4⅞	4⅝	3 1/16	3 11/16	3	13	24 08
24 12	3¾	4½	4⅝	3¾	3⅜	11	4⅝	3⅞	4⅞	3	3¾	11⅜	5 7/16	5	4¼	4 1/16	3 5/16	15	24 12
24 20	4⅜	5¼	5¼	4⅜	3 7/16	16¼	5⅜	4½	5⅜	3½	3⅞	16⅞	6¼	5¾	4⅞	4⅜	3½	23	24 20
24 25	4⅜	5¼	5¼	4⅜	3⅞	18½	5⅜	4½	5¾	3½	4¼	19½	6¼	5¾	4⅞	4⅜	3½	26	24 25
24 50	■5½	6⅜	7⅛	5⅝	5¼	42	6⅜	5 5/16	7¼	4¼	5½	43	7½	6⅞	5 13/16	5⅝	4¼	53	24 50
24 100	■6 1/32	7 1/16	7⅜	5 13/16	5¼	51							8¼	7 1/16	6 17/32	5 13/16	4 25/32	65	24 100
36 00	2¼	2⅝	1⅞	2 3/16	1⅝	1¼	2⅝	2 3/16	2⅛	1¾	1⅜	1½	3 13/16	3½	3	2⅝	2⅛	3⅜	36 00
36 01	2½	3	2⅛	2½	1⅞	2	3 1/16	2½	2⅝	2	1 11/16	2	3 13/16	3½	3	2⅝	2⅛	3¼	36 01
36 02	2 13/16	3⅜	2¾	2 13/16	2¼	3½	3⅜	2 13/16	3 5/16	2¼	2⅛	3½	4¼	3⅞	3 5/16	3	2 1/16	5¼	36 02
36 04	3 7/16	4⅛	3⅝	3 7/16	2½	6¼	4⅛	3 7/16	4	2¾	2⅞	6½	4⅞	4⅝	3 1/16	3 11/16	3	10	36 04
36 06	3¾	4½	3¾	3¾	2⅝	8¼	4⅝	3⅞	4 1/16	3	2⅞	8½	5 7/16	5	4¼	4 1/16	3 5/16	11	36 06
36 08	3¾	4½	4¾	3¾	3½	11¾	4⅝	3⅞	5⅛	3	3⅞	12½	5 7/16	5	4¼	4 1/16	3 5/16	15½	36 08
36 12	4⅜	5¼	5⅜	4⅜	3¾	17⅛	5⅜	4½	5¾	3½	4⅛	17⅞	6¼	5¾	4⅞	4⅜	3½	22½	36 12
36 20	4⅜	5¼	6⅜	4⅜	4⅞	23¾	5⅜	4½	6¾	3½	5¼	25	7⅜	5¾	4⅞	4⅜	3½	29	36 20
36 30	■5½	6⅜	6¾	5⅝	4⅞	34½	6⅜	5 5/16	6¾	4¼	4 11/16	36	7½	6⅞	5 13/16	5⅝	4¼	42	36 30
36 50	■6½	7 1/16	6¾	5 13/16	5¼	48							8¼	7 1/16	6 17/32	5 13/16	4 25/32	55	36 50
36 100	■7½	9	9¼	7⅝	7⅛	85													36 100
56 01	2½	3	2¾	2½	2¼	2½	3 1/16	2½	3	2	2	2¾	3 13/16	3½	3	2⅝	2⅛	4	56 01
56 02	3⅛	3¾	3 7/16	3⅛	2⅜	4½	3⅞	3¼	3 5/16	2½	2⅜	4¾	4 1/16	4¼	3⅝	3 5/16	2 1/16	6¾	56 02
56 05	3¾	4½	4¾	3¾	3½	11½	4⅝	3⅞	5⅛	3	4	12	5 7/16	5	4¼	4 1/16	3 5/16	18	56 05
56 08	4⅜	5¼	5	4⅜	3 11/16	16¾	5⅜	4½	5⅝	3½	4	17	6¼	5¾	4⅞	4⅜	3½	24	56 08
56 12	■5½	6⅜	5½	5⅝	3 7/16	24	6⅜	5 5/16	5½	4¼	3½	25	7½	6⅞	5 13/16	5⅝	4¼	30	56 12
56 25	■5½	6⅜	7	5⅝	5⅛	33	6⅜	5 5/16	7	4¼	5 1/16	34½	7½	6⅞	5 13/16	5 5/16	4¼	45	56 25
56 50	■6 1/32	7 1/16	8	5 13/16	6	60							8¼	7 1/16	6 17/32	5 13/16	4 25/32	68	56 50
56 100	■7⅝	9	11½	7⅝	9⅝	146													56 100
64 00	2¼	2⅝	2 5/16	2 3/16	2	1¾	2⅝	2 3/16	2 5/16	1¾	1½	1¾	3⅛	3	2 9/16	2 9/32	1 27/32	2½	64 00
64 01	2½	3	2 13/16	2½	2⅜	3	3 1/16	2½	3	2	2⅛	2¾	3 13/16	3½	3	2⅝	2⅛	4½	64 01
64 02	3⅛	3¾	3 1/16	3⅛	2⅜	4¾	3⅞	3¼	3⅛	2½	2	4⅛	4¼	4¼	3⅝	3 5/16	2 1/16	8	64 02
64 04	3¾	4½	4¼	3¾	3 1/16	10	4⅝	3⅞	4⅝	3	3½	10½	5 7/16	5	4¼	4 1/16	3 5/16	14½	64 04
64 08	4⅜	5¼	5⅝	4⅜	3 15/16	18¾	5⅜	4½	6	3½	4⅜	18½	6¼	5¾	4⅞	4⅜	3½	24	64 08
64 12	■5½	6⅜	5¾	5⅝	3⅞	26	6⅜	5 5/16	5⅞	4¼	3⅞	28	7½	6⅞	5 13/16	5⅝	4¼	34	64 12
64 25	■6 1/32	7 1/16	7½	5 13/16	5 1/16	52							8¼	7 1/16	6 17/32	5 13/16	4 25/32	66	64 25
64 50	■7⅝	9	7⅝	7⅝	5¾	75							10⅜	8	6¾	6¾	5½	105	64 50
68 01	2½	3	2 13/16	2½	2⅜	3¼	3 1/16	2½	3	2	2 1/16	2⅞	3 13/16	3½	3	2⅝	2⅛	4½	68 01
68 02	3⅛	3¾	3⅛	3⅛	2½	5	3⅞	3¼	3¾	2½	2½	5½	4 1/16	4¼	3⅝	3 5/16	2 1/16	8	68 02
68 04	3¾	4½	4⅜	3¾	3⅛	10½	4⅝	3⅞	5⅛	3	3⅞	12½	5 7/16	5	4¼	4 1/16	3 5/16	15	68 04
68 08	4⅜	5¼	5¾	4⅜	4	19½	5⅜	4½	6	3½	4⅜	19	6¼	5¾	4⅞	4⅜	3½	23	68 08
68 12	■5½	6⅜	5⅞	5⅝	4	26	6⅜	5 5/16	6	4¼	4	30	7½	6⅞	5 13/16	5 5/16	4¼	35	68 12
80 01	2 13/16	3⅜	2¾	2 13/16	2¼	3½	3⅜	2 13/16	3 5/16	2¼	2 3/16	3¾	4¼	3⅞	3 5/16	3	2 7/16	5½	80 01
80 02	3 7/16	4⅛	3⅝	3 7/16	2½	6½	4⅛	3 7/16	4 1/16	2¾	2⅝	7	4⅞	4⅝	3 1/16	3 11/16	3	11	80 02
80 05	4⅜	5¼	5⅛	4⅜	3½	15¼	5⅜	4½	5½	3½	3⅞	16½	6¼	5¾	4⅞	4⅜	3½	27	80 05
80 10	■5½	6⅜	5½	5⅝	4	28	6⅜	5 5/16	5¾	4¼	4	29	7½	6⅞	5 13/16	5⅝	4¼	35	80 10
80 25	■6½	7 1/16	6⅜	5 13/16	4¼	39							8¼	7 1/16	6 17/32	5 13/16	4 25/32	53	80 25
80 50	■7⅝	9	8½	7⅝	6⅝	89													80 50
120 01	3⅛	3¾	3⅜	3⅛	2½	5⅜	3⅞	3¼	3¾	2½	2½	5½	4 7/16	4¼	3⅝	3 5/16	2 1/16	8	120 01
120 02	3¾	4½	4	3¾	3⅛	9¾	4⅝	3⅞	4⅜	3	3⅛	9	5 7/16	5	4¼	4 1/16	3 5/16	12	120 02
120 04	4⅜	5¼	4⅞	4⅜	3⅝	16⅜	5⅜	4½	5½	3½	3⅞	15	6¼	5¾	4⅞	4⅜	3½	25	120 04
120 08	■5½	6⅜	5¾	5⅝	4⅝	33	6⅜	5 5/16	6	4¼	4¼	34	7½	6⅞	5 13/16	5⅝	4¼	34	120 08
120 12	■5½	6⅜	7½	5⅝	5¾	43	6⅜	5 5/16	7¾	4¼	6	44	7½	6⅞	5 13/16	5⅝	4¼	47	120 12
180 00	3⅛	3¾	3	3⅛	2⅛	4¼	3⅞	3¼	3⅛	2½	2	4¼	4 7/16	4¼	3⅝	3 5/16	2 1/16	7⅛	180 00
180 01	3 7/16	4⅛	3⅞	3 7/16	2⅝	7	4⅛	3 7/16	4⅛	2¾	3	7¼	4⅞	4⅝	3 1/16	3 11/16	3	12	180 01
180 04	4⅜	5¼	6⅜	4⅜	4⅞	24	5⅜	4½	6¾	3½	5¼	25	7⅜	5¾	4⅞	4⅜	3½	29	180 04
180 08	■5½	6⅜	7½	5⅝	5¾	43	6⅜	5 5/16	7¾	4¼	6	44	7½	6⅞	5 13/16	5⅝	4¼	47	180 08
230 00	3⅛	3¾	3¼	3⅛	2⅜	5	3⅞	3¼	3 5/16	2½	2⅜	5⅛	4 7/16	4¼	3⅝	3 5/16	2 1/16	7¾	230 00
230 01	3 7/16	4⅛	4⅜	3 7/16	3⅛	8¼	4⅛	3 7/16	4 5/16	2¾	3½	8¾	4⅞	4⅝	3 1/16	3 11/16	3	12 3/4	230 01
230 02	4⅜	5¼	5⅛	4⅜	3¾	17	5⅜	4½	5 11/16	3½	4	17	6¼	5¾	4⅞	4⅜	3½	27	230 02
230 05	■5½	6⅜	5⅞	5⅝	4	29	6⅜	5 5/16	6⅛	4¼	4⅜	30	7½	6⅞	5 13/16	5⅝	4¼	35	230 05
230 08	■6 1/32	7 1/16	7⅝	5 13/16	5½	50							8¼	7 1/16	6 17/32	5 13/16	4 25/32	68	230 08
300 00	3 7/16	4⅛	3⅜	3 7/16	2 5/16	6	4⅛	3 7/16	3⅞	2¾	2¾	6¼	4⅞	4⅝	3 15/16	3 11/16	3	10½	300 00
300 01	3¾	4½	4⅝	3¾	3 1/16	11¼	4⅝	3⅞	4 13/16	3	3¾	11¼	5 7/16	5	4¼	4 1/16	3 5/16	14½	300 01
300 02	4⅜	5¼	6	4⅜	4⅝	20	5⅜	4½	6½	3½	5	21	7⅜	5¾	4⅞	4⅜	3½	28	300 02
300 05	■5½	6⅜	6⅝	5⅝	5	38	6⅜	5 5/16	6⅞	4¼	5⅛	40	8¾	6⅞	5 13/16	5⅝	4¼	53	300 05

Add 3/16 to H W D for Style BE



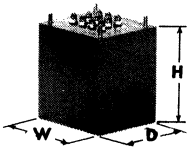
STYLE B: • "Open Frame" Bracket Mounted • Double Vacuum Varnish Impregnated

STYLE BE: • Conforms to MIL-T-27B • Epoxy Encapsulation added to Style B



OUTLINE DRAWINGS AVAILABLE

STYLE V: • Fully Enclosed in Metal Shells • Ease of "Wiring with Leads" • Attractive Appearance • Dbl Vacuum Varnish Impregnated



STYLE CM: • Hermetically Sealed to MIL-T-27B • Environment Proof • Attractive Gray Finish • Permanent Name Plate

DATA SUBJECT TO CHANGE WITHOUT NOTICE

CONTACT FACTORY FOR PRICES

QUALITY ENGINEERED
www.toddsystems.com
e-mail: info@toddsystems.com

TODD SYSTEMS INC.
50 ASH STREET, YONKERS, NY, 10701 U.S.A.

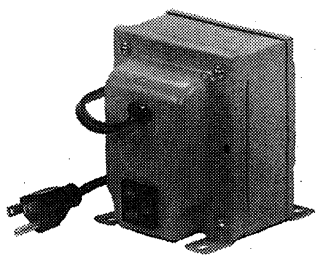
PRECISION BUILT
Tel: (914) 963-3400
Fax: (914) 963-3506

LINE ISOLATION TRANSFORMERS

ELECTROSTATIC SHIELD CONNECTED TO CORE

1:1 LINE ISOLATION — 115 VOLT INPUT → 115 VOLT OUTPUT

CATALOG NUMBER	MAX.VA (WATTS)	NOMINAL AMPS	HIPOT TEST VOLTS	WEIGHT LBS.	DIMENSIONS H	W	D	MW	MD
LI-25	25	0.22	1500	1 5/8	3 1/8	2 5/8	2 1/2	2	1 1/2
LI-50	50	0.44	1500	3	3 1/2	2 7/8	3	2 1/4	1 7/8
LI-100	100	0.87	1500	4	3 1/2	2 7/8	3 1/2	2 1/4	2 1/4
LI-175	175	1.52	1500	7	4 5/8	3 7/8	3 7/8	3	2 3/4
LI-250	250	2.17	1500	10	4 5/8	3 7/8	4 3/8	3	3 1/4
LI-350	350	3.04	1500	14	4 5/8	3 7/8	5 1/4	3	4 1/8
LI-500	500	4.35	1500	17 1/2	6	4 3/8	5 1/8	3 7/16	3 3/8
LI-750	750	6.52	1500	24	6	4 3/8	6 3/8	3 7/16	4 1/2
LI-1000	1000	8.70	1500	30	6	4 3/8	7 1/4	3 7/16	5 1/2
LI-1500	1500	13.04	1500	42	6 1/2	5 1/2	7 1/2	4 1/4	5 3/8
LI-2000	2000	17.39	1500	58	6 1/2	5 1/2	9	4 1/4	6 7/8



STYLE G SHOWN

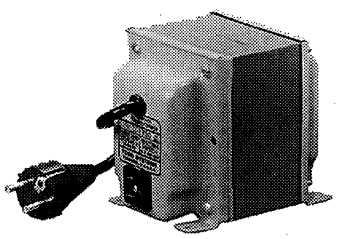
- *STYLE G:* 6 FOOT 3 WIRE POWER CORD WITH GROUNDING PLUG
- *STYLE L:* FOUR 12 INCH FLYING LEAD WIRE TERMINALS

2:1 LINE ISOLATION — 230 VOLT INPUT → 115 VOLT OUTPUT

CATALOG NUMBER	MAX.VA (WATTS)	NOMINAL AMPS	HIPOT TEST VOLTS	WEIGHT LBS.	DIMENSIONS H	W	D	MW	MD
LI-50-1	50	0.44	2000	3 1/3	3 1/2	2 7/8	4	2 1/4	2 7/8
LI-100-1	100	0.87	2000	4	3 1/2	2 7/8	4 1/4	2 1/4	3 1/8
LI-250-1	250	2.17	2000	10	4 5/8	3 7/8	4 3/4	3	3 3/4
LI-350-1	350	3.04	2000	13	4 5/8	3 7/8	5 1/2	3	4 1/2
LI-500-1	500	4.35	2000	17 1/2	6	4 3/8	5 1/2	3 7/16	3 7/8
LI-750-1	750	6.52	2000	23 1/2	6	4 3/8	6 3/8	3 7/16	4 1/2
LI-1000-1	1000	8.70	2000	30	6	4 3/8	7 1/2	3 7/16	5 7/8
LI-1500-1	1500	13.04	2000	42	6 1/2	5 1/2	8 1/4	4 1/4	6 3/4
LI-2000-1	2000	17.39	2000	58	6 1/2	5 1/2	9 1/2	4 1/4	8

STYLE G PLUG

STYLE SC PLUG



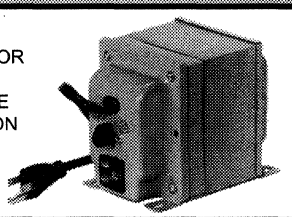
STYLE SC SHOWN

- *STYLE G:* 6 FT 3 WIRE POWER CORD W/ 220V GROUNDING PLUG
- *STYLE SC:* 6 FOOT 3 WIRE POWER CORD WITH EUROPEAN PLUG
- *STYLE L:* FOUR 12 INCH FLYING LEAD WIRE TERMINALS

1:1 ADJUSTABLE LINE ISOLATION — 105/115/125 VOLT INPUT → 115 VOLT OUTPUT

CATALOG NUMBER	MAX.VA (WATTS)	NOMINAL AMPS	HIPOT TEST VOLTS	WEIGHT LBS.	DIMENSIONS H	W	D	MW	MD
LI-50-2	50	0.44	1500	3	3 1/2	2 7/8	3 7/8	2 1/4	2 1/2
LI-100-2	100	0.87	1500	4 1/2	3 1/2	2 7/8	4 3/8	2 1/4	3
LI-250-2	250	2.17	1500	11 1/2	4 5/8	3 7/8	5 1/8	3	4
LI-500-2	500	4.35	1500	19	6	4 3/8	5 7/8	3 7/16	4 1/8
LI-1000-2	1000	8.70	1500	34	6	4 3/8	8 1/8	3 7/16	6 3/8

SWITCH FOR INPUT VOLTAGE SELECTION



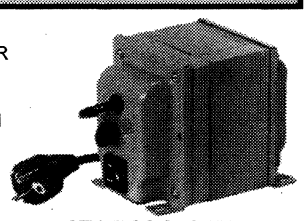
STYLE G SHOWN

- *STYLE G:* 6 FOOT 3 WIRE POWER CORD WITH GROUNDING PLUG
- *STYLE L:* FOUR 12 INCH FLYING LEAD WIRE TERMINALS

2:1 ADJUSTABLE LINE ISOLATION — 210/230/250 VOLT INPUT → 115 VOLT OUTPUT

CATALOG NUMBER	MAX.VA (WATTS)	NOMINAL AMPS	HIPOT TEST VOLTS	WEIGHT LBS.	DIMENSIONS H	W	D	MW	MD
LI-50-3	50	0.44	2000	3	3 1/2	2 7/8	3 7/8	2 1/4	2 1/2
LI-100-3	100	0.87	2000	4 1/2	3 1/2	2 7/8	4 3/8	2 1/4	3
LI-250-3	250	2.17	2000	11 1/2	4 5/8	3 7/8	5 1/8	3	4
LI-500-3	500	4.35	2000	19	6	4 3/8	5 7/8	3 7/16	4 1/8
LI-1000-3	1000	8.70	2000	34	6	4 3/8	8 1/8	3 7/16	6 3/8

SWITCH FOR INPUT VOLTAGE SELECTION

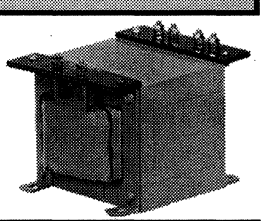


STYLE SC SHOWN

- *STYLE G:* 6 FT 3 WIRE POWER CORD W/ 220V GROUNDING PLUG
- *STYLE SC:* 6 FOOT 3 WIRE POWER CORD WITH EUROPEAN PLUG
- *STYLE L:* FOUR 12 INCH FLYING LEAD WIRE TERMINALS

BRACKET MOUNTED W/ TERMINAL BOARD — 115 / 230 / 230 / 460 VOLT INPUT → 115 VOLT OUTPUT

CATALOG NUMBER	MAX.VA (WATTS)	NOMINAL AMPS	HIPOT TEST VOLTS	WEIGHT LBS.	DIMENSIONS H	W	D	MW	MD
LI-2500-4/5	2500	21.74	2000	60	6 1/8	7 1/8	8 3/4	5 7/8	7
LI-3000-4/5	3000	26.09	2000	95	7 1/2	9	7 7/8	7 1/2	6 1/2
LI-4000-4/5	4000	34.78	2000	113	7 1/2	9	9	7 1/2	7 5/8
LI-5000-4/5	5000	43.48	2000	135	7 1/2	9	10 1/4	7 1/2	8 7/8
LI-6000-4/5	6000	52.17	2000	168	7 1/2	9	11 3/4	7 1/2	10 1/4



- *STYLE -4:* INPUT VOLTS OF 115/230
- *STYLE -5:* INPUT VOLTS OF 230/460
- WIRING INSTRUCTIONS CLEARLY MARKED ON TERMINAL BOARDS

QUALITY ENGINEERED
www.toddsystems.com
e-mail: info@toddsystems.com

TODD SYSTEMS INC.
50 ASH STREET, YONKERS, NY, 10701 U.S.A.

PRECISION BUILT
Tel: (914) 963-3400
Fax: (914) 963-3506

TODD ENGINEERED

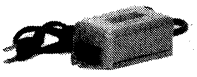
STEPDOWN AUTOTRANSFORMERS

CONVERT DOMESTIC APPLIANCES FOR USE ON FOREIGN VOLTAGES

50/60 HERTZ—*UL* COMPONENTS

PORTABLE MODEL — 220/240 INPUT 110/120 OUTPUT

CATALOG NUMBER	WATTS (VA)	WEIGHT LBS.	DIMENSIONS H	W	D
SD-35	20	.7	1 1/2	1 3/4	2 3/4
SD-36	40	1.3	1 5/8	2	3 3/4
SD-37	60	1.4	1 5/8	2	3 3/4
SD-41	80	1.5	1 5/8	2	3 3/4



LINE CORD • RECEPTACLE

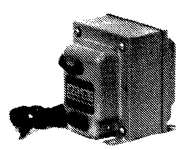
CHANNEL MOUNTED MODEL — 220/240 INPUT 110/120 OUTPUT

CATALOG NUMBER	WATTS (VA)	WEIGHT LBS.	DIMENSIONS H	W	D
SD-24	50	1.6	2 1/4	2 3/4	2 1/4
SD-21	65	1.6	2 1/4	2 3/4	2 1/4
SD-25	80	1.9	2 1/4	2 3/4	2 3/8
SD-23	100	1.9	2 1/4	2 3/4	2 3/8
SD-26	125	2.4	2 5/8	3 1/16	2 1/2
SD-27	150	2.4	2 5/8	3 1/16	2 1/2

LINE CORD • PIGTAIL

HEAVY DUTY MODEL — 220/240 INPUT 110/120 OUTPUT

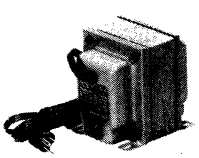
CATALOG NUMBER	WATTS (VA)	WEIGHT LBS	DIMENSIONS H	W	D
SD-16A	100	2.5	3 1/8	2 5/8	3 1/4
SD-17A	150	3.3	3 1/8	2 5/8	3 5/8
SD-38A	200	4.0	3 1/8	2 5/8	4
SD-12A	250	4.5	3 1/8	2 5/8	4 3/8
SD-43A	300	4.6	3 1/8	2 5/8	4 1/2
SD-18A	350	6.5	4 5/8	3 7/8	3 5/8
SD-11A	500	9.7	4 5/8	3 7/8	4 1/4
SD-19A	750	12.0	4 5/8	3 7/8	5
SD-13A	1000	13.8	4 5/8	3 7/8	5 1/4
SD-14A	1500	19.0	4 5/8	3 7/8	6 5/8



TWO PRONG LINE CORD/RECEPTACLE

HEAVY DUTY GROUNDED MODEL — 220/240 INPUT 110/120 OUTPUT

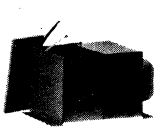
CATALOG NUMBER	WATTS (VA)	WEIGHT LBS.	DIMENSIONS H	W	D
SD-16G	100	2.5	3 1/8	2 5/8	3 3/8
SD-17G	150	3.3	3 1/8	2 5/8	3 3/4
SD-38G	200	3.8	3 1/8	2 5/8	4 3/16
SD-12G	250	4.5	3 1/8	2 5/8	4 9/16
SD-43G	300	4.5	3 1/8	2 5/8	4 5/8
SD-18G	350	6.7	4 5/8	3 7/8	4 1/8
SD-11G	500	8.7	4 5/8	3 7/8	4 3/4
SD-19G	750	12.4	4 5/8	3 7/8	5 5/8
SD-13G	1000	13.7	4 5/8	3 7/8	6
SD-14G	1500	18.2	4 5/8	3 7/8	7 1/16
SD-20G	2000	24.2	5 15/16	4 3/8	6 7/16
SD-39G	2500	36	6 3/8	5 5/16	7 5/8



3 WIRE (GROUNDING) LINE CORD/RECEPTACLE
FOREIGN PLUGS AVAILABLE

INDUSTRIAL MODEL — 220/240 INPUT 110/120 OUTPUT

CATALOG NUMBER	WATTS (VA)	WEIGHT LBS.	DIMENSIONS H	W	D
SD-11JB	500	9.0	4	4 1/2	5 7/8
SD-19JB	750	12.8	4	4 1/2	6 3/4
SD-13JB	1000	14.3	4	4 1/2	7 3/4
SD-14JB	1500	18.5	4	4 1/2	9
SD-20JB	2000	25.	4 9/16	5 3/4	8 5/8
SD-39JB	2500	36.5	5 5/8	6 3/8	9 1/2
SD-28JB	3000	44.5	6 1/4	7	10
SD-29JB	4000	61.	6 1/4	7	12
SD-22JB	5000	54.	6 1/4	7	11
SD-30JB	6000	66.	6 1/4	7	12 1/4



JUNCTION BOX LEAD TERMINALS

3 TAP FHP MOTORS & REFRIGERATION

188/210
210/234
234/258
→ 105V-50Hz
115V - 60Hz.
INPUT V. +10%

CATALOG NUMBER	WATTS (VA)	WEIGHT LBS.	DIMENSIONS H	W	D
SD-31G	350	7.7	4 5/8	3 7/8	4 7/8
SD-32G	550	10.5	4 5/8	3 7/8	5 3/8
SD-33G	750	12.7	4 5/8	3 7/8	6
SD-42G	850	14.7	4 5/8	3 7/8	6 3/8
SD-34G	1000	17	4 5/8	3 7/8	7
SD-40G	1500	24.5	5 1/2	4 1/2	7 7/8
SD-44G	2000	24.7	5 1/2	4 1/2	7 7/8

CATALOG NUMBER	WATTS (VA)	WEIGHT LBS.	DIMENSIONS H	W	D
SD-31L	350	7.5	4 5/8	3 7/8	3 7/8
SD-32L	550	9.9	4 5/8	3 7/8	4 3/8
SD-33L	750	12.2	4 5/8	3 7/8	5
SD-42L	850	14	4 5/8	3 7/8	5 1/2
SD-34L	1000	16.2	4 5/8	3 7/8	6
SD-40L	1500	24	5 1/2	4 1/2	6 7/8
SD-44L	2000	24	5 1/2	4 1/2	6 7/8

FOREIGN PLUGS AVAILABLE

STYLE G

TAP SWITCH

3 WIRE (GROUNDING) LINE CORD/RECEPTACLE

STYLE L

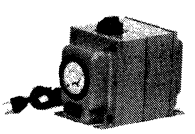
JUNCTION BOX

LEAD WIRE TERMINALS

MULTI-TAPPED VOLTAGE REGULATOR — METER • SWITCH

TYPE	PRIMARY VOLTS (SELECTOR SWITCH TAPS)								OUTPUT VOLTS
11	84	92	100	108	115	122	130	138	110/120
12	84	92	100	108	115	122	130	138	220/240
21	170	185	200	215	230	245	260	275	110/120
22	170	185	200	215	230	245	260	275	220/240

CATALOG NUMBER	TYPE	WATTS (VA)	WGT. LBS.	DIMENSIONS H	W	D
MVR-17	11 or 22	150	4.7	4 5/8	3 7/8	4 7/8
MVR-18	11 or 22	350	6.5	4 5/8	3 7/8	5 1/4
MVR-11	11 or 22	500	8.2	4 5/8	3 7/8	5 7/8
MVR-19	11 or 22	750	10	4 5/8	3 7/8	6 3/8
MVR-13	11 or 22	1000	13.7	4 5/8	3 7/8	7
MVR-14	11 or 22	1500	15.5	6	4 3/8	6 3/4
MVR-20	11 or 22	2000	20.5	6	4 3/8	7 3/8
MVR-17	12 or 21	150	5.9	4 5/8	3 7/8	5 1/2
MVR-18	12 or 21	350	7.9	4 5/8	3 7/8	5 3/4
MVR-11	12 or 21	500	11.2	4 5/8	3 7/8	6 5/8
MVR-19	12 or 21	750	15.5	4 5/8	3 7/8	7 1/4
MVR-13	12 or 21	1000	19	6	4 3/8	7 1/4
MVR-14	12 or 21	1500	25	6	4 3/8	8 3/8
MVR-20	12 or 21	2000	33.5	6	4 3/8	9 3/4

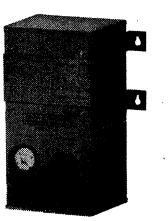


3 WIRE (GROUNDING) LINE CORD/RECEPTACLE

PANEL MOUNTED VOLTAGE REGULATOR — METER • SWITCH JUNCTION BOX

TYPE	PRIMARY VOLTS (SELECTOR SWITCH TAPS)								OUTPUT VOLTS
11	84	92	100	108	115	122	130	138	110/120
12	84	92	100	108	115	122	130	138	220/240
21	170	185	200	215	230	245	260	275	110/120
22	170	185	200	215	230	245	260	275	220/240

CATALOG NUMBER	TYPE	WATTS (VA)	WGT. LBS.	DIMENSIONS H	W	D
PVR-20	11 or 22	2000	27.	5 3/4	6 3/8	10 5/8
PVR-28	11 or 22	3000	34.5	5 3/4	6 3/8	11 1/2
PVR-29	11 or 22	4000	42.5	5 3/4	6 3/8	12 1/4
PVR-22	11 or 22	5000	48.5	5 3/4	6 3/8	13
PVR-30	11 or 22	6000	50.5	5 3/4	6 3/8	13 3/4
PVR-20	12 or 21	2000	57.5	6 1/2	7	13
PVR-28	12 or 21	3000	63	6 1/2	7	14 1/8
PVR-29	12 or 21	4000	67.5	6 1/2	7	14 1/2
PVR-22	12 or 21	5000	74.5	6 1/2	7	15
PVR-30	12 or 21	6000	78.5	6 1/2	7	15 1/2



- JUNCTION BOX
- LEAD TERMINALS

CONTACT FACTORY FOR PRICES

QUALITY ENGINEERED
www.toddsystems.com
e-mail: info@toddsystems.com

TODD SYSTEMS INC.
50 ASH STREET, YONKERS, NY, 10701 U.S.A.

PRECISION BUILT
Tel: (914) 963-3400
Fax: (914) 963-3506

Tortran TOROIDAL MAGNETIC COMPONENTS
CUSTOM MADE-HIGHEST QUALITY

LINE POWER TRANSFORMERS 15 VA TO 10 KVA

TOROIDAL TRANSFORMERS OFFER:

Low Profile	High Efficiency
Reduced Weight	Improved Regulation
Low Noise Level	Easy Mounting
Low Magnetic Stray Field	Unlimited Flexibility

STANDARD PROGRAM, TOROIDAL POWER TRANSFORMERS

In order to meet the day-to-day demand for prototypes and short production runs, we carry a stock of semi-fabricated transformers. These consist of cores with the primary winding and insulation already in place. In most cases, the core with a 117V 60Hz primary represents the generic part of a transformer, whereas the secondary often requires special voltages, centertaps or multi-voltages at different current ratings.

By means of our semi-fabricated stock, in the majority of cases we can tailor make your secondaries with windings as required and color coded leads, and ship product out within a few days from the receipt of your order.

The stock program provides us with added flexibility, but in no way limits our capability of providing you with totally tailored transformers, meeting demands for odd dimensions, multiple primaries, or off-standard operating frequencies.

NEW LINE POWER TOROIDS
RATINGS 1,000 TO 10,000 VA

OFF-THE-SHELF SERIES "S" PRIMARY WOUND TRANSFORMERS

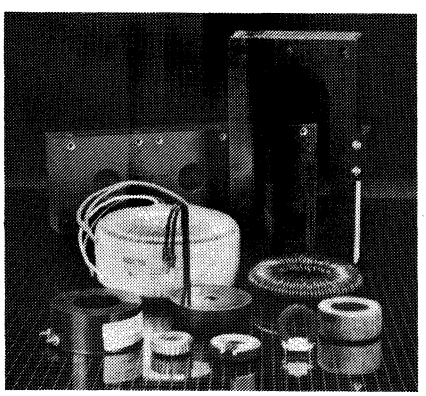
VA RATING FULL LOAD	REGULATION % VOLTAGE	MOUNTING DETAILS	FINISHED O.D x HT.	FIN. WEIGHT APP. LBS.
15	15	A	2.2" x 1.1"	.4
26	14	A	2.3" x 1.3"	.6
42	13	A	2.6" x 1.6"	.9
65	12	B	3.0" x 1.6"	1.3
100	10	B	3.4" x 1.8"	1.7
135	9	B	3.8" x 1.8"	2.6
180	8	B	4.1" x 1.9"	3.1
240	7	C	4.2" x 2.0"	3.9
320	6	C	4.5" x 2.1"	4.8
450	6	C	4.9" x 2.4"	5.8
600	5	C	5.2" x 2.8"	7.7

MOUNTING DETAILS

Zinc plated, circular steel washer +2 neoprene washers.
Mounting by means of one central screw.

SIZE 1	2" DIA.	.19 HOLE
SIZE 2	2.38" DIA.	.19 HOLE
SIZE 3	2.75" DIA.	.25 HOLE
SIZE 4	3.50" DIA.	.25 HOLE
SIZE 5	4.38" DIA.	.31 HOLE

CURRENT TRANSFORMERS, CHOKES, BALLASTS AND FILTERS



The toroidal design is utilized in instrument transformers to measure high currents in power cables and busbars. Instrument transformers can be taped, resin dipped or potted.

Toroids are also used to regulate current in AC systems for electronic and lighting applications and to filter out transients in sensitive electronic equipment. For these applications cores are often provided with a closely controlled air gap which is cut into the core before the wire is put into place. Core size, Gap width, Number of turns and Wire gauge are infinitely variable design parameters.

TORTRAN Inc. 915 PEMBROKE STREET, BRIDGEPORT, CT 06608
Phone: 203 - 367 - 5188 FAX: 203 - 366 - 6119

SUPERIOR Toroid® TRANSFORMERS

TOROIDAL POWER TRANSFORMERS

DESIGN GUIDE AND APPLICATION NOTES

Internet Address: http://www.toroid.com ▪ **e-mail:** sales@toroid.com

DESIGN DATA AND APPLICATION NOTES

A custom designed transformer is usually based on a standard core with appropriate power rating. Data for our standard cores are shown on the following page. Special cores can be manufactured to meet specific requirements, e.g. extremely low profile designs.

EFFICIENCY

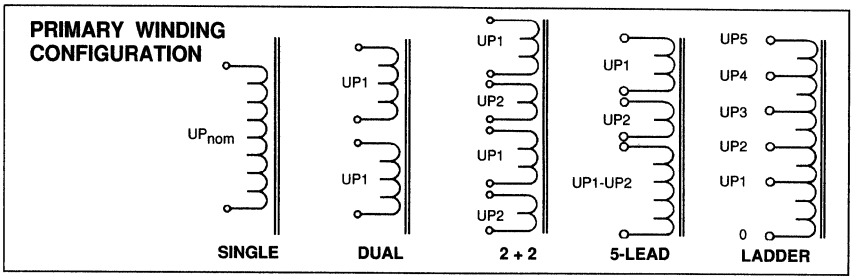
The figure shows typical curves for efficiency as a function of output power in relation to nominal output power for different core sizes.

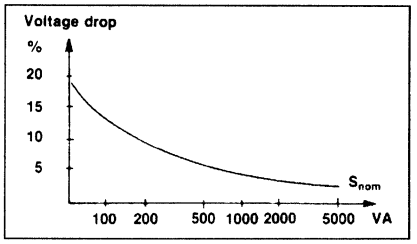
TEMPERATURE CONSIDERATIONS

Operating temperature is an important safety factor. Our transformers, built for Class A (105°C) operation, are normally calculated for a temperature rise of 60°-65°C. Actual increase will depend on how and where the transformer is mounted and how well it is cooled. When higher temperature ratings are needed, we offer UL recognized (UL1411 and UL544) transformers to class B (130°C). Transformers rated for class E (120°C), class F (150°C) and class H (180°C) are also available.

Using a larger core size will reduce the temperature rise. Due to the small core losses (in comparison with a laminated core), the temperature rise will drop drastically when the output power is reduced. At half the load the temperature rise will only be about 25% of the rise at full load.

The figure shows how temperature rise varies with the actual output power (S out) in relation to nominal power (S nom) for a given core size.





VOLTAGE DROP

This chart shows voltage drop at full load for standard cores at 50/60Hz. The voltage drop is slightly higher for a 60Hz transformer. A design with an oversized core will reduce voltage drop and temperature rise.

STATIC SHIELDING

Static shielding may be required to minimize capacitive coupling between primary and secondary winding when the transformer is used in an extremely noisy environment. Since the shield adds layers, a larger core size may be necessary to provide adequate inside diameter for the shuttle of the winding machine.

DUTY CYCLE

A smaller transformer can be designed if the load is not constant and the duty cycle is much shorter than the transformer's thermal time constant (which has a magnitude of hours). Note that the voltage drop increases linearly with the instantaneous current.

IN-RUSH CURRENTS

A consequence of the superior magnetic properties of a toroidal transformer is that the transformer "remembers" what polarity the primary voltage had immediately before the power was last shut off. Whenever the voltage has the same polarity when the transformer next is turned on, the core will saturate for part of a half-cycle, and a high in-rush current will flow in the primary of the transformer. This in-rush current is larger than the in-rush current in a conventional transformer, but it is of very short duration, so it will not affect slow-blow fuses or magnetic overload protectors with thermal delay characteristic. (Some delayed magnetic overload protectors act instantly if the current exceeds a certain value. These cannot be used with large toroidal transformers unless a current limiting resistor is used as described below.)

For very large transformers (1,500VA and up), it is common to use a small current-limiting primary resistor to reduce the magnitude of the in-rush current, and a delayed by-pass relay to short out the resistor after 30-200 milliseconds. This method eliminates external voltage dips caused by the in-rush current, but slow-blow fuses or delayed magnetic overload protectors must still be used, as is the case for all types of transformers.

A GUIDE

This chart shows size, weight, no-load losses of our custom made transformers from 20VA-10,000VA using our standard core sizes. Other core configurations are available to meet your needs.

60Hz Operation	50/60Hz Operation		Approximate size & weight of finished transformer	
Max. rated power (VA)	Max rated power (VA)	No-load loss (W)	OD x H (Inches)	Weight (lbs)
23	17	.2	2.4 x 1.2	.7
38	30	.2	2.8 x 1.3	1.1
57	45	.4	2.8 x 1.8	1.4
90	72	.6	3.2 x 1.8	2.0
140	112	.7	3.7 x 1.9	2.6
190	152	1.0	3.9 x 2.1	3.5
220	176	1.0	4.5 x 1.9	3.8
345	276	1.5	4.5 x 2.5	5.5
550	440	2.3	5.5 x 2.5	8.1
950	760	3.5	6.4 x 2.6	12.4
1,400	1,120	4.7	7.1 x 2.9	18.0
2,000	1,650	6.7	8.2 x 3.3	24.2
2,750	2,200	9.4	8.2 x 4.0	32.8
3,300	2,640	9.2	9.5 x 3.4	36.5
5,000	4,000	16.3	10.4 x 4.7	56.0
7,000	5,600	20.6	11.6 x 5.0	70.0
12,000	10,000	31.7	13.8 x 6.0	118.0

Power rating (VA) is determined by secondary RMS data. Physical size may vary from above data depending on number of primary and secondary windings.

UL and CSA Agency Files
UL and CSA have issued the following reference (file) numbers for our construction family approvals received for all our standard designs and over 500 custom designs.

Safety Standard	Agency Reference
UL 1411 (Non-medical)	UL file E-98086
UL 544 (Medical)	UL file E-115282
CSA C22.2 No. 66, 1988	CSA Ref. No. LR 97400
CSA C 22.2 No. 1-M 90	C-UL file E-98086

36 MONTH PRODUCT WARRANTY

ULTRA-LOW MAGNETIC STRAYFIELD EMISSION DESIGN
Our standard design considerably reduces the strayfields in comparison with a laminated transformer. For sensitive applications, our optional Ultra-low Strayfield Design, achieved through a special process, further reduces the emission. In applications such as high resolution CRT displays, a magnetic shield around the circumference of the transformer can be added to achieve even lower strayfield levels.

TOROID CORPORATION OF MARYLAND

SUPERIOR TRANSFORMERS — SUPERIOR SUPPORT FROM DESIGN TO DELIVERY

2020 NORTHWOOD DR., SALISBURY, MD 21801-7805
PHONE: (410) 860-0300 • FAX (410) 860-0302
ENGINEERING HOT LINE NUMBER: 800-274-5793

The Industry Leader in Power Toroids

SUPERIOR Toroid® TRANSFORMERS

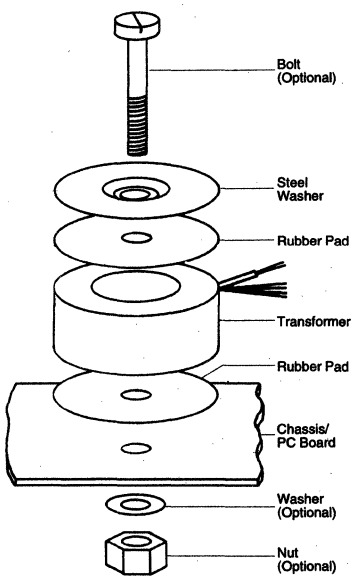
TOROIDAL POWER TRANSFORMERS

MOUNTING METHODS AND HARDWARE

Internet Address: http://www.toroid.com • **e-mail:** sales@toroid.com

MOUNTING WASHER AND RUBBER PADS

The most economical way of mounting the transformer horizontally is using a metal washer and rubber pads. This mounting method is quite adequate for transformers up to 15 lbs (7 kg), provided the transformer is not installed in a product subject to rough handling.



P/N	OD	ID	t
W050	2.0	0.17	0.04
W060	2.4	0.20	0.05
W070	2.8	0.25	0.05
W090	3.5	0.25	0.06
W110	4.4	0.32	0.08
W145	5.7	0.40	0.08

APPLICATION NOTES

Our engineering staff has written three application notes:

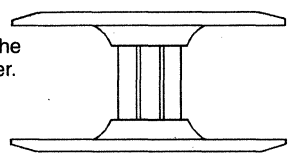
- **Bulletin #1** -- Form Factor and Size of Rectifier Transformers
- **Bulletin #2** -- International Supply Voltages and Primary Windings for Power Transformers
- **How to Specify Transformers** -- A design guide for using toroidal transformers.

We will be glad to send you any of these bulletins free of charge.

36 MONTH PRODUCT WARRANTY

POLY-MOUNT

Our Poly-Mount is an option to the standard metal washer and rubber pads for transformers with power ratings up to 600VA. The Poly-Mount is shipped as an integral part of the transformer and will reduce the mounting time of the transformer. The Poly-Mount consists of two parts made of UL recognized Polyamide with high temperature ratings. A screw through the center hole holds the assembly to the chassis. The Poly-Mount adds slightly to the total height of the transformer.

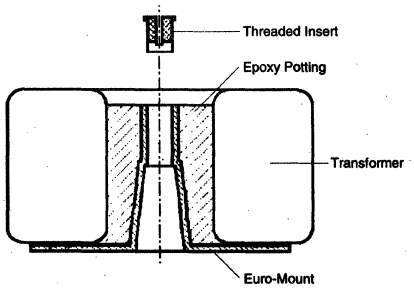


THE EURO-MOUNT

The Euro-Mount is a UL listed plastic insert with a tapered hollow stem in the center. A threaded insert is located at the top of the stem. The cavity surrounding the stem inside the transformer is filled with epoxy. Up to 300 VA the Euro-Mount comes with a single insert. For larger sizes two stems each with an insert are used.

The Euro-Mount is an extremely secure mounting method and guarantees a totally flat bottom of the transformer.

The Euro-Mount eliminates the risk of too much pressure on the windings, should excess torque be applied.



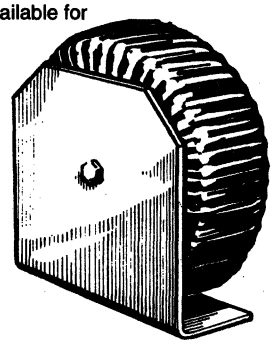
***CAUTION** — It is important that our transformer is mounted in such a way that the mounting screw and the metal chassis will not form a closed loop and thereby a shorted turn on the transformer.*

POTTED CENTER

For large size transformers, 15 lbs or more, or when the washer may cause height problems, we recommend Epoxy potting with a center hole. The top of the potting will be recessed to accommodate the screw head. A flat bottom of the potting is available upon request.

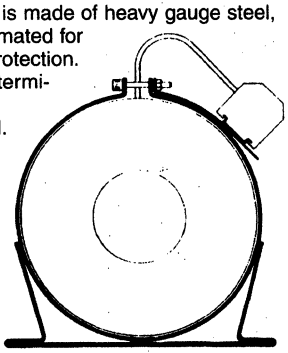
THE L-BRACKET

This L-shaped steel bracket is an economical solution for vertical mounting. A metal washer and two rubber pads are furnished with each L-Bracket. The L-Bracket is available for transformers up to 700VA. Larger sizes are custom designed.



THE OMEGA BRACKET

The Omega bracket is highly recommended when a rugged installation is required — or for large size transformers. The Omega bracket is available for transformers up to 4500VA. Like the L-Mount, the Omega is made of heavy gauge steel, yellow-chromated for corrosion protection. UL listed terminal blocks are optional.



LEADS AND CONNECTORS

Flying self-leads are standard termination. 18" leads for 2KVA and up, 12" leads for smaller VA ratings. Other lead lengths, multi-stranded leads with or without connector assembly are available options.

UL and CSA Agency Files
UL and CSA have issued the following reference (file) numbers for our construction family approvals received for all our standard designs and over 500 custom designs.

Safety Standard	Agency Reference
UL 1411 (non-medical)	UL file E-98086
UL 544 (Medical)	UL file E-115282
CSA C22.2 No. 66, 1988	CSA Ref. No. LR 97400
CSA C22.2 No. 1-M 90	C-UL file E-98086

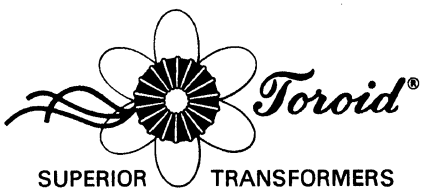
TOROID CORPORATION OF MARYLAND

SUPERIOR TRANSFORMERS — SUPERIOR SUPPORT FROM DESIGN TO DELIVERY

2020 NORTHWOOD DR., SALISBURY, MD 21801-7805
PHONE: (410) 860-0300 • FAX (410) 860-0302

ENGINEERING HOT LINE NUMBER: 800-274-5793

The Industry Leader in Power Toroids



TOROIDAL RECTIFIER TRANSFORMERS

RECOGNIZED TO UL 1411 — CSA CERTIFIED
COMPLIANCE WITH EN / TUV

Internet Address: http://www.toroid.com • **e-mail:** sales@toroid.com

WITH DUAL PRIMARIES (117/234V, 50-60HZ) AND WITH DUAL SECONDARIES

TCM Part No.	Power (VA)	Secondary Rating (RMS) In Series (Center Tap) AC Volt (V)	In Series (Center Tap) AC Amps (A)	In Parallel AC Volt (V)	In Parallel AC Amps (A)	No-load Voltage (V)	Typical DC Data when transformer supplies bridge rectifier with large filter capacitor Secondaries in Series DC Volt (V)	Secondaries in Series DC Current (A)	Secondaries in Parallel DC Volt (V)	Secondaries in Parallel DC Current (A)	Dimensions ODxH Inches (mm)	Weight Lbs. (Kg)	TCM Part No.	Prices FOB Factory Salisbury, MD 1-4 Pcs.
701.062	20		1.67		3.34	2x 7.7	13.2	1.10	5.6	2.20	2.4x1.2(61x31)	0.7 (0.3)	701.062	$ 39.30
704.062	35	12	2.92	6	5.84	2x 7.5	13.4	1.85	5.7	3.70	2.8x1.3(71x33)	1.1 (0.5)	704.062	41.05
707.062	57		4.75		9.50	2x 7.1	13.6	2.85	5.8	5.70	3.2x1.4(81x36)	1.5 (0.7)	707.062	43.00
704.082	35		2.10		4.20	2x10.3	19.2	1.40	8.6	2.80	2.8x1.3(71x33)	1.1 (0.5)	704.082	41.05
707.082	57	17	3.30	8.5	6.60	2x10.1	20.0	2.00	9.0	4.00	3.2x1.4(81x36)	1.5 (0.7)	707.082	43.00
711.082	100		5.90		11.80	2x 9.6	20.2	3.50	9.1	7.00	3.9x1.5(99x38)	2.2 (1.0)	711.082	49.25
701.092	20		1.11		2.22	2x11.8	21.0	0.73	9.5	1.46	2.4x1.2(61x31)	0.7 (0.3)	701.092	39.30
704.092	35	18	1.94	9	3.88	2x11.3	20.8	1.24	9.4	2.48	2.8x1.3(71x33)	1.1 (0.5)	704.092	41.05
707.092	57		3.17		6.34	2x10.6	21.4	1.90	9.7	3.80	3.2x1.4(81x36)	1.5 (0.7)	707.092	43.00
711.092	100		5.56		11.12	2x10.3	21.4	3.20	9.7	6.40	3.9x1.5(99x38)	2.2 (1.0)	711.092	49.25
701.122	20		0.83		1.66	2x15.4	28.4	0.55	13.2	1.10	2.4x1.2(61x31)	0.7 (0.3)	701.122	39.30
704.122	35		1.46		2.92	2x15.0	28.6	0.93	13.3	1.86	2.8x1.3(71x33)	1.1 (0.5)	704.122	41.05
707.122	57	24	2.38	12	4.76	2x14.4	29.0	1.40	13.5	2.80	3.2x1.4(81x36)	1.5 (0.7)	707.122	43.00
711.122	100		4.17		8.34	2x13.7	29.4	2.40	13.7	4.80	3.9x1.5(99x38)	2.2 (1.0)	711.122	49.25
713.122	150		6.25		12.50	2x13.2	30.0	3.40	14.0	6.80	3.9x1.9(99x48)	3.0 (1.4)	713.122	57.35
718.122	190		7.94		15.84	2x13.2	29.6	4.30	13.8	8.60	4.5x1.8(114x46)	3.8 (1.7)	718.122	65.10
701.152	20		0.67		1.34	2x19.3	36.0	0.44	17.0	0.88	2.4x1.2(61x31)	0.7 (0.3)	701.152	39.30
704.152	35		1.20		2.40	2x18.8	36.4	0.74	17.2	1.48	2.8x1.3(71x33)	1.1 (0.5)	704.152	41.05
707.152	57		1.90		3.80	2x18.2	36.8	1.10	17.4	2.20	3.2x1.4(81x36)	1.5 (0.7)	707.152	43.00
711.152	100	30	3.33	15	6.66	2x17.3	37.4	1.90	17.7	3.80	3.9x1.5(99x38)	2.2 (1.0)	711.152	49.25
713.152	150		5.00		10.00	2x16.6	37.6	2.75	17.8	5.50	3.9x1.9(99x48)	3.0 (1.4)	713.152	57.35
718.152	190		6.33		12.66	2x16.4	37.6	3.50	17.8	7.00	4.5x1.8(114x46)	3.8 (1.7)	718.152	65.10
732.152	320		10.67		21.34	2x16.2	38.2	5.70	18.1	11.40	4.5x2.2(114x56)	5.9 (2.7)	732.152	70.10
701.182	20		0.56		1.12	2x23.4	43.4	0.37	20.7	0.74	2.4x1.2(61x31)	0.7 (0.3)	701.182	39.30
704.182	35		1.00		2.00	2x22.7	44.0	0.62	21.0	1.22	2.8x1.3(71x33)	1.1 (0.5)	704.182	41.05
707.182	57		1.60		3.20	2x21.2	44.6	0.95	21.3	1.90	3.2x1.4(81x36)	1.5 (0.7)	707.182	43.00
711.182	100	36	2.78	18	5.56	2x20.4	45.0	1.65	21.5	3.30	3.9x1.5(99x38)	2.2 (1.0)	711.182	49.25
713.182	150		4.17		8.34	2x20.0	46.0	2.20	22.0	4.40	3.9x1.9(99x48)	3.0 (1.4)	713.182	57.35
718.182	190		5.28		10.56	2x19.8	45.8	2.90	21.9	5.80	4.5x1.8(114x46)	3.8 (1.7)	718.182	65.10
732.182	320		8.89		17.78	2x19.4	46.0	4.60	22.0	9.20	4.9x2.2(114x56)	5.9 (2.7)	732.182	70.10
738.182	385		10.69		21.38	2x19.2	46.0	5.40	22.0	10.80	4.9x2.4(114x61)	6.7 (3.0)	738.182	74.95
701.222	20		0.45		0.90	2x28.8	53.4	0.30	25.7	0.60	2.4x1.2(61x31)	0.7 (0.3)	701.222	39.30
704.222	35		0.80		1.60	2x27.8	54.2	0.50	26.1	1.00	2.8x1.3(71x33)	1.1 (0.5)	704.222	41.05
707.222	57	44	1.30	22	2.60	2x26.1	55.0	0.78	26.5	1.56	3.2x1.4(81x36)	1.5 (0.7)	707.222	43.00
711.222	100		2.27		4.54	2x25.0	55.2	1.35	26.6	2.70	3.9x1.5(99x38)	2.2 (1.0)	711.222	49.25
713.222	150		3.41		6.82	2x24.6	56.2	1.80	27.1	3.60	3.9x1.9(99x48)	3.0 (1.4)	713.222	57.35
718.222	190		4.32		8.64	2x24.3	56.6	2.34	27.3	4.68	4.5x1.8(114x46)	3.8 (1.7)	718.222	65.10
707.242	57		1.19		2.38	2x28.2	60.2	0.72	29.1	1.44	3.2x1.4(81x36)	1.5 (0.7)	707.242	39.30
711.242	100		2.08		4.16	2x27.6	60.8	1.19	29.4	2.38	3.9x1.5(99x38)	2.2 (1.0)	711.242	49.25
713.242	150		3.13		6.26	2x26.7	61.2	1.70	29.6	3.40	3.9x1.9(99x48)	3.0 (1.4)	713.242	57.35
718.242	190		3.96		7.92	2x26.3	61.4	2.20	29.7	4.40	4.5x1.8(114x46)	3.8 (1.7)	718.242	65.10
732.242	320	48	6.67	24	13.34	2x25.8	62.0	3.50	30.0	7.00	4.9x2.2(114x56)	5.9 (2.7)	732.242	70.10
738.242	385		8.02		16.04	2x25.7	62.2	4.05	30.1	8.10	4.9x2.4(114x61)	6.7 (3.0)	738.242	74.95
749.242	470		9.79		19.58	2x25.6	62.6	4.75	30.3	9.50	5.3x2.4(135x61)	8.1 (3.7)	749.242	84.60
767.242	670		13.96		27.92	2x25.3	63.0	6.80	30.5	13.60	6.3x2.3(160x58)	10.9 (5.0)	767.242	96.60
782.242	820		17.08		34.16	2x25.1	63.2	8.10	30.6	16.20	6.3x2.7(160x69)	13.1 (6.0)	782.242	107.30
798.242	1000		20.83		41.66	2x25.0	62.4	9.80	30.2	19.60	6.4x3.3(163x84)	17.0 (7.7)	798.242	139.90
711.282	100		1.79		3.58	2x31.7	71.2	1.05	34.6	2.10	3.9x1.5(99x38)	2.2 (1.0)	711.282	49.25
713.282	150	56	2.68	28	5.36	2x30.8	72.0	1.48	35.0	2.96	3.9x1.9(99x48)	3.0 (1.4)	713.282	57.35
718.282	190		3.39		6.78	2x31.1	72.4	1.82	35.2	3.64	4.5x1.8(114x46)	3.8 (1.7)	718.282	65.10
711.302	100		1.67		3.34	2x34.5	76.6	0.95	37.3	1.90	3.9x1.5(99x38)	2.2 (1.0)	711.302	49.25
713.302	150		2.50		5.00	2x33.3	77.2	1.35	37.6	2.70	3.9x1.9(99x48)	3.0 (1.4)	713.302	57.35
718.302	190		3.17		6.34	2x33.2	77.2	1.72	37.6	3.44	4.5x1.8(114x46)	3.8 (1.7)	718.302	65.10
732.302	320	60	5.33	30	10.66	2x32.2	78.0	2.80	38.0	5.60	4.9x2.2(114x56)	5.9 (2.7)	732.302	70.10
738.302	385		6.42		12.84	2x32.1	78.6	3.20	38.3	6.40	4.9x2.4(114x61)	6.7 (3.0)	738.302	74.95
749.302	470		7.83		15.66	2x31.7	78.6	3.95	38.3	7.90	5.3x2.4(135x61)	8.1 (3.7)	749.302	84.60
767.302	670		11.17		22.34	2x31.7	79.0	5.40	38.5	10.80	6.3x2.3(160x58)	10.9 (5.0)	767.302	96.60
782.302	820		13.67		27.34	2x31.4	79.0	6.50	38.5	13.00	6.3x2.7(160x69)	13.1 (6.0)	782.302	107.30
767.332	670	66	10.15	33	20.30	2x34.7	87.4	5.00	42.7	10.00	6.3x2.3(160x58)	10.9 (5.0)	767.332	96.60
732.382	320		4.21		8.42	2x40.8	99.6	2.20	48.8	4.40	4.9x2.2(114x56)	5.9 (2.7)	732.382	70.10
738.382	385		5.02		10.14	2x40.5	100.0	2.60	49.0	5.20	4.9x2.4(114x61)	6.7 (3.0)	738.382	74.95
749.382	470	76	6.18	38	12.36	2x40.2	100.4	3.10	49.2	6.20	5.3x2.4(135x61)	8.1 (3.7)	749.382	84.60
767.382	670		8.82		17.64	2x40.2	100.8	4.20	49.4	8.40	6.3x2.3(160x58)	10.9 (5.0)	767.382	96.60
782.382	820		10.79		21.58	2x39.8	101.4	5.10	49.7	10.20	6.3x2.7(160x69)	13.1 (6.0)	782.382	107.30
798.422	1000	84	11.90	42	23.80	2x43.6	112.2	5.60	55.1	11.20	6.4x3.3(163x84)	17.0 (7.7)	798.422	139.90
782.482	820	96	8.54	48	17.14	2x50.4	128.2	4.00	63.1	8.00	6.3x2.7(160x69)	13.1 (6.0)	782.482	107.30
798.552	1000	110	9.09	55	18.18	2x57.0	148.0	4.35	73.0	8.70	6.4x3.3(163x84)	17.0 (7.7)	798.552	139.90

The above transformers are supplied with metal washers and rubber pads at no extra charge. See separate page for available mounting hardware options.

36 MONTH PRODUCT WARRANTY

ENGINEERING HOT LINE NUMBER:
800-274-5793

TOROID CORPORATION OF MARYLAND

SUPERIOR TRANSFORMERS — SUPERIOR SUPPORT FROM DESIGN TO DELIVERY

2020 NORTHWOOD DR., SALISBURY, MD 21801-7805
PHONE: (410) 860-0300 • FAX (410) 860-0302

The Industry Leader in Power Toroids

SUPERIOR TRANSFORMERS

TOROIDAL ISOLATION TRANSFORMERS

RECOGNIZED TO UL 1411 / UL 544
CERTIFIED TO IEC / TUV

Internet Address: http://www.toroid.com ▪ **e-mail:** sales@toroid.com

ISOLATION TRANSFORMERS WITHOUT ENCLOSURE

Commercial and Medical Equipment for US/Canada and International Markets

FOR INDUSTRIAL/COMMERCIAL APPLICATIONS

DUAL PRIMARIES • (2 x 117V) • 50-60Hz Operation

Standard Transformers are UL recognized to UL1411, certified to CSA C22.2, No. 66-1988. Comply with IEC 950 with 8 mm creep distance. 100% final inspection includes 4000V Hi-pot test. Supplied with metal washer and rubber pads.*

DUAL SECONDARIES • (2 x 117V)

TCM Part No.	Power (VA)	Secondary Rating (RMS) In Series (Center Tap) AC Volt (V)	In Series (Center Tap) AC Amps (A)	In Parallel AC Volt (V)	In Parallel AC Amps (A)	No-load Voltage (V)	Dimensions ODxH Inches (mm)	Weight Lbs. (Kg)	TCM Part No.	Prices FOB Factory Salisbury, MD 1-4 Pcs.
713.1202	150		0.64		1.28	2x130.1	3.9x1.9 (99x48)	3.0 (1.4)	713.1202	$ 57.35
718.1202	190		0.81		1.62	2x129.5	4.5x1.8 (114x46)	3.8 (1.7)	718.1202	65.10
732.1202	320		1.37		2.74	2x126.3	4.9x2.2 (114x56)	5.9 (2.7)	732.1202	70.10
738.1202	385	234	1.65	117	3.30	2x125.3	4.9x2.4 (114x61)	6.7 (3.0)	738.1202	74.95
749.1202	470		2.01		4.02	2x123.8	5.3x2.4 (135x61)	8.1 (3.7)	749.1202	84.60
767.1202	670		2.86		5.72	2x122.7	6.3x2.3 (160x58)	10.9 (5.0)	767.1202	96.60
782.1202	820		3.50		7.00	2x122.6	6.3x2.7 (160x69)	13.1 (6.0)	782.1202	107.30
798.1202	1000		4.27		8.54	2x121.9	6.4x3.3 (163x84)	17.0 (7.7)	798.1202	139.85

FOR MEDICAL AND INDUSTRIAL/COMMERCIAL APPLICATIONS

QUAD PRIMARIES • (100V, 120V, 220V, 240V) • 50-60Hz Operation

Standard Isolation Transformers UL recognized to UL544. Certified by TUV to IEC 601.1, with 50µA leakage current, 4000V Hi-pot tested, 8 mm creep distance, auto resettable fuse, static shield. Transformers 1500VA or larger are supplied with epoxy potted center with hole for mounting bolt. Steel washer and rubber pads are supplied for smaller power ratings.*

SINGLE SECONDARIES • (120V)

TCM Part No.	Power (VA)	Secondary Rating (RMS) AC Volt (V)	AC Amps (A)	No-load Voltage (V)	Dimensions ODxH Inches (mm)	Weight Lbs. (Kg)	TCM Part No.	Prices FOB Factory Salisbury, MD 1-4 Pcs.
901.1201	100		0.83	136.2	3.9x1.9 (100x 49)	3.9 (1.8)	901.1201	$ 71.50
902.1201	200		1.67	132.2	4.6x2.1 (117x 54)	4.6 (2.1)	902.1201	77.70
903.1201	300		2.50	129.6	5.3x2.1 (135x 54)	5.3 (2.4)	903.1201	85.90
904.1201	400		3.33	128.3	5.4x2.4 (138x 61)	7.8 (3.5)	904.1201	92.00
906.1201	600	120	5.00	127.8	6.4x2.5 (163x 64)	11.4 (5.2)	906.1201	119.25
908.1201	800		6.33	126.5	6.5x2.8 (166x 72)	13.0 (5.9)	908.1201	131.10
910.1201	1000		8.34	124.7	6.6x3.7 (168x 94)	17.8 (8.1)	910.1201	145.50
915.1201	1500		12.50	124.5	8.1x3.5 (206x 89)	24.2 (11.0)	915.1201	202.50
920.1201	2000		16.66	124.0	9.0x3.8 (229x 97)	34.0 (15.4)	920.1201	248.30
925.1201	2500		20.84	123.3	10.2x4.0 (259x102)	41.0 (18.6)	925.1201	292.50

NEW DESIGNS

DUAL SECONDARIES • (2 x 120V)

TCM Part No.	Power (VA)	Secondary Rating (RMS) In Series (Center Tap) AC Volt (V)	In Series (Center Tap) AC Amps (A)	In Parallel AC Volt (V)	In Parallel AC Amps (A)	No-load Voltage (V)	Dimensions ODxH Inches (mm)	Weight Lbs. (Kg)	TCM Part No.	Prices FOB Factory Salisbury, MD 1-4 Pcs.
901.1202	100		0.42		0.83	2x136.2	3.9x1.9 (100x 49)	3.9 (1.8)	901.1202	$ 89.40
902.1202	200		0.83		1.67	2x132.2	4.6x2.1 (117x 54)	4.6 (2.1)	902.1202	97.10
903.1202	300		1.25		2.50	2x129.6	5.3x2.1 (135x 54)	5.3 (2.4)	903.1202	107.35
904.1202	400		1.67		3.33	2x128.3	5.4x2.4 (138x 61)	7.8 (3.5)	904.1202	115.00
906.1202	600		2.50		5.00	2x127.8	6.4x2.5 (163x 64)	11.4 (5.2)	906.1202	140.30
908.1202	800		3.17		6.33	2x126.5	6.5x2.8 (166x 72)	13.0 (5.9)	908.1202	154.25
910.1202	1000	240	4.17	120	8.34	2x124.7	6.6x3.7 (158x 94)	17.8 (8.1)	910.1202	161.60
915.1202	1500		6.25		12.50	2x124.5	8.1x3.5 (206x 89)	24.2 (11.0)	915.1202	225.00
920.1202	2000		8.33		16.66	2x124.0	9.0x3.8 (229x 97)	34.0 (15.4)	920.1202	275.85
925.1202	2500		10.42		20.84	2x123.3	10.2x4.0 (259x102)	41.0 (18.6)	925.1202	325.00
930.1202	3000		12.50		25.00	2x122.2	10.2x4.7 (259x120)	50.0 (22.7)	930.1202	363.55
940.1202	4000		16.67		33.34	2x122.2	11.3x5.0 (287x127)	62.0 (28.1)	940.1202	383.20
950.1202	5000		20.83		41.66	2x122.1	12.5x5.3 (313x135)	79.0 (35.8)	950.1202	520.85

Supplied at no extra charge. See separate page for other available mounting hardware solutions.

36 MONTH PRODUCT WARRANTY • ALL PRICES AND DATA SUBJECT TO CHANGE WITHOUT NOTICE

TOROID CORPORATION OF MARYLAND

SUPERIOR TRANSFORMERS — SUPERIOR SUPPORT FROM DESIGN TO DELIVERY

2020 NORTHWOOD DR., SALISBURY, MD 21801-7805
PHONE: (410) 860-0300 • FAX (410) 860-0302
ENGINEERING HOT LINE NUMBER: 800-274-5793

The Industry Leader in Power Toroids

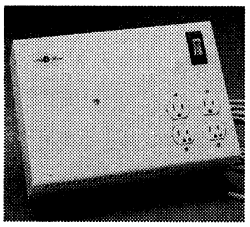
Toroid®
SUPERIOR TRANSFORMERS

ISO-BOX MEDICAL/HOSPITAL GRADE ISOLATION TRANSFORMERS

Internet Address: http://www.toroid.com ▪ **e-mail:** sales@toroid.com

NORTH AMERICAN

- **Very low leakage current: <50µA**
- **300VA, 600VA, 1200VA, 1700VA**
- **Input/output: 120V 60Hz**
- **Safety agency approvals: UL 2601.1, CSA 601.1**
- **Wall or table top installation**



Introducing the ISO-BOX SERIES, A new product line of Medical Grade Isolation Transformers with low noise and low EMR (Electro-Magnetic Radiation). Four standard models are available in attractive aluminum cases for floor or wall mounting.

Typical applications include installation of computers, video monitors, surveying cameras, test and measurement instruments, printers, etc. in hospitals, clinics, or doctors' offices, or whenever safe operation of electronics equipment requires low leakage current levels.

All four models of the ISO-BOX SERIES Isolation Transformers operate at 60Hz line frequency with 120V input and output voltages. Other voltages and frequencies are available upon request.

Our new product line of enclosed isolation transformers offer all the advantages of toroidal construction such as low weight, low magnetic strayfield, low mechanical noise, low losses, high efficiency and cool operating temperature. The low height of the toroidal transformer allows the enclosure to have a low profile for easy installation in a modern office environment.

The enclosures are made of sturdy aluminum with white finish. Other colors are optional.

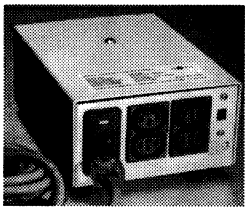
Each isolation transformer has four rubber feet for floor installation and two interchangeable brackets for wall mounting. Carrying handles are optional.

NORTH AMERICAN ISO-BOX SERIES

TCM Part No.	Power VA	Regulation (Voltage Drop)	Duplex Receptacles (Hospital Grade)	Dimensions Inches	Dimensions mm	Weight Lbs.	Weight Kg	Power Cord Length Ft.	TCM Part No.	Prices/each FOB Factory Salisbury, MD 1-4 pcs.
ISB-030A	300	< 6%	One	7.6x5.9x3.1	193x150x 79	7.6	3.5	8	ISB-030A	$285.00
ISB-060A	600	< 5%	Two	10.5x6.5x3.5	267x165x 89	12.6	5.7	8	ISB-060A	345.00
ISB-120A	1200	< 3%	Two	12.0x8.6x3.9	305x218x 99	23.7	10.8	8	ISB-120A	395.00
ISB-170A	1700	< 2.5%	Two	13.1x9.6x4.4	333x244x112	32.9	14.9	8	ISB-170A	595.00

INTERNATIONAL

- **Low leakage current: <100µA**
- **300VA, 600VA, 1000VA**
- **Input/Output: Selectable, 115 or 230V/50-60Hz**
- **Safety agency approvals: UL 2601.1, CSA C22.2 No. 601.1, EN 60601.1, EN 60742, IEC 601.1**
- **Wall or table top installation**
- **CE Marking**



The International Series has selectable input voltages, 115 or 230V, through a power entry module with power switch and current limiting fuses. In addition, the selectable output voltage, 115/230V, makes these units suitable for most applications and locations worldwide.

The outlets are appliance type outlets (IEC320). The secondary neutral conductor is NOT grounded. "U.S. power cord is included."

INTERNATIONAL ISO-BOX SERIES

TCM Part No.	Power VA 120/240V	Regulation (Voltage Drop)	No. Outlets	Dimensions Inches	Dimensions mm	Weight Lbs.	Weight Kg	Power Cord Length Ft.	Min. AWG/mm²	TCM Part No.	Prices/each FOB Factory Salisbury, MD 1-4 pcs.
ISB-030W	300	6%	4	7.6x5.9x3.1	193x150x79	8	3.5	10	18/0.75	ISB-030W	$395.00
ISB-060W	600	5%	6	10.5x6.5x3.5	267x165x89	13	5.7	10	18/1.00	ISB-060W	450.00
ISB-100W	1000	3%	9	12.0x8.6x3.9	305x218x99	24	10.8	10	16/1.50	ISB-120W	495.00

TOROIDAL AUTO-TRANSFORMERS

- **Standard design**
- **Recognized to UL1411 and C-UL**
- **Certified to CSA C22.2 No. 1-M 90**
- **From 250VA to 1000VA**
- **Other power ratings available upon request.**

Using an auto-transformer is always an economical solution when you need to step down the voltage from 230V to 120V or vice versa, and the equipment already has a fully isolated transformer or when the components do not require an isolated transformer.

The toroidal construction of an auto-transformer offers important advantages in comparison with an E/I lamination core transformer, like smaller physical size and weight, 30-70% reduction (depending on secondary voltage) and very low magnetic strayfields. The auto-transformer can be mounted horizontally using a steel washer or our Poly-Mount, a plastic insert, or an epoxy potted center with a 1/4" mounting hole. See separate page for information on hardware for vertical mounting.

With its small size and weight, the auto-transformer can be installed easily in existing equipment or supplied in an optional enclosure with or without cord, plug and receptacle.

STEP-UP FROM 120V TO 230V, 60Hz OPERATION

TCM Part No.	Power VA	No-Load Losses	Temp. Rise at Full Load	Dimensions Inches	Dimensions mm	Weight Lbs.	Weight Kg	TCM Part No.	Prices FOB Factory Salisbury, MD 1-4 pcs.
AZ8 5615	250	0.7W	45C	3.9x1.7	99x43	2.6	1.2	AZ8 5615	$55.80
AZ8 5616	500	1.2W	55C	4.5x1.9	114x49	4.2	1.9	AZ8 5616	72.70
AZ8 5617	750	1.5W	58C	5.0x2.3	127x59	5.8	2.6	AZ8 5617	77.00
AZ8 5618	1000	2.0W	63C	5.5x2.3	140x59	7.1	3.2	AZ8 5618	89.70

STEP-DOWN FROM 230V TO 120V, 50-60Hz OPERATION

TCM Part No.	Power VA	No-Load Losses	Temp. Rise at Full Load	Dimensions Inches	Dimensions mm	Weight Lbs.	Weight Kg	TCM Part No.	Prices FOB Factory Salisbury, MD 1-4 pcs.
AZ8 5620	250	0.7W	54C	3.7x1.8	94x46	2.6	1.2	AZ8 5620	$55.95
AZ8 5621	500	1.3W	50C	4.5x2.2	114x56	4.8	2.2	AZ8 5621	73.40
AZ8 5622	750	1.7W	54C	5.5x2.1	140x53	6.5	2.9	AZ8 5622	78.95
AZ8 5623	1000	2.3W	56C	5.5x2.5	140x64	8.3	3.8	AZ8 5623	90.95

UL File No. E98086 section 7. Both Class A (105°C) and Class B (130°C) insulation systems.

TOROID CORPORATION OF MARYLAND

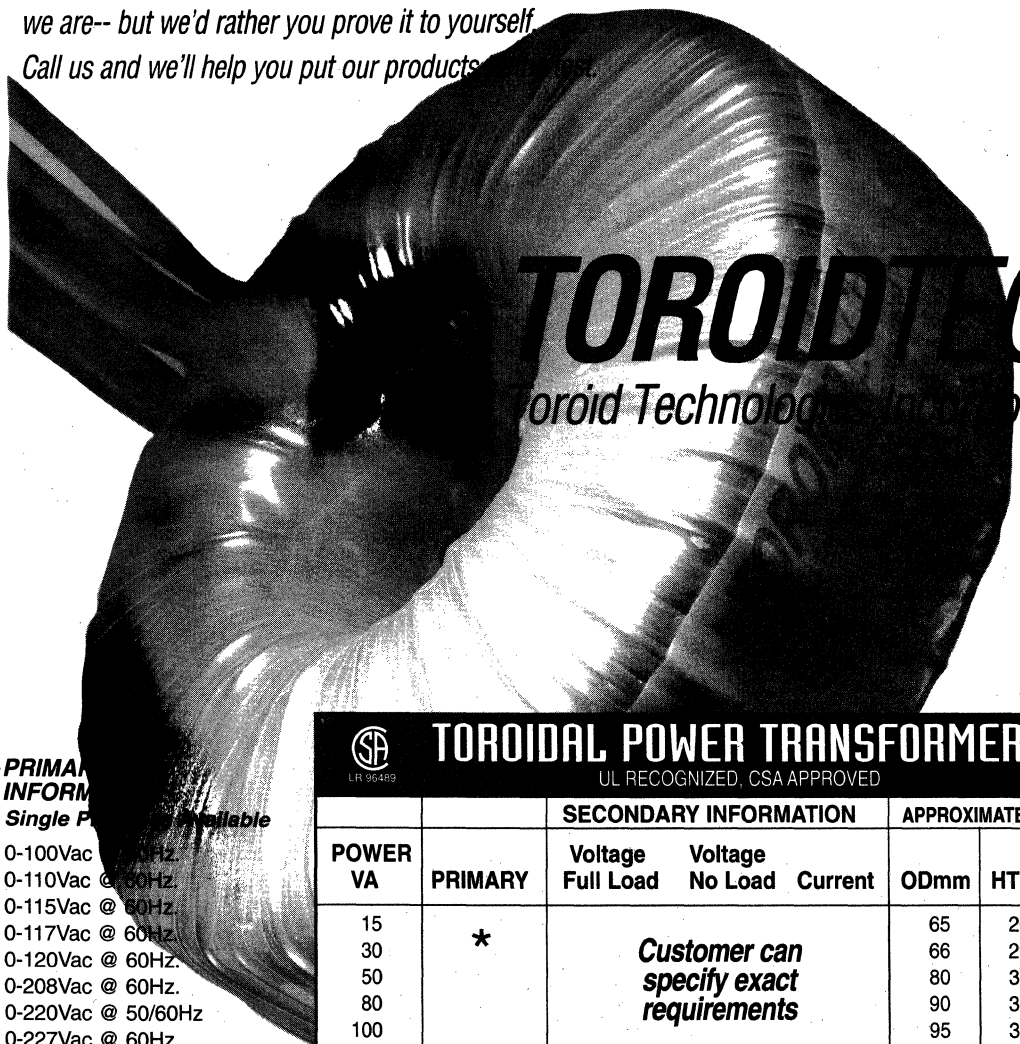
SUPERIOR TRANSFORMERS — SUPERIOR SUPPORT FROM DESIGN TO DELIVERY

2020 NORTHWOOD DR., SALISBURY, MD 21801-7805
PHONE: (410) 860-0300 • FAX (410) 860-0302
ENGINEERING HOT LINE NUMBER: 800-274-5793

The Industry Leader in Power Toroids

If You Want The Best, We Want Your Business.

Compare the torodial power transformers your using right now against TOROIDTECH. We could tell you how good we are-- but we'd rather you prove it to yourself. Call us and we'll help you put our products



TOROIDTECH

Toroid Technolog[illegible]orated

TOROIDAL POWER TRANSFORMERS

LR 96489

UL RECOGNIZED, CSA APPROVED

POWER VA	PRIMARY	SECONDARY INFORMATION Voltage Full Load	Voltage No Load	Current	APPROXIMATE SIZE & WEIGHT ODmm	HTmm	WTkg
15	*	***Customer can specify exact requirements***			65	26	0.31
30					66	29	0.39
50					80	35	0.71
80					90	34	0.94
100					95	35	1.09
120					89	42	1.12
160					106	40	1.66
225		*Secondaries are available in Single or Multiple windings up to 250Vac for Series or Parallel Connection*			108	47	2.01
300					110	55	2.57
400					131	58	3.67
500					136	62	4.31
625					137	72	5.35
750					150	69	6.26
1000					159	75	7.98
1500					185	82	11.24

***PRIMA[illegible]**
***INFORM[illegible]**
***Single P[illegible]vailable**

0-100Vac [illegible]Hz.
0-110Vac @ 60Hz.
0-115Vac @ 60Hz.
0-117Vac @ 60Hz.
0-120Vac @ 60Hz.
0-208Vac @ 60Hz.
0-220Vac @ 50/60Hz
0-227Vac @ 60Hz.
0-230Vac @ 50/60Hz
0-240Vac @ 50/60Hz.
0-277Vac @ 60Hz.
0-Up to 490Vac

*** Dual or Multiple Primaries Available**

0-110-220Vac @ 50/60Hz.
0-115-230Vac @ 50/60Hz.
0-117-234Vac @ 50/60Hz
0-120-240Vac @ 50/60Hz
0-100-120-220-240Vac @ 50/60Hz

COMMERCIAL & MEDICAL ISOLATION TRANSFORMERS

Input Voltage	Frequency (Hz)	Power VA	Secondary Current	Output Voltage	Size and Weight		
					ODmm	HTmm	WTkg
115/230Vac	50/60	50	0.22 x 2	115/230Vac	82	40	0.83
115/230Vac	50/60	80	0.35 x 2	115/230Vac	93	41	1.15
115/230Vac	50/60	120	0.52 x 2	115/230Vac	91	46	1.30
115/230Vac	50/60	160	0.70 x 2	115/230Vac	108	43	1.80
115/230Vac	50/60	300	1.30 x 2	115/230Vac	114	64	3.00
115/230Vac	50/60	500	2.17 x 2	115/230Vac	133	71	4.70
115/230Vac	50/60	750	3.26 x 2	115/230Vac	152	73	6.75
115/230Vac	50/60	1000	4.35 x 2	115/230Vac	161	79	8.40
115/230Vac	50/60	1500	6.52 x 2	115/230Vac	188	87	12.25

Medical transformers have a 5-mil copper Foil Shield, and are thermally protected.
Call for your custom requirements

AUTOTRANSFORMERS

WHERE ISOLATION IS NOT REQUIRED

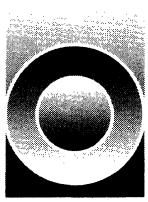
Part Number	Power VA	*Input Voltage	* Output Voltage	Size and Weight		
				ODmm	HTmm	WTkg
TA0060-0001	60	115	230	68	33	0.48
TA0100-0001	100	115	230	81	39	0.86
TA0160-0001	160	115	230	92	38	1.17
TA0240-0001	240	115	230	92	48	1.55
TA0320-0001	320	115	230	108	45	2.00
TA0450-0001	450	115	230	110	54	2.60
TA0600-0001	600	115	230	114	63	3.25
TA0800-0001	800	115	230	133	62	4.25
TA1000-0001	1000	115	230	137	69	5.40

*These transformers can be configured for conversion of 115Vac to 230Vac **or** 230Vac to 115 Vac

AUDIO DISTRIBUTION TRANSFORMERS

Part Number	Wattage	Input	Output	Size and Weight		
				ODmm	HTmm	WTkg
AU0064-2570	60	4	0-25-70V	91	35	1.00
AU0068-2570	60	8	0-25-70V	91	35	1.00
AU0124-2570	120	4	0-25-70V	105	37	1.55
AU0128-2570	120	8	0-25-70V	105	37	1.55

*Call for your **FREE** copy of*
"TEST YOUR TOROIDS"
an interactive disk presentation
by TOROIDTECH
Please contact Client Services at :
1-800-TOR-ROID 1-800-867-7643



TOROIDTECH

Toroid Technologies Incorporated

70 Hanlan Road, Woodbridge, Units 11&12, Ontario L4L 3P6
Phone: 905-850-5122 Fax: 905-850-5129

TRANSFORMERS

TOROTEL PRODUCTS INC
WEB PAGE: WWW.TOROTELPROD.COM E-MAIL:TOROTEL@SOUND.NET
13402 SOUTH 71 HIGHWAY GRANDVIEW, MO 64030 TEL: (816) 761-6314 FAX: (816) 763-2278

400 Hz MINIATURE POWER TRANSFORMERS

Reference for all Industrial and Military Standard 400 Hz Miniature Power Transformers

These 400 Hz Miniature Power Transformers are selected for use in all Military and Industrial applications requiring high performance in the smallest possible package size. They conform to all of the requirements of MIL-T-27, Class S (-55°C to +130°C). The minimum continuous operating life expectancy is 10,000 hours. This series is available having power ratings of 0.5 VA through 25 VA. The primaries are 115 Vrms with secondary voltages ranging from 5 Vrms through 300 Vrms. It is recommended that these transformers be specified for all applications where space, weight, and cost effectiveness are prime considerations.

PART NUMBER EXAMPLE

0.5 S T 26

- 0.5 — V.A. Rating (See Table I)
- S — Package Style
- T — Schematic (See Table I)
- 26 — Secondary Voltage (See Table II)

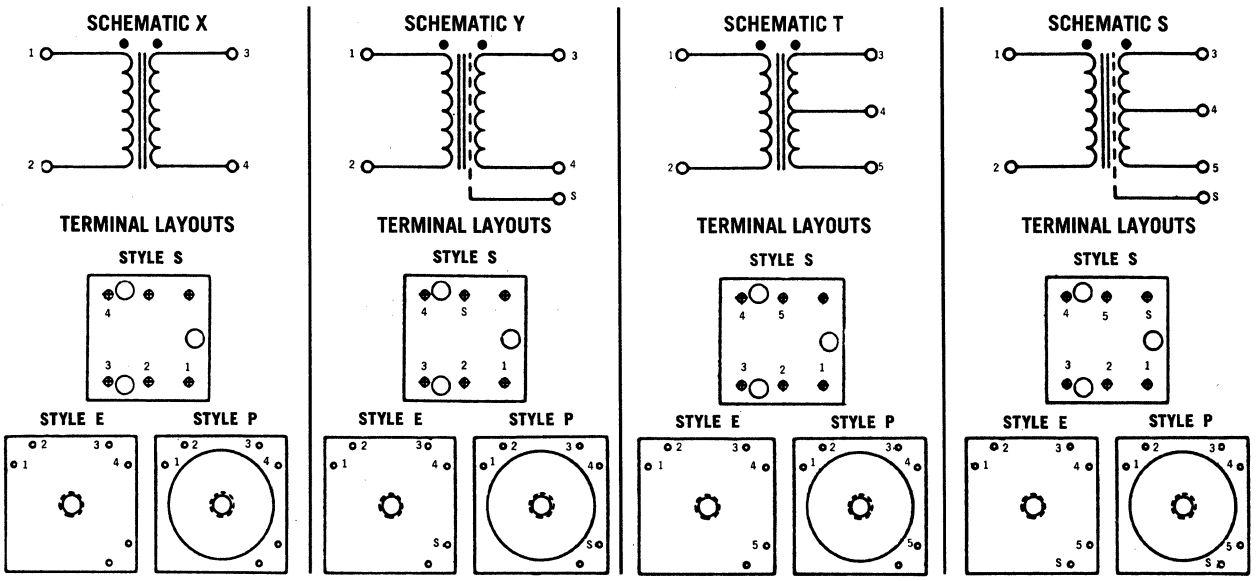
TABLE I

VA Rating	Package Style	Schematic	Size	Max. Height (Inches)	Regulation (%)		Available Secondary Voltages (VRMS)		Exciting Current (ma)	Efficiency (%)		Temperature Rise (°C) — MIL-T-27 No Heat Sink		Weight (Oz.)	
					Nom.	Max.	Min.	Max.	Max.	Min.	Nom.	Nom.	Max.	Nom.	Max.
0.5	S	T, X	—	—	15	18	5	300	1.5	65	70	10	15	0.38	0.4
0.5	S	S, Y	—	—	17	21	5	300	1.5	65	70	12	17	0.38	0.4
1.5	E, P	T, X	A	0.47	20	23	5	300	1.5	70	76	13	17	0.76	0.85
1.5	E, P	S, Y	A	0.59	15	18	5	300	3	70	76	13	17	0.97	1.1
2	E, P	T, X	A	0.78	3	3.7	5	300	6	72	87	10	15	1.5	1.65
2.4	E, P	S, Y	A	1.03	3	3.8	5	300	9	73	88	11	16	1.9	2.2
3	E, P	T, X	A	0.59	15	18	5	300	3	75	84	15	20	0.97	1.1
3	E, P	S, Y	A	0.78	10	12	5	300	6	75	84	15	20	1.5	1.65
3.6	E, P	T, X	A	1.03	3	3.8	5	300	9	76	87	10	15	1.9	2.2
6	E, P	T, X	A	0.78	10	12	5	300	6	81	88	18	25	1.5	1.65
6	E, P	S, Y	A	1.03	8	10	5	300	9	80	88	18	25	1.9	2.2
7.3	E, P	S, T, X, Y	B	0.97	3	3.5	5	300	16	84	92	15	23	3.2	3.4
9	E, P	T, X	A	1.03	8	10	5	300	9	83	89	23	30	1.9	2.2
13	E, P	S, T, X, Y	B	1.20	3	3.6	5	300	25	87	93	21	28	4.2	4.4
16	E, P	S, T, X, Y	B	0.97	7	8	5	300	16	87	92	25	32	3.2	3.4
25	E, P	S, T, X, Y	B	1.20	6	7	5	300	25	88	93	36	45	4.2	4.4

TABLE II INDUSTRY STANDARD SECONDARY VOLTAGES

Secondary Voltage	5	5.5	6	6.3	7	7.5	8	9	10	11	12	12.6	13	15	16	18	20	22	24	26	28	30	33
Maximum Working Voltage	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325
Secondary Voltage	36	39	43	47	51	56	62	68	75	82	91	100	110	115	120	130	150	180	200	220	240	270	300
Maximum Working Voltage	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	440	440	440	580	580

SCHEMATIC AND TERMINAL CONFIGURATIONS



TRANSFORMERS

TOROTEL PRODUCTS INC
WEB PAGE: WWW.TOROTELPROD.COM E-MAIL:TOROTEL@SOUND.NET
13402 SOUTH 71 HIGHWAY GRANDVIEW, MO 64030 TEL: (816) 761-6314 FAX: (816) 763-2278

400 Hz MINIATURE POWER TRANSFORMERS

Reference for all Industrial and Military Standard 400 Hz Miniature Power Transformers

PHYSICAL SPECIFICATIONS

Size: Sizes for Standard VA Types are given in Table I, and Outline Drawings.

Construction: MIL-T-27, Grade 5; Black Epoxy Encapsulated.

Terminals: Printed circuit pins — tinned brass.

Terminal Strength (Method 211 of MIL-STD-202, Test Condition A): 2.0 pounds.

Marking: Includes MIL-T-27 Type Designation, winding ratings, maximum working voltage, schematic, Torotel name, and part number.

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature Range: -55°C to +130°C (ambient plus temperature rise).

Altitude: 70,000 feet, maximum.

Vibration: MIL-STD-202, Method 204, Test Condition D.

Life Expectancy: 10,000 hours minimum.

Other Environmental Specifications: In accordance with MIL-T-27, Grade 5, Class S, Family 03.

ELECTRICAL SPECIFICATIONS

Primary Voltage: 115 volts rms ±10%

Frequency: 400 Hz ±5%.

Secondary Voltage: See Table II.

Secondary Voltage Tolerance: ±3% at full load and 115 volts, 400 Hz applied to primary.

Electrostatic Shielding (Schematics S and Y): 5 to 1 minimum voltage ratio at 20 KHz.

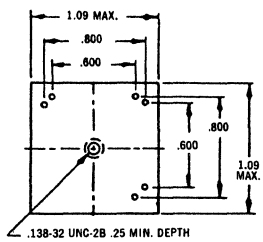
Phase Shift: 1.0 electrical degree between primary and secondary voltage at rated load, maximum.

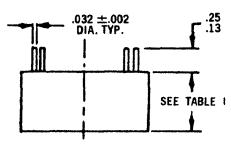
Insulation Resistance: 10,000 megohms minimum at 500 VDC.

Dielectric Strength: At sea level—2.8 times the maximum working voltage. At reduced barometric pressure—1.25 times the maximum working voltage.

Mech. Tol. = ±.005 unless indicated.

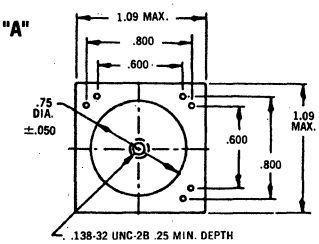
PACKAGE STYLE E

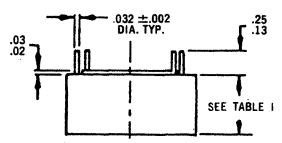




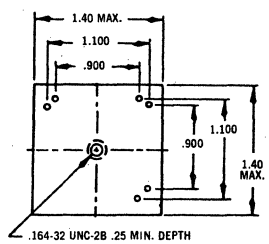
PACKAGE STYLE P

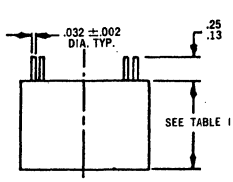
SIZE "A"

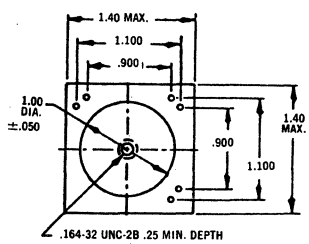


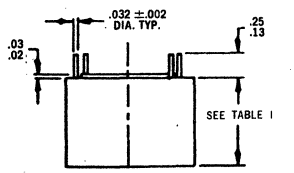


SIZE "B"

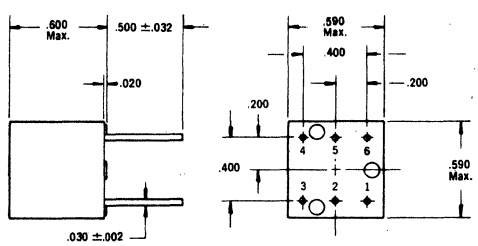








PACKAGE STYLE S



MECH. TOL. FOR STYLE "S" = ±.010 UNLESS INDICATED

Military-Aerospace

MIL-T-27 / QPL APPROVED / MIL-STD-2000 / MIL-STD-981

PULSE: RF/Pulse; Hc-Tran; Gen. App.;

DESIGNED TO MEET MIL-T-21038 / 2,4,6,8,9,11,17,18,25,-27* OR CUSTOMIZE YOUR OLD DESIGN TO MEET CURRENT NEED.

SURFACE MOUNT: Convert Old Design Into Surface Mount.

MINATURE 400 HZ POWER TRANSFORMERS: QPL APPROVED MIL-T-27 / 37- / 47* 308 Standard Designs

400 HZ 3Ø POWER TRANSFORMERS: Designed To Meet MIL-T -27 / 344 THRU / 349*

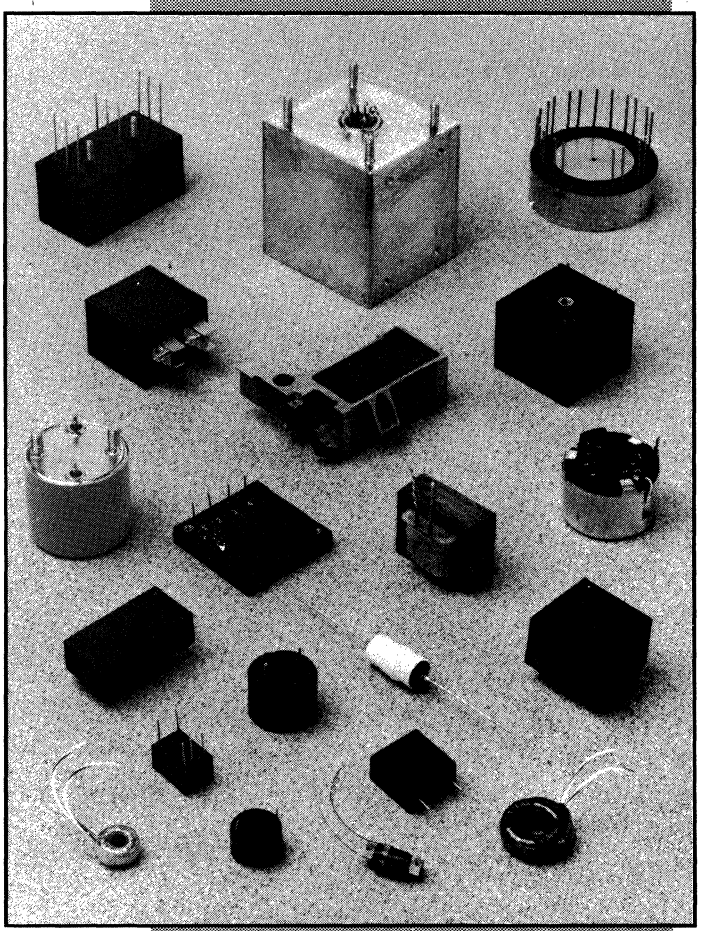
SWITCHING REGULATOR INDUCTORS: Designed To Meet MIL-T-27 / 287 / 288 / 289*

SCOTT "T" TRANSFORMERS: Precision Toroidal; Syncro-Resolver / Resolver-Syncro

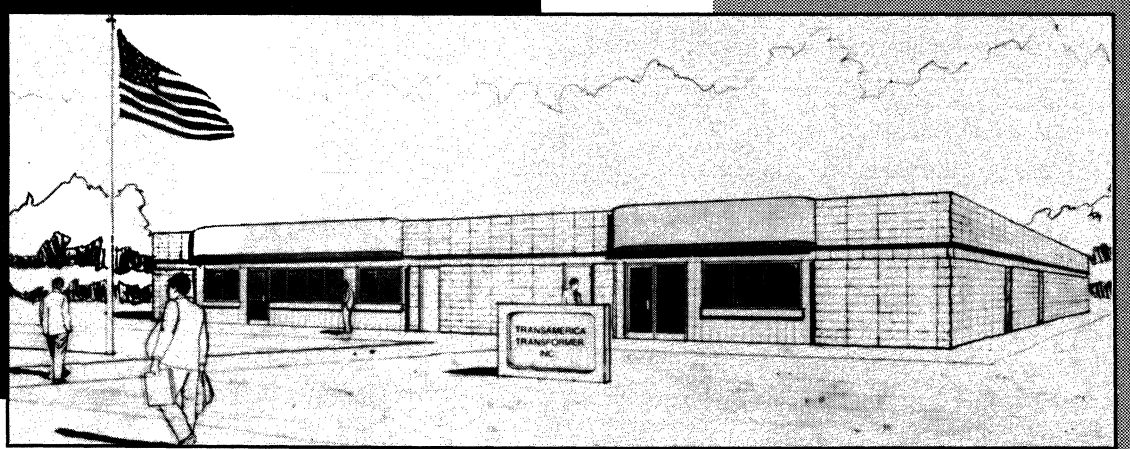
ALL YOUR CUSTOM NEEDS: PROTO-TYPE SERVICE - ONE WEEK DELIVERY

*NOT ALL PARTS ARE ON QPL CHECK WITH FACTORY FOR CURRENT STATUS

CALL FOR STANDARD LINE CATALOGUE OR CUSTOM DESIGN ASSISTANCE



THE SOURCE FOR MILITARY MAGNETICS



TRANS AMERICAN TRANSFORMER INC.

26 Hulse Road, E. Setauket, N.Y. 11733 • Tel: 516-928-0762 • Fax: 516-928-0852 • Engineering Hot Line: 516-928-0771

TRANSFORMER ENGINEERING CORPORATION

2550 Brookpark Road
Cleveland, Ohio 44134
Phone: (800) 794-8533
Fax: (216) 741-4860

Internet - http://www.trenco.com E-mail - info@trenco.com

Excellence in Design and Manufacturing Since 1937

Serving Your Custom Magnetic Component Needs

Trust Transformer Engineering Corporation (TEC) to fulfill your custom transformer, inductor, or other electromagnetic component requirements. Established in 1937, TEC has built a reputation of superior quality, reliable service, and overall customer satisfaction. From your initial contact with us, through production, to shipping and delivery, our valuable years of experience enable us to provide what you require.

All Of Our Transformers And Inductors Are Dry-Type

Transformers
- Single & Three-Phase
- Control
- Potential
- Current
- Constant Voltage (Ferroresonant)
- Auto
- Grounding
- Phase Shifting

Inductors
- Single & Three-Phase
- DC Filter Choke
- AC Line Reactor
- AC Load Reactor
- Air Core
- Current Limiting
- Trap

Capabilities

Coil Winding Equipment:
- Bobbin • Multiple • Hand • Individual

Copper & Aluminum Conductors:
- Round • Rectangular • Square • Foil

Impregnations:
- Vacuum & Pressure with 100% Epoxy
- Varnish Dip • Air Dry

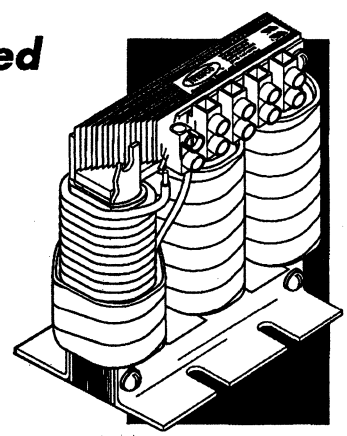
Magnetic Core Material:
- EI and UI laminations • C-core
- Toroidal • Strip Steel

Engineering & Quality Assurance:
- Workstations for computer aided design
- Computer aided drafting
- Computerized shop floor control
- Finite element analysis (FEA) • Mathcad

Testing Capabilities:
- Corona (up to 50KV) • Induced potential
- Hi-Pot (up to 40KV DC, 50KV AC)
- 50 Hz, 400 Hz • Noise • Surge test

Three Phase AC Line Reactors, Factory Stocked

TEC has been designing and manufacturing custom line reactors for some of the toughest customer applications for years. We now offer this design experience and product quality in a standard line of AC reactors. These reactors are rated by horsepower and amperage for drive applications and come in a full range of inductance, input voltage, and impedance values. Various termination styles are offered and all are UL component recognized. Many types are factory stocked.



Reactor Benefits

- Controls current and voltage harmonic distortion.
- Reduces harmful surge currents.
- Eliminates nuisance tripping of AC PWM drives.
- Components tested with the latest IGBT adjustable speed drives.
- Can be used on the input or output side of an AC drive.
- Less expensive and more compact than drive isolation transformers.
- Conforms to UL standards for the U.S. and Canada.
- Available in open core and coil configurations, or enclosed.

AC Line Reactors

- 230, 460 and 575 volts
- 1 to 500 Hp
- 1.5%, 3.0%, and 5.0% impedances

Standard Technical Specifications

- Harmonic Compensation: K rated designs help to meet IEEE 519 standards
- Overload Capability: 150% of rated current for one minute
- Saturation Rating: 2.5 times rated current with 80% Inductance minimum
- Insulation System: 180°C (120°C rise)
- Ambient Temperature: 40°C

V & F TRANSFORMER CORPORATION

31W222 West Bartlett Road
P.O.Box 8449
Bartlett, Illinois 60103
630-497-8070 • FAX 630-497-8076
Visit V & F's website:
vf-transformer.com

The History of "the Very Finest"

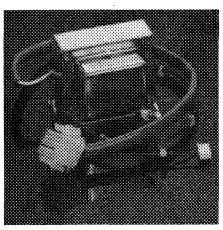
In 1963, already a "veteran" of more than 20 years in the transformer industry, Anthony J. Foderaro founded **V & F TRANSFORMER** CORPORATION on one uncomplicated premise. . . that he would engineer, build and market "the Very Finest" all American made transformers. The proud company he built is testimony to the overall merits of his concept...and how well Mr. Foderaro and his company have implemented his ideas!

V & F's success has been "by design". By being, from the outset,"The Very Finest Company" we could be, it has become axiomatic that we would produce transformers which are truly **the Very Finest!**

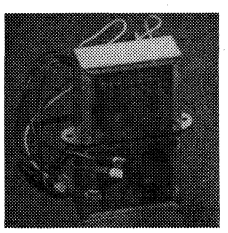
What V & F TRANSFORMER does:

V & F TRANSFORMER engineers, manufactures, assembles, tests and delivers transformers of the following types:

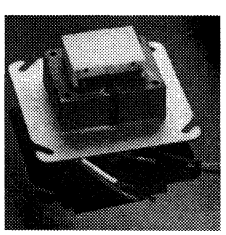
- **Constant Voltage** (up to 750 VA), **Normal Harmonic** or **DC Output Transformers.**
- **Audio Transformers,** both output and input (up to 200 watt).
- **Power Transformers,** up to 6KVA including 3-phase (50 amp maximum current).
- **Plug-in Transformers** to 30 VA. **Chokes,** up to 50 amps AC or DC.
- **Toroids** from 1" I.D. to 10" O.D., either **Power** or **Isolation** or **Auto Transformers.**
- **Custom Applications** including inverters, converters, high reactance and more.



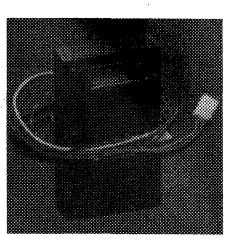
Power Isolation



International Power



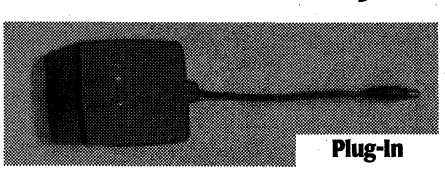
UL Class 2



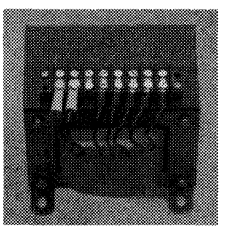
UL Class 2 Resettable Recognized and listed

TYPE	RANGE	COMMENTS
Power, 1 ϕ	To 6 KVA	50 amp max. load current
Power, 3 ϕ	To 8.5 KVA	50 amp max. load current
Autotransformer	To 10 KVA	Voltage ratio no greater than 2:1 (3 ϕ)WYE configuration, 3 or 4 wire (if 3 ϕ wire loads must be equal)
Audio	To 200 WATT	Input, Interstage, output
Plug-In	To 30 VA	2 blade only, cordset nom. length is 72 in.
CV	To 750 VA	AC/DC output; Input voltage range is 17%; customer supplies resonant capacitor Sine wave output not available
Class 2	Inherently limited (to 50 VA) Non-Inherently limited (50 VA to 100 VA) Many physical configurations	Input voltages to 480V frequency 50, 60, 50/60 output voltages 12-27
Toroid	From 1" I.D. To 10" O.D.	Power Transformers Isolation Transformers Auto Transformers

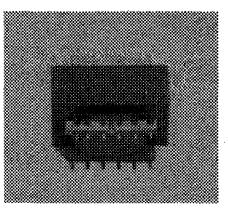
"the Very Finest"



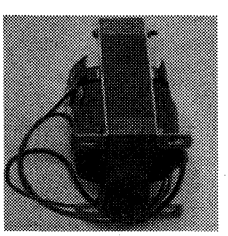
Plug-In



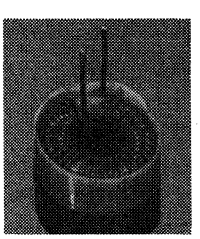
Auto Transformers



Printed Circuit



Constant Voltage



Toroid

Learn more about **V & F TRANSFORMER**. Call or write for your FREE copy of our new full color brochure and/or visit our website: **vf-transformer.com**

V & F TRANSFORMER CORPORATION

31W222 West Bartlett Road
P.O.Box 8449
Bartlett, Illinois 60103
630-497-8070 • FAX 630-497-8076
Visit V & F's website:
vf-transformer.com

Transformer Ratings: Transformers are rated in **VA** (volt-amperes) which give transformers their size based on a number on assumptions:

1) Dielectric strength capability of 1500VRMS allows the transformers to operate safely in the midst of line surges/spikes.
2) Continuous duty operation.
3) Varnish impregnation/coating allows the transfer of heat more efficiently to the coil's outer surface).
4) The transformer's coil is open to the ambient air.
5) The transformer is at standard atmospheric pressure and ambient temperature.
6) The temperature rise of the transformer is within a limiting temperature is based on the insulation system (**) in the transformer.

Vary any one of these assumptions and the transformer defined above now changes size to meet your particular requirements.

** Insulation Systems: Families of insulating materials able to maintain dielectric strength capability and not degrade chemically at a given temperature are called "Insulation Systems "

System names are: Class **0** (90°C), Class **A** (105°C), Class **B** (130°C), Class **F** (155°C), Class **H** (180°C), and Class **C** (220°C).

If transformer size is maintained, using different insulation systems will allow MORE POWER to be delivered by the transformer defined above.

If maximum temperature rise is maintained, higher temperature insulation systems will allow transformer size to decrease.

CERTIFICATE OF QUALIFICATION

issued by

Underwriters Laboratories Inc.

On

February 26, 1996

V&F Transformer Corporation
31W222 West. Bartlett Road
P.O. Box 8449
Bartlett, IL 60103

is eligible to participate in Underwriters Laboratories Inc. Client Test Data Program. Continued eligibility to participate is dependent upon continued conformance with the requirements under the Program.

Steve Hewson
Managing Engineer
Engineering Services, 413

V & F POWER SUPPLIES take the following forms and are used in the following applications:

TYPE	RANGE	COMMENTS
Linear	15 AMPS	Single or Multi-Output.
Switch Mode	To 1 KW	DC Output
Inverters	I to I KW	Single Phase
Battery Chargers	To 50A	Lead Acid, Gel or NiCad
Neon Lighting	1100V-7500V	Above 7500V on Request

"the Very Finest"

TESTING AND UL APPROVALS...

V & F's on-premises UL and TUV Approved labs and computerized test facilities can provide the most detailed of test results. New designs and improvements can be tested for compliance with UL, CSA, VDE and other standards. And because of our close working relationship with UL, **V & F** can frequently expedite the approval process, actually performing some of the required procedures.

V & F CUSTOM TRANSFORMERS CLIENT TEST DATA PROGRAM...

V & F Transformer has successfully completed the requirements to participate in Underwriters Laboratories' Client Test Data Program. This allows **V & F**, after consultation with UL, to conduct our own transformer testing [under UL Standards 506, General Purpose Transformers and 1585, Class 2 & Class 3 Transformers] and to submit the resulting test data to UL for acceptance.

V & F's acceptance into UL's program offers customers two important advantages:

1) Since **V & F** has only its own customers' needs to satisfy the time needed to complete the testing program is greatly reduced, and...
2) The cost of performing the tests, writing and submitting the reports iis also greatly reduced.

Learn more about **V & F TRANSFORMER**. Call or write for your FREE copy of our new full color brochure and/or visit our website: **vf-transformer.com**

VISHAY DALE

TRANSFORMERS

- Surface Mount
- Leaded
- PC Mount

EEM DESCRIPTIONS

TRANSFORMERS:

- Audio
- Autotransformer
- Converter, DC to DC
- Discriminator
- Driver
- Ferroresonant
- Filament
- 400 Hz
- High Voltage
- Hybrid
- Input
- Instrument
- Interstage
- Inverter
- Isolation
- Line
- Matching
- Mixing
- Output
- Plate
- Power
- Power Distribution
- Pulse
- RF
- Rectifier
- Split Bobbin
- Surface Mount
- Telephone Coupling
- Toroidal
- Transistor
- Voltage Dividing
- Voltage Regulating
- Wideband
- Military
- Inverter

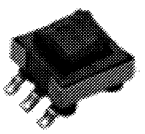
FLASHFAX℠

Fax 1-800-835-4272 for literature.

Or call Vishay's FlashFax℠ at 1-800-487-9437. Request document 9999. This is a listing of data sheets you can order by fax in a flash!

10 Transformer data sheets are available.

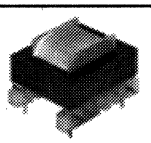
INTERNET

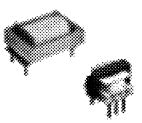


SURFACE MOUNT

Power Management Applications
Model LPE, Gapped, Ungapped, E-Core

Flexible design for low level battery to DC/DC conversion applications.
Easily configured as transformers.
Fast turn around of custom design needs.
Low DCR vs inductance.
Hot tin dipped terminations.
Inductance: 10µH to 150,000µH.
Tolerance: ± 20%, ± 30%.

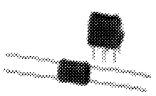


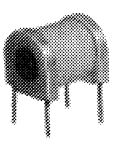


AUDIO, DIGITAL

Telephone Coupling
Model TA

Provides line isolation, impedance matching and line balance, designed to meet FCC Part 68, UL and CSA recognized.
Designed and built to meet telephone company requirements for data and voice access on leased private telephone lines or through dial-up telephone networks.
Power Level: - 45 dBm to + 10 dBm.
Longitudinal Balance: 60 dB min. = 200 - 1000Hz. 45 dB min. = 1000 - 4000Hz.
Frequency Range: Data/Voice = 300 - 3500Hz. Data = 800 - 3500Hz.

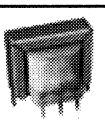




SCR ISOLATION

Pulse, Trigger Type, Leaded and PC Mount
Models PT-10, PT-20, PT50

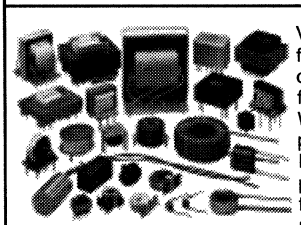
Designed for low-cost trigger source isolation in half and full wave SCR power control circuits, including motor speed, heater and incandescent lighting controls.
Transfers high amplitude or long duration pulses without saturation.
Leaded Styles: PC board or bobbin-type.
Primary Inductance (Min.): 200µH to 5000µH.
Leakage Inductance (Max.): 3µH to 1500µH.



LAMINATED

Low Power, PC Pin Mounting
Model PL

Provides low-cost power line isolation.
Recognized under UL File E71961, UL Std. 506.
Single primary, dual secondary, single secondary, dual primary - dual secondary.
Input Voltage: 115 V 60Hz.
Output Voltage: .75 VA to 10 VA.



Vishay Dale has extensive facilities for custom design and production of custom magnetics. We can give you fast turnaround on your proto-types. We can design magnetics for your power management needs such as DC-DC conversion, for switching power supply applications, for high frequency applications and for many others.

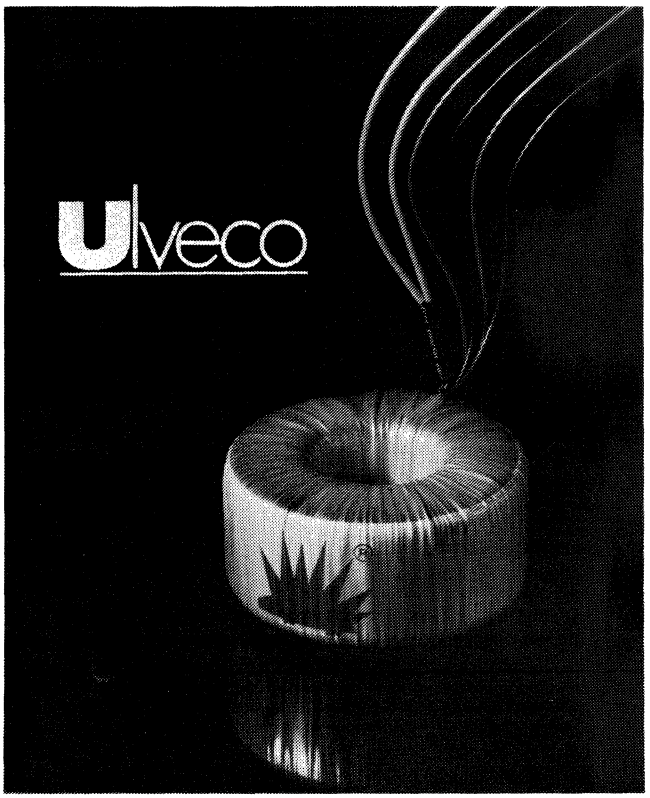
Our special custom transformer products and capabilities include: Power transformers, 50 to 400Hz, VA rating to 100VA; specialty transformers in low profile and PC mount; Audio transformers, coupling and hybrids available in PC mount, leadset and low profile; and, current sense styles. Call us with your custom design and we can help you select the material and package you need.

Vishay Dale E. Hwy 50, PO Box 180, Yankton, SD 57078-0180 • **Phone** (605) 665-9301 • **Fax** 605-665-1627 • **Internet** www.vishay.com
Major Vishay Brands Dale • Draloric • Foil Resistors • Measurements Group • Roederstein • Sfernice • Sprague • Thin Film • Vitramon

Ulveco

TOROIDAL TRANSFORMERS

Toroidal Power Transformers



Features:

Low Weight
Typically 50% lighter than traditional stacked lamination transformers.

Small Size
Low height profile allows slim, compact design of electronic equipment.

Flexible Dimensions
The Ulveco Toroidal Power Transformer can be "modeled" to fit very limited spaces and still conform to your electrical requirements.

Easy To Mount
Just one center screw easily and quickly mounts the Ulveco Toroidal Power Transformer to the chassis.

Low Magnetic Strayfield
No air gap; primary and secondary windings are evenly spread around the core resulting in a very low radiated magnetic field.

Low Mechanical Hum
A single continuous strip of steel tightly wound into a roll results in a very solid and stable unit. No loose parts to buzz.

Small No Load Losses
Ulveco Toroidal Power Transformers can reduce open circuit power by 90% compared to traditional stacked lamination transformers.

- **50/60/400 Hz transformers**
- **UL/CSA certified**
- **Quick response to design inquiries**
- **Computer aided programs provide quick solutions**
- **Rapid delivery of low cost prototype samples**
- **Wide choice of mounting arrangements**
- **Single phase transformers 15 VA to 10,000 VA**

Over 90% of our output is for custom designs. Because they require no elaborate production tools and are individually wound, **toroidal transformers are particularly suited to custom designs.**

Take advantage of our **custom design service at no obligation.** Our experts can become part of your power supply design group. We'll show you how you can optimize your product's appearance and performance without increasing cost.

Our interactive computer aided design program enables us to optimize designs for either AC or DC loads.

Other Products:

- 3-Phase Transformers to 30 KVA
- Auto Transformers
- Filter Chokes for 50/60 Hz
- Inverter Transformers for 50/60 Hz
- Value Added Assemblies

For additional Product and Design Data and Application Notes, please call for our informative 16 page brochure.

Ulveco Is Dedicated To Product Quality & Customer Service.

Experience
With over thirty years of dedication to product excellence and quality, Ulveco enjoys the position of U.S. leader in the design and manufacture of toroidal power transformers and inductors. We know Ulveco has been successful because of two key company philosophies:

— Our quality standards will drive us to success

— A commitment to unequaled customer service.

Quality—UL & CSA Recognized—ISO 9001 Certified
ULVECO is certified as a manufacturer of "Recognized" transformers for various configurations from class A (105°C) to class H (180°C). Every single transformer that we make is tested before delivery.

Customer Service
ULVECO's engineering and sales office, located at the manufacturing facility in Houston, Texas, is staffed with experienced transformer designers using proprietary software programs for optimal designs.

In addition to our custom designed toroids, we carry an extensive inventory of

OFF-THE-SHELF TRANSFORMERS

for 117V/60 Hz, or 2 x 117V/50 - 60 Hz, in power ratings of 15 VA to 1000 VA.
UL, CSA recognized. Please call 1-800-972-8213 for price and data sheets.

Ulveco, Inc.
10401 Westoffice Drive
Houston, Texas 77042
FAX: (713) 977-5031

1-800-972-8213
http://www.ulveco.com

ISO 9001 Registered

Ulveco
TOROIDAL TRANSFORMERS

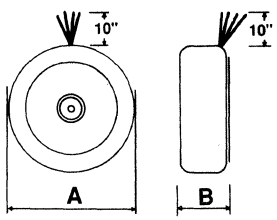
Custom Designed Toroidals

The Design Process
Our Computer Aided Design System, based upon years of experience, processes customer furnished data, presents our designers with several alternative solutions for electrical and mechanical dimensions, and assembles a specification. In some cases the specification is forwarded to the customer for review, in others, prototype design is begun immediately.

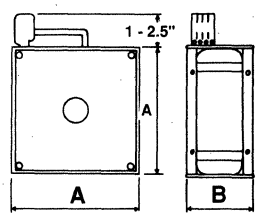
Prototype Design
Initial prototypes are designed according to our general procedure based on UL 1411, 506 and 544, as applicable, as well as CSA 22.2 No. 66. Every effort is made to fit the prototype design into our standard manufacturing process, but, when necessary, engineering and manufacturing cooperate to find new ways to solve customer's problems.

Prototypes
Prototypes are built and extensively tested, usually within a few days, by our regular production and inspection departments. After additional engineering tests for conformity to design specifications and safety agency requirements, the prototypes are shipped with their individual test reports. Our customers are encouraged both to bench test the transformers and to test them in the end equipment. We discuss and process modifications and, when necessary, furnish new prototypes. In most cases, the design is covered by our existing safety agency recognition/certification. In the few instances not covered, we will work closely with the agencies involved until the toroids are accepted.

General Data Custom Designed Toroidals



Disk Mounting



Flange Mounting

Nominal Power [VA]	Copper Losses[2] [W]	Core Losses [w]	Disk Mounting Dimensions A inch	B inch	Weight lb	Flange Mounting Dimensions A inch	B inch	Weight lb
15 (18)	3.0	0.20	2.5	1.3	0.7			
30 (36)	5.8	0.25	3.0	1.5	1.1			
50 (60)	8.6	0.45	3.2	1.4	1.6			
80 (95)	12.0	0.60	3.9	1.5	2.2			
120 (145)	16.0	0.90	3.9	1.9	3.0			
160 (190)	19.0	1.20	4.5	1.7	3.8			
225 (270)	20.0	1.40	4.5	2.0	4.9			
300 (360)	22.0	1.70	4.6	2.6	5.7			
400 (480)	27.0	2.00	5.4	2.0	6.5	5.7	3.3	8.1
500 (600)	31.0	2.40	5.4	2.4	8.0	5.7	3.7	9.6
625 (750)	36.0	3.10	5.5	3.2	9.5	5.7	4.2	11.1
800 (960)	45.0	3.80	6.4	2.7	12.3	6.9	3.9	14.6
990 (1200)	45.0	4.70	6.4	3.0	16.0	6.9	4.3	18.3
1100 (1320)	45.0	6.50	6.4	3.3	17.0	6.9	4.6	19.3
1300 (1560)	60.0	5.70	8.0	2.6	20.0	8.3	3.9	23.0
1600 (1920)	62.0	7.10	8.0	3.0	23.0	8.3	4.3	26.0
1900 (2280)	65.0	8.50	8.0	3.4	26.0	8.3	4.7	29.0
2200 (2640)	73.0	8.10	8.9	3.3	29.0	9.3	5.1	33.5
2500 (3000)	79.0	9.70	8.9	3.5	33.0	9.3	5.3	37.5
2800 (3860)	89.0	11.00	9.8	3.1	35.0	10.2	4.9	41.0
3200 (3840)	91.0	11.00	9.8	3.5	42.0	10.2	5.3	48.0
3700 (4440)	93.0	15.00	9.8	3.9	46.0	10.2	5.7	52.0
4400 (5280)	112.0	17.00	11.2	4.3	53.0	11.6	6.1	60.0
5000 (6000)	112.0	20.00	11.2	4.7	62.0	11.6	6.5	69.0
6300 (7560)	130.0	27.00	12.4	4.7	76.0	13.8	6.5	89.0
8000 (9600)	140.0	28.00	13.4	4.7	88.0	13.8	6.5	101.0
10000 (12000)	140.0	39.00	13.4	5.9	120.0	13.8	7.7	133.0

TÜV PRODUCT SERVICE Bauart geprüft

UL 544
UL 1950
UL 1411
UL 506
UL 2601
CSA 22.2 No.66
IEC 601.1

The values given are typical values.
1) Values within parenthesis are for 60Hz operation only.
2) Copper losses at 25°C ambient temperature and full load.

Ulveco, Inc.
10401 Westoffice Drive
Houston, Texas 77042
FAX: (713) 977-5031

1-800-972-8213
http://www.ulveco.com

ISO 9001 Registered

Ulveco
TOROIDAL TRANSFORMERS

UL 544/2601 Recognized Medical Power / Isolation Transformers

Nominal Power VA	Secondary Current at 120 V	Secondary Current at 240V	ODxHt inch Weight lb.	Part No.
100	.83A		4.0X2.0	MT0100SS
			2.7	
100	.83A	.42A	4.0X2.0	MT0100DS
			2.7	
230	1.92A		4.6X2.4	MT0230SS
			5.2	
230	1.92A	.96A	4.6X2.4	MT0230DS
			5.2	
400	3.33A		5.5X2.5	MT0400SS
			8.0	
400	3.33A	1.67A	5.5X2.5	MT0400DS
			8.0	
600	5.00A		6.2X3.1	MT0600SS
			13.0	
600	5.00A	2.5A	6.2X3.1	MT0600DS
			13.0	
750	6.25A		6.6X3.0	MT0750SS
			14.0	
750	6.25A	3.12A	6.6X3.1	MT0750DS
			14.0	
1000	8.33A	4.16A	6.9X3.5	MT1000DS
			20.0	
1500	12.5A	6.25A	8.2X4.0	MT1500DS
			28	
2000	16.6A	8.33A	9.1X4.4	MT2000DS
			35	
2500	20.8A	10.4A	9.4X4.5	MT2500DS
			39	
3000	25.0A	12.5A	10.0X4.3	MT3000DS
			47	
3750	31.2A	15.6A	10.5X4.9	MT3750DS
			65	
5000	41.6A	20.8A	11.8X5.4	MT5000DS
			78	
6250	52.0A	26.0A	11.5X5.0	MT6250DS
			90	
7500	62.5A	31.2A	12.0X5.5	MT7500DS
			100	
8750	72.9A	36.4A	12.5X6.5	MT8750DS
			110	
10000	83.3A	41.6A	13.0X5.2	MT10000DS
			120	

In addition to above standard line of UL 544 recognized toroids, we can cost effectively help you custom design a transformer which meets your exact requirements.

Features & Benefits

- **Very High Isolation** - At Ulveco all transformers are 100% Hipot tested at 4,000 Volts AC.
- **Low Leakage Current** - Special design/construction techniques developed by Ulveco, allow us to manufacture isolation transformers with leakage currents well below the Medical Safety Standard requirements. This will allow a certain margin for cordage and peripheral components.
- **Very Low Flux Field** - Because the toroidal core is completely contained under the windings, the 50/60 Hz magnetic field is greatly attenuated; making toroids a popular choice for use in today's densely populated chassis.
- **High Efficiencies** - In most medical applications and particularly "portable equipment", it is important to squeeze as much power as possible from the service outlets; efficiencies as high as 98% have been realized by Ulveco customers. These ultra high efficiencies have been made possible due to technologcial breakthroughs by the Ulveco design team and special manufacturing processes. Core losses are reduced to a mere 1/2 watt per pound.
- **Weight Savings** - Toroidal Isolation Transformers are dramatically lighter than conventional transformers, in many cases up to 50%. Ease of installation and considerably less structural support make toroids a welcome addition to competitive medical designs.
- **Quiet Operation** - Due to the single strip core construction, there are no air gaps or lamination layers to vibrate or loosen over time.
- **Flexible Dimensions** - At Ulveco we manufacture our own cores in house. This allows our engineers to have almost unlimited flexibility in the form factor of the finished transformer.
- **Electrostatic Shield** - A 2 mil copper strip, laminated between two layers of polyester insulation, wound between the energized circuit(s) (primary side) and the isolated circuit(s) (secondary side) significantly reduces leakage current in medical applications. In addition, the shield will reduce electrostatic coupling between windings. An insulated wire lead from the strip provides connection to ground.
- **Thermally Protected** - In order to meet the European over-voltage and over-load protection test and requirements as defined in IEC 601-1, Ulveco winds and terminates a UL Recognized, CSA & VDE Certified, normally closed, automatically resetting thermal device, or upon request, a single-shot cut-out.
- **UL 544,UL 2601, CSA 22.2 No. 601-1, and IEC 601-1 Recognition** - Ulveco maintains family files for UL 544, UL 2601, CSA 22.2 No. 601-1, and IEC 601-1, which include the construction of all of our standard Medical Isolation Transformers as well as many of our custom designs. Our custom transformers can be easily and cost effectively added to these files for quick and painless approvals.

TÜV PRODUCT SERVICE Bauart geprüft

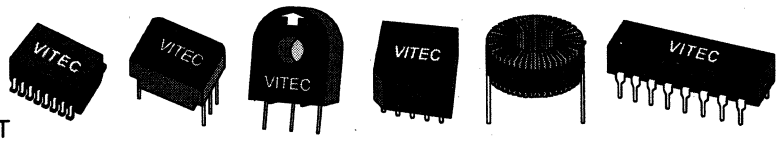
First and only North American toroidal transformer manufacturer to be certified to ISO 9001.
Only toroidal transformer manufacturer to offer a lifetime warranty.

Ulveco, Inc.
10401 Westoffice Drive
Houston, Texas 77042
FAX: (713) 977-5031

1-800-972-8213
http://www.ulveco.com

ISO 9001 Registered

- Friendly technical support
- Short lead time
- Competitive prices
- Free engineering samples
- Capability of meeting UL, CSA, TUV, BABT



General Purpose Transformers

CONTROL TRANSFORMER

Part#	Turns Ratio	Inductance uH	Dimension LxWxH
11Z2000	1:1	200	0.95 x 0.78 x 0.80
11Z2001	1:1	1000	0.95 x 0.78 x 0.80
11Z2002	1:1	5000	0.95 x 0.78 x 0.80
11Z2003	2:1	1000	0.95 x 0.78 x 0.80
11Z2004	5:1	5000	0.95 x 0.78 x 0.80
11Z2100	1:1:1	200	0.95 x 0.78 x 0.80
11Z2101	1:1:1	1000	0.95 x 0.78 x 0.80
11Z2102	1:1:1	5000	0.95 x 0.78 x 0.80
11Z2103	2:1:1	1000	0.95 x 0.78 x 0.80
11Z2104	5:1:1	5000	0.95 x 0.78 x 0.80
11Z2200	1:1	200	0.95 x 0.78 x 0.80
11Z2201	2:1	1000	0.95 x 0.78 x 0.80
11Z2300	1:1:1	200	0.95 x 0.78 x 0.80
11Z2301	2:1:1	1000	0.95 x 0.78 x 0.80
11Z3000	1:1	200	0.95 x 0.78 x 0.75
11Z3001	1:1	1000	0.95 x 0.78 x 0.75
11Z3002	1:1	5000	0.95 x 0.78 x 0.75
11Z3003	2:1	1000	0.95 x 0.78 x 0.75
11Z3004	5:1	5000	0.95 x 0.78 x 0.75
11Z3100	1:1:1	200	0.95 x 0.78 x 0.75

CONTROL TRANSFORMER

Part#	Turns Ratio	Inductance mH	Dimension LxWxH
13Z1001	1:1	1.00	0.75 x 0.75 x 0.55
13Z1003	2:1	0.20	0.75 x 0.75 x 0.55
13Z1006	1:1:1	0.20	0.75 x 0.75 x 0.55
13Z1008	1:1:1	5.00	0.75 x 0.75 x 0.55
13Z1014	1:1	1.00	0.94 x 0.78 x 0.90
13Z1015	1:1	5.00	0.94 x 0.78 x 0.90
13Z1017	2:1	1.00	0.94 x 0.78 x 0.90
13Z1018	2:1	5.00	0.94 x 0.78 x 0.90
13Z1019	1:1:1	0.20	0.94 x 0.78 x 0.90
13Z1023	2:1:1	1.00	0.94 x 0.78 x 0.90

RF / PULSE TRANSFORMER

Part#	Turns Ratio	Inductance	Dimension LxWxH
14Z3245	1:1	40.0 uH	0.30 x 0.30 x 0.23
14Z3246	1CT:1CT	40.0 uH	0.30 x 0.30 x 0.23
14Z3250	1:2CT	25.0 uH	0.30 x 0.30 x 0.23
14Z3252	1:1.41CT	40.0 uH	0.30 x 0.30 x 0.23
14Z3254	1:4CT	10.0 uH	0.30 x 0.30 x 0.23

SMD Package available

GENERAL PURPOSE TRANSFORMER

Part#	Turns Ratio	Inductance uH	Dimension LxWxH
16Z5760	1:1:1	5000	0.35 x 0.50 x 0.25
16Z5761	1:1:1	2000	0.35 x 0.50 x 0.25
16Z5762	1:1:1	500	0.35 x 0.50 x 0.25
16Z5763	1:1:1	200	0.35 x 0.50 x 0.25
16Z5764	1:1:1	50	0.35 x 0.50 x 0.25
16Z5769	2:1:1	500	0.35 x 0.50 x 0.25
16Z8270	1:1	2000	0.35 x 0.50 x 0.25
16Z8271	1:1	500	0.35 x 0.50 x 0.25
16Z8272	1:1	200	0.35 x 0.50 x 0.25
16Z8276	2:1	2000	0.35 x 0.50 x 0.25
16Z8277	2:1	500	0.35 x 0.50 x 0.25

SMD Package available

Power Products

EMI COMMON MODE SUPPRESSION INDUCTOR

Part#	Rated current	Inductance mH	Dimension LxWxH
54P2911	1.80 Amp	10.00	1.15 x 0.55 x 1.15
54P2912	3.50 Amp	3.00	1.15 x 0.55 x 1.15
54P2913	6.00 Amp	1.00	1.15 x 0.55 x 1.15
54P2914	2.60 Amp	16.00	1.52 x 0.80 x 1.50
54P2915	3.20 Amp	8.00	1.52 x 0.80 x 1.50
54P2916	5.20 Amp	4.00	1.52 x 0.80 x 1.50
54P2917	7.50 Amp	2.00	1.52 x 0.80 x 1.50

Horizontal Mount also available

EMI COMMON MODE SUPPRESSION INDUCTOR

Part#	Rated current	Inductance mH	Dimension LxWxH
54P2923	25.0 Amp	0.80	1.70 x 0.95 x 1.75
54P2924	13.0 Amp	1.60	1.33 x 0.80 x 1.30
54P2925	6.0 Amp	3.00	1.27 x 0.80 x 1.30
54P2926	6.0 Amp	0.90	1.15 x 0.60 x 1.00
54P2927	3.0 Amp	6.00	1.15 x 0.60 x 1.00

LOW COST INDUCTOR - VERTICAL MOUNT

Part#	Rated current	Inductance uH	Dim. Dia. x Height
55P9100	2.50 Amp	25	0.58 x 0.34 x 0.60
55P9101	2.50 Amp	50	0.65 x 0.45 x 0.65
55P9102	2.50 Amp	100	0.83 x 0.45 x 0.85
55P9103	2.50 Amp	35	0.65 x 0.45 x 0.65
55P9104	3.00 Amp	70	0.83 x 0.45 x 0.85
55P9105	3.00 Amp	145	0.95 x 0.60 x 0.95
55P9106	3.00 Amp	285	1.25 x 0.70 x 1.25
55P9108	3.50 Amp	100	0.95 x 0.60 x 0.95
55P9109	4.00 Amp	165	1.25 x 0.70 x 1.25
55P9111	4.00 Amp	40	0.83 x 0.45 x 0.85
55P9112	5.00 Amp	100	1.25 x 0.70 x 1.25
55P9114	5.00 Amp	55	0.95 x 0.60 x 0.95
55P9116	7.00 Amp	55	1.25 x 0.70 x 1.25

Bare coil or other packages available

CURRENT SENSE INDUCTOR

Part#	Turns	Inductance mH	Package & Dim.
57P1686	50	5.00	0.67 x 0.38 x 0.80
57P1687	100	20.00	0.67 x 0.38 x 0.80
57P1688	200	80.00	0.67 x 0.38 x 0.80
57P1717	50CT	5.00	0.67 x 0.38 x 0.80
57P1718	100CT	20.00	0.67 x 0.38 x 0.80
57P1719	200CT	80.00	0.67 x 0.38 x 0.80

CURRENT SENSE TRANSFORMER

Part#	Turns	Inductance mH	Package & Dim.
57P3586	50	5.00	0.90 x 0.70 x 0.70
57P3587	100	20.00	0.90 x 0.70 x 0.70
57P3588	200	80.00	0.90 x 0.70 x 0.70
57P3589	300	180.00	0.90 x 0.70 x 0.70
57P3617	50CT	5.00	0.90 x 0.70 x 0.70
57P3618	100CT	20.00	0.90 x 0.70 x 0.70
57P3619	200CT	80.00	0.90 x 0.70 x 0.70
57P3620	300CT	180.00	0.90 x 0.70 x 0.70
57P3556	50	5.00	0.75 x 0.57 x 0.76
57P3557	100	20.00	0.75 x 0.57 x 0.76
57P3558	200	80.00	0.75 x 0.57 x 0.76
57P3559	300	180.00	0.75 x 0.57 x 0.76

Vitec Offers different through hole, DIP, or SMD packages to meet various domestic and international safety agency requirement. Products for operating under extended temperature ranges and higher isolation voltages are also available when required. Please call factory for a full line catalog.

VITEC
4027 Clipper Court, Fremont, CA 94538
(510) 353-9260 Fax: (510) 353-9836
http:\\www.VitecCorp.com
info@VitecCorp.com

TELECOMMUNICATIONS PRODUCTS

T1/E1 INTERFACE TRANSFORMER - 1500VRMS

Part#	Turns Ratio	LP mH	Package LxWxH
16Z5931	1:1:1(2CT)	1.20	THT, .35x.50x.25
16Z5932	1CT:1CT	1.20	THT, .35x.50x.25
16Z5933	1CT:3CT	1.20	THT, .35x.50x.25
16Z5934	1:1	1.20	THT, .35x.50x.25
16Z5935	1:1.36CT	1.20	THT, .35x.50x.25
16Z5936	1CT:1	1.20	THT, .35x.50x.25
16Z5937	1:1.36	1.20	THT, .35x.50x.25
16Z5943	1:1.58:2	1.20	THT, .35x.50x.25
16Z5944	2CT:1CT	2.00	THT, .35x.50x.25
16Z5945	2.53CT:1	2.00	THT, .35x.50x.25
16Z5946	1:2CT	1.20	THT, .35x.50x.25
16Z5948	1:4CT	0.50	THT, .35x.50x.25
16Z5950	1CT:2CT	1.20	THT, .35x.50x.25
16Z5952	1:1.15CT	1.50	THT, .35x.50x.25
16Z5953	1:1:1.266	1.50	THT, .35x.50x.25
16Z5955	1:.63:.63	1.50	THT, .35x.50x.25
16Z5961	1CT:2.3CT	1.20	THT, .35x.50x.25
16Z5962	1CT:1.53CT	1.20	THT, .35x.50x.25
24Z4651	1:2CT & 1:2CT	1.20&1.20	THT, .80x.39x.25
24Z4652	1:2CT & 1:1.36	1.20&1.20	THT, .80x.39x.25
24Z4654	1CT:2CT & 1:1	1.20&1.20	THT, .80x.39x.25
24Z4663	1CT:2.3CT & 1CT:2CT	1.20&1.20	THT, .80x.39x.25
24Z4664	1CT:1.53CT&1CT:2CT	1.20&1.20	THT, .80x.39x.25
24Z4665	1:1.15CT & 1:2CT	1.50&1.20	THT, .80x.39x.25
24Z4666	1:1:1.266 & 1:2CT	1.50&1.20	THT, .80x.39x.25

T1/E1 INTERFACE TRANSFORMER - 3000VRMS

Part#	Turns Ratio	LP mH	Package LxWxH
18Z4880	1:1:1.58	0.60	THT, .56x.56x.40
18Z4881	1:1:2	0.60	THT, .56x.56x.40
18Z4882	1:1.36CT	1.20	THT, .56x.56x.40
18Z4883	1:1.15CT	1.20	THT, .56x.56x.40
18Z4884	1:1	1.20	THT, .56x.56x.40
18Z4885	1CT:2CT	1.20	THT, .56x.56x.40
18Z4886	1CT:3CT:1	0.60	THT, .56x.56x.40
18Z4887	1:2.3CT	1.20	THT, .56x.56x.40
18Z4888	1:1.53CT	1.20	THT, .56x.56x.40
18Z4889	1:1:1.26	1.50	THT, .56x.56x.40
18Z4890	1:1.58:2	1.50	THT, .56x.56x.40

T1/E1 INTERFACE TRANSFORMER - Dual SMD

Part#	Turns Ratio	Inductance	Package LxWxH
28Z651	1:2CT & 1:2CT	1.20&1.20	SMD, .65x.60x.34
28Z652	1:2CT & 1:1.36	1.20&1.20	SMD, .65x.60x.34
28Z654	1CT:2CT & 1:1	1.20&1.20	SMD, .65x.60x.34
28Z663	1CT:2.3CT & 1CT:2CT	1.20&1.20	SMD, .65x.60x.34
28Z664	1CT:1.53 & 1CT:2CT	1.20&1.20	SMD, .65x.60x.34
28Z665	1:1.15CT & 1:2CT	1.50&1.20	SMD, .65x.60x.34
28Z666	1:1:1.266 & 1:2CT	1.50&1.20	SMD, .65x.60x.34

T1/E1 INTERFACE TRANSFORMER - Compact SMD

Part#	Turns Ratio	Inductance	Package LxWxH
46Z211	1:2CT & 1:2CT	1.20&1.20	SMD, .45x.36x.21
46Z212	1:2CT & 1:1.36	1.20&1.20	SMD, .45x.36x.21
46Z214	1CT:2CT & 1:1	1.20&1.20	SMD, .45x.36x.21
46Z223	1CT:2.3CT & 1CT:2CT	1.20&1.20	SMD, .45x.36x.21
46Z224	1CT:1.53 & 1CT:2CT	1.20&1.20	SMD, .45x.36x.21
46Z225	1:1.15CT & 1:2CT	1.50&1.20	SMD, .45x.36x.21
46Z226	1:1:1.266 & 1:2CT	1.50&1.20	SMD, .45x.36x.21

INTERFACE TRANSFORMERS FOR T3/E3/DS3/STS-1

Part#	Turns Ratio	Inductance	Package LxWxH
26Z086	1:1	40 uH	SMD, .30x.30x.23
26Z087	1:2CT	19 uH	SMD, .30x.30x.23

Please call factory for a full line catalog

ISOLATION TRANSFORMERS FOR ISDN S INTERFACE

Part#	Turns Ratio	Inductance	Package LxWxH
18Z4893	1CT:1CT	22 mH	THT, .56x.56x.40
18Z4894	1CT:1.8	22 mH	THT, .56x.56x.40
18Z4895	1CT:2CT	22 mH	THT, .56x.56x.40
18Z4896	1CT:2.5	22 mH	THT, .56x.56x.40
18Z4897	1CT:2CT	22 mH	THT, .56x.56x.40
24Z4893	1:1 & 1:1	22 mH	THT, .56x.92x.40
24Z4894	1:1.8 & 1:1.8	22 mH	THT, .56x.92x.40
24Z4895	1:2 & 1:2	22 mH	THT, .56x.92x.40
24Z4896	1:2.5 & 1:2.5	22 mH	THT, .56x.92x.40
24Z4897	1:2 & 1:2	22 mH	THT, .56x.92x.40

ISOLATION TRANSFORMER FOR ISDN U INTERFACE

Part#	Turns Ratio	Inductance mH	Package LxWxH
33Z3850	1.25:1	3.80 - 4.60	THT, .75x.75x.47
33Z3877	1.65:1	13.00 - 18.00	THT, .50x.65x.34
33Z3879	2.00:1	25.50 - 28.50	THT, .92x1.05x.45
33Z3881	1.15:1	11.40 - 12.60	THT, .92x1.05x.45
33Z3882	1.50:1	25.60 - 28.40	THT, .92x1.05x.45
33Z3883	1.25:1	26.50 - 29.50	THT, .92x1.05x.45
33Z3904	1.32:1	06.20 - 07.60	THT, .70x.99x.49
33Z3905	1:0.5:0.5	13.05 - 15.95	THT, .80x.80x.67

ISOLATION TRANSFORMER FOR 64 KBPS

Part#	Turns Ratio	Inductance	Package LxWxH
18Z4845	1:2CT	7.50 mH	THT, .56x.56x.40
18Z4846	1CT:1	10.00 mH	THT, .56x.56x.40

ISOLATION TRANSFORMER FOR DDS SWITCHED 56

Part#	Turns Ratio	Inductance	Package LxWxH
33Z3815	1:1	200 mH	THT, .60x.80x.40
33Z3818	1CT:1	15 mH	THT, .39x.30x.39

ISOLATION TRANSFORMER FOR HDSL

Part#	Rated current	Inductance	Package LxWxH
33Z3816	2:1:1	3 mH	THT, .92x1.05x.45
33Z3817	2:1:1	2 mH	THT, .92x1.05x.45

COMMON MODE CHOKE FOR TELECOMM APPS

Part#	OCL	CM Rejection	Package LxWxH
24Z4681	24 uH	20 dB (100MHz)	THT, .39x.39x.25
26Z091	24 uH	20 dB (100MHz)	SMD, .40x.36x.21
24Z4688	6 mH	13 dB (100MHz)	THT, .56x.56x.40

ISOLATION TRANSFORMER FOR ETHERNET

Part#	Turns Ratio	Inductance	Package LxWxH
46Z248	1CT:1CT, 1CT:1.41CT	200 uH	SMD, .45x.36x.21
46Z288	1CT:1CT, 1CT:2CT	200 uH	SMD, .45x.36x.21
46Z302	1:1, 3 Coils	75 uH	SMD, .45x.36x.21
46Z303	1:1, 3 Coils	100 uH	SMD, .45x.36x.21
46Z307	1CT:1CT, 1CT:1CT	200 uH	SMD, .45x.36x.21
46Z348	1CT:1CT, 1CT:1.41CT	200 uH	SMD, .45x.36x.21
46Z480	1:1, 4 Coils	200 uH	SMD, .45x.36x.21
46Z481	1:1.41, 4 Coils	200 uH	SMD, .45x.36x.21

FAST ETHERNET INTERFACE MODULES

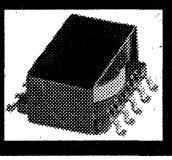
Part#	Turns Ratio	Inductance	Package LxWxH
46Z282	1CT:1	350 uH	SMD, .45x.36x.21
46Z283	1CT:1.41	350 uH	SMD, .45x.36x.21
46Z284	1:1:1	350 uH	SMD, .45x.36x.21
46Z285	2:1	750 uH	SMD, .45x.36x.21
46Z333	1CT:1	350 uH	SMD, .45x.36x.21

COMMON MODE CHOKE FOR LAN APPLICATIONS

Part#	OCL	CM Rejection	Package LxWxH
24Z4687	36 uH	25 dB (200MHz)	THT, .39x.39x.25
26Z085	36 uH	25 dB (200MHz)	SMD, .40x.36x.21
42Z417	68 uH	25 dB (200MHz)	SMD, .22x.36x.21

VITEC
4027 Clipper Court, Fremont, CA 94538
(510) 353-9260 Fax: (510) 353-9836
http:\\www.VitecCorp.com
info@VitecCorp.com

HIGH FREQUENCY TRANSFORMERS for Switch Mode Power Supplies - WCM 401



PRODUCT DESCRIPTION: West Coast Magnetic's 401 series high frequency transformers are intended for use in switch mode power supplies including push/pull, flyback, and forward converter circuits. Output power as high as 7 watts can be achieved in push/pull circuits. All sizes are based on low profile ER core geometry and all sizes are offered in surface mount packaging. West Coast Magnetics stocks core material which will accommodate a range of operating frequencies from 50 Khz to 3 Mhz.

DESIGN CONSTANTS

Size Code	A_l frequency > 500 Khz a.	A_l frequency ≤ 500 Khz a.	A_l single gap	A_l double gap	Ae core area (mm^2)	le magnetic path length (mm)	Ve core volume (mm^3)	Wa bobbin winding area (mm^2)	WaAc core area x winding area (mm^4)	Bobbin window width (mm)	Bobbin window height (mm)	Mean length per turn (mm)
ER 9.5	525	950	70	135	8.6	14.0	120	3.1	26.7	2.15	1.43	18
ER 11	725	1400	70	135	11.7	14.6	170	3.3	38.6	2.00	1.65	22
ER 14.5	—	1600	70	135	17.6	19.0	330	5.5	96.8	2.00	2.75	27

OUTPUT POWER VS. FREQUENCY OF OPERATION (WATTS)

50 Khz	100 Khz	250 Khz	500 Khz	1000 Khz	2000 Khz	3000 Khz
0.9	1.3	2.0	2.3	3.5	2.8	2.3
1.3	1.8	2.8	3.1	4.8	3.9	3.2
2.8	3.9	6.1	6.9	not available		

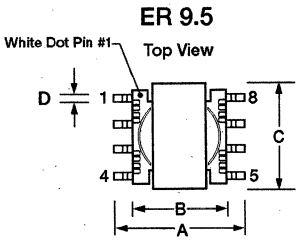
Notes:

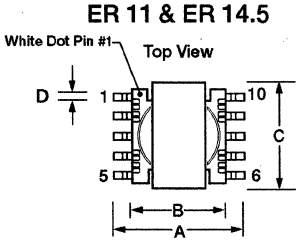
1. Reduce power rating in Table above by 50% for forward converter topologies. Reduce by 50% minimum for flyback circuits.
2. Final sizing of the transformer will depend on a number of interrelated variables. The data in the above table should be considered a starting point only.
3. If safety agency is required, the final size may be significantly larger than the data in the table would indicate.
4. High frequency material (>500Khz) is available in ER 9.5 and ER 11 sizes only.

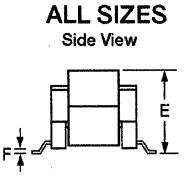
Power Curve Assumptions:

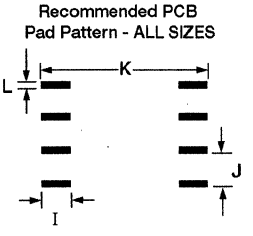
1. Push/Pull circuit topology
2. Bobbin Window area utilization = 40%
3. Flux density (B) chosen so that core losses at all Frequencies are 100 mW/cm^3.

a. A_l measured for ungapped cores. $nH/T^2 \pm 25\%$









Dimensions: inches / mm

SIZE CODE	A	B	C	D	E	F	I	J	K	L
ER 9.5	.457 11.6	.319 8.1	.395 10.0	.028 0.7	.240 6.1	.004 0.1	.079 2.0	.079 2.0	.535 13.6	.051 1.3
ER 11	.480 12.2	.362 9.2	.460 11.7	.028 0.7	.240 6.1	.004 0.1	.079 2.0	.079 2.0	.559 14.2	.051 1.3
ER 14.5	.630 16.0	.472 12.0	.600 15.2	.028 0.7	.295 7.5	.004 0.1	.079 2.0	.079 2.0	.708 18.0	.051 1.3

Call for additional product information and samples.

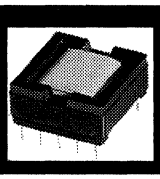
ADDITIONAL WCM PRODUCTS INCLUDE:

- High Q RF Inductors — WCM 202 Series, designed for resonant circuit applications requiring Q values 100 or greater and standard inductance tolerances of ± 5% or less.

- High Frequency Inductors — WCM 304 Series, designed for use as filters in high frequency power supplies, able to handle significant amounts of DC.

- Common Mode Chokes — WCM 501 Series, designed to attenuate common mode noise in switching power supplies at frequencies from 100KHz to 30 MHz.

WEST COAST MAGNETICS
356 Preston Court • Livermore, CA 94550
925-373-7711 Fax: 925-373-6465
Toll Free: 800-628-1123
www.wcmagnetics.com



HIGH FREQUENCY TRANSFORMERS for Switch Mode Power Supplies - WCM 402

PRODUCT DESCRIPTION: West Coast Magnetic's 402 series high frequency transformers are intended for use in switch mode power supplies including push/pull, flyback, and forward converter circuits. Output power as high as 257 watts can be achieved in push/pull circuits. All sizes are based on low profile E-core geometry and two sizes are offered in surface mount packaging. West Coast Magnetics stocks core material which will accommodate a range of operating frequencies from 50 Khz to 3 Mhz.

OUTPUT POWER VS. FREQUENCY OF OPERATION (WATTS)

Size Code	50 Khz	100 Khz	250 Khz	500 Khz	1000 Khz	2000 Khz	3000 Khz
EFD 15	6.8	9.3	14	16	25	20	17
EFD 20	20	27	42	47	72	59	49
EFD 25	49	67	104	117	180	147	121
EFD 30	70	96	149	169	257	210	173

DESIGN CONSTANTS

A_L frequency > 500 Khz a.	A_L frequency ≤ 500 Khz a.	A_L single gap	A_L double gap	Ae core area (mm^2)	le magnetic path length (mm)	Ve core volume (mm^3)	Wa bobbin winding area (mm^2)	WaAc core area x winding area (mm^4)	Bobbin window width (mm)	Bobbin window height (mm)	Mean length per turn (mm)
400	850	70	135	15.0	34.0	510	17.1	257	8.9	1.93	27
650	1200	70	135	31.0	47.0	1460	28.1	871	13.4	2.10	38
1000	2000	80	155	58.0	57.0	3300	42.5	2465	16.7	2.55	48
1050	2150	80	155	69.0	68.0	4700	54.1	3733	20.4	2.65	52

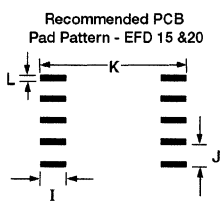
Power Curve Assumptions:

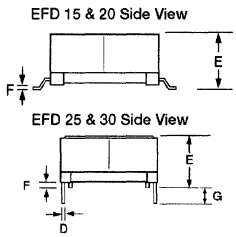
1. Push/Pull circuit topology
2. Bobbin Window area utilization = 40%
3. Flux density (B) chosen so that core losses at all Frequencies are 100 mW/cm^3.

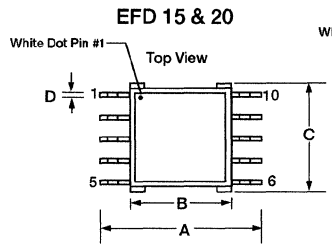
a. A_L measured for ungapped cores. $nH/T^2 \pm 25\%$

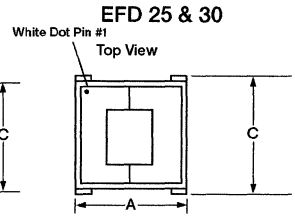
Notes:

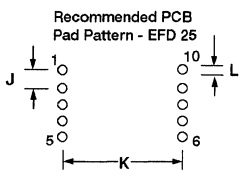
1. Reduce power rating in Table above by 50% for forward converter topologies. Reduce by 50% minimum for flyback circuits.
2. Final sizing of the transformer will depend on a number of interrelated variables. The data in the above table should be considered a starting point only.
3. If safety agency is required, the final size may be significantly larger than the data in the table would indicate.

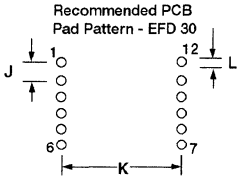












Call for additional product information and samples.

Dimensions: inches / mm

SIZE CODE	A	B	C	D	E	F	I	J	K	L
EFD 15	.866 22.0	.610 15.5	.610 15.5	.028 0.7	.325 8.3	.008 0.2	.138 3.5	.100 2.5	.945 24.0	.051 1.3
EFD 20	.965 24.5	.825 21.0	.846 21.5	.039 1.0	.413 10.5	.008 0.2	.138 3.5	.150 3.8	1.083 27.5	.075 1.9

SIZE CODE	A	C	D	E	F	G	J	K	L
EFD 25	1.024 26.0	1.024 26.0	.031 0.8	.511 13.0	.071 1.8	.138 3.5	.197 5.0	.886 22.5	.052 1.3
EFD 30	1.220 31.0	1.220 31.0	.031 0.8	.511 13.0	.071 1.8	.138 3.5	.197 5.0	1.083 27.5	.052 1.3

WEST COAST MAGNETICS has designed and manufactured components since 1974.

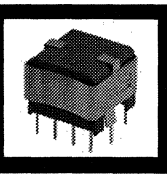
Custom component capabilities include:

- air core inductors
- balun transformers
- bobbin winding
- common mode chokes
- high frequency transformers
- high Q RF inductors
- laminated transformers
- power inductors
- toroidal inductors
- tunable inductors

Toll Free: 800-628-1123
www.wcmagnetics.com

WEST COAST MAGNETICS
356 Preston Court • Livermore, CA 94550
925-373-7711 Fax: 925-373-6465

HIGH FREQUENCY TRANSFORMERS for Switch Mode Power Supplies - WCM 403



PRODUCT DESCRIPTION: West Coast Magnetic's 403 series transformers are ideal for switch mode power supply applications where very low emitted electromagnetic radiation is a priority. The cubic shape of the 403 series core and bobbin provides exceptional shielding. The 403 series geometry also facilitates high PCB packing densities. The 403 series transformer is also commonly used in broadband small signal transmission applications.

DESIGN CONSTANTS

Size Code	SMD	A_L frequency	A_L single gap	Ae core area (mm^2)	le magnetic path length (mm)	Ve core volume (mm^3)	Wa bobbin winding area (mm^2)	WaAc core area x winding area (mm^4)	Bobbin window width (mm)	Bobbin window height (mm)	Mean length per turn (mm)
EP 7	Yes	750min	63	10.7	15.7	162	3.8	39	3.2	1.3	18.0
EP 10	Yes	750min	63	11.3	19.2	217	11.4	129	5.4	2.1	21.3
EP 13	Yes	1600±25%	100	19.5	24.2	472	13.8	269	7.4	1.9	23.8
EP 17	NA	2500±25%	100	33.7	28.5	966	18.8	637	9.3	2.0	28.7
EP 20	NA	4000±25%	160	78.7	39.8	3100	33.2	2590	11.9	2.8	40.8

OUTPUT POWER VS. FREQUENCY OF OPERATION (WATTS)

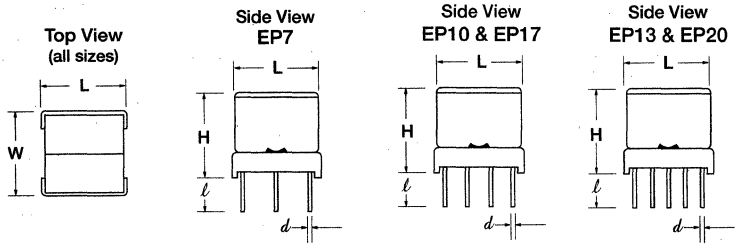
25 Khz	50 Khz	100 Khz	250 Khz	500 Khz
0.7	0.9	1.2	1.9	2.2
2.0	2.7	3.6	5.6	6.3
3.8	5.1	6.8	16.7	12.0
8.1	10.8	14.3	22.3	25.1
27.3	36.4	49.0	76.0	85.8

Notes:

1. Reduce power rating in Table above by 50% for forward converter topologies. Reduce by 50% minimum for flyback circuits.
2. Final sizing of the transformer will depend on a number of interrelated variables. The data in the above table should be considered a starting point only.
3. If safety agency is required, the final size may be significantly larger than the data in the table would indicate.

Power Curve Assumptions:

1. Push/Pull circuit topology
2. Bobbin Window area utilization = 40%
3. Flux density (B) chosen so that core losses at all Frequencies are 100 mW/cm^3.



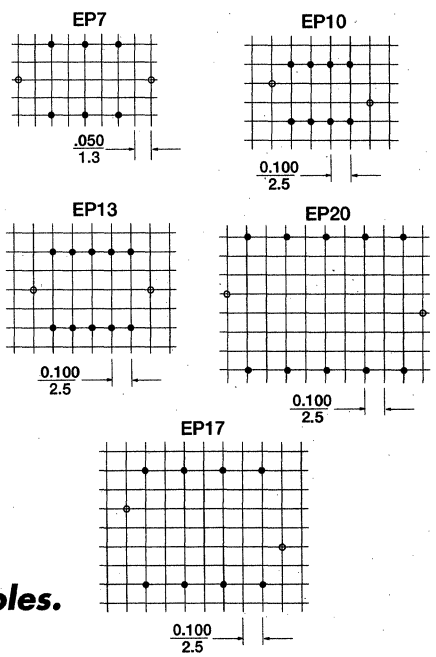
Dimensions: inches / mm

SIZE CODE	L	W	H	ℓ	d
EP7	.85 / 21.6	.385 / 9.8	.413 / 10.5	.122 / 3.1	.026 / .66
EP10	.550 / 14.0	.510 / 13.0	.470 / 11.9	.190 / 4.8	.026 / .66
EP13	.625 / 15.9	.625 / 15.9	.545 / 13.8	.210 / 5.3	.026 / .66
EP17	.840 / 21.3	.800 / 20.3	.640 / 16.3	.197 / 5.0	.026 / .66
EP20	1.080 / 27.4	1.000 / 25.4	.815 / 20.7	.197 / 5.0	.026 / .66

All **WCM** series of high frequency transformers are designed around basic size codes. Decide which size code best fits your application and contact our sales staff regarding your specific electrical requirements.

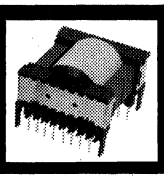
PCB Layouts

- Holes for bobbin
- Holes for clip pins



Call for additional product information and samples.

WEST COAST MAGNETICS
356 Preston Court • Livermore, CA 94550
925-373-7711 Fax: 925-373-6465
Toll Free: 800-628-1123
www.wcmagnetics.com



HIGH FREQUENCY TRANSFORMERS for Switch Mode Power Supplies - WCM 404

PRODUCT DESCRIPTION: West Coast Magnetic's 404 series are ideal for use in switch mode power supply applications. These transformers extend the output power range available beyond the West Coast Magnetics 401 and 402 series transformers up to 500 watts. The geometry of the 404 series bobbin and core provides a uniform winding area around the magnetic circuit which provides greater efficiency than other E-core designs. The core and bobbin have also been designed to maximize inter-winding isolation, making the 404 series a good choice when compliance with safety agencies is important.

OUTPUT POWER VS. FREQUENCY OF OPERATION (WATTS)

Size Code	25 Khz	50 Khz	100 Khz	250 Khz	500 Khz
EDT 29	73	98	131	185	221
EDT 34	115	153	204	287	344
EDT 39	198	264	352	495	593
EDT 44	311	415	554	778	932
EDT 49	460	612	817	1146	1374

Power Curve Assumptions:

1. Push/Pull circuit topology
2. Bobbin Window area utilization = 40%
3. Flux density (B) chosen so that core losses at all Frequencies are 70mW/cm^3.

DESIGN CONSTANTS

A_ℓ (ungapped, min.)	A_ℓ single gap	Ae core area (mm^2)	le magnetic path length (mm)	Ve core volume (mm^3)	Wa bobbin winding area (mm^2)	WaAc core area x winding area (mm^4)	Bobbin window width (mm)	Bobbin window height (mm)	Mean length per turn (mm)
1600	160	76	72	5500	95	7220	19.4	4.9	53
1900	160	97	79	7600	123	11930	21.0	5.9	60
2100	250	125	92	11500	177	22125	25.9	6.8	69
2600	250	173	104	17800	214	37022	29.7	7.2	77
3000	400	211	114	24000	273	57603	32.7	8.3	85

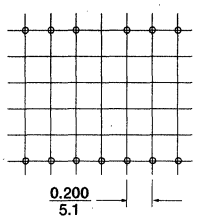
Notes:

1. Reduce power rating in Table above by 50% for forward converter topologies. Reduce by 50% minimum for flyback circuits.
2. Final sizing of the transformer will depend on a number of interrelated variables. The data in the above table should be considered a starting point only.
3. If safety agency is required, the final size may be significantly larger than the data in the table would indicate.

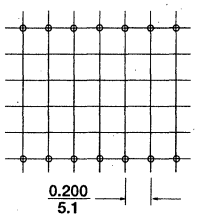
PCB Layouts

- Holes for bobbin

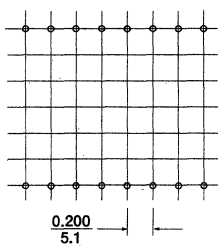
ETD29



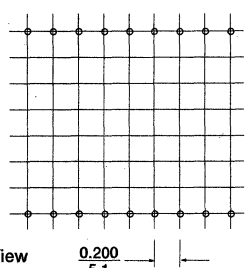
ETD34



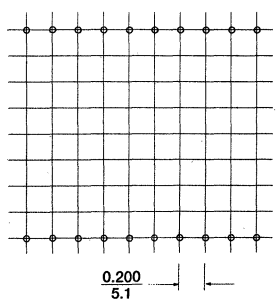
ETD39



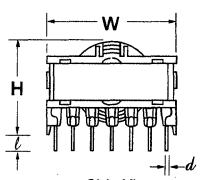
ETD44



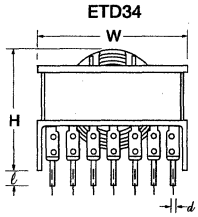
ETD49



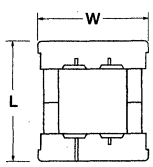
Side View ETD29



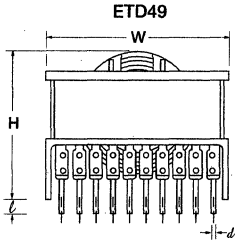
Side View ETD34



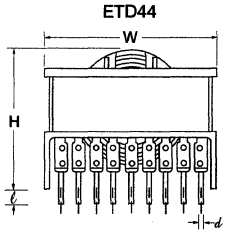
Top View (all sizes)



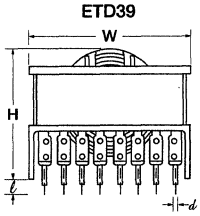
Side View ETD49



Side View ETD44



Side View ETD39



Dimensions: inches / mm

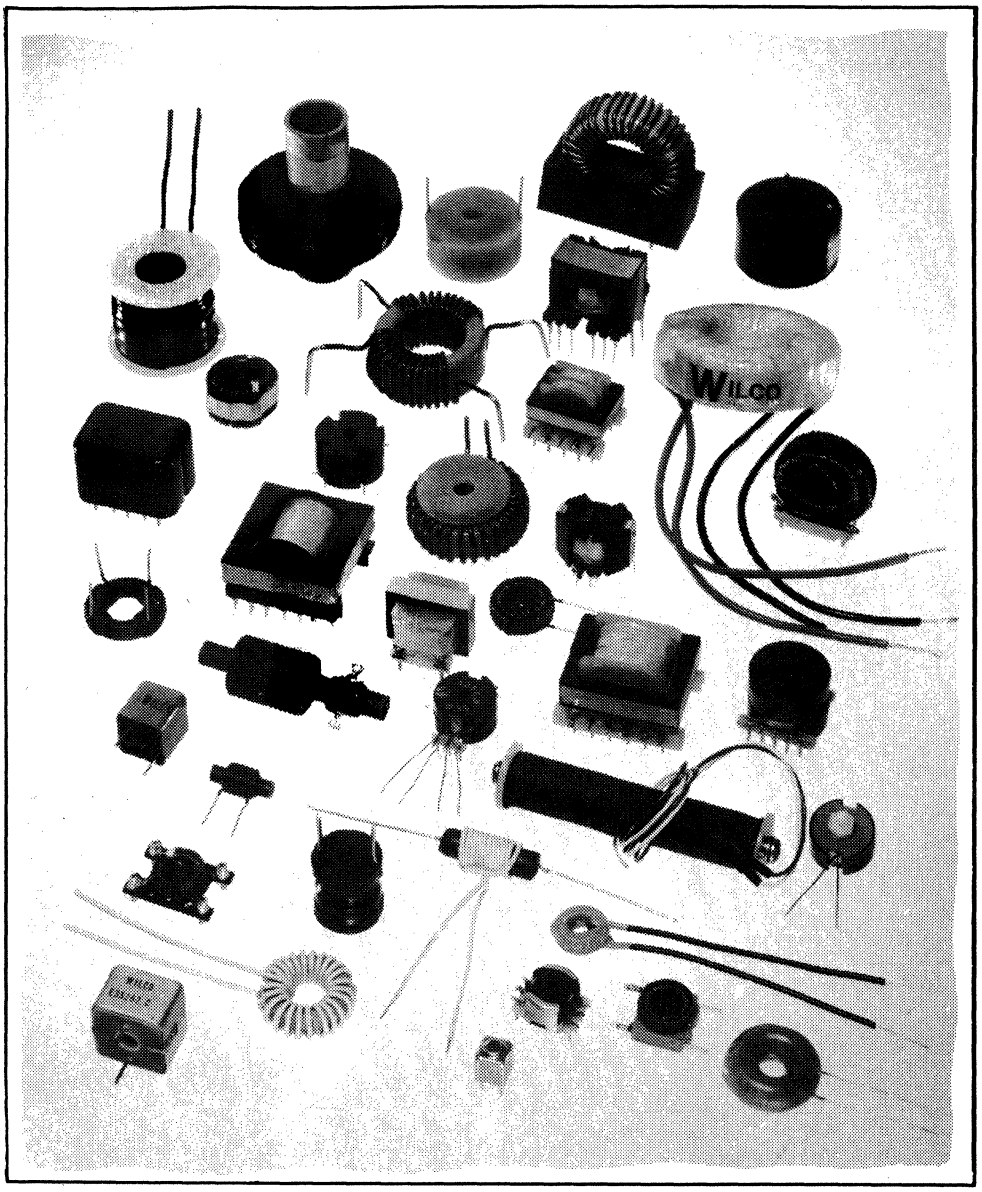
SIZE CODE	L	W	H	ℓ	d
ETD29	1.39 35.3	1.39 35.3	1.00 25.4	.125 3.2	.028* .70
ETD34	1.68 42.7	1.58 40.1	1.38 35.1	.200 5.1	.039 1.0
ETD39	1.90 48.3	1.80 45.7	1.48 37.6	.200 5.1	.039 1.0
ETD44	2.08 52.8	2.00 50.8	1.58 40.1	.200 5.1	.039 1.0
ETD49	2.28 57.9	2.18 55.4	1.68 42.7	.200 5.1	.039 1.0

* square pin

Toll Free: 800-628-1123
www.wcmagnetics.com

WEST COAST MAGNETICS
356 Preston Court • Livermore, CA 94550
925-373-7711 Fax: 925-373-6465

call WILCO *CORPORATION* for CUSTOM MAGNETICS



WILCO CORPORATIONS' manufacturing plant is equipped with some of the most advanced machinery in the industry. This includes high precision computerized winding machines, printing machines, ovens, epoxy encapsulation, testing and measuring instruments.

While **WILCO CORPORATION** manufactures many standard coils and transformers the mainstay of the company has come to be custom magnetics. Every day we wind toroidal power transformers, split bobbin transformers, switch mode power transformers, and switch mode power supply filter inductors to **CUSTOMER SPECIFICATIONS.**

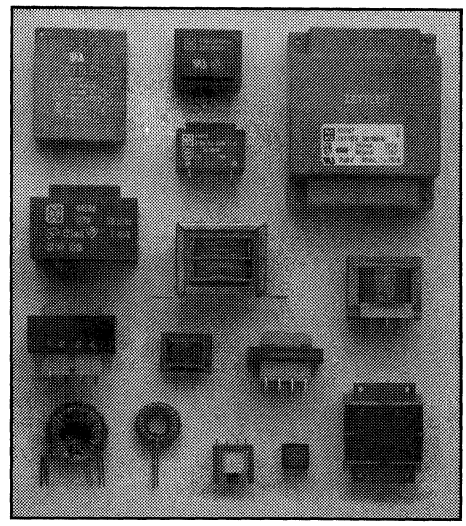
WILCO

6451 Saguaro Court • Indianapolis, Indiana 46268
317-293-9300 FAX 317-293-9462 • 1-(800) 611-2343
e-mail:wilco@iquest.net

CALL OR FAX YOUR REQUIREMENTS TODAY!

Transformer Selection Guide

Sealed Transformers
Power Transformers
Low Profile Transformers
International Transformers
Custom Designs



Sealed Transformers

- Single 115V or 230V and Dual 115/230V Primaries
- Available Secondaries of 6V through 48V
- UL, CSA, VDE and other European agency approvals
- 4000 Vrms dielectric strength
- Available in regular size (44000) and low profile (45000)
- 100% tested
- Vacuum filled
- Split bobbin design

Series	44000 EI 30-5	44000 EI 30-10.5	44000 EI 30-12.5	44000 EI 30-15.5	44000 EI 30-18
Power	0.5VA	1.0VA	1.5VA	2.0VA	2.3VA
Primaries	115VAC or 230VAC				
L x W x H [in.]	1.28 x 1.09 x 0.60	1.28 x 1.09 x 0.87	1.28 x 1.09 x 0.96	1.28 x 1.09 x 1.07	1.28 x 1.09 x 1.17

Series	44000 EI 38-13.6	44000 EI 42-14.8	44000 EI 48-16.8	44000 EI 54-18.8	44000 EI 60-21
Power	3.2VA	5.0VA	10VA	16VA	22VA
Primaries	115VAC or 230VAC				
L x W x H [in.]	1.61 x 1.38 x 1.10	1.74 x 1.46 x 1.27	1.99 x 1.67 x 1.37	2.22 x 1.86 x 1.53	2.50 x 2.11 x 1.79

Series	44000 EI 66-23	45000 UI 21	45000 UI 30	45000 UI 39	45000 UI 48
Power	30VA	1.0VA	2VA thru 10VA	1.2VA thru 30VA	40VA thru 60VA
Primaries	115 or 230 VAC	230VAC	115/230VAC		
L x W x H [in.]	2.76 x 2.30 x 1.92	1.34 x 1.22 x 0.59	2.09 x 1.73 x varies	2.68 x 2.24 x varies	2 sizes available

Power Transformers

- Single 115V or Dual 115/230V Primaries
- Dual Secondaries from 5V through 120V
- UL and C-UR agency approvals
- 2500Vrms dielectric strength
- Split bobbin design

Series	AH200/ADH200	AH300/ADH300	AH400/ADH400	AH500/ADH500	AH600/ADH600	AH700/ADH700
Primary	115V (AH-series) or 115/230V (ADH-series)					
Power	1.1VA	2.4VA	6.0VA	12VA	20VA	36VA
L x W x H [in.]	1.37 x 1.12 x 0.93	1.37 x 1.12 x 1.17	1.62 x 1.31 x 1.29	1.87 x 1.56 x 1.41	2.25 x 1.87 x 1.41	2.62 x 2.19 x 1.56

Low Profile Transformers

- Dual115/230V Primaries
- Dual Secondaries from 5V through 230V
- UL and C-UR agency approval
- 1500Vrms dielectric strength
- Split bobbin design

Series	AHF02	AHF06	AHF12
Primary	115/230V		
Power	2.4VA	6.0VA	12VA
L x W x H [in.]	1.87 x 1.56 x 0.65	1.87 x 1.56 x 0.85	2.50 x 2.00 x 1.07

Look for us on the Web under http://www.zettlermagnetics.com

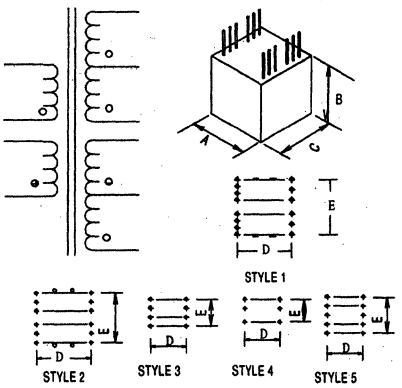
ZETTLER *Magnetics, Inc.*

75 COLUMBIA • ALISO VIEJO, CA 92856 • PHONE (949) 831-5000 • FAX: (949) 831-8642 • E-MAIL: SALES@ZETTLERMAGNETICS.COM

ZMAN magnetics

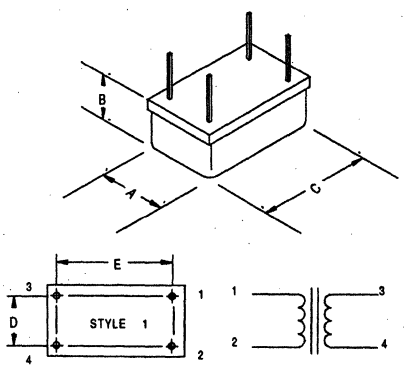
Custom Designed and Standard Value magnetic components.
***Our commitment is* On Time Service *at* Competitive Prices.**

High Voltage Isolation Transformer Line



P/N	Style	Watts	Isolation	A	B	C	D	E
Z-T410	1	20	5KVAC	1.08	0.60	1.03	0.80	0.80
Z-T420	1	32	5KVAC	1.08	0.98	1.03	0.80	0.80
Z-T460	2	75	8KVAC	1.26	1.26	1.26	1.00	0.90
Z-T480	2	180	8KVAC	1.47	1.47	1.47	1.20	1.10
Z-T510	3	8	5KVAC	0.73	0.81	0.67	0.55	0.50
Z-T520	4	5	7KVAC	0.73	0.81	0.67	0.52	0.60
Z-T610	5	5	5KVAC	1.03	0.67	1.03	0.80	0.60

Miniature High Voltage Line



P/N	Input Volts	Output Volts	A	B	C	D	E	F
MHV-3KV*	5 to 12	1 to 3KV	0.35	0.45	0.65	0.30	0.45	0.45
MHV-6KV	5 to 12	3 to 6KV	0.55	0.45	0.65	0.40	0.45	0.45
MHV-9KV	5 to 12	6 to 9KV	0.45	0.65	0.65	0.35	0.50	0.55
MHV-10KV	5 to 12	6 to 10KV	0.65	0.50	0.65	0.50	0.50	0.55

* Under development Pin dimension: 0.025 Square

Other Available Products

- Pot Core
- Isolation
- Pulse
- Surface Mount
- Flyback
- Switch Mode
- Split Bobbin
- DC-DC Converter
- Toroidal
- Low Profile
- High Frequency
- UL VDE CSA

See section 1800 for Coils, Chokes & Inductors

ZMAN *magnetics*

WASHINGTON
7633 S. 180th
Kent, Washington 98032
Phone: (425) 251-8064
Fax: (425) 251-6264

OREGON
2350 NE Griffin Oaks St., Suite 1500
Hillsboro, Oregon 97124
Phone: (503) 681-0900
Fax: (503) 681-0909

Email: sales@zmanmag.com
http//www.zmanmagnetics.com